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Social Media Marketing's Impact on Health Care

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Abstract— Social media offers a platform for expanding and promoting effective data distribution and translational health communication tactics, enabling users to use, generate, and share relevant health information. Health care professionals (HCPs) have access to a wide range of social media technologies, such as social networking sites, blogs, microblogs, wikis, media-sharing websites, virtual reality platforms, and gaming settings. These resources may be utilized to increase or improve organizational promotion, patient treatment, patient education, and public health initiatives.

Index Terms— Advertising, Analytics, Branding, Campaigns, Content, Engagement.

I. INTRODUCTION

A paradigm shift in word-of-mouth communication has been brought about by the worldwide rise of social networking sites, which allow users to connect, observe, and share information. While social networking sites like Facebook, Myspace, LinkedIn, and Twitter have recently gained popularity among web users, there has been a gold rush-like response from businesses to this development despite the Internet's longstanding reputation as an efficient, affordable, and global corridor for business growth. Businesses now have more ways than ever to contact their intended client base [1]. While there is still a low level of Internet use in India, it is estimated that 180 million people actively utilize online services, including different social media and email platforms [2],[3]. This is anticipated to rise to 600 million by 2019, putting India second only to China in terms of the number of people adopting this new technology.

Such a startling number presents India with the chance to change its Internet profile in order to increase use even further than current projections and increase GDP sustainability [4]. The Internet's use in marketing communication has been one of its key advantages. SNSs are expanding quickly over the globe, and one of the largest expanding marketplaces for social networks is India. Indian companies are also hopping on the social networking bandwagon in an effort to attract their "most-sought-after clientele" and get useful data about them with little financial outlay. Technology is often seen as the new moment of truth explaining the interaction of a product, service, or brand with customers, consumers, or even noncustomers in marketing, which is seen as the process of recognizing and satisfying customer requirements and desires throughout time. The traditional forms of communication are increasingly being displaced by social networking sites (SNSs) among the millennium generation. Digital platform promotion is becoming quite popular.

Marketing communications are evolving to be more exact, individualized, interactive, fascinating, and social. Businesses in India are increasingly using the many SNS platform formats, such as Facebook, Twitter, LinkedIn, Pinterest, and others, to connect with their clients, business partners, and employees. Research Review with millions of members worldwide, social networking services are now considered to be the most widely used technologies on the World Wide Web [5],[6].

The use of this potent medium, its objectives, and contexts are currently being studied, as well as how social networking sites (SNSs) are changing how people think, work, and communicate. Web 2 technology has enabled the new phenomena of social networking on a worldwide level. Via unofficial online networks of friends, the Internet revolution has completely changed how we communicate. Word-of-mouth marketing and interactive, integrative marketing communications now use it as a strategy element. Word-of-mouth has evolved significantly from local groups and communities to expansive internet networks of customers, such those made possible by social networking sites. As social networking sites provide a unique potential to attain unmatched depth and reach in marketing operations, this development has significant ramifications for marketers. With this new medium, marketers have a chance to directly affect word-of-mouth advertising in a way that is almost unachievable with traditional IMC tactics like mass marketing or personal selling. SNSs are remarkable and effective because they enable consumers to interact with one another as well as enabling marketers to engage with their customers.

Moreover, SNSs are essential for the younger generation's information and communication consumption habits. The success of IMC methods hinges on selecting the ideal IMC mixture. As a result, companies and marketers have begun to embrace social media as one of the IMC tools after realizing the unique advantages of this platform. SNSs have been increasingly popular over the last few years due to the rise in user-friendly and appealing websites and the rising demand for smart phones. As a result, companies looking to spread the word about their goods and services often utilize SNSs. In 2010 Harvard Business Review found from one of its surveys that the biggest advantage of adopting social

media gained by firms was "greater awareness of their brands". Even now, this is one of the main drivers for using social media, although "building communities" is the main driver for businesses to use social media. A community gives businesses a platform to contact many clients at once with promotional initiatives. Moreover, it strengthens brand experience tales, fosters consumer affinity, and develops powerful WOM. Long-term benefits include lead generation assistance, increased customer loyalty, quicker customer query response, lower marketing and maintenance costs, and encouragement of creative ideas. Before spending money on a product or service, many of us do online research.

For instance, businesses in the hospitality industry are very susceptible to customer feedback since customer's research hotels and resorts online before making a choice. It is now much more crucial to create social media outreach to address customers' questions. Even while there may not be many people using social media right now, their effect is widespread, making it impossible to forecast how many people will be using it tomorrow. This new medium has developed into much more than simply a way to connect with loved ones, display photos, or exchange first-hand impressions of the newest movies or local restaurants. Several businesses are "smarting up" to join the race to give customers the newest methods to purchase products and experience services, as millions of people are hooked to their smart phones or computers for many hours each day. New models of interactive user-to-user messaging have been made possible by the emergence of new media [7],[8].

Consumers in developing nations are adopting social media at an unusually rapid pace of expansion. These include Mexico, Brazil, Indonesia, India, and a few more prominent nations. With many users regularly posting videos, messages, images, and other content to Facebook, India and Indonesia are gradually seeing a significant rise in Facebook use. Since social media offers a straightforward and convenient venue for everyone to submit comments, it facilitates engagement between customers and service providers. The urge to "get it right the first time and reduce expenses" constantly remains a worry for firms, pushed more and more by regulatory demands. Peer evaluations of goods or services provide an example of user-generated content that is made possible by new media. Such evaluations, or feedback, enhance business and assist company executives in better comprehending clients' needs and identifying the weak spots of the goods or services they provide. The usage of social media by Indian organisations is far greater than both the world average and that of their peers in developing countries. In 76.1 percent of the social media-savvy businesses in India use social media as a platform to promote brand news, while 95.7 percent utilize it to create communities. A high level of social maturity and a tendency towards obtaining business via interactions are shown by the fact that around 16 percent of user organisations utilize the social platform to address customer complaints, create leads, and conduct research [9].

II. DISCUSSION

Healthcare Industry India has been undergoing a healthcare system transition over the last ten years. The administration made significant structural adjustments and reiterated its goal of ensuring that everyone has access to a basic package of healthcare services. At this time, the private sector grew at an unparalleled rate. Together with technical and medical advances, the Internet revolution completely changed the industry. There was a belief that the healthcare industry will adopt social media, just as occurred in every other industry. Surprisingly many healthcare facilities have begun using social media in their marketing initiatives. Thus, it is crucial to comprehend how the social media and Internet worlds have affected the health care industry. We looked at 40 hospitals throughout India to get more knowledge about how social media affects the health-care industry. The authors of this paper were interested in determining the degree of difference between information hospitals acquired from the web and information hospitals acquired from sharing information on various social platforms, even though there is enough information related to health and medicine available on the internet.

Hospital Facebook pages the authors wanted to know if the hospitals were active or inactive on Facebook and other social media platforms since the majority of hospitals advertise their services there. However, just 35% of hospitals were very active on Facebook, with Twitter and YouTube coming in second and third with only 9% of the total activity. Hospitals have taken the initiative to distribute in response to the abundance of graphic information on social channels. The hospital's name Facebook Facebook LinkedIn Google+ Youtube Slide Share Internet social media emblem for Global Hospitals. Information about medicine may help individuals address their issues. Applications, videos, and images are often utilised to enhance the attractiveness of information. Strategy Facts that the majority of people need to know are offered, along with daily health suggestions and simple counsel.

One clever strategy hospital have used to keep their followers engaged is to have live Facebook discussions with expert physicians. Lifeline numbers, testimonials, value-added services, and other common pieces of information are among the information most often offered by hospitals on these sites. Highlights and differentiating features Apollo's programmes, including those run on the social blood donation site The Blood Connection and Ask the Doctor, address common questions about health and medicine. Strangely, this hospital's Facebook page doesn't do any advertising. – Apollo Hospitals also run live Facebook conversations where participants may ask questions about a certain subject that is publicised in a status update. Fortis is very well-liked by all of its patients. Each remark or inquiry

submitted on its page is swiftly answered. Their effort to aid acid attack victims substantially improved its standing among supporters. To keep its fans interested, Wockhardt attempts to include a wide range of health and fitness-related topics in its distinctive updates. Also, the hospital offers self-explanatory applications for back specialists, knee specialists, and other specialists. One of the top nephrology healthcare organisations in India is NU Hospitals, and on their Facebook page, they provide interesting medical information, brainteasers, and noteworthy holidays. Kokilaben Hospital, which was founded in 2009, likewise takes a highly distinctive approach to educate the public about exercise and health. Its upgrades include raising awareness of fitness and a healthy diet. The majority of the page offers suggestions for leading a healthy lifestyle and preventing illnesses.

Medications on Twitter Twitter has altered some people's communication and connection patterns. In contrast to other virtual worlds, its mechanism is very quick and requires little time. Hospitals make an effort to provide quick, concise information. Hospitals use Twitter mostly to listen to patient questions and answer to them. Strategy these hospitals often post three to four tweets every day, which are roughly divided into the categories of guidance, information, broadcasting, and recommendations. To reduce the administrative overhead, the majority of hospitals post duplicate information on Facebook and Twitter. Health-related hashtag campaigns widen followers' perspectives and provide useful information. Fortis created "#mon soonmantra" on Twitter and Facebook, which has grown into a collection of incredible health advice for coping with monsoons. Also, Fortis engages in certain self-promotional initiatives and offers some information on organ donation. With these initiatives, Fortis has a sizable Twitter fan base.

Apollo Hospitals, on the other hand, are highly active in listening to their followers and quickly address any concerns or issues raised by their patients. For instance, they look for tweets with the phrases "headache," "cold," "body ache," and similar terms and reply with recommendations for home treatments. The straightforward rule at Kokilaben Hospital is to accompany tweets with images. They do a good job of carrying out the well-known "#didyouknow" campaign. The NU Hospital's Twitter activity resembles a kidney-related diseases awareness portal. Frequent tweets include all the information required. SOCIAL Media Marketing's Impact on Health Care LinkedIn lists 172 hospitals. LinkedIn provides a wide network. While it has so far shown an active presence, the health care industry has yet to successfully use this service. A LinkedIn page's overall recommendations, service listings, and career section are used to assess its quality. Out of all the research participants, with more than 10,286 followers, Apollo Hospitals has the strongest LinkedIn presence. The number of workers stated on the hospital's page is also made visible by LinkedIn. For instance, Apollo's pro file lists more than 3000 personnel, which lends credibility in of of itself. Hospitals with a LinkedIn presence provide standard corporate communications, preferring to discuss business expansion and finances.

LinkedIn has not yet created tailored pages for Fortis and NU Hospitals. Medications on YouTube YouTube is the second biggest search engine behind Google. Learning and education have been changed by the ideas presented in YouTube videos. The healthcare industry also uses this network to offer services and customer reviews. Videos are related to medical services, patient feedback, testimonials, medical guidance, health media, etc. Over 150 of Apollo's films have received more than 162,000 views. Almost 126 of Fortis' films have received more than 169,000 views. On YouTube, these two hospitals have the strongest social media presence. Apollo has gone a step further by posting instructional films of medical crises on subjects including first aid for heart attacks, choking, and burns. Healthcare facilities are becoming more aware of the value of showing their infrastructure. The infrastructure they have created is seldom seen in videos. Hospital Google+ pages While Google+ is not widely used, several organisations do provide updates on their Google+ sites. This is also true in the health care industry.

Once again taking the lead in establishing a presence on this channel is Apollo Hospitals. The top five hospitals and hospital groups do not, however, generally have a particularly active Google+ presence. The top two hospitals on the list are Apollo and Escorts/Fortis. By providing information on facts, advice, answers to common health issues, and other such topics, Escorts and Apollo Hospitals interact with their audiences. Yet the majority of the stuff that these hospitals provide was already published on Facebook. The promotion of healthcare services and related promotional activities on social media platforms are still relatively new ideas, but the top five hospitals in this study have shown the researchers wrong with their straightforward yet clever social media marketing strategies, and they have excelled across all platforms.

Apollo Hospitals is the hospital group with the highest social media activity, but all five hospitals have already made a significant impact and are most likely to succeed because to their creative approaches and engaging communication styles. By successfully connecting with their audiences and interacting with them via updates on subjects like health recommendations and first aid emergencies, they have transformed the health care industry. They also listen to their audiences and react to their feedback without resorting to broadcasting. These five hospitals vary from the other hospitals in that they have continued to communicate with their followers and have not restricted their marketing methods to broadcasting. They didn't merely create profiles on social media sites like Google+ that they later deleted because they had no followers; instead, they continued to provide updates and interact with their followers.

Social media is being embraced by consumers in emerging countries at an extraordinarily quick rate of growth. They include a few more well-known countries as well as Mexico, Brazil, Indonesia, and India. India and Indonesia are progressively seeing a large increase in Facebook usage as a result of many people frequently contributing videos, messages, photographs, and other information to Facebook. Social media encourages interaction between clients and service providers since it provides a simple and practical platform for everyone to post remarks. Firms are continually concerned about the need to "get it right the first time and cut expenditures," which is being driven more and more by regulatory requirements. Peer reviews of products or services serve as an illustration of the kind of user-generated content that new media makes available. Such assessments, or feedback, help businesses succeed and help corporate leaders better understand customers' demands and detect areas where their products or services need improvement. Indian organisations use social media far more than the global average and their counterparts in developing nations. 95.7 percent of India's social media-savvy firms use social media to build communities, and 76.1 percent utilize it to spread brand news. The fact that almost 16 percent of user organisations utilize the social platform to resolve consumer complaints, generate leads, and carry out research demonstrates a high degree of social maturity and a propensity towards getting business via interactions.

Throughout the last 10 years, the Indian healthcare system has undergone a change. The government reaffirmed its commitment to ensure that everyone has access to a minimum range of healthcare services while making important structural changes. The private sector was expanding at an unheard-of pace at this period. The Internet revolution fundamentally transformed the sector, along with scientific and technological advancements. There was a notion that, like other industries, the healthcare sector will embrace social media. Interestingly, a lot of medical institutions have started embracing social media for marketing purposes. Thus, it is critical to understand how the social media and online communities have impacted the healthcare sector. To learn more about how social media influences the healthcare sector, we looked at 40 hospitals throughout India. Even though there is a sufficient amount of information about health and medicine available online, the authors of this paper were interested in determining the degree of difference between information hospitals acquired from the web and information hospitals acquired from sharing information on various social platforms.

Hospital Pages on Facebook as the majority of hospitals offer their services on social media, the authors were curious as to whether or not the hospitals were active there. Yet, just 35% of hospitals were extremely active on Facebook, and only 9% were engaged on Twitter and YouTube combined. In reaction to the deluge of graphic content on social media, hospitals have taken the effort to publish. The name of the hospital Facebook LinkedIn Facebook Google+ Vimeo Slide Share the Global Hospitals logo for social networking. People may find that learning more about medicine may help them solve their problems. Apps, videos, and photos are often used to make information more visually appealing. Strategy Information that the majority of people need to know is provided, along with straightforward advice and daily health tips. Hospitals have adopted the ingenious tactic of hosting live Facebook debates with knowledgeable doctors to keep their fans interested. Hospitals most often include lifeline numbers, testimonials, value-added services, and other typical pieces of information on these websites.

Highlights and distinctive qualities the programmers produced by Apollo, such as those featured on the social blood donation website The Blood Connection and Ask the Doctor, answer frequent questions about health and medicine. Interestingly, there is no advertising on this hospital's Facebook page. Fortis is highly well-liked by all of its patients. Apollo Hospitals also conduct live Facebook discussions in which participants may ask questions about a particular issue that is made public in a status post. Each comment or question posted on its page receives a prompt response. Their assistance to victims of acid attacks significantly raised their status among fans. Wockhardt makes an effort to cover a variety of health and fitness-related themes in its weekly updates to keep its readers engaged. The hospital also provides self-explanatory apps for professionals in the fields of the knee, the back, and other specialties.

NU Hospitals, one of the leading nephrology healthcare providers in India, offers intriguing medical facts, brainteasers, and important holidays on their Facebook page. The 2009-founded Kokilaben Hospital also has a very unique strategy to educate the public about physical activity and health. It has been upgraded to include promoting a healthy diet and exercise regimen. Much of the page provides advice on living a healthy lifestyle and avoiding ailments. Pharmaceuticals on Twitter some people's communication and relationship habits have changed as a result of Twitter. Its mechanism, in contrast to those of other virtual worlds, is rapid and time-consuming.

Hospitals strive to provide information that is clear and straightforward. Twitter is mostly used by hospitals to read and respond to patient inquiries. Strategy These hospitals often tweet three to four times each day, broadly categorizing each tweet into the areas of suggestions, broadcasting, information, and counselling. Why the majority of hospitals share redundant information on Facebook and Twitter to cut administrative costs. Campaigns using hashtags relating to health broaden followers' viewpoints and provide helpful information. On Twitter and Facebook, Fortis started the hashtag "#mon soon mantra," which has become into a fantastic resource for monsoon-related health advice. Moreover, Fortis

participates in certain self-promotional activities and provides some guidance on organ donation. Fortis has gained a considerable following on Twitter thanks to these measures. On the other side, Apollo Hospitals are quite active in listening to its supporters and promptly fix any difficulties or concerns brought up by their patients. For instance, they search for tweets that include the words "headache," "cold," "body ache," and other similar terms, and then respond with advice for home remedies. The simple guideline at Kokilaben Hospital is to include photographs in tweets. The NU Hospital's Twitter activity resembles a kidney-related disorders awareness portal, and they do an excellent job of carrying out the well-known "#didyouknow" campaign.

All of the necessary information is included in frequent tweets. The Effect of Social Media Marketing on Healthcare There are 172 hospitals on LinkedIn. A large network is available on LinkedIn. The health care sector hasn't yet used this service to its advantage, despite its active existence so far. The general endorsements, service listings, and career part of a LinkedIn page are utilized to rate its quality. The strongest LinkedIn presence among all study participants is held by Apollo Hospitals, which has more than 10,286 followers. LinkedIn also makes the number of employees listed on the hospital's profile available. For instance, the fact that Apollo's pro file includes a list of more than 3000 employees provides confidence in of itself. In their usual corporate communications, hospitals with a LinkedIn profile tend to talk on company growth and profitability. Fortis and NU Hospitals do not yet have customized pages on LinkedIn. YouTube medical videos After Google, YouTube is the second-largest search engine. Ideas expressed in YouTube videos have altered learning and education.

This network is also used by the healthcare sector to provide services and client feedback. Videos may be found on topics such as medical services, patient reviews, testimonials, medical advice, and health-related media. More than 162,000 people have seen more than 150 of Apollo's flicks. Almost 169,000 people have seen almost 126 of Fortis' movies. These two hospitals have the most robust social media presences on YouTube. Hospital institutions are becoming more conscious of the benefits of displaying their infrastructure, with Apollo going a step further by releasing instructional footage of medical emergencies on topics like first aid for heart attacks, choking, and burns. Several videos highlight the infrastructure they have built. Hospital Pages on Google+ Even though Google+ is not very popular, a number of organisations do provide updates to their Google+ pages. In the field of health care, this is also accurate. Apollo Hospitals is once again leading the charge in establishing a presence on this medium. Nonetheless, the top five hospitals and hospital networks often don't have a very active Google+ presence. Apollo and Escorts/Fortis are the top two medical facilities on the list. Escorts and Apollo Hospitals engage their audiences by offering information on details, suggestions, solutions to typical health problems, and other similar themes. Nevertheless, much of the information that these hospitals provide was previously posted on Facebook. The promotion of healthcare services and related promotional activities on social media platforms is still a relatively new concept, but the top five hospitals in this study have proven the researchers wrong with their simple but effective social media marketing strategies, succeeding on all platforms. The hospital group with the greatest social media engagement is Apollo Hospitals, but all five hospitals have already had a big effect and have the best chance of success because to their innovative strategies and compelling communication methods. They have revolutionized the health care sector by effectively engaging their audiences and communicating with them via updates on topics like health tips and first aid crises. Without using broadcasting, they also pay attention to their viewers and respond to their criticism. These five hospitals set themselves apart from the competition by maintaining contact with their fans and not limiting their marketing strategies to broadcasting. They continued to provide updates and communicate with their fans rather than just creating accounts on social media platforms like Google+ that they subsequently removed since they had no followers.

III. CONCLUSION

Social media marketing has become an essential aspect of any modern business strategy. With the vast reach and engagement opportunities offered by social media platforms, businesses can effectively target and connect with their audiences in a cost-effective manner. Through the use of various techniques such as influencer marketing, content creation, and targeted advertising, social media marketing can drive brand awareness, customer loyalty, and ultimately, sales. However, it is crucial for businesses to continually analyze and adapt their strategies based on their audience's preferences and behaviors, as the social media landscape continues to evolve rapidly. With a well-executed social media marketing strategy, businesses can leverage the power of social media to achieve their marketing objectives and stay ahead of the competition. Social media gives doctors the means to exchange knowledge, discuss problems with healthcare policy and practice, encourage healthy habits, connect with the general public, and instruct and communicate with patients, carers, students, and colleagues. Remain informed.

REFERENCES

[1] C. Du Plessis, “The role of content marketing in social media content communities,” SA J. Inf. Manag., 2017, doi: 10.4102/sajim.v19i1.866.

[2] M. Stead and G. Hastings, “Advertising in the Social Marketing Mix: Getting the Balance Right,” in Social Marketing: Theoretical and Practical Perspectives, 2018. doi: 10.4324/9781315805795-3.

[3] T. Rasul, "Relationship Marketing's Importance In Modern Corporate Culture," J. Dev. Areas, 2018.
[4] A. D. Slobodzian and M. Delbaere, "Covert Persuasion Attempts: Do People Notice? An Abstract," in Developments in Marketing Science: Proceedings of the Academy of Marketing Science, 2018. doi: 10.1007/978-3-319-66023-3_128.
[5] D. Mushka and Y. Erfan, "The features of transnational corporations' advertisement in social networks," Socio-Economic Probl. Mod. Period Ukr., 2019, doi: 10.36818/2071-4653-2019-4-15.
[6] M. C. Rabidas and G. Bowen, "Viral Marketing Consumer Purchase Intentions: A Theoretical Review," 2nd Int. Work. Adv. Soc. Sci., 2019.
[7] M. Lamest and M. Brady, "Data-focused managerial challenges within the hotel sector," Tour. Rev., 2019, doi: 10.1108/TR-03-2017-0064.
[8] L. L. Golden et al., "Special Session: An Abstract on 'Marketing Techniques to Assist Public Sectors in Engaging Customers to Meet Societal and Individual Disasters Crisis Need and Beyond,'" in Developments in Marketing Science: Proceedings of the Academy of Marketing Science, 2019. doi: 10.1007/978-3-030-02568-7_131.
[9] D. Adilova, "Toward Understanding Social Media Marketing's Possitive And Negative Sides From Literature Review Perspective," IOSR J. Bus. Manag., 2017, doi: 10.9790/487x-1902036774.

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The Advantages of Social Media Marketing Over Traditional Advertising

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Abstract*— The internet has expanded significantly in recent years, and so has the digital world. This has resulted in the development of new marketing strategies, such as social media marketing, which has shown to be an effective tool for fostering relationships with customers and raising brand recognition. The efficacy of conventional advertising, which is a useful technique for raising brand recognition, is waning at the same time. The goal of this study is to finds why businesses continue to use conventional advertising to raise brand recognition in light of the expanding digital market and rising internet and social media use.

Index Terms*— Marketing, Social Platforms, Social Media Marketing, Traditional Advertising,

I. INTRODUCTION

Due to the internet's rapid expansion, businesses increasingly struggle to decide which marketing strategy to use in order to effectively target the correct customers and boost marketing effectiveness. Marketing is a tool that businesses use to engage with clients and generate demand. The "activity, collection of institutions, and procedures for developing, disseminating, delivering, and exchanging offers that have value for consumers, client partners, and society at large" is one definition of marketing [1],[2].

Companies may use a variety of marketing strategies to educate customers about their goods or services as well as to establish and raise brand recognition. One of the cornerstones of brand equity is brand awareness, which is thought to be essential for customers' buying decisions. Brand awareness is the extent to which a brand and the items it is associated with are known to customers. One of the crucial elements in promoting and marketing a product is stated to be building brand awareness. The author also explains how brand awareness helps businesses stand out from rivals and that the greater the amount of brand awareness, the more probable it is that the company will increase sales [3],[4].

A. Conventional media

Traditional advertising is a sort of marketing that is believed to be hard to ignore, and it is something that consumers is exposed to everyday. Traditional marketing is an offline kind of promotion used by businesses to promote their products and services [5],[6].

Companies employ mass advertising techniques including television, radio, catalogues, and print ads in conventional advertising. By the use of media like television, radio, newspapers, catalogues, and magazines, businesses may reach customers with a succinct, standardized message known as mass advertising. According to Spacey, mass advertising is a technique that businesses may utilize, for instance, to build brand recognition. Yet, things have changed, and social media has created new opportunities for efficient advertising [7],[8].

B. Marketing using social media

The promotion of goods and services via the use of digital platforms was once referred to as "digital marketing." It is now more of an umbrella phrase used to represent the use of digital technology to attract consumers, develop their preferences, promote companies, keep them around, and boost revenues. Digital marketing is described as "an adaptable, technology-enabled process through which enterprises engage with consumers and partners to collaboratively develop, convey, deliver, and maintain value for all stakeholders [9].

Social media marketing is only one of several strategies businesses may use in digital marketing to connect with customers. Consumers utilize social media as a platform to engage with one another through exchanging information, text, and photographs, among other things, as technology advances, the field of digital marketing will as well.

Nearly all businesses now engage in social media marketing, and, social media has grown in importance within businesses' promotional strategies, businesses should use social media to interact with customers. The writers also detail the benefits social media has for businesses, including publishing, market research, and customer assistance. By encouraging customer word-of-mouth, businesses may utilize social media marketing to support brand development. Word-of-mouth is a potent marketing strategy. According to the authors, word-of-mouth refers to individuals telling others about a company's goods or services.

C. Social media marketing vs traditional advertising

Many marketing strategies may be used by businesses to advertise a product or service, and social media marketing and conventional advertising both have their own benefits and drawbacks. Traditional advertising has the benefit of being able to quickly contact your local audience through radio or television. Nevertheless, compared to social media

marketing, which is less expensive and simpler to monitor, conventional advertising is difficult to assess and more expensive. Because of the employment of bots, there is significant criticism around social media marketing for Facebook and Instagram. A computer algorithm known as a "bot" is programmed to automatically engage with users on social media and produce content. According to the authors, social media bots may sway debates and disseminate false information, which is problematic for businesses. The authors point out that this causes customers to question whether or not the information they see online is accurate.

II. DISCUSSION

Expert interviews were selected as the technique, and the interviewees held marketing manager positions or equivalent positions, were from several branches, and had extensive understanding of the subject. One of the major benefits of social media marketing has been proved to no longer be valid. The conventional advertising may still be a successful marketing strategy to adopt if businesses wish to connect with the elder demographic. Yet, the results also suggest that, rather than focusing on choosing the most effective marketing medium, it may be more crucial to have high-quality advertising in order to avoid upsetting customers.

The theoretical contribution is to increase our understanding of the benefits and drawbacks of conventional advertising vs social media marketing. The report also sheds light on how businesses might address the issue of lessening customer dissatisfaction with advertising. The understanding that advertising irritation occurs in both conventional advertising and social media marketing, and that it is not only vital to identify the optimum marketing channel, is another theoretical contribution. The information that may provide to businesses who are debating whether to use social media marketing or not is its practical value. This report also provides information on the benefits of social media marketing and how businesses can utilise it to build brand recognition.

A. Marketing on social media

In the recent years, it has begun to become standard practise for businesses and consumers to utilise social media to connect, build, and form connections. Social media is now a part of our daily life. Iankova, Davies, Archer Brown, Marder, and Yau claim that customers are increasingly turning to social media to find out information about and personal experiences with brands and businesses. Consumers are utilizing social media sites like Facebook, Twitter, and Instagram to share experiences, whether they are positive or bad, claim Assaad and Gómez . Social media networks, product and business profiles, and other information are seen to be more trustworthy and dependable sources than conventional advertising.

Social media refers to programmers that enable users to share content and create personal information profiles with one another. Social media have begun to play a bigger role in marketing recently, thus it's critical that businesses understand how to utilize social media marketing. Studies have looked at particular marketing goals for social media marketing, include raising brand recognition and enhancing a company's reputation. According to the authors, social media marketing is a multidisciplinary approach that combines social media with conventional media channels to further organisational objectives through generating value for stakeholders. The writers also discuss how businesses may utilise social media marketing to track and examine online discussions in order to better understand how customers perceive their brand.

Ztamur and Karakadilar assert that understanding the market is the first and most significant step in using social media as a marketing tool for a business. The writers indicate that the company's first step should be to specify the types of customers it wants to attract. What are their demographic characteristics? The authors go on to provide a few more questions that are often useful for achieving this. Do they have a set place to be? What are they looking for? what do they presently purchase? . Social media is a fantastic instrument for businesses to employ to develop customer trust in a manner that was previously impossible with conventional advertising media.

According to Mata and Quesada , social media marketing may be thought of as pull advertising, where the customer is in the spotlight and chooses to learn about a brand, service, or product. Since their customers may pick the sort of information they want to learn about a product, service, or brand, this can also be considered selective advertising. The writers also note that this pull advertising technique need direct connection between the \company and customers.

Advertising has a crucial part in establishing awareness, consideration, and purchase in the conventional consumer buying funnel. Customers establish their expectations for the brand's claims here. Companies may use social media to track and engage with customers after they have bought a product or service. A Point to Consider Buy Usage Criticism. Customers become aware of the good or service. Customers begin learning more about the goods or services before deciding whether to buy them or not. Customers buy the goods or services. Customers begin using the commodity or service. Customers begin developing their own opinions about the commodity or service.

In social media, customers begin discussing the product or service with one another, and businesses may join in to ensure that customers are happy. Awareness Speak to 7 customers. According to the author, by doing this, businesses have the opportunity to improve the way their product or service is delivered, which may lead to positive word of mouth and eventually influence additional customers to consider the company's goods or services.

According to Edward, firms may employ "talkers," "themes," "tracking," and "taking part" as strategies to promote word-of-mouth. The author defines talkers as a small group of customers who are happy with the good or service and wish to spread the word about the business and their own experience. The author goes on to say that the subject is crucial since it gives customers something to speak about and is simple to share with other consumers. The author concludes by stating that monitoring is done to learn what customers are saying about the business on social media, and participating is done to respond to customers' inquiries and provide information.

Nowadays, however, customers are exposed to advertising on a daily basis, which has caused them to become weary of hearing commercials for things they are not interested in. Hutter, Hautz, Dennhardt, and Füller claim that social media marketing is less intrusive than conventional advertising and is hence less irritating. The authors point out that since users have greater choice over how much material they see, social media marketing is less bothersome. Companies have learnt to take a more subdued approach on social media with more conversational and fun messages in order to avoid annoying customers. According to Edward, the "talk" phase of the social media marketing funnel is crucial since it is at this phase that businesses may engage in or monitor conversations with customers through social media. It is crucial for businesses to look out for their customers and ensure that they are pleased with the goods or services they get. According to the author, if businesses do this, it may result in good word of mouth, which can draw in new customers and, in turn, increase brand recognition for the business. According to Hotter et al., social media marketing may not only be unsuccessful if it begins to anger customers, but it can also be detrimental to the brand and even the business.

If businesses know how to utilize social media effectively, it may be the quickest and greatest method to engage with their customers. According to Icha and Agwu , businesses may leverage social media platforms like Facebook, Twitter, and Instagram through leveraging word-of-mouth. According to the authors, word-of-mouth marketing efforts for businesses might spread through social media platforms, for example, to raise brand recognition.

B. Online community sites

A network site that enables users to build personal information profiles, interact with friends and colleagues, and see each other's profiles is referred to as a social media platform. According to Kaplan and Haenlein and Boyd & Ellison , these social media accounts may include any kind of material, such as blogs, videos, and images. According to Statista, Facebook has 2271 million active members and is the most popular social networking site. Facebook users may communicate with one another and exchange information and photographs. Facebook is a social networking platform that allows businesses to promote, giving customers the chance to connect with the brand and the advertisement that appears on their home page. The writers go on to explain that doing so enables customers to like, share, and track which of their friends also did the same for an advertising. The writers also highlight that social media platforms like Facebook might serve as a check to evaluate the legitimacy of companies. Consumer assessments of the interest sparked by the adverts should be taken into account when evaluating the effectiveness of advertising. Facebook is a useful tool for boosting the brand image of different products and services since marketers utilize it to spread word of mouth.

Instagram is owned by Facebook and according to Statista have 1000 million active users. Instagram is a social media platform, according to Sheldon and Bryant, where users may publish and share photographs and interact by like and commenting on other users' photos. Twitter was developed in 2006 and made public by Dorsey, Williams, Stone, and Glass. Users of Twitter, an online social networking and microblogging site, may send and read tweets, which are brief text messages. Twitter has 326 million active users in January 2019, according to Statista. According to Icha and Agwu , Twitter users have the option to retweet, like, or comment to any original tweet, which enables businesses to learn what products customers are purchasing at any given time. Businesses have the option to buy advertisements, which, according to Icha and Agwu , implies that they may acquire real estate on people's timelines. According to the author, Twitter has made it feasible for businesses to send advertising solely to users who use certain phrases that could be related to the company's goods or services, and that advertising would appear in users' timelines, starting in 2013.

According to Ferrara et al businesses utilize social bots to assist take care of their customers on every social media platform. According to the writers, social bots are computer algorithms that automatically engage customers of businesses by posting material on social media. Moreover, there are social bots that are intended to hurt other individuals or businesses. Ferrara et al. claim that these bots are used to deceive, take advantage of, and influence users on social media by spreading rumors, disinformation, spam, or plain noise.

C. Benefits and drawbacks of social media marketing

The benefits and drawbacks of social media marketing may be emphasized now that we are more aware of what it is and how businesses have begun utilising it as a tool for marketing. Comparing social media marketing to conventional advertising, it has been shown to be more cost-effective. Compared to conventional advertising, Tardik and Adnan explain that social media enables businesses to reach end consumers at extremely cheap prices. Customers are less irritated by social media marketing, and this is because customers may decide when to engage with the

advertisement and for how long by deciding how much time they want to spend on social media.

Social media marketing has also made it simpler for businesses to gauge the effectiveness of their advertising and allowed them to focus their advertising on specific target audiences. A benefit of social media is that businesses may connect with customers directly and establish relationships with them. Social media also enables customers to voice their opinions on the goods or services a business provides. According to Tarik and Adnan, one benefit of social media is that businesses may develop strong connections with customers and learn about their beliefs, which is a useful marketing strategy for sustaining and boosting brand recognition. Companies may reach customers worldwide via social media marketing, and there is a chance that material can go viral and get a lot of publicity for them without them having to put in more work or spend more money for it. One benefit of social media marketing is that if a marketing plan doesn't work out, it's simple to replace it. The use of social media for marketing has some drawbacks as well, however, so it's not all benefits.

There are drawbacks to social media marketing, such as the ease with which competitors may imitate marketing initiatives online and the vulnerability of trademarks and logos to consumer fraud. According to Tuten and Mintu-Wimsatt , people are capable of posting fictitious reviews—positive or negative—endorsing goods or services for financial gain without ever utilising or purchasing them. Businesses that employ social media marketing depend on customers who spend a lot of time online, and many people in the older age still don't believe what is shown on social media, according to Todor. According to Das and Lall, social media must constantly maintain the material, which is another drawback of social media marketing. It might also take longer to see results than with conventional advertising. Social bots, which have been around for a while, are another drawback of using social media for marketing. According to Ferrara et al., social bots may engage with users on social media to change their behaviour, defame them, and propagate rumors and fake information.

D. Conventional Media

According to Taherdoost and Jalaliyoon , marketing is a channel via which businesses may reach their customers. The writers go on to say that marketing has always been a crucial component of any business since without it, consumers would not be aware of the goods or services that a company provides. Nowadays, businesses have access to a variety of marketing strategies, including social media marketing and conventional advertising. Traditional advertising, according to Taherdoost and Jalaliyoon , uses media including television, radio, newspapers, and billboards, to name a few. Due to their primary goal of reaching as many customers as possible, these instruments are classic examples of one-way communication advertising, or conventional mass advertising. Conventional mass advertising refers to the dissemination of material to customer's via media like radio or television.

Advertising plays a significant part in raising brand awareness, and as explained by Yamamoto and Matsumura, customers are unable to follow or tweet about brands they are unaware of. Hence, traditional advertising plays a crucial function in raising awareness, which acts as a gateway into the customer buying funnel and fosters interest in the goods and services that the firm is providing.

The conventional customer purchasing funnel is shown. Advertising is described by Yamamoto and Matsumura as information that businesses develop to disseminate via various media in order to reach customers. businesses use social media to improve the delivery of their product or service, continuing the customer journey beyond the purchase phase. This may lead to good word-of-mouth through interacting with customers online.

According to Mata and Quesada, conventional advertising may also be thought of as a push advertising technique, in which the business forces information about its goods or brand in front of customers. According to the author, push advertising involves businesses promoting their goods via mass media, such as radio and television, and it irritates customers quickly.

As customers are now attempting to avoid that kind of marketing as much as they can, some academics claim that social media has begun to alter the power dynamics in the marketplace and that mass advertising is no longer an effective marketing tactic. Consumers attempt to avoid this kind of advertising since, on average, they are exposed to 1500 adverts every day, and as a result, they get weary and irritated of hearing advertisements for things they are not interested in. Unwanted advertising may anger people, according to Hutter et al. Companies' insistence that conventional advertising is the best strategy for success, despite studies showing the reverse, is one of the reasons they continue to employ it and do not adopt digital marketing techniques

Conventional advertising is now like businesses throwing items against a wall and hope they stick. Many people claim that traditional advertising has started to lose its efficacy. De Vries, Gensler, and Leeflang note that conventional advertising is a highly efficient marketing method for building brand recognition. The efficacy of conventional advertising in raising brand recognition, according to the authors, may be due to the fact that it may be aired across a variety of media and so reach a vast audience.

E. The benefits and drawbacks of conventional advertising

While academics claim that conventional advertising has lost its efficacy, businesses still utilise it. Here, several benefits and drawbacks will be presented to help you understand how successful traditional advertising is. Traditional advertising has the benefit of yielding results

much more quickly. Also, the author claims that advertising that are strategically positioned and appropriate for the target audience might be more successful. Traditional advertising also has the benefit of being long-lasting. Traditional advertising may be the greatest way to target the older population, according to Das and Lall, and data indicate that older people are the ones who spend the most time with traditional media. The amount of confidence in conventional media, including television and radio, is, nevertheless, the biggest benefit of traditional advertising. But, conventional advertising has a few drawbacks as well.

As was already noted, conventional advertising is becoming less and less popular and effective, and highlight that it has several drawbacks. All three writers note that it is more challenging to quantify outcomes for things like brand recognition and that sometimes conventional advertising cannot be quantified at all. However, all three writers pointed out that conventional advertising requires many businesses to retain outside consultants since media is so costly. Traditional advertising may be quite static, which prevents corporations from interacting with customers and the consumers from interacting with the brand. According to data, people are spending more time online, such as on social media, rather than on radio or television, which is bad for businesses that employ conventional advertising.

III. CONCLUSION

In conclusion, social media marketing has emerged as a game-changer in the marketing industry, offering businesses a powerful tool to connect with their target audience in ways that were previously impossible with traditional advertising methods. Unlike traditional advertising, social media marketing allows businesses to reach a highly targeted audience with personalized and interactive content, allowing for a more engaging and immersive experience for the consumer. Additionally, social media marketing offers businesses the ability to track and analyze campaign performance, allowing for more informed decision-making and better return on investment. While traditional advertising methods still have their place, social media marketing has become a crucial aspect of any modern marketing strategy, offering businesses a cost-effective way to build brand awareness, drive engagement, and ultimately, increase sales Finding the ideal route to connect with a company's target market is crucial, but not the only one. It's also critical to create engaging, compelling advertising for customers. In order to lessen consumer aggravation and increase consumer acceptance of advertising, the second idea for more study that would be interesting to look into is what elements make advertising more qualitative and relevant for customers.

REFERENCES

[1] T. O. Kowang, R. A. Jacob, L. K. Yew, O. C. Hee, G. C. Fei, and C. S. Long, “E-commerce Advertising: Does the Traditional Advertising Elements Still Relevant?,” Int. J. Acad. Res. Bus. Soc. Sci., 2019, doi: 10.6007/ijarbss/v9-i7/6103.

[2] X. Qin and Z. Jiang, “The Impact of AI on the Advertising Process: The Chinese Experience,” J. Advert., 2019, doi: 10.1080/00913367.2019.1652122.

[3] Y. Zhang, W. Zhong, and S. Mei, “Combination advertising with budget constraint,” J. Southeast Univ. (English Ed., 2019, doi: 10.3969/j.issn.1003-7985.2019.02.017.

[4] S. De Jans, L. Hudders, L. Herrewijn, K. Van Geit, and V. Cauberghe, “Serious games going beyond the call of duty: Impact of an advertising literacy mini-game platform on adolescents’ motivational outcomes through user experiences and learning outcomes,” Cyberpsychology, 2019, doi: 10.5817/CP2019-2-3.

[5] J. A. Braun and J. L. Eklund, “Fake News, Real Money: Ad Tech Platforms, Profit-Driven Hoaxes, and the Business of Journalism,” Digit. Journal., 2019, doi: 10.1080/21670811.2018.1556314.

[6] G. Taneja and S. Vij, “Dynamics of a Digital Advertising Campaign,” SSRN Electron. J., 2019, doi: 10.2139/ssrn.3308035.

[7] Y.-K. Toh, H. Hashim, Y. A. Aziz, and S. I. Ng, “Effects of Game-Product Congruence on Game-Players’ Brand Attitude in Mobile Games: A Review,” Int. J. Acad. Res. Bus. Soc. Sci., 2019, doi: 10.6007/ijarbss/v9-i4/5830.

[8] Z. Idrysheva, N. Tovma, K. Z. Abisheva, M. Murzagulova, and N. Mergenbay, “Marketing communications in the digital age,” in E3S Web of Conferences, 2019. doi: 10.1051/e3sconf/201913504044.

[9] L. De Gauquier, M. Brengman, K. Willems, and H. Van Kerrebroeck, “Leveraging advertising to a higher dimension: experimental research on the impact of virtual reality on brand personality impressions,” Virtual Real., 2019, doi: 10.1007/s10055-018-0344-5.

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Social Media Marketing Applications

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***Abstract*— Social media marketing has become an essential aspect of modern marketing, allowing businesses to connect with their target audience in a more personalized and interactive manner. This abstract will explore the various applications of social media marketing, including influencer marketing, content creation, targeted advertising, and customer engagement. Influencer marketing has emerged as a popular technique, leveraging the popularity of social media personalities to promote products and services. Content creation is another critical aspect, with businesses creating engaging and shareable content to increase brand awareness and drive engagement. Targeted advertising allows businesses to reach a highly specific audience with personalized messages, while customer engagement techniques such as social listening and community building help businesses build customer loyalty and improve brand reputation.**

***Index Terms*— Adverting, Consumer, Marketing, Social Media, Social Media Marketing.**

I. INTRODUCTION

As can be observed, Internet market trends have a tendency to spread gradually to developing markets. For the interested reader, here are some short Internet statistics for India: With more than five Internet businesses valued at more than US$1 billion, India is the third nation in the world. With just 19% Internet penetration, India is the second-largest market in the world for Facebook and LinkedIn, behind only 50% in China and 61% in Brazil. By 2020, it is predicted that Internet use would account for more than 4% of India's GDP [1],[2].

These statistics make me, an Indian entrepreneur, happy. It seems sense that more people would sign up for different social media platforms as Internet connection grows. Social media's rise and uptake over the last five years has been nothing short of amazing. Social media, in all its variety, has given individuals all across the globe the power of "oneness," doing anything from launching billion-dollar businesses overnight to overthrowing governments and changing consumer behavior [3],[4].

When the Internet becomes more pervasive in emerging markets like Social media will become a part of everyone's everyday life in India, from different sectors to different origins. The potential that social media will provide to prospective business owners are incredible, and no doubt that more billion-dollar firms will soon come out of India. Social media's evolution has reached a turning point where companies have no option but to embrace it or lose out on the opportunity to interact with audiences across the world on the platform that will undoubtedly have the most influence on how consumers make decisions in the contemporary day [5],[6].

Being active on social media is like having a corner shop on a popular street for a company. Customers see and listen to interactions between brands and other consumers even when they are not actively making purchases, which shapes their opinion of the brand. It is crucial for companies to remain active and engage with their audience since current customers' reviews might affect other consumers' future purchasing choices.

On Growth Story, my entrepreneurship platform, I'd want to introduce you to a firm before I go into the specifics of social media marketing. Social media marketing is functioning very well for this firm, Portea. A healthcare firm called Portea offers patients at-home access to hospital-quality treatment. Via social media, especially Facebook, it has a steady track record of increasing leads, enticing viewers, and raising brand exposure. The health care sector is not recognised for having innovative marketing campaigns, and consumers in this sector are also not as receptive to marketing as audiences in other sectors, such as FMCG. But, consumers of healthcare, particularly the younger generation, are voracious information consumers. People depend on social media for research and making crucial choices, particularly ones involving the health of their family. These choices include picking a doctor, researching hospitals, learning about treatment options, and anything else they need information on [7],[8].

It was crucial for Portea to include social media into its long-term marketing plan since social media groups with members who have received medical care are willing to share their experiences (positive or negative) [9].

Social media will become more and more prevalent in people's everyday lives as the Internet becomes more widely used in emerging nations like India. The potential that social media will provide to prospective business owners are incredible, and I have no doubt that more billion-dollar firms will soon come out of India.

Social media's evolution has reached a turning point where companies have no option but to embrace it or lose out on the opportunity to interact with audiences across the world on the platform that will undoubtedly have the most influence on how consumers make decisions in the contemporary day.

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Various companies working with Growth Story use various social media relationship-building techniques. The connection between a brand and a customer on social media is equally as successful even if it is less "personal" than conventional commercial interactions. Brands must get it right from the outset since others will be seeing the encounter and forming an opinion of the company.

Since we're talking about it, here are some guidelines for creating enduring online connections:

A. Keep your brand's personality consistent

Each brand has its own distinct identity. Maintaining the same brand identity throughout all client interactions is crucial for firms that are active on social media. Sharing material, replying to clients or rivals, and even running advertisements that target new demographics all fall under this category. You should keep the dialogue intimate while remaining loyal to your brand's essence. Since Portea really cares about its consumers and comprehends their suffering, the discourse attempts to be helpful—and it succeeds.

B. Recognize the client

A group of people make up a brand's target audience. A brand must first comprehend each individual consumer in order to comprehend its target demographic. Consumers of various GrowthStory-affiliated firms have extremely distinct demands, and it might be difficult to comprehend and effectively meet all of their needs.

C. Create Trust, Not Censorship

Unsatisfied consumers are a given in any firm. These clients have a platform to publicly criticise the company thanks to social media. Customers must be allowed the freedom to voice their ideas without fear of censorship in order for companies to build genuine connections on social media (unless, of course, it is really essential). In this approach, viewers of the dialogue who are following the brand will have confidence in it and understand that it is working to enhance its services. Future clients will prioritise your brand above all others when they need a product or service that you provide.

Facebook is Portea's primary source of criticism, praise, and feedback. Portea leverages consumer input to enhance services, and I can attest from personal experience that it is preferable to take customers' honest criticism to heart and make adjustments than to maintain the status quo.

II. DISCUSSION

The desire to support your fans goes a long way. The majority of customers will anticipate assistance from any brand in times of need. This enthusiasm is a requirement, not a choice, for the healthcare sector. Customers often compliment my wife Meena, the CEO of Portea, on how the company's services helped them care for their parents in their last days. As a result of your enthusiasm while interacting and providing assistance, more people soon begin to recognise and support your business.

And last, be willing to learn. A consumer could sometimes be able to point out something you overlooked. Even if your company provides the finest product or service, there is always room for growth. When this is pointed out, use it as a teaching moment. Be grateful and express your gratitude. That will be fantastic for the connection!

These strategies were employed by Portea and other businesses in our portfolio to build connections with their followers on social media. These are not absolute guidelines for developing connections on social media, but they provide a strong foundation from which to work.

There isn't a single strategic key that can open all social media sites, as I previously said (how I wish there was!). The advertising alternatives available on various social media platforms vary, but the success of a marketing campaign relies on some factors that are universal, such as the selection of the best platform, creativity, precise targeting, and optimisation. Let me share all I know about them with you.

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It is crucial to choose the appropriate platform depending on the sort of product or service you are offering in order to be seen where your target audience is most likely to be. Nonetheless, there are certain exceptions to any rule. For instance, I now understand that Facebook is the best channel for Portea, despite the fact that the business operates in the healthcare industry. I had serious misgivings before Facebook replaced Twitter as Portea's main social media marketing tool. Portea's audience ranged in age from forty-five to eighty and Facebook is often thought to be utilized by the young (and restless) for socializing, exchanging pictures, and staying in contact.

The folks that typically use Facebook didn't appear to fit the healthcare industry. No other company (in the healthcare industry) has utilized Facebook as its main method of client acquisition. We were exploring unexplored territory. And finally, rather than being a channel for client acquisition, Facebook was mostly utilized to enhance brand recognition. You may be asking what led Portea to even contemplate using Facebook as their main method of client acquisition. I'll explain.

A. Query Volume

Home healthcare is an extremely specialized industry. There wasn't a high enough search traffic on Google when Portea's digital marketing initiatives first began, so it was necessary to test out alternative channels.

Due to a need, Portea tried Facebook marketing and was successful. The bigger lesson, though, was that even less-than-ideal platforms may produce fantastic outcomes. All you have to do is try! No other digital platform in India offers greater reach and targeting possibilities than Facebook, according to Portea's study. Social media marketing specialists at Portea were able to reach out to a lot more people and meet certain targets at a spectacular rate because to the ability to target particular locations and even more precise segments of the audience.

Success in advertising, both offline and online, relies on creativity. There is considerably less room for inventiveness in a sector like health care than, say, in the food business. Yet Portea effectively communicates her point with the perfect mix of words and pictures. Facebook and other social media platforms provide a difficulty in that the available area for sponsored advertising (text and picture) is relatively limited. As a result, advertisements must be concise but distinctive enough to stand out and draw users' attention.

B. Targeting Facilitates

It would take a lot of time and effort to list every targeting option available on Facebook, LinkedIn, Twitter, and other social media networks. Let's use Facebook as an example to make things clearer.

Right-hand side (RHS) and News Feed are the two kinds of ad formats that Facebook provides. RHS advertising are nice to start with since they are less expensive and simpler to put up. Our social media marketers were experimenting with various visuals and communication topics even while they were building up Portea's first Facebook campaign. Also, I recall that advertisements were first launched with a large user base and then fine-tuned as more data accumulated.

The success of Portea's social media marketing is mostly due to this. A highly capable internal social media marketing staff at Portea manages optimization at the most minute levels while meticulously keeping track of each campaign. To understand user behaviour, each company employing social media marketing has to be data driven and interpret data in its own language.

Daily campaign adjustments by the Portea social media marketing team guarantee success regardless of shifting trends. Brands will need some time to find out what works on social media, just like with any new marketing channel, but once they do, the effort and time will be well worth it.

C. Advertisements could be your worst enemy

Even the most inventive and effective commercial might fail due to ad weariness. When the click-through rate declines as a result of the target audience seeing the advertisement too often, this is known as ad weariness. A campaign's quality may be severely lowered by ad fatigue, thus advertising should constantly be kept fresh with regular changes in colour, content, and call-to-action language.

Facebook currently brings in more new clients for Portea than any other channel. While there is a latent need for home health care services like physiotherapy, nobody looks them up online. They depend on information from friends, thus they are unaware of information on different services that may be offered. Facebook enables Portea to reach the desired demographic and attract new consumers at a substantially reduced cost, even for very specialised services like those offered by nursing attendants.

D. Facebook Campaign by Portea: What Worked

If you asked me to give you just one reason why Portea's Facebook marketing campaigns were so successful, I would have to say analytics. A highly capable analytics team at Portea is committed to campaign enhancement via constant testing and data interpretation. I'm aware that Portea employs a variety of targeting strategies, including remarketing and look-alike audiences, but I've never dug further into how it all works since the team performs an excellent job and the results are clear.

E. Critical Success Factors for Portea

Defining the target market constant campaign performance adjustment effective Facebook tool utilization and change response reacting to and interacting with clients to enhance services enhancing messaging, landing pages, and creatives.

Facebook Marketing Lessons from Portea's Campaigns

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Portea has regularly been able to attract clients for around one-fifth of what above-the-line (ATL) marketing is expected to cost.

Local companies and Facebook marketing may work together. This was a huge insight!

Portea's company expanded to fifteen cities using Facebook, all without the need to create local marketing teams.

Facebook advertising requires ongoing optimisation, including frequent changes to graphics, text, and content.

The importance of strong creatives to a campaign's success cannot be overstated.

Although News Feed advertisements are 50% more successful than RHS ads for converting traffic into revenue, RHS ads are still beneficial for creating brands.What Motivates Portea (Heart-Image) to Use Facebook In only six months, the number of service requests (leads) rose from around 30 per day to 600 per day. The lead to patient conversion rate has exceeded 10%. In six months, the rate of adding new patients surged tenfold.

Compared to traditional internet marketing strategies like search engine marketing, Facebook brings in a lot more new clients (SEM). The cost of acquisition compared to SEM, where customers look for services with the purpose to buy, is shockingly cheaper. Facebook page "likes" increased from 500 to 70,000 without any paid advertising.

When Portea started experimenting with Facebook marketing, I thought that it would provide the company the exposure and expansion I had anticipated. I now have solid evidence that social media marketing is effective on a local, state, and global scale and offers useful information on client profiles including demographics, geography, marital status, education, and hobbies. Social media marketing may assist in making even a young brand into a force to be reckoned with by lowering marketing expenses.

F. Social media marketing's future

With Messenger, Facebook has included a friend-to-friend payment tool that allows users to connect with Visa/Mastercard and send money with no costs. Why has a payment gateway suddenly become so interesting? The corporation may not want to fall behind in the face of competition from services like Apple Pay, Square, and Stripe. Users may shop immediately if payment was incorporated into the site, which could lead to higher conversion rates.

The Purchase button, which allows users to make rapid purchases, has been in experimental testing on Facebook and Twitter for a while. Google has also said that it will roll out the Purchase button, which will provide advertisers a tonne of new chances. Purchase buttons that are connected with wallets will supplement "suggested" purchases, and a new age of social media marketing may be on the horizon.

Digital marketing has already been significantly impacted by mobile, and it is anticipated that in the future, mobile traffic will supplant desktop traffic. Marketers will need to adapt their campaigns for mobile if they want to remain relevant as more and more consumers access social media platforms via mobile devices.

We've all heard it said before that content is king, but it's a fairly general statement to make. I anticipate that this king's rule will continue. The importance of relevant content will increase as Google and social media platforms develop. Brands will educate their consumers with helpful material, and the value of helpful user-generated content will become more apparent on social media platforms.

Marketers will become more data-driven than ever as better tools and methods for data analysis are developed. Future digital marketers will be able to use hypertargeted adverts to increase sales by matching visitors with precisely what customers are searching for. Whatever the future holds, social media will continue to be important. Future social media users may utilise a variety of different platforms, new advertising strategies will likely be developed, and connections between them will likely be greater than they are now.

III. CONCLUSION

Realizing the significance of social media in the daily lives of those who are most likely to become your consumers will help you determine the value of using social media apps in marketing. Because of social networks' widespread use and users' positive effects on businesses, social media marketing tools have become essential. By leveraging the power of social media platforms, businesses can connect with their audience in a more personalized and interactive manner, building brand awareness, driving engagement, and ultimately, increasing sales. However, it is crucial for businesses to continuously analyze and adapt their social media marketing strategies to stay up-to-date with the latest trends and techniques. With the potential for high ROI and improved brand reputation, social media marketing is a critical component of any modern marketing strategy, and businesses that invest in it are better equipped to succeed in today's highly competitive marketplace.

REFERENCES

[1] G. M. Eckhardt, M. B. Houston, B. Jiang, C. Lamberton, A. Rindfleisch, and G. Zervas, “Marketing in the Sharing Economy,” J. Mark., 2019, doi: 10.1177/0022242919861929.

[2] R. Langan, S. Cowley, and C. Nguyen, “The State of Digital Marketing in Academia: An Examination of Marketing Curriculum’s Response to Digital Disruption,” J. Mark. Educ., 2019, doi: 10.1177/0273475318823849.

[3] N. A. Morgan, K. A. Whitler, H. Feng, and S. Chari, “Research in marketing strategy,” Journal of the Academy of Marketing Science. 2019. doi: 10.1007/s11747-018-0598-1.

[4] K. Jarek and G. Mazurek, “Marketing and artificial intelligence,” Cent. Eur. Bus. Rev., 2019, doi: 10.18267/j.cebr.213.

[5] F. Diez-Martin, A. Blanco-Gonzalez, and C. Prado-Roman, “Research challenges in digital marketing: Sustainability,” Sustain., 2019, doi: 10.3390/su11102839.

[6] D. M. V. Desai, "Digital Marketing: A Review," Int. J. Trend Sci. Res. Dev., 2019, doi: 10.31142/ijtsrd23100.

[7] D. Iacobucci, "A chronology of health care marketing research," Found. Trends Mark., 2019, doi: 10.1561/1700000060.

[8] J. J. L. García, D. Lizcano, C. M. Q. Ramos, and N. Matos, "Digital marketing actions that achieve a better attraction and loyalty of users: An analytical study," Futur. Internet, vol. 11, no. 6, pp. 1–16, 2019, doi: 10.3390/fi11060130.

[9] A. Miklosik, M. Kuchta, N. Evans, and S. Zak, "Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing," IEEE Access, 2019, doi: 10.1109/ACCESS.2019.2924425.

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Social Media Marketing and Brand Loyalty

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***Abstract*— Social media marketing has been utilized to help consumers and companies engage and communicate, and it is seen as a powerful tool for influencing customers' loyalty and purchasing habits. Samsung's smartphone brand has established a sizable market share in Vietnam since entering the market there. To maintain relationships with its consumers, Samsung has turned on a few social media networks. Several academics have looked at social media marketing strategies and how they affect consumer brand loyalty, but they haven't focused sufficiently on the particular instance of the smartphone sector.**

***Index Terms*— Branding, Campaigns, Content, Engagement, Hashtags, Influencers.**

I. INTRODUCTION

Every company strives to develop consumer loyalty to its goods in today's competitive marketplace. To develop a competitive advantage in the market, it is crucial to acquire and keep loyal consumers. Media marketing makes it feasible to build a devoted customer base. The use of both traditional and new internet channels for brand promotion and product and service sales is known as media marketing. Display advertising, content marketing, and social media developments are just a few of the many various media types that are used in media marketing [1],[2].

Social media marketing (SMM) is a sort of marketing that uses the internet to produce and distribute marketing material on social media networks in order to fulfil marketing and brand objectives. SMM is a crucial component of modern culture since it helps businesses access millions of clients worldwide. This is a fantastic technique to draw clients, mix with them, and communicate with them. Its goal is to increase brand recognition and consumer attraction via sales-related strategies. Companies can reach clients globally thanks to social media marketing. SMM is an effective tool that companies of all sizes utilize to draw in new and different types of clients. SMM may be very effective in fostering brand loyalty and increasing revenue by recruiting new consumers. Moreover, it offers businesses many kinds of value. One of these advantages is the rise in brand recognition [3],[4].

Consumers now utilize social media to research products depending on their preferences. Social media marketing campaigns for brands and businesses are still active. Social media offers unique chances for companies to develop interactions with consumers. Companies may upload and promote brand content, such as messages, videos, information, and other things, using brand fan page. With the establishment of buy intents and the enhancement of customer connections, social media marketing initiatives may increase consumer asset drive and loyalty [5],[6].

It is challenging to find loyal clients because of the rise in internet use, but at the same time, brand loyalty is crucial to this generation's existence. Creating and sustaining brand loyalty has been a major area of study for marketers for a long time. Marketers use a variety of strategies to preserve client brand loyalty. The modern strategy is social media marketing. Customers are simpler to identify and interact with when using social media marketing. A business may increase customer loyalty and retention by connecting with consumers on social media. Every firm has to communicate with its clients and engage with them. Thus, in order to attract and keep more devoted clients, many businesses are adopting social media marketing. Customer loyalty will increase when a firm runs effective marketing efforts and produces well-liked content [7],[8].

A series of internet-based apps known as social media are described as "allowing the production and sharing of user created content and "building on the philosophical and technical underpinnings of Web 2.0. The Web 2.0 platform, which provides the technological infrastructure to support user involvement and the creation and dissemination of content, is the foundation of social media. While social networks and social media are sometimes used interchangeably online, there are some distinctions between the two. Social networking is the practice of connecting with others via social media [9].

According to this viewpoint, social networks are understood as web-based services that enable a person to create a public or semipublic profile within a bounded system, create a list of users with whom they share a connection, and view and navigate their list of connections as well as those made by others within the system. Hence, social networks are a channel in the social media community that emphasize user cooperation, communication, and sharing. While networked relationships are possible across all social media platforms, the major focus of social networks is on interaction and cooperation. The social network sites, such as Facebook, Twitter, and LinkedIn, are the online hosts that let users to construct their own private profile.

In social networks, there are many different types of virtual life, including personal friendships, group communities, and corporate partnerships. Individuals use the internet to interact with people, exchange interests and experiences, and have discussions about various topics. As

human behaviors are supposedly integrated in these online interpersonal relationships, according to the social network theory, it is possible that social network practises have an impact on how members behave. Marketers go from conventional media to social media in order to raise awareness of their brands and encourage customer preferences for them due to the speed of communication and the abundance of information sources. A new environment for brand marketing communication is created by the usage of social media channels in the marketing context; it allows customers more control and offers a direct line for user-generated content and social engagement.

Social media marketing was first described in the literature as "brand communications in an online social networking framework. In the brand's endeavor to engage with its customers and prospects, it is distinguished by social networking and user interaction. Social media marketing is "a dialogue frequently triggered by consumers/audiences, or a business/product/service that travels in a circle among the stated parties to set in motion revealing communications on some promotional information, or to learn from one another's use experiences, ultimately benefiting either or all of the involved parties." In general, social media marketing is the process of developing, communicating, and delivering marketing products that increase the value of the company's stakeholders.

From the various emerging definitions of social media marketing (SMM), it can be deduced that, firstly, SMM utilizes the social media platform and uses it as a marketing tool to create a two-way communication with customers and deliver valuable offers in order to garner greater attention for the brand/product or service and encourage consumer participation, and, secondly, SMM facilitates interaction, content sharing, and information diffusion. Finally, SMM focuses on how users feel about a brand or social networking sites, including their beliefs or views, attitudes, or behaviors.

So, social media marketing activities can be characterized as efficient marketing communication methods that capture engaged consumers' perceptions and understanding of social media marketing activities by five dimensions, namely entertainment, interaction, trendiness, customization, and word-of-mouth. Many research with varied settings have explored the forces of social media marketing. The connection between luxury fashion brand purchase intentions and SMM, as well as the determinants of customer equity—namely, value equity, brand equity, and relationship equity. The report identifies amusement, personalization, engagement, word-of-mouth, and trendiness as SMM activities.

A. Brand Value

There are several definitions of brand equity that follow the marketing perspective, however according to (Srivastava & Shocker, 1991), brand equity is the brand's added value. Customer-based brand equity is described as "the differential influence of brand knowledge on consumer reaction to the marketing of the brand" in the context of marketing decision-making based on consumers.

The customer assesses the brand equity based on the brand's strength, associations, and worth, as well as the perceived brand utility in relation to expenses. Customers' opinions of a brand's value have an impact on how well it performs and improve the company's profits. Brand equity has four components: brand awareness, brand image, brand associations, and perceived brand quality. This study, however, focuses on overall brand equity, which measures the added value of the focal brand as perceived by consumers in comparison to other brands

B. Brand Loyalty

The concept of trust comprises a calculation based on an object's responsibility to consistently fulfil its duty and the trade-off between costs and benefits. A consumer's readiness to depend on a company's capacity to deliver what it promises is known as brand trust. So, it entails the business' goodwill to act in the client's best interests to improve the aspects of trust, such as safety, dependability, and dependability. Trust is an implicit set of assumptions that no one is taking advantage of the circumstances in an uncertain setting, especially when regulations cannot ensure that people will behave as anticipated. The lack of enforceable norms in online communities increases the significance of trust.

Several studies have focused on the importance of trust and a person's confidence on social media platforms in the online setting. Individuals' perceptions of trust in the online environment are significantly influenced by their personality traits, which in turn impact their intents and behavior. According to, confidence in a website is correlated with how well a user's personality fits with social media. The findings of their research support the notion that trust is crucial in social media because it affects users' behavioural reactions, such as their intentions to use and suggest social networks in the future. Hypothesis that users' perceptions of trust differ based on their gender, age, and amount of social media usage. The five aspects of kindness, integrity, competence, identity, and concern are used to quantify the notion of trust.

The results imply that user judgements of integrity, which represent the moral and ethical beliefs held by a person, vary according to gender, age, and the frequency of social media use. As a result, found that female and young consumers had high expectations regarding integrity. This aspect of trust is connected to and used to evaluate affective trust, which is concerned with one's emotional connections and care for other people's well-being. Although cognitive trust emphasizes advantages over disadvantages. Social media's emphasis on interaction promotes emotional trust more than conventional websites do. These messages, whether produced by a company or by users, improve consumer relationships and brand trust. The assumption that in the

tourist industry, brand communities are more trusted by customers than the company's conventional PR strategies. If a company's content is inconsistent with its brand image or caters to its customers' preferred language use, trust will suffer.

The attributes of the online world are also regarded as trust-building factors. look at how trust mediates the link between behavioral intentions and social commerce features. Users are more likely to trust social commerce if it offers a positive online environment in terms of communication, reputation, transaction safety, size, information quality, and word-of-mouth recommendations, according to the research. Moreover, the effects of social media marketing on brand trust and brand loyalty in the tourist industry. The results confirm that social media experience, which is measured by a clear website, online engagement, website security, and cooperation, is a major driver of trust.

II. DISCUSSION

Users' perceptions of improved ability to share information and easily access and conduct transactions on social media contribute to the development of trust on social media platforms. This empowerment of consumers or the presence of both psychological and structural conditions are also thought to contribute to the development of trust. Customers communicate with people they have something in common with and who they trust and who are influencing their choices. Virtual communities are seen as a component of the network effect that affects credibility and trust. Consumers place a high value on neighbours who are approachable and open with their personal information. Consumers use social media as a platform to communicate with one another and share personal details and experiences.

A. Brand Adherence

Early theories of brand loyalty place a strong emphasis on the consumer's behaviour, such as their buying habits or likelihood of making another purchase. The buying behavior is a false indicator of loyalty; thus, this viewpoint alone cannot determine loyalty. As a result, it is suggested that the second attitudinal part of loyalty refers to consumers' psychological predispositions, such as attitudes, preferences, and devotion to a brand. As a result, attitudinal loyalty deduces the variables influencing skewed repeat purchase behavior. Based on the two viewpoints, brand loyalty is described as the ardent desire to continue purchasing the brand in the future regardless of external circumstances. According to this definition, behavioral loyalty often results in a large market share, but attitudinal loyalty typically results in a greater relative brand value.

The causes and effects of brand loyalty in the online setting have been the subject of many research. In contrast to the conventional or offline context, the online environment has several aspects that influence customer loyalty. They include connection, engagement, personalization, simplicity of use, convenience, and the development of relevant online communities and information.

Several organisations have embraced social media in recent years to link consumers to brands. Moreover, they still don't understand how to develop consumer engagement with businesses. Characterised social media marketing as a "broad range of PR expenditures encompassing social network use, podcasts, blogger authorizations, \svirtual worlds, social information sites, product review created by users, games, and ads \made by customers". To encourage and motivate social media users to collaborate with their friends and family, SMM turns customers into advocates and marketers for businesses who generate, review, and break online information about the goods of the company.

Social media was first solely used by individuals to stay in touch with their family and friends, but with time it evolved into a tool for business publicity and delivering information about popular businesses throughout the globe. Consumers now follow the branding sites to learn about the newest products from the firm and to read business news.

Companies are establishing a clear understanding of their target markets and basing their product development on the lifestyles of their clients. If a company has more devoted customers, it will improve its standing in the market and make more money. The customer may become dependable to reduce scepticism about purchases and foster faith in the items if the brand's first experience is successful and it earns their trust.

Trust is often a driving force behind brand loyalty, however loyalty cannot be replaced by trust since customers are frequently dissatisfied while being loyal to the brand (Bitner, 1990). When customers are confident in the things they buy, especially the brand they intend to buy, they will use those products. Furthermore crucial, satisfaction encourages customer brand loyalty. The link between brand loyalty and satisfaction and demonstrate that the association is positive.

Consumers may not have known anything about businesses before the development of social media marketing. In the modern day, social media marketing is essential for helping businesses retain their current customers by providing them with reliable information about the product or brand. The customer gathers corporate information from online sources and contrasts it with a product from a different brand to make it more advantageous and less reliant on the one brand they were going to buy in the competitive current market. At times, the company has failed because customers depend too much on other people's opinions and on incorrect statements made by others.

According to branding literature, businesses may increase brand loyalty through strengthening their relationships with consumers. The client relationship comprises timely reporting on brands, information on updates, information on

the business's most recent offering, and the enhancements the company makes to the old and new brands.

Customers will see the brand more favourably and believe that it was created with their needs in mind as a result of this kind of detail. Several companies make such goods to consumers' demands using social media. This may increase customer confidence and brand loyalty. A product is offered to customers depending on their choices. Hence, brand satisfaction will be increased if customers connect everyday. The results indicate that social media marketing and brand loyalty may be strongly associated if it influences brand loyalty.

B. Society

The term "culture" is most often used in a collectivist meaning; tribes, nations, organisations, and even occupations utilise it. Social cultures are idealistic in that certain circumstances are more likely than others to result in issues being solved. Society controls culture, yet even society's representatives are under its influence. A researcher by the name of Hall postulated in 1981 that culture governed how people interacted with one another and went about living their daily lives. People from different cultures exhibit diverse behaviours. Hofstede also presented the cross-cultural analysis theory in 1980, which illustrates the many interactions and behaviour between members of various communities and cultures. Since it allows for the quantitative measurement of cultural variations, the Hofstede analysis is often employed by scientists.

Social media has an impact on communities today because everyone can connect their expertise to social media and because the flow of information and knowledge cannot be stopped. Due to the availability of social media, the world becomes a multicultural community where society is transferred. Social media is used by persons with many ethnic identities. While it has been shown that social media employs various individuals depending on their culture, social media is crucial in helping people make decisions about their purchases, healthcare, and employment, all of which are directly related to their society. Social networking enables connections, yet it may be challenging to communicate across cultural barriers.

The community has a key role in influencing people's purchasing decisions. According to their cultural characteristics, people purchase the things either on the street or online. Men outnumber women in terms of proportion when purchasing online. E-commerce has taken place using a variety of venues, such as social media. Hofstede presented a five-dimensional cultural paradigm in 1980. Three cultural dimensions—out of five—include collectivism, avoiding ambiguity, and using social networking sites. A brand's preference and purchasing decisions are influenced by the community. While social media is utilised differently across cultures, e-commerce tastes vary. Also, consumers utilize social media in accordance with their culture, follow companies, and learn about brands. Culture is a factor in social media usage, thus it seems sense that it would act as a mediator between brand loyalty connections and social media advertisements.

III. CONCLUSION

Brand loyalty is a critical aspect of any successful business strategy. By creating a positive brand image, delivering quality products or services, and engaging with customers on a personal level, businesses can cultivate a loyal customer base that is more likely to return for future purchases and recommend the brand to others. Brand loyalty is not only beneficial for a company's bottom line but also serves as a powerful marketing tool, as loyal customers can become brand advocates and help spread positive word-of-mouth. However, building brand loyalty is a continuous process that requires ongoing efforts to meet and exceed customer expectations. By listening to customer feedback and consistently delivering high-quality products or services, businesses can create a strong foundation for brand loyalty that will help them succeed in today's highly competitive marketplace. Such as a brand community built on social media works to benefit its members, promote information exchange, and strengthen ties between consumers, it solidifies the connections between the customers and the brand, the item, the business, and other customers.

REFERENCES

[1] L. Gajanova, M. Nadanyiova, and D. Moravcikova, “The use of demographic and psychographic segmentation to creating marketing strategy of brand loyalty,” Sci. Ann. Econ. Bus., 2019, doi: 10.2478/saeb-2019-0005.

[2] V. M. M. Fortes, G. S. Milan, L. Eberle, and D. D. E. Toni, “Brand loyalty determinants in the context of a soft drink brand,” Revista de Administracao Mackenzie. 2019. doi: 10.1590/1678-6971/eRAMR190015.

[3] I. Khan and M. Fatma, “Connecting the dots between CSR and brand loyalty: The mediating role of brand experience and brand trust,” Int. J. Bus. Excell., 2019, doi: 10.1504/ijbex.2019.099123.

[4] H. J. Song, J. H. Wang, and H. Han, “Effect of image, satisfaction, trust, love, and respect on loyalty formation for name-brand coffee shops,” Int. J. Hosp. Manag., 2019, doi: 10.1016/j.ijhm.2018.12.011.

[5] H. Kuang Chi, H. Ren Yeh, and Y. Ting Yang, “The impact of brand awareness on consumer purchase intention: The mediating effect of perceived quality and brand loyalty,” J. Int. Manag. Stud., 2019.

[6] M. Khamitov, X. (shane) Wang, M. Thomson, V. G. Morwitz, J. J. Inman, and J. Hoegg, “How Well Do Consumer-Brand Relationships Drive Customer Brand Loyalty? Generalizations from a Meta-Analysis of Brand Relationship Elasticities,” J. Consum. Res., 2019, doi: 10.1093/jcr/ucz006.

[7] R. A. Rather and M. A. Camilleri, “The effects of service quality and consumer-brand value congruity on hospitality brand loyalty,” Anatolia, 2019, doi: 10.1080/13032917.2019.1650289.

[8] S. A. Sop and N. Kozak, "Effects of brand personality, self-congruity and functional congruity on hotel brand loyalty," J. Hosp. Mark. Manag., 2019, doi: 10.1080/19368623.2019.1577202.

[9] M. Noh and K. K. P. Johnson, "Effect of apparel brands' sustainability efforts on consumers' brand loyalty," J. Glob. Fash. Mark., 2019, doi: 10.1080/20932685.2018. 1550006.

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Social Media Consumer Relationship Management

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Abstract— CRM has typically been used to describe a business's management of customer connections. Its core purpose is being tested by the growth of social media, which has linked and empowered consumers. This essay looks at how CRM must change to keep up with the expansion of social media. Explored are the prospects and potential problems brought about by the fusion of social media with CRM. This session is organized around the new "social CRM house," and we go through how social media involvement impacts the house's primary business sectors. the use of social media in CRM strategy, despite the fact that we have chosen to concentrate on the different difficulties that come with social CRM. Instead, we think that by thoroughly understanding these difficulties, businesses and researchers will be better equipped to handle them.

Index Terms— Advertising, Business, Consumer Relationship Management, Management, Social Media.

INTRODUCTION

The conventional idea of customer relationship management is being challenged by the growth of social media. With a conventional CRM system, the company has a wealth of client data at its disposal, which it utilizes to manage its interactions with them [1],[2]. CRM is a process that "entails the systematic and proactive management of relationships as they proceed from beginning to end, with execution across the different customer-facing contact channels," according to Reinartz, Krafft, and Hoyer. In particular, the business aims to make the most of customer lifetime value and the ensuing customer equity by using customer information. For instance, a company may have a database of clients and potential clients, segmented according to various traits, and focus various marketing initiatives to various categories [3],[4]. The company may decide to allocate more resources to certain market segments, cross-sell to some customers, up-sell to others, and concentrate on lowering the cost of supplying others. In such circumstances, the business serves as the primary actor and addresses passive consumers, whose capacity to react to the business's efforts is mostly conveyed in their purchasing patterns.

Large social networking sites have emerged, allowing customers to participate more actively in their interactions with businesses [5],[6]. Mobile devices not only make it easier for customers to access more information about competing products, but they also make it simple for them to share their opinions with large audiences [7],[8]. As a result, businesses will likely find it harder and harder to control the messages that their customers receive about their goods and services. The overall result has been to give customers more control. According to Searls , businesses should concentrate on understanding vendor relationship management , where customers control their relationships with suppliers rather than the other way around, rather than CRM. These trends might be harmful to businesses: If consumers share unfavorable information about a business, they could substantially harm its reputation . The rise of social media, however, also gives businesses the chance to interact with their clients, listen to what they have to say, and maybe even persuade them to recommend their goods to others. The difficulty for businesses is to recognize and seize such possibilities while avoiding the dangers they pose [9].

This essay looks at how CRM must change to keep up with the expansion of social media. We define social media as a collection of web-based tools that facilitate the production and sharing of user-generated content. We take Greenberg's phrase "social CRM" to describe this new CRM approach. We provide a paradigm for describing social media's impact on CRM and its drawbacks called the "social CRM home." The CRM house focuses on the relationship between levels of engagement and various CRM actions, including as acquisition, retention, and termination.

After analysing the research on the relationship between social media and CRM, we will talk about what we mean when we talk about customer engagement levels and look at how it influences conventional CRM operations. After a discussion of the components of the "social CRM house" and the accompanying problems, we will provide research topics that might help businesses avoid these errors.

A. Background Information about CRM and social media

Many research have started to appear at the intersection of CRM and social media, despite the fact that social CRM is still a young field. These articles are divided into two main areas. The first category comprises of studies that outline how to take social factors into account while analysing common CRM issues. For instance, some studies are starting to look at social factors that contribute to client turnover. CRM has always been based on understanding and anticipating churn. By including social impacts into the discussion of churn, recent research by Nitzan and Libai and Haenlein aim to pinpoint the circumstances in which groups of consumers are most likely to leave at the same time. Additional study in this category examines how value assortativity affects seeding and new client acquisition. For instance, Haenlein and Labia build on research on seeding techniques by considering the idea that consumers in the seeded base may differ in the value they provide to the

company. The second area of study focuses on "social value," which is the term for the financial effects of social interactions or word-of-mouth.

These studies examine client acquisition via word-of-mouth and other channels, referral behaviour and reference value, and reference value. The articles in this genre range from analytical works to case studies that highlight effective corporate activities. . They have together contributed to a more comprehensive grasp of the idea of customer value: In addition to social components like the value of customer influence, recommendations, and expertise, such value is no longer restricted to purchase-based CLV.

When taken as a whole, these studies highlight the shortcomings of the conventional CRM strategy, which sees the client as an autonomous decision-maker who creates value for the business via consumption and purchase behaviour. Social media allows for a variety of options for customers to support business success. Companies must switch from a conventional understanding of CRM to a social-CRM approach in order to realise this potential. Yet this shift also brings about a number of difficulties, which we will go through in the parts that follow.

B. Defining the Idea of Social CRM

To better understand how social media effect CRM, we provide a structure called the social CRM house. We first envision the relationship between social CRM and conventional CRM in order to build this framework. In particular, we suggest that social media impact the amount of customer involvement with a business and that the level of customer engagement both influences and is influenced by the business' approach to each of the three classic CRM components—acquisition, maintenance, and termination. The relationship between the three CRM components and consumer involvement. A business may create its social-CRM strategy by using this conception of social CRM as a starting point.

We presume that social CRM is based on a foundation of insights that businesses obtain from evaluating sizable amounts of consumer data made accessible by social media. The "raw materials" of diverse data sources are included in Item 3, as well as the information technology needed to collect, store, analyses, and utilize the data. Item 4 deals with the procedures for obtaining value from the databases. The raw materials must be processed before they can be put to use.

The "inhabitants" of a strategy, or the workers of the organisation, are what make it successful. Lastly, it's important to decide on the best ways to gauge how well each component is doing. Each component of the social CRM system has potential dangers that the business must avoid.

C. Characteristics of Social CRM

The two aspects of social CRM that we envision are the CRM dimension and the social media dimension. The relationship start, maintenance, and termination phases of the standard CRM process are included in the CRM dimension. As the social media landscape is rapidly changing and new applications are constantly being released to the market, we make an effort to pinpoint the ways in which the emergence of social media influences each component. However, we do not make an effort to differentiate between particular types of social media.

DISCUSSION

Businesses are under tremendous pressure to participate where their consumers are paying attention as a result of the global growth in social media use. This centre of consumer activity is now increasingly virtual and is housed inside a social media or social networking site. Take into account how quickly both companies and consumers are embracing social media.

More than 500 million users were active on Facebook in 2010, with 70% of them located outside of the United States. Since Twitter's debut in 2006, more over 10 billion communications, or Tweets, have been transmitted by March 2010. That figure doubled to 20 billion by July. Also, in the Asia-Pacific area, 240.3 million people accessed social networking sites in February 2010, representing 50% of the region's overall internet population.

There is no doubt that companies desire to be located where their consumers are gathered. Social media has a huge potential to help businesses connect with their consumers and grow sales, save costs, and improve operations. Our data show that social media projects are rapidly emerging throughout enterprises, as could be predicted.

Traditional customer relationship management strategies, however, face intriguing issues as a result of employing social media as a platform for client involvement. The goal of CRM strategy, supported by procedures and technology, is to manage customer relationships in order to get the most value possible from customers throughout the course of the relationship. These tactics often focus on the tactical actions necessary to manage the consumer. Yet, with social media, businesses are no longer in charge of the connection. Instead, consumers and their enormously powerful virtual networks are now in charge of the discourse, and because of their unmatched immediacy and reach, they may surpass a company's marketing, sales, and service efforts.

A. Social customer relationship management is a fresh approach

Businesses must adapt to this change with a new approach called social CRM, which acknowledges that rather than controlling consumers, the company's job is to promote the kind of interaction and collaboration that its clients appreciate.

Building a social CRM strategy begins with understanding what consumers value, particularly when they are in the particular context of a social platform. What

prompts a consumer to look up a business or brand on social media? What might discourage a consumer from interacting? And to the extent that companies anticipate it to, can social involvement affect consumers' emotions of loyalty towards a brand?

More than 1,000 customers were polled globally by the IBM Institute for Business Value to learn who uses social media, what websites they visit, and what motivates them to interact with businesses. Also, we questioned 350 CEOs on their perceptions of the reasons why clients engage with their businesses. The businesses who believe customers are looking for them because they want to engage with their brand may be surprised by what we found. Customers are really far more interested in acquiring concrete value, indicating that organizations may be misunderstanding their own desire for customer intimacy with customers' reasons for participating.

Our study demonstrates that despite their adoption of social media, consumers have strong views about their interactions there, and it is important to remember that their desire to communicate with brands cannot be taken for granted or assumed:

All generations of consumers from across the globe are flocking to social media, yet the majority only sporadically engage. Despite the remarkable growth in social media use, only a very tiny proportion of users frequently participate by leaving comments on articles and creating original material.

Not companies, but friends and family are what matter. More than half of customers never even think about interacting with brands on social media. Social media and networking are about building close relationships with friends and family for them. What customers really want. We found wide discrepancies between what firms believe consumers care about and what customers said they desire from their contacts with enterprises on social media. Customers expect something concrete in return for their time, endorsement, and personal information.

The paradox of advocacy. Most companies think social media would boost advocacy, but just 38% of consumers agree, and more than 60% think that having a strong connection to a company or brand is necessary for social media involvement. Businesses need to come up with innovative methods to harness the power of the reliable social network.

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Customers are really far more interested in acquiring concrete value, indicating that organisations may be misunderstanding their own desire for customer intimacy with customers' reasons for participating.

Seventy percent of customers who were asked why they use social media or social networking sites said "Connecting with network of friends and family," while just 23 percent said "Interacting with companies."

In general, Engaged Writers are more likely to contact with businesses, but even they place this reason well down their list—"Connecting with friends and family" received a staggering 92 percent of the vote.

In fact, just over half of surveyed customers claim they never interact with businesses on social media. Spam and privacy concerns were the two main deterrents. More than a third of respondents also give plain old indifference in the brand as their excuse for not participating.

The majority of the 45 percent of people who do contact with companies say they will only do so if they believe the brand is being honest in its communications. Sixty-seven percent of businesses claim to have a culture that supports open dialogue with consumers, while a third were either ambivalent about it or believed their workplace culture did not support it. Customers may see businesses that struggle with openness as being dishonest or deceptive. Some firms could struggle to engage in social media discussions with the sincerity that has come to be expected from business-customer relationships.

C. Reality vs perception

The top two things customers say they do when interacting with companies or brands on social media are "receiving discounts or coupons" and "buying items and services," respectively. They place "reading reviews and product rankings" third, despite the fact that buyers often do product research before making a purchase.

Contrarily, CEOs claim that receiving discounts and making purchases are the two things customers are least interested in doing when asked why they follow their businesses on social media, which is the exact reverse of what customers believe. Another connected perception gap is shown by the same question. Companies are three times more likely to believe that customers want to engage with them in order to feel like a member of a community. Companies often exaggerate how eager people are to interact with them in order to identify with their brand. From the standpoint of the customer, these two tasks are really among the least attractive.

Customers are open to interacting with brands if they feel it will be to their advantage, have confidence in the firm, and choose social media as the best route for obtaining the value they want. A discount or special information might be included in such value. Consumers may get a sense of connectivity after interacting with a brand on social media, which is an emotional, intangible benefit, but most of them don't participate out of a desire for intimacy.

Businesses who wish to monetize social media should be happy to hear that consumers want to utilise social networks to transact with brands. Social networking is increasingly being used for social commerce, and we think that convenience, financial savings, and special deals will trump privacy concerns. Social media is becoming a more popular tool for consumers to get suggestions, evaluations, and opinions from friends, family, specialists, and the larger social community. Once people get access to this material, there may be a strong need to buy right away. Increasingly businesses are delivering business possibilities through social media platforms run by third parties, such Facebook. Customers were among the first to be able to choose items and make purchases straight. In 2010, Delta Airlines introduced a "social media ticket window" on Facebook, enabling users to make travel arrangements without visiting the airline's website. According to Delta, more people use Facebook while flying than any other website, making it a "logical starting place" for its effort.

D. The paradox of advocacy

Companies hope that interactions on social media will improve client loyalty. Consumers disagree on how big of an impact they believe these encounters will have, with many claiming that engagement requires passion. About three-fourths of the CEOs polled for this research think that engaging with consumers on social media would enhance customer advocacy.

On this matter, customers have differing opinions. Just 38% of respondents believe that their social media contacts with a firm will increase their loyalty to that company, 28% are indifferent, and 33% think that their interactions would not increase their loyalty to that company. They disagree on whether social engagement with a firm might affect the amount of money people spend there. Just 49% of customers think their interaction will probably result in future purchases from that business. 27 percent of respondents believe their use of social media won't have an impact on their spending, while 24 percent are undecided.

Additionally, for almost two thirds of customers, having a strong connection to a brand or company is necessary before connecting with it on social media. This indicates that most customers are more likely to engage with businesses they already know and love.

In other words, people who interact already have a strong affection for the brand or business, and just using social media to participate may not always lead to greater spending or loyalty. Yet, a referral from a friend or relative could be significant. Every time someone "likes" a business on Facebook or retweets its message on Twitter, the endorsement and influence of the social community is felt. By creating social media programmers specifically with the intention of impacting consumers emotionally and inspiring them to share their experiences with others, businesses may profit from this dynamic. An example of a business using social media to connect with customers based on shared values is the American Express Small Business Saturday programmer on Facebook. This programmed offers tangible value to both the company and the consumer.

CONCLUSION

CRM is based on the idea that a company can, and should, manage its connections with its clients to maximize

lifetime value, a goal that exclusively serves the firm's interests. New technologies like social media and others have given consumers more influence. Moreover, technological advancements have made it possible for customers to filter out CRM and advertising communications, shop around for the best deals using mobile devices, and communicate both good and negative brand messages to a large audience. To remain relevant in this market, CRM must develop new touch points that engage customers and benefit both businesses and customers.

REFERENCES

[1] M. A. M. A. Daqar and A. K. A. Smoudy, "The Impact Of Consumer Buying Behavior On Customer Relationship Management In The Banking Sector," Int. Rev. Manag. Mark., 2019, doi: 10.32479/irmm.8151.
[2] L. O. Amegavie, N. M. D. Mensah, and A. Jephthah Kwame, "Consumer Relationship Management and Its Effect On Organizational Performance Within the Telecommunication Industry of Ghana," Eur. J. Bus. Manag. Res., 2019, doi: 10.24018/ejbmr.2019.4.6.166.
[3] J. Sinha, S. Kant, and K. K. Ravulakollu, "Significance of intelligent agents in strengthening consumer relationship management," Int. J. Eng. Res. Technol., 2019.
[4] S. Sharpe, "Safeguarding brands in online review forums: The role of managerial response," J. Brand Strateg., 2019.
[5] J. E. Lee, M. L. Goh, and M. N. Bin Mohd Noor, "Understanding purchase intention of university students towards skin care products," PSU Res. Rev., 2019, doi: 10.1108/prr-11-2018-0031.
[6] M. D. Arco, L. Lo Presti, V. Marino, and R. Resciniti, "Embracing AI and Big Data in customer journey mapping: From literature review to a theoretical framework," Innov. Mark., 2019, doi: 10.21511/im.15(4).2019.09.
[7] Y. M. Teng and K. S. Wu, "Sustainability development in hospitality: The effect of perceived value on customers' green restaurant behavioral intention," Sustain., 2019, doi: 10.3390/su11071987.
[8] A. Mulyawan, D. Rosadi, and S. Mardira Indonesia, "Sistem Informasi Customer Relationship Management Cv. Junindo Pratama," J. Comput. Bisnis, 2019.
[9] I. G. Juanamasta et al., "The role of customer service through customer relationship management (Crm) to increase customer loyalty and good image," Int. J. Sci. Technol. Res., 2019.

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Development of Social Media Marketing

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Abstract*— A digital platform known as social media allows users to produce, share, and engage with media in real-time. It has developed into a platform that enables users to communicate with one another through social media accounts. Because of this, social media sites come and go often, which is one of the reasons why vine was shut down. The transfer of power from institutions to individuals has been social media's most important result. Users of social media now have a voice and a place to interact, work together, and co-create content for both themselves and others. It has been discovered that this user-generated material has a greater impact on customer behaviour and purchasing choices since it is seen as being more trustworthy.

Index Terms*— Platforms, Reach, ROI, Strategy, Targeting, Viral marketing.

I. INTRODUCTION

The idea of social media has grown to be crucial for today's technologically driven organisations and people. With regard to their interactions, work, and contact with others, these platforms have a significant influence on users [1],[2]. As long as one is also conscious of the difficulties connected with it, social media offers opportunity for interaction and engagement with the community. Social media is a notion that creates a new participatory culture in library patron interactions. Social media is "the use of web-based and mobile technology to transform communications into an interactive discussion." Social media are "websites and programmers that allow users to generate and share information or to engage in social networking [3].[4].

Social media is seen as the democratization of information, turning users from content consumers into content creators. Another change is the transition from a one-to-many broadcast system to a many-to-many approach that is based on interactions among writers, individuals, and peers. Moreover, social media is defined as a collection of web-based programmes that expand on the conceptual and technical underpinnings of Web 2.0 and enable the production and sharing of user-generated content [5],[6].

Promoting information sources and libraries. Marketing refers to the interaction and connection between a service provider and customer with the goal of meeting the demands of the customer. Since they assess user information requirements then collect and package content to satisfy those needs, library and information professionals are engaged in the marketing process. As a result, the marketing concept is founded on the idea that two parties—information experts and information users—engage in an exchange. This entails determining the requirements of users, conveying how libraries and information institutions may assist users in meeting those needs, and providing services in accordance with those needs [7],[8].

The main goals of library marketing are to increase user awareness of information resources and their accessibility, foster positive user interactions with information resources and services, and lessen the burden of any costs and waiting times associated with getting users the information they need. E-marketing is the practice of leveraging information technology and conceptualizing ideas in the context of a library to disseminate and advertise services that meet the requirements of both individuals and organisations. It alludes to the use of marketing tactics and concepts in electronic media, most notably the internet. According to Raul et al., e-marketing enables librarians to assist their clients in locating material online through a variety of channels, including e-mail, Facebook and related platforms, chat, websites, e-conferences, and blogs. Moreover, it strengthens interactions with clients and guarantees information consistency. Marketing library and information services and resources using social media. Users are drawn to social media, which also enables them to learn about chances for distant learning, knowledge sharing, and information locating [9].

Information specialists to be attentive in monitoring all of the comments made on their library's social media accounts and promptly replying to them. Crucially, they must base their choice of social media marketing's objectives and purpose on the particular requirements of their library. Kroski also advises using a popular social media platform, such Facebook or Twitter, to establish a library's online presence. Also, it is crucial to have a consistent presence across all social media channels the library uses, such. Establishing the library brand and tying all social media profiles to the website or mobile presence of the library by utilizing the same logo and colour palette. Burkhardt advises that it is essential to choose what to put on your social media platforms, including whether to provide library news and events, new library acquisitions, links to articles, videos, community information, images, and any other promotional materials.

The library uses a variety of social media channels to spread a consistent message. Making your "posts" more engaging is essential if you want to get more followers and connect with a large user base to promote your library.

Burkhardt proposes a number of methods for promoting a social media presence, such as connecting wherever feasible, interacting with others, running printed and online ads, and gathering a group of friends and followers to form an active online social community. With social media marketing, users and librarians may get better acquainted.

Information is now more accessible than ever via the internet, cloud-based services, repositories, online databases, and other means. Social media is crucial for marketing library services and goods to internet users since it attracts prospective patrons and provides much more than conventional techniques. After researching German academic and public libraries, the social media presences of libraries' marketing efforts. According to the report, social media is more efficient since it enables users to produce, interact, talk, and share information, which enables libraries to better engage with their varied user groups.

Many libraries employ social media platforms for video conferencing, advertising, and research help. How libraries might use social media and networking expertise to provide dynamic library services. Similar to this, contend that promoting information resources and services and engaging library users may both be accomplished via the use of video. It is required of librarians and information specialists to utilize social media to deliver information to consumers' doorsteps. The benefits of social media marketing over conventional marketing are emphasised by Jain as being timely, cost-effective, interesting and engaging, creative, collaborative, and interactive.

Web-based and mobile social media platforms enable highly dynamic spaces where people and groups may exchange, collaborate on, debate, and alter user-generated content. According to Statista, a global statistics source, the overall amount of time spent on social media worldwide in 2017 was 135 minutes per day, up from 126 minutes per day in 2016. Also, according to data, the percentage of total worldwide web traffic that was generated by mobile devices increased from 52.21 percent in the same quarter of 2017 to 51.89 percent in the second quarter of 2018. It also demonstrates that social media accounts for 80% of all mobile device internet use. This confirms the need for librarians and information workers to make full use of social media platforms, especially those with mobile applications.

Statista reports that as of October 2018, Facebook is the market leader with 2.23 billion monthly active users, YouTube has 1.9 billion monthly active users, WhatsApp has 1.5 billion monthly active users, Facebook Messenger has 1.3 billion monthly active users, WeChat has 1.058 billion monthly active users, and Instagram had 1 billion monthly active accounts. Facebook was the first social media platform to surpass 1 billion registered accounts.

II. DISCUSSION

The most popular social networks often include numerous languages, allowing users to communicate with friends and other users across political, economic, and geographical boundaries. Social networks now have over 2 billion members, and it is anticipated that these numbers will continue to rise as mobile device use and mobile social networks gain popularity. Individuals utilize social media platforms in a wide range of ways. Depending on the site, some are more focused on interpersonal contacts, continually pushing information and conversations, and enabling quick communication. Several social media sites emphasize community while showcasing and displaying user-generated material on others.

Making yourself more relevant in the rapidly changing digital world is now a problem for librarians. The problem for most librarians, according to Iwhiwhu et al., is to get patrons to the library and keep them there.

In order to promote their services and information resources, librarians are expected to reconsolidate, restructure, re-design, and repackage resources, as recommended by the research. By leveraging various social media platforms for certain objectives, libraries may efficiently sell their services and goods. For instance, a library might use Facebook to advertise forthcoming events, recently acquired materials, and new services.

By posting films to YouTube, many programmes, including conferences and seminars, may be promoted. According to Khan & Bhatti, who were quoted by Yi, Flickr may be used to distribute images of various library events and activities.

Blogs may be used to promote library services to online students. IM and Twitter may be utilized to promote a library's reference and research services. These technologies allow libraries to announce newly acquired materials and provide service notifications.

According to Ezeani and Igwesi , social media platforms let professionals like librarians take on new responsibilities by engaging in social interactions with users. This enables them to provide the essential connections, communication, and collaboration that are required for new and creative connections.

According to Igun , "librarians play a special role in the global information ecosystem. The essential control of information resources in both physical and virtual realms depend on their functions. Aras and C olaklar noted that in order to communicate more effectively and easily with their target audiences, librarians must have a thorough understanding of these groups' differences in terms of education, age, career, interest, and behaviour.

The interaction between sellers and buyers has historically been aided through communication, with sellers utilizing words, signs, and symbols to attract the attention of prospective consumers to their items and persuade them to purchase them. Although the fundamental purposes of marketing communications—differentiate, recall, inform, and persuade remain constant, the nature of marketing communications has altered due to the emergence of new

media systems, which are becoming more and more extensive and complicated. Real-time interaction has been introduced by Web 2.0 technologies, particularly social media, which has eliminated the previous limitations of time and place. The transfer of power from institutions to individuals has been social media's most important result. Users of social media now have a voice and a place to interact, work together, and co-create content for both themselves and others. It has been discovered that this user-generated material has a greater impact on customer behaviour and purchasing choices since it is seen as being more trustworthy.

For marketers, these changes in the consumer-brand connection have created new difficulties and possibilities. Due to the information spreading like wildfire on social media, marketers are in a hazardous situation where both physical and online brand-consumer interactions may have rapid, global repercussions. Yet, social media is a priceless chance to form long-lasting relationships with customers and to foster brand advocacy by promoting good brand interactions among customers. As a result, the substance of marketing messages and the manner in which they are disseminated have to change in response to these consumer interactions.

Researchers and business professionals throughout the world have taken notice of the social media platforms such as Facebook, Orkut, Myspace, and Twitter due to their widespread popularity. Social networking has attracted the attention of marketers as a potential new channel for building lucrative customer connections. In terms of a proactive, committed customer base, online consumer data, and fresh campaign ideas, researchers contend that the online environment may provide businesses structural asset, scale, and process advantages. Social media marketing has just begun to receive a considerable percentage of firms' marketing expenditures. Despite the exponential rise of SMM, several problems still exist. Marketers are still confused about how to gauge the success of their social media strategy, how it affects their bottom line, and how to utilize social media to establish and maintain connections with consumers that are valuable to them. However, social media research is still in its infancy and needs time to develop into its own marketing subdiscipline.

With this in mind, we rigorously evaluate earlier studies to identify a consistent theme in the body of social media literature and give a comprehensive analysis of the conclusions. We trace the development of social media research and look for underlying themes from the viewpoint of communication. We also put up a model that takes both conventional and social media communication into account. In order to provide structure and direction for future study, we want to identify the gaps that currently exist in the literature.

A. Social media's importance in marketing

The strategic emphasis for marketing has shifted from being product- and segment-centric to being customer- and relationship-centric, driven by the imperatives of improving marketing efficiency, growing market variety, and use of technology . Because of this new relationship-based marketing paradigm, academics and marketers must consider include interactive components in their strategies in addition to the classic marketing mix's components.

The term "social media marketing" is often used to describe the usage of online SMPs for marketing. SMM is described as the "usage of social media platforms to promote a company and its goods". This description resembles that put out by, who defined social media marketing as the "use of the current social media platforms for growing the brand recognition among consumers on online platforms via application of the WOM principles." Although these definitions of SMM all focus on the "promotional" side, they neglect the relationship advantages of engaging in social media conversations with customers.

SMM may benefit businesses in a number of ways. SMPs empower customers to communicate with companies in a two-way fashion in addition to facilitating the free interchange of thoughts and information among themselves. This serves to lessen customer bias against brands, increasing the value of the brand. Companies may give direction and enhance the conversation experience by actively engaging in online discussions, which will result in more relevant and focused material. This enables businesses to collaborate with their customers more closely on marketing campaigns and other initiatives.

The importance of social media as a point of entry to "a series of infinitely rich, dynamic, rewarding, strong, real and important discussions happening out there" in his book Join the Conversation. In contrast to conventional market research methods, social media provides a real-time window into the consumer mind through listening to customer discussions and a chance for the consumer to contribute real-time feedback. Hence, depending on what is "now," marketers may adjust their marketing mix, goods, services. The value of listening, which may improve brand strategy and tactics, assist in determining competition risk, address public concerns, and boost marketing effectiveness.

Conventional targeting strategies do not account for the impact that a segment's members have on other people's buying choices. This is primarily because it is difficult to identify the relationships that create and spread this impact. As social media is cent red on communities, data gained from social media may be used to create new, better targeting and segmentation techniques. By examining the social media activity of various age groups, found that the age-based segmentation of a "generation" may be reduced to a shorter and more relevant period of three years.

Understanding how people and user groups use online social interactions for various objectives and how various

SMPs are perceived are crucial for using SMPs as successful marketing tools. Thus, it's critical for marketers to understand how each new social media platform has developed in an effort to fulfil a particular specific need.

Brand communication on social media had a beneficial impact on relationship equity as well as brand equity. Customer equity was boosted by fostering good connections with customers and having a positive impact on purchase intent, while value equity was improved by offering consumers innovative value and the chance to engage in two-way communication with companies. Nevertheless, contended that interactive media may not always be preferable to conventional media. Advertising might be more successful, if it is experientially compatible with the media vehicle.

B. Customer Interaction on social media

Researchers have looked at the connections between ewe, online communication, and consumer behaviour. Yet, rather than the brand-consumer interaction, the majority of the study has emphasized the relationship between consumers. The number of variables in this situation has been suggested to be increased by various authors to include elements like empathy, relevance, and credibility. SNS features perceived enjoyment, satisfaction, privacy, and involvement and demographic factors. The conceptualization and application of consumer involvement in the online consumer-brand interaction have largely been ignored, despite its prevalence in social media literature. This can be due to the difficulty in comprehending this idea in the context of the whole consumer-brand relationship. Consumer interaction has elevated to a strategic research priority during the last ten years.

Despite the fact that there is already a definition for consumer engagement in online contexts, particularly in the context of social media, more convergence is still needed to conceptualize consumer engagement on SMPs and its function in the customer-brand relationship. We suggest looking at consumer engagement as a distinct concept in social media research since unique consumer-brand interaction encounters have varied degrees of consumer involvement depending on the environment.

The assertions about the usefulness of social media in marketing have no empirical backing. The issue is made worse by the lack of precise and defined metrics to assess the success of social media-based communication. Previous studies claim that consumer engagement has positive effects on customer satisfaction, loyalty, repurchase intentions, and word-of-mouth. However, it is still unclear how consumer engagement on social media affects the development of consumer-brand relationships and the likelihood that a consumer will choose a particular brand. Several research have examined the relationship between social media activity and consumer behaviour, however these studies did not take consumer participation as a distinct component.

Even the conventional response hierarchy models that describe passive communication do not take into account active customer interaction. In contrast to other relational definitions like involvement, commitment, loyalty, and participation, Bowden asserts that engagement is a unique entity within the larger engagement process since it fully considers interactive consumer experiences. Due to the ambiguous definition of engagement, Calder et al. contend that the majority of works seem to conflate involvement with the consequences of engagement.

According to Brodie et al., "involvement" and "participation" are prerequisites for customer engagement. These need not be strictly antecedents, however, and may coexist or even constitute engagement results given the iterative nature of the engagement process. We propose further study on consumer engagement on social media, its antecedents, and results in light of the uncertainty in the academic literature.

Do customers have diverse opinions on the various SMPs? If so, what characteristics underlie these differences? Fascinating results from Akar and Topcu imply that customers who use Facebook and YouTube more often have a favourable impact on attitudes towards social media marketing. This may suggest that the selection of social media platforms affects social media marketing. While the typology created previously makes clear that SMPs have distinct features, the defining traits from the perspective of the customer have not yet been investigated. Researchers may get insights into the distinctive positioning of each SMP by understanding the similarities and differences across SMPs, which might result in the formulation of a focused and successful SMM strategy. As a result, we suggest investigating the current SMPs to see how they affect customer purchasing behaviour.

C. Customer Engagement with Companies on social media: Profile

According to the examination of the literature, it is clear that many studies have tried to group Internet users into distinct categories based on things like their use of social media or their purchasing habits. Nevertheless, the majority of the categorization is restricted to certain platforms, such social networking or microblogging. It's critical to comprehend the traits of social media consumers who are eager to connect with and engage with companies on these platforms. According to Riegner and Smith et al., marketers are still unable to identify the influencers in social networks and online communities. In order to find the social media users engaging with brands and businesses on social media, the study of social media users must be expanded. Furthermore, it is important to comprehend user profiles and social media use trends, particularly for users outside of the United States and Europe. Very few research has been done to analyse and classify Indian social media users.

III. CONCLUSION

This research was motivated by the need for a comprehensive analysis of SMM from a communication standpoint. The present academic literature on social media is systematically analyzed, and the underlying themes in the body of work are effectively discerned. This study concludes the retrospective analysis by identifying three crucial research topics that will provide future research a stronger foundation. The study emphasizes the potential of social media for establishing a connection between brands and consumers and for using both online and offline interactions to shape customer behaviour. The study emphasizes the value of comprehending social media users' demographics and online activity patterns. Also, the report recommends that one of the most important factors in boosting the efficiency of marketing communications on social media is analyzing customer involvement.

REFERENCES

[1] I. P. Chiang, R. Wong, and C. H. Huang, "Exploring the benefits of social media marketing for brands and communities," International Journal of Electronic Commerce Studies. 2019. doi: 10.7903/IJECS.1547.

[2] S. C. Chen and C. P. Lin, "Understanding the effect of social media marketing activities: The mediation of social identification, perceived value, and satisfaction," Technol. Forecast. Soc. Change, 2019, doi: 10.1016/j.techfore.2018.11.025.

[3] S. V. Jin, A. Muqaddam, and E. Ryu, "Instafamous and social media influencer marketing," Mark. Intell. Plan., 2019, doi: 10.1108/MIP-09-2018-0375.

[4] B. M. A. Almohaimmeed, "The Effects of Social Media Marketing Antecedents on Social Media Marketing, Brand Loyalty and Purchase Intention: A Customer Perspective," J. Bus. Retail Manag. Res., 2019, doi: 10.24052/jbrmr/v13is04/art-13.

[5] M. L. Cheung, G. D. Pires, and P. J. Rosenberger, "Developing a conceptual model for examining social media marketing effects on brand awareness and brand image," Int. J. Econ. Bus. Res., 2019, doi: 10.1504/IJEBR.2019.098874.

[6] J. Abbas et al., "The effects of corporate social responsibility practices and environmental factors through a moderating role of social media marketing on sustainable performance of business firms," Sustain., 2019, doi: 10.3390/SU11123434.

[7] A. S. Arora and S. A. Sanni, "Ten Years of 'Social Media Marketing' Research in the Journal of Promotion Management: Research Synthesis, Emerging Themes, and New Directions," J. Promot. Manag., 2019, doi: 10.1080/10496491.2018.1448322.

[8] R. Anggraeni and D. Diana, "Analisis Pemanfaatan Social Media Marketing Terhadap Customer Loyalty Yang Menggunakan Brand Trust Sebagai Variabel Mediasi," J. Ris. Manaj. dan Bisnis Fak. Ekon. UNIAT, 2019.

[9] E. L. E. De Vries, "When more likes is not better: the consequences of high and low likes-to-followers ratios for perceived account credibility and social media marketing effectiveness," Mark. Lett., 2019, doi: 10.1007/s11002-019-09496-6.

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Customer's Role in Social Media Marketing

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Abstract— Jobs including customer service, support, success, and experience are known as customer service positions. The jobs range from assisting consumers with their shopping selections to managing their travel. Moreover, it entails helping clients comprehend your goods or services and offering assistance after the sale. The Social Web establishes a visible connection between your company or organization and its constituents' customers, suppliers, and influencers who all have established new roles for themselves and are actively in charge of the information they share as they weigh their alternatives. This section describes these new roles in business terms and demonstrates how to identify who is influencing whom and where the next big ideas are most likely to come from.

Index Terms— Customer, Mobile, Platforms, Strategy, Targeting, Trends.

INTRODUCTION

More than just technology, more than just social media sites where users share images and book reviews, the "social" in "Social Web" implies: The Social Web differs from previous, transactional web technologies in that it is less concerned with the "what" and more concerned with the "how, why, and among whom [1],[2]. The word "social" relates to the manner in which people interact; for example, friends need reciprocal recognition of a connection, while followers are more loosely related [3],[4]. The word "social" also sheds light on their motivations for interacting, which may be to gain knowledge, exchange stories, or work together on a project. As a result, the fundamental connections made between users of social networks and social apps, and the subsequent kinds of interactions between them, are a wonderful location to start learning about the Social Web and its link to business [5],[6]. The social graph, a term of art that simply refers to who you are (such as your profile), who you are related to (such as your friends or followers), and what you are doing, is what connects community members and defines it (e.g., status updates). The social graph is to relationship development what regular website links are to information network construction:

They specify the social ties. Online social communities are reduced to task-oriented, self-serve utilities without the social graph—without the profiles and the friends, followers, and other relationships that develop between them—much how a simple website or shopping catalogue may present itself [7],[8]. Think of a website like Yelp to quickly understand this. Yelp offers all the information need to organize an evening or other excursion, including reviews, ratings, venue details, and schedules. This is the type of thing that someone may accomplish on their own or on behalf of a small, well-established group of friends with a particular personal objective in mind: Locate a decent restaurant and then go to a concert, etc. With the exception of the user-to-user ratings and reviews that Yelp permits, it is the fundamental service that Yelp gives, and by itself it isn't especially social [9].

Yet if you go one step further, Yelp also turns into a social network. The transactional service transforms into a relationship-driven community when someone creates a Yelp profile and interacts with other Yelpers—what that's users of Yelp call one another. The inquiry should be "With whom would I want to do anything this evening?" as opposed to "What would I like to do this evening?" This is a very social reason, and what makes Yelp's social features function are the utility value (information and ratings) combined with the other Yelper's own profile and messages (the social components) along with whom they are linked. Yelp is powered by social technologies rather than transactional ones.

The possibility of meaningful engagement and cooperation is significantly boosted by promoting the growth of connections inside a collaborative community, across functional boundaries within an organisation, or between customers and workers of a company. Within a customer community as well as equally well inside an organisation, the production and sharing of knowledge (experiences) is driven by this sort of cooperative, shared experience. It functions for Yelp and in business networks that link clients with vendors and staff with clients. The secret to all of them is cultivating connections and offering opportunities for real, relevant face-to-face communication.

Partnerships and interactions are often based on a number of key participant behaviour. This section discusses the creation of conduct and usage regulations (also known as Conditions of Use), which are crucial for preserving a positive, cooperative atmosphere, as well as three of the most important actions: friending and following, reputation management, and moderating. Each of these is essential to creating communities with a purpose (including support sites, supplier networks, and staff knowledge sharing) and, therefore, to putting into practise a successful social business plan.

The foundation of cooperative social contact is friending—the mutually accepted connecting of profi les

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within or beyond defined groups. As in real life, some characteristics of the types of anticipated interactions and the environment for them are often implied by the numerous connections that exist between professionals (people). Relationships in a club or church vary from relationships at work in terms of context and expectations, for instance: In the context of the network in which this connection has been developed, there is also an expectation of value received in return for the follower relationship when someone chooses to follow another on Twitter or within an employee network built on a platform like SocialText. Individuals form connections in part to trade value with others they are connected to via those interactions.

In opposed to websites, where users often engage by navigating a self-service library of material, building relationships between professionals and the people they represent is a prerequisite for value exchange amongst community members. People may still upload articles, rate contributions, and do other things without these connections, but for what purpose? A fantastic example of this kind of content development and sharing is YouTube. As a consequence, the website receives a lot of traffic and generates a lot of buzz, but the "social engagement" often takes place at the level of individual content consumption rather than as authentically shared or collaborative experiences. Participants on YouTube share and use material in a far less social way than, say, Facebook users: When two people connect on YouTube, they often share or recommend videos they think the other person would find interesting. Contrast this with Facebook, where the bulk of sharing consists of thoughts, ideas, and discussions and takes place between users who have established a real (even if often fictitious) friendship bond.

DISCUSSION

From a personal to a professional setting, "friending" promotes knowledge production and improvement since it links individuals and makes it easier for them to collaborate. Once participants' awareness of a common stake or goal emerges, collaborative actions start to occur in contexts of connected friends. Working together rather than alone nearly always results in better results. Consider the training sessions for businesses that start with a survival scenario: Given the given circumstance, the group almost always comes up with a better solution than individuals working alone (meaning, the group members are more likely to survive!).

Communities created around shared content benefit from the duration process and its related activities, such as rating and recommending a photo, which enhances the community's overall body of content, enhances the user experience, and increases the value of membership. A greater shared outcome is produced by this kind of informal cooperation and public improvement. The practise of reputation among friends or coworkers in the social network is another way in which these actions of curating reveal themselves. Similar to how a picture is scored, a community member's contributions are also assessed, building their reputation. Whether adopting social technology inside the organisation or building an engaged, long-lasting community of customers or stakeholders around it, this feeling of "shared result" is what you are going for.

The ties that bind the community and convert it into an organically emerging social entity are ultimately supported and encouraged by the actions of friending, following, and similar publicly proclaimed forms of online social connections. It is crucial that the community members increase their dedication to the upkeep and welfare of the neighborhood as these ties are established. Even though many users have many friends, several social networking services have failed.

A. Joining a club comes with expectations

The topic of how social norms or standards of etiquette are developed and maintained within a community was left out of the discussion of connections and interactions and their significance in the establishment of a strong sense of shared purpose within a community. Flame battles, general bashing of newcomers, and cyberbullying are all plainly at odds with any attempt to build an online community. The regulations that specify and regulate participant behaviour are of essential significance in the design of any social interaction, whether it be as simple as posting on Twitter or as complicated as fostering creativity in a professional group.

The application of policies, usually referred to as Conditions of Use, and the practises of moderation go hand in hand in maintaining order and a clear sense of decorum. While whole volumes have been written on these subjects, there are certain fundamental ideas that need to be included in each community initiative under a social business programme. The successful deployment of a community or collaborative workplace also depends on effective moderating, which involves directing users and discussions within the restrictions imposed by the Conditions of Use.

Generally, the Conditions of Use will allow for the following, each of which contributes directly to the overall health of a collaborative community: Participation expectations, maybe governed by a reputation system that rewards contributions that are made more often and of greater quality. Ensuring that participants stay on topic within any given conversation in order to preserve the discussion's value to the greater community and to make it simple to locate the issues addressed again at a later time. Reducing behaviours within a normal company (or related) community that are manifestly counterproductive, such as bullying, the use of hate speech, publishing spam, and similar behaviours

Beyond these fundamental guidelines, moderation's role is to keep an eye out for emerging problems or ones that call for escalation. Moderation essentially serves to enforce the

Rules of Service by alerting users to offensive language, postings, or conduct. For more recent members who may not be acquainted with the community's more nuanced expectations or standards, moderation offers a feeling of security. When implementing social media and social technology programmes, moderation practises, terms of use (governing external communities, such as a customer or supplier community), and social computing policies (governing internal use of social technology, such as by company employees), together provide an organisational safeguard. An effective social computing and community moderation policy includes knowledge of who may engage, what is and isn't suitable for social channels, disclosure procedures, and more.

One more topic on preserving community health before we leave moderation—and go check Jake McKee's resources (see sidebar feature on Community Moderation) for further discussion on moderation best practises: For seasoned participants, moderation serves as a crucial release valve. Skilled moderators actually make it simpler (and more enjoyable) for the experts in a community to remain involved and to continue contributing in ways that benefit everyone by directing dialogues in the right direction and keeping discussions on track. Also, this aids in the overall creation of social community initiatives that are beneficial.

B. Customer Connections: CRM Embraces Social

CRM (customer relationship management) provides a data-driven foundation for a comprehensive customer life cycle in the conventional sales cycle. Offers are created based on prior transactions, insights about what a client could need next or when a specific customer might be ready for an upsell, and the wider purchase or usage patterns that exist throughout the whole customer base.

CRM is being modified to meet this new position of the customer on the Social Web, where they are now becoming an essential part of the sales process. Consider the Social Feedback Cycle in particular, as well as the function of a brand ambassador or an advocacy campaign that operates on social media. Each of them has a distinct development phase that can be explained in terms of the behavioural data that is now accessible, from tyre kicker to automobile owner to devoted customer to brand evangelist. Social media posts gathered by social analytics tools, for instance, might reveal precise information about a person's current position on the ascent to brand advocate (or descent to detractor) continuum.

The key social concepts of shared outcomes, influencer and expert identification, and general treatment of the market as a social community can be woven into some of the traditional CRM ideas and practises in order to effectively understand and manage this new role of the customer, based on relationships and shared activities that play out on the Social Web. In the social web, users establish connections for particular reasons like amusement, learning, or other ways to leverage the knowledge of the community to better achieve their own objectives.

In the context of social business, the objectives include increasing consumer knowledge of a product or service or expanding staff innovation and personal contribution value. By paying attention to the dialogues, the participants, and the connections between them, it is possible to comprehend how the general relationship between a company and its consumers is changing: The telltale signs may be seen in anything from the way goods and services are designed and introduced to the market to the discussions that develop about them on the Social Web. This offers a really essential window into what your stakeholders or customers are actually thinking and what they are most likely to do next. With relation to what is occurring on and around the Social Web, Social CRM, as it is now defined, provides you a potential competitive edge in both strategic planning and tactical reaction.

C. The New Influence Function

Think about a typical social media exchange between, example, a prospective consumer reading a review and a buddy on Twitter. Someone wrote that review, and they did it for a purpose. The identity of that person—consider profile plus connections—gives a hint as to the purpose of the evaluation. Moreover, the event that led to that assessment was the outcome of a business process.

A prospective consumer reading a review is really seeing the end product of a business process through the eyes of someone with an identifiable purpose or point of view, when seen in a larger context. If that motivation or point of view can be understood, you may determine the review's actual business effect (if any), apply this information to your company, and make the required adjustments to your internal business procedures that are producing the experiences that motivated the review. To understand and then optimise your processes to generate the discussions you desire, as well as to address and improve the processes that lead to the conversations you'd want to avoid, it is essential to know who is talking about you (and not just what they are saying).

The discipline that achieves this is Social CRM, which is covered in detail in Chapter 9 of this book. A few current business technologies and related practises are combined by social CRM. The "social" component is based on how individuals interact with one another, how relationships are managed, and how the life cycle of a relationship and its different trigger points are studied. Traditional customer relationship management (CRM) focuses on clients and previous commercial dealings that they have had with your company or organisation. The systems that underpin the standard CRM installation collect all of the interactions and data around customer transactions, including what was bought, what was returned under warranty, which services were renewed or upgraded, and by whom. When combined, it's a fantastic resource for sales knowledge that is based on

actual historical actions. As a consequence, CRM is a fundamental best practise in the majority of top companies and organisations.

Consider customer relationship management as it is now used in many top companies, where past sales data is utilised to enhance the subsequent pitch and prolong the client life cycle. Similar in principle to traditional CRM, social CRM extends throughout your whole company and encompasses the full customer experience, including external influencers. It also operates on a feedback loop and is data-driven. What makes social CRM so potentially effective is a knowledge of the current function of the customer in your organisation, together with the role of influencers and a subsequent capacity to communicate with them much as with customers.

Noting that customer relationship management systems are often utilised by Operations in addition to educating Marketing with respect to customer trends and business challenges is very essential and provides significant insight into what distinguishes social business from social media marketing. Social CRM uses data and procedures in the same comprehensive manner. The divisions and operations inside your company that actually provide the client experiences are referred to as "Operations" in this context.

Beyond product marketing, CRM data and associated analytical tools are often used to gauge phone unit staffing levels, uncover new innovations, and detect warranty-driven design or product use/misuse concerns. A large portion of this takes place outside of the marketing department, particularly in businesses where marketing is more directly correlated with communications and advertising than with product development and business strategy.

In light of these elements, what exactly is social CRM? Simply said, it's a method of doing business that explicitly acknowledges the importance of the consumer and outside influencers in comprehending and controlling talks about a certain brand, product, or service. If the mention of "conversations" appears to limit the definition, take this into account: In the context of modern business, a conversation is nothing less than a comprehensive, digital artefact that captures and communicates the whole of what your company or organisation has accomplished. Indeed, markets are dialogues.

All of the characteristics defining the connection are based on transactional data from the past, including purchases, phone conversations, and other past-tense activities. From the perspective of the consumer, the situation is over and the person's job as a customer is over.

In contrast, Social CRM uses a collaborative, forward-thinking method to bring the consumer inside your company or organisation. It acknowledges what has occurred, much like conventional CRM, but goes one step further by asking, "How can this product or service be made better?" to invite the customer into the processes that control what is going to happen, may possibly happen, or should never happen again. All parties involved in the company or organisation, including its partners, suppliers, and workers, participate in this kind of forward-looking cooperation. It is the foundation of a holistic methodology and strategy that is created and put into practise to delight consumers. It is a whole-business, future-focused approach.

CONCLUSION

The use of marketing technology enables the promotion and realization of shared corporate resources, such as products and services, as well as the selection of efficient promotional strategies for each product to help the customer. Also, it improves the effectiveness of their operations. In order to communicate with prospective consumers in the digital economy, utilising social media for marketing will immediately and consistently enhance brand loyalty. As a result, many businesses recognise the significance and need of doing so. However, it is crucial for businesses to continuously analyze and adapt their social media marketing strategies to stay up-to-date with the latest trends and techniques. With the potential for high ROI and improved brand reputation, social media marketing is a critical component of any modern marketing strategy, and businesses that invest in it are better equipped to succeed in today's highly competitive marketplace.

REFERENCES

[1] H. M. Y. Diebes and R. A. M. Iriqat, “Social Media As A Strategic Marketing Communication Tool In Palestinian Mobile Telecom Companies - Business To Customers Relationship Perspective,” Int. Rev. Manag. Mark., 2019, doi: 10.32479/irmm.7714.

[2] D. M. Ghoshal, “Social Media as an Effective Tool to Promote Business- An Empirical Study,” Glob. J. Manag. Bus. Res. E Mark., 2019.

[3] H. K. Kalejahi, M. Ramezani, and R. Rostamzadeh, “Impact of social media on brand commitment: Testing the mediation role of perceived value and brand image,” Int. J. Bus. Environ., 2019, doi: 10.1504/IJBE.2019.097966.

[4] N. Michailidou and M. Goula, “Customer’s Welcoming in the beauty insitute,” Heal. Res. J., 2019, doi: 10.12681/healthresj.19636.

[5] M. Grzesiak and K. Bilińska-Reformat, “Young Consumers’ Behaviours In Social Media And Their Impact On Personal Brand Development,” Zesz. Nauk. Wyższej Szk. Humanit. Zarządzanie, 2019, doi: 10.5604/01.3001.0013.5209.

[6] M. Al-Ghalibi, A. Al-Azzawi, and K. Lawonn, “NLP based sentiment analysis for Twitter’s opinion mining and visualization,” 2019. doi: 10.1117/12.2522679.

[7] N. M. Sheriff et al., “Salient Features Of Customer Engagement, Visual Presentation And Copywriting For Effective Social Media Marketing: An Exploratory Perspective,” J. Acad. UiTM Negeri Sembilan, 2018.

[8] N. Dsouza and J. Paulose, “An approach to finding customer-value and devising marketing strategies by using data-mining techniques,” Int. J. Mech. Eng. Technol., 2018.

[9] A. Zachari, Y. S. Nawar, and E. Javaherizadeh, “The impact of sexuality in advertisements on consumers purchase

behaviour: A social media perspective," Bus. Manag. Rev., 2018.

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Growth of Digital Gifting by Social Marketing

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***Abstract*— The usage of social media and the internet has altered both consumer behaviour and how businesses operate. Organizations have a lot of chances thanks to social and digital marketing, which lowers expenses, raises brand recognition, and boosts sales. But there are serious issues with poor internet word-of-mouth and unwanted, obtrusive brand presence. Social marketing's role in the expansion of digital gifting is helpful to save time of buying the gift in offline.**

***Index Terms*— Advertising, Audience, Branding, Campaigns, Channels, Content.**

I. INTRODUCTION

A social media is a kind of virtual social structure made up of various groups of people, businesses, and organizations. The dyadic relationships between these entities are defined [1],[2]. The social network platform offers a variety of tools for examining and understanding the social actor structure. Social media platforms enable interaction and connection building between businesses and people [3],[4]. Customers may communicate directly with a firm about a particular query or issue when they are present on these social media networks. Compared to conventional offline marketing and promotion strategies, this contact may seem more personal to consumers [5],[6]. This one-on-one interaction has the power to inspire loyalty in prospective customers and followers. Also, by choosing who to follow on social media platforms, businesses or goods may reach a specific, narrowly targeted target audience while simultaneously reaching the followers' many connections [7],[8].

Social media marketing is becoming into a crucial component of advertising firms via online media as a result of the quick changes in marketing methods. According to research, prospective online users are hesitant and undecided about using social media marketing over the long run. As a result, it's important to pinpoint some of the reasons why customers like or unfollow certain brands on social media. The usage of social networks has rapidly expanded along with the worldwide expansion in internet access. Both urban and rural populations are joining social networks as a result of lower data rates. Facebook, Twitter, LinkedIn, Instagram, and other popular social media platforms are included. Marketers must concentrate on using social media platforms to promote their businesses and goods. These options include the ability to share photo galleries, wall posts, blogs, tweets, videos, and more [9].

Social media facilitates the development of relationships between users from various backgrounds, creating a strong social structure. Massive volumes of information are produced as a conspicuous byproduct of this structure, providing consumers with superior service value proposition. One issue with this information overload, however, is that consumers often struggle to discover reliable information that will help them when they need it. Social media platforms have already become so ingrained in our daily lives that people rely on them for a wide range of needs, including daily news and updates on important events, entertainment, connecting with family and friends, reviews and recommendations on goods and services, and finding new hash tags, to name a few.

Social media platforms like Facebook, WhatsApp, Twitter, YouTube, LinkedIn, Pinterest, and Instagram often spring to mind when we talk about it. User-generated content powers these apps, which have a significant impact on a wide range of contexts, including business practises, political concerns, and venture capitalism. With 1.97 billion monthly users as of April 2017, Facebook is in the enviable position of dominating the social media industry. In addition to postings, social media platforms are inundated with picture and video uploads. According to latest statistics, Snapchat records around 400 million snaps every day, with about 9000 photographs posted every second. Two million companies use Facebook advertising, despite their being 50 million active businesses on Facebook business pages. It seems that 88% of firms utilize Twitter for marketing.

For the last several years, researchers and professionals have researched and investigated social media's numerous facets. Organizations use social media mostly to get input from stakeholders. Another significant component of social media is user evaluations, which raise questions about the validity, reliability, and authenticity of the material. The idea of micro blogging has become increasingly popular in part because online communities have been effective in uniting individuals with comparable interests and objectives.

Although reports on current events or personal status updates dominate social media communication, other postings are support seeking, where users ask for aid and support. It's interesting to note that certain messages have been identified as socially draining ones that create social overload, leading other users to have unfavourable behavioural and psychological effects because they feel obligated to reply.

Information systems academics have been interested in social media as a result of its importance to a variety of

stakeholders and the multiple negative effects linked to its usage. The many academic publications that have been published in several places serve as proof of this. Before beginning a new research endeavour, researchers must invest a significant amount of time and energy in gathering, analysing, and synthesising data from previous efforts. Considering the sizeable amount of published studies, a thorough and systematic evaluation may be quite helpful for academics planning to do social media research. According to our literature search, there exist evaluations of social media in the context of marketing.

Nevertheless, there isn't a thorough analysis that combines and synthesizes the data from publications that were published in journals for information systems. A full intellectual platform will be made available to academics via such an endeavor, which will also provide them a holistic picture of the social media research that has already been done. This will assist progress the field's study in this quickly increasing sector. In order to do this, this study looked at pertinent papers to clarify the major theme areas of research on social media, including its advantages and knock-on consequences. The ensuing study is anticipated to act as a one-stop resource, providing information on what has been done so far in terms of social media research, what is being done now, and what obstacles and possibilities lie ahead.

II. DISCUSSION

The way information is sent to and from individuals throughout the globe is changing as a result of social media. The use of social media is altering how businesses react to customer demands and desires as well as to rivals. With the aid of social media marketing technologies, marketers now have the chance to participate in more expansive and creative online mass media communications. Passion, emotion, and sincere expression for a brand are key components of social media marketing. Consumers may communicate with one another in the virtual world and share their thoughts and opinions about brand value thanks to the development of social media and, by extension, eWOM. Hence, social media marketing offers communication chances for businesses to reach a broader audience, as well as access to useful data that has an impact on developing and sustaining client connections.

Social media marketing is becoming more crucial to marketing strategy as a result of the rise of social media, which has enabled improved situational awareness in international online contexts. . The author determined that may profit from a gap in the South African tyre market based on the literature evaluations. Among the top four tyre producers are Bridgestone, Continental, Dunlop, and Goodyear. As of right now, none of these regional tire producers are active on social networking. Businesses utilize a variety of social media sites, including Facebook, Snapchat, Twitter, and others, for social media marketing. Platform selection is influenced by marketing strategy and target audiences. The social media marketing strategy of using Snapchat to reach young customers. According to the study's results, Snap chat is the most private, laid-back, and dynamic platform for sharing information, interacting with others, and having fun. According to the report, young customers seem to have a favorable view of Snapchat, which is reflected in their purchase intentions and brand loyalty.

Tafesse and Wien examined a variety of business strategies, including transformational marketing, in which the experience and identity of the focal brand exhibits desired psychological characteristics, informational marketing, in which factual information about a product or service is presented in plain language, and interactional marketing, in which social media advertising fosters ongoing interactions with customers and message strategies. According to study interactive brand postings received more responses than message content that was educational. Twitter performed better in terms of informational appeal. The research showed that Instagram was better suited for interactive material combining informative-entertainment appeals whereas Facebook performed better for interactive entertainment postings. The most popular brand postings on Facebook and Instagram were interactive and had a variety of attractions, while the least popular were self-centered and educational.

The success of marketing communications is significantly influenced by content marketing. The utilisation of emotions in a message has been suggested to have a substantial impact on customer behaviour in certain literary works. In their 2018 research, Hutchins et al. examined eleven B2B firms' marketing materials. It was shown that utilising emotions in content marketing might lead to a competitive advantage and enhanced brand \sequity. How businesses should distribute their films was the subject of certain research. A live streaming-oriented strategy is more authentic in the eyes of consumers than pre-recorded videos, according to Nag et al., who used a scenario-based experiment with 462 participants and applied social impact theory to reach this conclusion. This is because live streaming increases consumer searching and subscription intention.

A. Marketers, social media messaging features are crucial

For instance, employed motivation theory in the context of tourism to get the conclusion that user pleasure is positively impacted by completeness, relevance flexibility, and timeliness of the argument, quality, and source credibility. This in turn may influence user intent, influencing whether visitors are likely to return to the website and buy the tourism-related item. The message structure has been found to have a substantial impact on customer behaviour, including attitudes about brands, corporate trust, and purchase intentions. While creating their

social media marketing strategy, businesses encounter various obstacles.

The importance of marketing communications have changed, and using social media marketing is a logical next step. First mover advantage would be granted since the local tyre maker would be the first to start Facebook and Twitter social media profiles. The advantages would include raising a brand's profile online, giving customers a way to investigate tyre manufacturers online, and giving them new venues to communicate with the brand and other tyre buyers.

For the last five years, social media has driven a new consumer sector in the Indian market, which is strategically significant. Due to relevant awareness, salience, and buzz generated on social media by the top brands across categories, the digital gifting sector took off and increased by over 30% year-over-year during the previous five years.

In order to leverage the power of recommendations and interactions with fans and followers to drive the benefits of digital gifting, social media has played the most significant role, receiving a share of over 70% of the resources of brands. As a result, social media has become the sole go-to market strategy for the majority of the leading brands in this industry. Some intriguing conclusions have been revealed through an analysis of the social media activity of fifty businesses spanning twenty consumer product categories during the last four years.

B. Expanding the fan and follower base

At the first stage, brands have successfully expanded their fan and following bases by using the power of social media. Brands have introduced digital gift cards throughout their ecosystem of brick-and-mortar shops, e-commerce websites, mobile applications, and institutional business teams. By social media programmes that effectively encourage people to follow brand activities, this portfolio has grown.

With the help of social media, companies like Café Coffee Day, Fastrack, Titan, and PVR Cinemas have amassed a following of more than 10 million people who now understand the advantages of digital gifting over more conventional forms of giving. These advantages include giving recipients the freedom to choose their own gift, outpacing gift certificates technologically, enabling consumers to load variable value, enabling part-redemption, enabling an adequate real-time management information system, making account reconciliation simple, and providing high security with no risk of theft.

Brands should analyse the fan bases on the numerous social platforms they utilise in order to design the dynamics of their marketing programmes. The information and profiles that the platforms provide make this possible. At this phase, it's crucial to measure and keep an eye on how many relevant followers the company has gained via its use of different offline, internet, and social media platforms. Yet building up this basis takes time.

C. Linked Local and Social Marketing

Social media platforms provide businesses effective ways to monitor the psychographics and demographics of their followers and customers. Brands must examine the website and app engagements in order to analyse this audience. Twitter, Facebook, Pinterest, and Instagram all help businesses monitor and efficiently push certain marketing messages.

Using criteria like sex, interests, profession, location, and age group, marketing analytics give deeper insights into customer profiling. Based on segmented business goals, these social media analytics and data have allowed gift-card-powering firms like Woohoo to generate a 400 percent ROI on transaction-specific interactions with local retailers and shops in targeted areas in Tier 2 and Tier 3 cities. Brands have been able to increase engagement levels and generate ROI for their marketing expenditures thanks to the ROI of such social to local marketing.

D. Regularity of Relevant Activities

The effectiveness of brand-specific postings in terms of interaction is crucial for maximising the return on investment of social media efforts. Tone, timing, and relevance to certain audiences are crucial factors that help marketers further customise their content so that it appeals to their fan base. Brands have mostly leveraged Facebook and Twitter as interaction engines for their digital gifting initiatives. To encourage productive interactions with Facebook and Twitter's platform improvements, the goals have been made even more difficult.

Companies made the most of the first stages of their Facebook presence to significantly increase organic reach. Brands have adjusted their approach to promote interactions by enhancing postings meant to appeal to the desired targeted demographic as a result of the adjustments made. For instance, with the debut of new movies on Fridays, theatre companies like PVR have teamed with the mobile gifting business Woohoo to encourage successful interactions there. Since more fans look forward to participating on Fridays to hear about new film releases and give digital giving choices to their loved ones, this has made the interaction quality with their fans more effective.

According to analysis, Facebook videos get the most interactions in the form of shares, while photographs and links mostly receive "likes" and comments. Amazon and Myntra are two examples of companies that intentionally combine their social media content to target and engage the right audiences for their individual gift card promotions. Tweets on Twitter circulate fast, making it a medium that is significantly more contagious. Companies like Café Coffee Day add fascinating animated GIF pictures and memes to their gift card tweets to make them stand out. These additions have increased retweets by over 200 percent.

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E. Social Retention through Conversions

In the current environment, businesses must secure social and emotional commitment rather than just transactional devotion. Even if not all conversations are meant to increase sales and foot traffic, marketers must set up analytics to make sure that engagements are recorded. Top companies with a large retail network, such as Titan, Fastrack, and Helios, have integrated their social media presence into their store systems so that transactions and foot traffic can be tracked and managed in real-time. This allows for the analysis of the impact of social media campaigns for digital gifting with regard to: digital gift card value activated digital gift card value redeemed digital gift card reloaded time elapsed between activation and redemption

Engagements may also take a no transactional form and be created by companies with a particular goal in mind. Some of the conversion strategies used by companies like Boohoo for its gifting app include: encouraging fans and followers to download the Boohoo app from the play store; encouraging viewers to watch a new brand's YouTube video; encouraging trial uses of a gifting product launched for specific markets; encouraging awareness of a new e-commerce gifting portal; and encouraging corporate clients to consider their reward requirements. It is crucial for businesses to generate ROI in line with their unique goals. Also, retailers should discover a way to find out how visitors found their website and what influenced them to make a purchase there. For creative and marketing services, this is often quite simple since they typically need the consumer to fill out a form that helps the merchant better understand the client's transactional experience.

F. Social persona consistency

Consumer behaviour on social media consistently diverges from customer behaviour on physical products. Brands see that their customer base exhibits very high levels of transactional loyalty but low levels of social media loyalty. This suggests that the social media persona falls short of what brand consumers are expecting. Brands must thus reevaluate and create content that speaks to both populations. The perception of the brand by fans and followers is crucial to the long-term success of the social media strategy. In order to evaluate the situation and make plans for the future, it is crucial to use efficient social media tools to analyse this trending measure. Special focus should be placed on how consumers are addressed in comments and complaints, as well as in social media recommendations.

G. Encourage Your Critics

Companies who have helped disgruntled customers and followers are considered as those that are effective in promoting their digital gifting items on social media. On social media, pleased customers comment more passionately than disgruntled customers. By providing excellent solutions quickly and demonstrating real concern for the issues raised by their supporters, brands have used this knowledge to turn their detractors into fans. Successful businesses have learned to use their social media issues as a strength rather than being defensive or hesitant to respond to criticism on social media.

H. The Ace, King, and Queen Are Relevant Content

Brands must engage their fans and followers in forums where they may express their opinions in order to have a successful social media presence. Contrary to the conventional notion of brand advertising, this. Companies have seen quicker growth in their social media interactions when they have offered a reasonable point of view on issues and been able to provide supporters with clear justifications.

Brands must be perceived as personable and accessible, having a viewpoint on issues important to their target audience. With the appropriate brightness, marketers have communicated with their followers about the favourable emotional state of mind associated with digital giving through gift cards. Brands like Allen Solly and Arvind have commemorated holidays including Raksha Bandhan, Mother's Day, Father's Day, Teachers Day, and festive festivals like Diwali, Durga Puja, Onam, Pongal, and Sankranthi. Companies emphasise the usefulness of gift cards for giving to friends and family on certain occasions in ways that appeal to their consumers.

I. Users make the best content possible

A lively content base that is utilised for certain occasions to foster virality has been created by successful businesses by leveraging their fan bases. Brands like Shoppers Stop have used their social media platforms on special days like Valentine's Day and Friendship Day to encourage their fans to share and create content in the form of videos and images, engaging and showcasing the advantages of digital gifting to their user base. This is similar to how Google allows external contributors to design the Google Doodle for specific events. With the posting of these user-created photographs on social media, Woohoo, a new mobile gifting company, produced more than 1200 interactions among customers in their target demographics on Friendship Day.

J. User-Friendly Value Clarity

Consumers, users, and brand followers are pressed for time in their everyday activities in the age of information overload. Brands must in this situation provide a message of value that is relevant to the user. It's important to deliver brand-related updates and details about sales and promotions in a way that quickly appeals to social media users. Chains of lifestyle department stores consistently provide engaging content to their Facebook, Twitter, and Instagram digital gift card portfolios. Using the information posted on social media, this has allowed users to increase sales at their shops.

III. CONCLUSION

Also, social media marketing enables companies to communicate directly with current and future clients. As a

result, connections are formed, which may generate more business and devoted clients. Social media furthermore offers organisations helpful insights into client behavior and trends. Organizations must deliberately employ social media marketing to appeal to their target audiences as more customers use social media every day for activities like reading the news, researching goods, and enjoying entertainment. The inability to measure and analyses constructs of interest using suitable scales, the ongoing changes to both established and new social media platforms, and the use of social network analysis are obstacles to utilizing social media to reach customers.

REFERENCES

[1] K. Kumar, "A Study Of The Growth Of Digital Marketing In Indian Scenario," Pramana Res. J., 2019.
[2] C. H. Padmaja and P. Venkata Durga Rao, "The rise and growth of digital payments in India," Int. J. Innov. Technol. Explor. Eng., 2019, doi: 10.35940/ijitee.L3263.1081219.
[3] C. Leong, S. L. Pan, D. E. Leidner, and J. S. Huang, "Platform leadership: Managing boundaries for the network growth of digital platforms," J. Assoc. Inf. Syst., 2019, doi: 10.17705/1jais.00577.
[4] D. Andrews, C. Criscuolo, and P. N. Gal, "Productivity Growth in the Digital Age," OECD Going Digit. Policy Note, 2019.
[5] I. A. Ajah and C. C. Chigozie-Okwum, "Prospects of ICT for digital growth and national development in Nigeria," African Res. Rev., 2019, doi: 10.4314/afrrev.v13i3.17.
[6] K. Bhide, "Growth of Digital Payment System in India," Think India J., 2019.
[7] T. Ravikumar, B. Suresha, M. Sriram, and R. Rajesh, "Impact of digital payments on economic growth: Evidence from India," Int. J. Innov. Technol. Explor. Eng., 2019, doi: 10.35940/ijitee.L3432.1081219.
[8] P. Coll and J. L. Micó, "Influencer Marketing in the Growth Hacking strategy of digital brands," Observatorio, 2019, doi: 10.15847/obsOBS13220191409.
[9] M. Muhos, M. Saarela, D. Foit, and L. Rasochova, "Management priorities of digital health service start-ups in California," Int. Entrep. Manag. J., 2019, doi: 10.1007/s11365-018-0546-z.

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Impact of Social Media Marketing on Purchase Decisions

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***Abstract*— A new kind of online media that incorporates involvement and interaction is referred to as social media. It may also be referred to as a digital tool that enables users to produce and disseminate information to a wider audience. Social media is the shift in people's attention to online platforms that allow them to exchange, find, and consume information. The evidence that social media is a link between sociology and technology that fosters a setting for individuals to exchange experiences and establish networks, which may or may not be official. Impacts of Social Media Marketing on Customers' Purchase Intentions and Social Media Marketing's Influences on Consumer Attitudes**

***Index Terms*— Consumer, marketing, Management, Marketing, Social Media.**

I. INTRODUCTION

It makes use of a digital platform, which may be portable or fixed. Unlike conventional media, it requires engagement with friends, family, or the general public and is not passive in terms of communication. Participation, openness, and dialogue are some of its traits. It also encourages community engagement and embraces connectedness. Facebook and Snapchat are a few prominent examples of social media. As long as they have internet connection, everyone may participate in social media. It simply needs you to sign up. With the exception of few instances of sexual material, it is generally open and unedited [1],[2].

A. Social media marketing

Using social media platforms and online communities to advertise goods and services is known as social media marketing. Social media marketing therefore makes advantage of people's natural conversational platforms to create connections that serve to meet demands via feedback. Social media marketing is described by Dwivedi et al., Yadar and Rahman as a concept that promotes connectedness and interactions between current and potential consumers. As a result, other researchers like Tuten and Solomon and Choi et al. conclude that the main objective of social media marketing is to support companies since it links customer pleasure and buy intentions with brand loyalty and consumer shares [3],[4]. According to Dwivedi et al., conversations that were centred on the market's offerings gave rise to the idea of social media marketing. The knowledge from other users' experiences might then be shared with users via these conversations. As a consequence, social media marketing has made it possible for businesses and individuals to engage in open discussions that welcome comments and allow for influencing a larger audience [5],[6].

B. Consumer Behavior

Consumer behaviour is the study of how people decide how to use their resources, such as time, money, and effort, towards purchasing consumer-related goods. It was described by Engel, Blackwell, and Miniard as the behaviours and choices that individuals make while making purchases for their own consumption. As a result, it was defined by Loudon and Bitta as the physical action and decision-making process that customers participate in when they access, acquire, use, or dispose of the aforementioned products and services. In essence, it involves researching the products that consumers purchase as well as their purchasing patterns, to name a few [7],[8].

According to Assael, customers influence an organization's profit and sales since they make the purchase choices, hence it is crucial to comprehend consumer behaviour. They thereby control whether a company will be profitable. In order to understand or anticipate how a customer will act in relation to market offers, consumer behaviour is examined [9].

C. Social Media's Past and Present Trends

While social media seems to be a recent phenomenon, its origins date back to the 1950s, when the computer age first began. Technology of today is the outcome of social media's ongoing evolution throughout the course of preceding centuries. The first social media platform, Usernets, was introduced in 1979, and it has been a long road from Usernets to Facebook. Social media has replaced traditional company marketing since the 1990s and is now used by almost all big and small business organisations. After bulletin board systems, which enabled user login and interaction, usernets allowed users to post on newsgroups.

Social media is a game-changer because it gives communication at the individual and corporate levels flexibility. Ten organisations enhance their ranks, revenue, leads, and traffic while networking with their customers by

using search symbols in social media marketing. Moreover, social media optimisation increases commerce for companies.

Social media marketing assists firms in maximising their strategies, leading to excellent Return on Investments, by creating clear goals and objectives. Throughout the 1990s, a lot of social networking websites were developed, including MoveOn, BlackPlanet, and Asian Avenue. There were also created other blogging platforms like Blogger and Epinions. The emergence of several social networking websites by the year 2000 gave social media a huge boost. Among those launched were Wikipedia, Cyworld, and LunarStorm. Sites like MySpace, LinkedIn, Tribe.net, Facebook, Yahoo, and YouTube were launched one after another starting in 2002. .

Also, social media marketing aids in goal-setting, understanding your audience, doing research and development, discovering other social networks, and giving you the power to choose important subjects for your company from online information. Social media marketing aids in boosting brand recognition for businesses.

Brand awareness is helpful in educating consumers about a product. According to Cohen, your brand identity should thus overwhelm your products and services. The corporation may develop a solid social content strategy by picking the appropriate social media platform for promoting its items. It is possible to keep track of all parameters, including reachability, connections, and customer interactions. Last but not least, social media marketing provides viral marketing on any trending subject. This communication is being sent from one person to another in an effort to foster business-friendly objectives. The ALS Ice Bucket Challenge, which attracted more media attention by including the whole world—including celebrities and businesspeople—is an example of viral marketing. Yet, with billions of dollars being spent on consumer commercials, Facebook, Google, and YouTube have been among the most prominent websites regulating social media marketing. Twitter has also been thought of as a more responsive website owing to its real-time information on a large number of followers. Moreover, new online businesses like TikTok are attempting to join social media networks in order to compete with the latter social media mogul.

II. DISCUSSION

Customers consider suggestions made by friends and online acquaintances on social media when choosing between pricey and affordable items. According to Mayfield's analysis of the connection between social media and consumer decision-making, social media has an impact on consumers' intents to buy products, attitudes towards advertisements, and brand quality.

In the end, customers may influence their choices and preferences indirectly rather than directly affecting how they make purchases. Also, strong branding influences how people make purchasing decisions. Moreover, it has a direct influence on their choices to buy things when friends of corporate customers publish recommendations about certain products on social media. Yet, brand-provided social media advertising has an impact on consumers' opinions and purchasing intentions. Marketers may design their strategy to acquire and keep consumers using the facts above. According to Kumar et al., social media is a common technique used by marketers nowadays for marketing initiatives. Due to the low cost of promoting their products and services on social media, it is simpler to interact with clients in this way. Another research looks at how social media serves as a form of branding since it allows potential customers to interact with one another as brand ambassadors rather than just for advertising. Social media is often used by customers to research products and make purchases, which may be advantageous for advertising. Although Gebauer et al. acknowledge that the global market for online consumers is flourishing, they also present a segmentation of the global cultural system.

For instance, if customers have pressing concerns about a firm's goods or services, they might contact that company via social media, which is a simpler approach to voice their complaints. Also, businesses struggle with how to respond to customer complaints on social media, yet such replies may strengthen a brand's reputation and influence customers to buy its goods and services. Every single piece of information a business shares with its customers immediately affects how they make decisions. Companies may use social networks, virtual worlds, blogging platforms, and online gaming sites to advertise their goods and services, provide 24/7 assistance, and build an online community of brand aficionados. Social media platforms are not only for advertising, but also serve as a draw for marketers, according to industry surveys on social media marketing. Akhtar the conventional forms of selling have been modified to purchase technological breakthroughs. Peer evaluations increasingly have an influence on customer purchasing behaviour because to social media, a technological medium.

Heinonen further notes that consumer motivations for using social media provide insights into consumer behaviour. The information, entertainment, and social components of using the Internet are among the gratifications that customers enjoy, according to the author. Both intellectual and emotional ideas may serve as motivation. Consumer knowledge of 16 particular items is based on rational considerations, while emotional considerations relate social media relationships and self-expression.

Consumers now utilise the Internet as a tool to accomplish their goals. The frequency with which they visit certain organisational sites is used by the corporation to gauge their behaviour. Their ties to former friends' company evaluations may serve as a source of purchasing inspiration.

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A. Effects of Social Media Marketing on Buy Intentions of Consumers

Socialization around certain brand expectations may aid in the purchase of products. Peer interactions and social dynamics may also influence a customer's intention to purchase a brand. The reviews mentioned above provide credence to customer decisions driven by how rationally they spend money on certain firm brands. According to Gunelius, social media influences consumer purchasing choices as well as other academic subjects like politics and jury impartiality. For instance, the jury in business disputes has access to the Internet and may get online guidance that aids in their discussions and decision-making. According to the author, Twitter is the finest platform for online media to convey news and information since it allows users to get the most recent information. Past scholars acknowledge the existence of beliefs that social influence has an impact on a person's ability to make decisions.

According to the authors, users using social media are members of online communities and seem to be impacted by what is happening in those particular groups. Understanding this social conduct demonstrates how a person's behaviour is impacted by their social environment. The argument for social media is made in this context by the fact that it affects every consumer's choice to buy a product or not. The majority of business executives are instructed to adopt new technology in order to outperform rival companies. Based on this material, 17 social media are considered in terms of how they affect consumer purchase behaviour.

This study's findings support the notion that other customer purchasing decision-making processes are not greatly impacted by social media marketing. Consumer purchase intentions are influenced by a variety of elements, including the marketing mix, individual characteristics, psychological factors, social factors, and cultural factors. De Valck et al., for instance, argue that the consumer's buying behaviour not only reflects but also is influenced by status. Consumers who buy high-end goods like watches, vehicles, and other pricey products are seen as having a higher status, which makes them feel proud of their possessions.

Gunelius proposes that managers of businesses do research of those specific categories in order for marketers to understand the factors influencing customer preference for various brands. First off, while building out the corporate plan, the marketing mix also includes elements like pricing, product, venue, and promotion. Each of these variables is essential to meeting consumer wants, thus marketing managers must be aware of them in order to use them in the development of CSR strategies for understanding the market segment. Second, while getting to know a company's potential customers, it's crucial to take personal aspects like age, gender, educational background, and income into account. Consumers' views about purchases are influenced by all of the aforementioned elements.

Nevertheless, Kaplan & Haenlein emphasise that because to variances in customers' perceptions, the influence might vary from person to person and how people regard organisational branding based on their skills, sales, and preferences. Last but not least, psychological elements including beliefs, perceptions, and motivation also affect purchase decisions. When a person is moved emotionally to make a purchase, a necessity transforms into a motivation.

According to motivational experts, each product elicits a unique combination of motives from each buyer. When someone takes action, they learn because they get personal experiences. According to learning theory, marketers may create a significant demand by connecting with signals that elicit positive reinforcement for making a purchase. Moreover, perspective and beliefs also 18 provide guidance as to what customers would like to buy or not. According to Kaplan & Heinlein, people choose and process information differently because their perceptions of certain products and services have a significant influence on how consumers respond to brands and services.

B. Effects of Social Media Marketing on Purchase Decisions by Consumers

Customers may choose to repurchase certain brands for a variety of reasons, including brand loyalty and contextual elements like setting, design, and even environmental purity. According to Asmussen et al., customers are more likely to have high levels of confidence in an organization's products and services if they have beliefs and descriptive thoughts in their brains. Due to their ongoing devotion, this attitude makes it simpler for customers to repurchase the goods. Consumers do online purchases and get delivery from retail stores and door-to-door deliveries because social media makes information accessible regardless of geography. Moreover, the lighting, layout, music, and product beautifications are situational elements that influence customer repurchase.

The passage of time, the need for a repeat purchase, and the impact of mood on choosing a comparable product are other considerations. The ability to replenish inventory, the proximity of the shops to the consumer's location, the high level of disposable money, and the potential for the firm to fulfil customer demands at the ideal time are just a few of the factors. As people have varied beliefs and experiences about the many brands that suit their wants and goals, purchasing behaviour varies across groups, individuals, and businesses.

According to Constantinides and Fountain, research on human behaviour may be used to understand the past and make predictions about the future. This entails learning about market trends via customer interactions on social media. It is therefore feasible to forecast future purchase curves while also knowing how customers have been buying the company's products and services. In other words, buyers may be persuaded to repurchase things by outside forces, particularly online crowds and individual perspective. The

widespread social media phenomena of 19 is the online discourse that provides views on certain businesses.

After this, a customer chooses to repurchase the product based on the reviews of other brands found online. Nevertheless, Kaplan & Haenlein also discovered that gender parity has an impact on perception since females are seen to be more impacted by the location of the brands they buy, making this problem conformity. How repurchasing is done may also be influenced by brand-consumer interaction. Because of the readily accessible information on brand performance and specifications that can be obtained online, for instance, customers are more likely to link themselves with corporate brands when businesses utilise social media to learn what items consumers are interested in purchasing.

Finally, according to Trainor et al., a constant level of online recommendations made by the management of the organization's website may also aid in reminding the customer of the corporate branding. Social media has now created online Word of Mouth engagements that have allowed for consumer contact, allowing customers to communicate with both the business and other customers, which helps them decide whether to make another purchase.

C. Social media marketing's effects on consumer attitudes

Three questions were posed under this purpose in an effort to ascertain the effects of social media marketing on customer sentiments. The opening query was directed towards if they believed that many of their customers used social media to learn about their goods. Almost all of the respondents agreed that their customers utilise social media platforms to learn more about their goods in their answers to this question. Indeed, they do, said Respondent 1 in response. Everything has become digital nowadays, and people are scouring the internet for the greatest discounts as a result of most transactions being conducted online.

People receive information from internet sources," which may refer to products or services. Respondent number four agreed with this and said, "Yes. Because of the widespread use of technology, everything now happens on social media, where we can keep up with the latest news and trends. Respondent 6 countered, saying, "Consumers learn about our items not only via social media, but also by visiting our stores. Social media is not used by all customers to research products. These responses concur with David, who claims that it has been shown via study that individuals utilise social media to get information. This suggests that, in addition to the normal amusement that they obtain from social media, people are increasingly looking for knowledge online.

The second question asked respondents for their opinions on the contribution of social media marketing to changing consumers' perceptions. Similar responses were given by the respondents, who said that customers are more likely to purchase goods if they have been tried and evaluated by influencers on social media. According to the first respondent, "most of them seek out recommendations from influencers they trust and end up buying the items because their opinions regarding it have been modified by the influencer."

"Social media influences via alluring advertisements that are done on social media platforms by well-known influencers on things, which they subsequently desire to purchase once they have seen it work for them." Respondent countered that "products advertised through social media create a certain sensation to consumers since they have a platform to talk about the product and seek advice from others who have had the opportunity to use the product thus influencing the initial attitude they had on the product." Further stating that "social media marketing considerably plays a part in influencing the opinions of customers because of the goods reviews they get online," respondent 6 made the following statement.

Overall, the respondents said that social media has a big impact on how people feel about things because they believe recommendations from those who have tried the products. These responses are consistent with FitzGerald's assertion that social media platforms serve as a source of knowledge for customers who also test and converse with others who have tried the items. The legitimacy and dependability of that data gleaned from other users thereby fosters consumer and brand confidence.

The third and last question asked the respondents to describe how they believed it affected customer opinions about their goods. Positively or adversely, that is. All of the respondents' responses were positive, indicating that social media marketing has a favourable effect on consumers' attitudes. This is done through fostering a friendly environment for the customers, which the respondents have seen via rising sales and strong demand for their goods. Asked what she would say, Respondent 1 said, "Positively. This is due to the fact that since the company began utilising social media marketing, sales have increased and customers are happier with our products. According to three responses, "it has favourably impacted customer sentiment."

This has been accomplished through an increase in sales, a strong customer base, and the maintenance of repeat clients. It demonstrates that it has also aided businesses in keeping both new and returning clients. According to respondent number 4, "the customers have forged a bond with us in that they offer recommendations for products they would like us to add and their future preferences, which indicates a positive relationship." This demonstrates unequivocally how social media marketing has strengthened the relationship between clients and businesses. Consumers can regularly communicate with businesses and express their opinions on their offerings. The use of social media has resulted in a tremendous increase in sales and high demand" for their products. This assertion is in line with the social report, which claims that social media has established its significance by fostering close relationships between

businesses and their customers, luring in new ones, retaining existing ones, and using high-end marketing strategies to increase brand potential and growth through higher product demand and sales. As a result, social media marketing has positively impacted customers' attitudes of their goods.

Three questions were presented to ascertain the effects of social media on purchasing intentions. Finding out how social media has impacted purchasing behaviour in their businesses was the first task. The second was to decide which social media trends the organisation followed, and the third was to figure out how the company could gauge the effect of social media. The six respondents all agreed that social media marketing had a major effect on customer purchase intentions.

All of them made the implication that products advertised on social media received reviews that affected how other customers chose to buy their goods. Respondent 5 gave the affirmative as a response. We've seen that an item sells better when there is a lot of buzz about it on social media, which boosts our sales. Respondent 4 elaborated on that issue by stating that "the majority of clients in our business often make both online and in-store transactions. Divergent results have been found when our IT specialists deployed computer analysts to assess the patterns.

The reply also brought up the problem of emotional involvement. The responder said specifically that they "saw that consumers are emotionally engaged there is a good attitude that comes with humour and excitement, but when negatively involved , then buying power collides." On Facebook, when users speak with one another, the outcomes rely on "the advise supplied and suggestions made by the fellow customers."

Information from a reliable source may affect consumers' beliefs, actions, and attitudes. This was made feasible since it increased web traffic by spreading word of mouth about the items. Respondents 3 and 1 said that positive comments from customers on social media increased brand loyalty and helped the business provide a favourable picture to customers. Dyadic interactions are what constitute the real influences that have an impact on a consumer's purchasing intentions.

The smallest kind of social group made up of two individuals is known as a dyad. In this case, someone who has similar interests to the consumer—a friend, a family member, or even a coworker—could influence the consumer's buying decisions. This could be accomplished by actions or beliefs. As a result, a customer would buy a certain product after hearing positive feedback from a friend. Due to the strength of the connection between the two persons in terms of the amount of time spent together, these interpersonal interactions have a significant impact on purchase intentions. All respondents listed the most prevalent trends, which included Facebook, snapchat, Instagram, and twitter among others, in regard to the social media trends that were used in their companies. That personality affected buyer behaviour, the majority of these trends include customer profiles that depict the personalities of the consumers, which in turn influence the purchasing decisions of other customers.

III. CONCLUSION

Social media marketing has a significant impact on purchase decisions in today's digital age. Social media platforms have become essential tools for businesses to connect with their target audience and influence their purchasing behavior. With the ability to target specific demographics and deliver personalized content, social media marketing can effectively build brand awareness, foster customer engagement, and ultimately, drive sales. Additionally, the use of social media influencers has become a popular tactic, leveraging the power of social media personalities to promote products and services to their followers. However, it is important to note that while social media marketing can influence purchase decisions, it is not the only factor at play. Factors such as price, quality, and customer service also play a significant role in purchasing decisions. Overall, businesses that effectively leverage social media marketing to understand and engage with their audience are better equipped to influence purchase decisions and drive sales. Every one of them had knowledge of marketing from either their jobs or their friends and families. This demonstrates that social media is an active part of communication today and that social media marketing has a solid history as a tool for marketing. Since individuals could access it from anywhere via their mobile phones, its development was linked to recent technical breakthroughs. By user interactions, social media platforms have helped social media marketing progress even further.

REFERENCES

[1] I. P. Chiang, R. Wong, and C. H. Huang, “Exploring the benefits of social media marketing for brands and communities,” International Journal of Electronic Commerce Studies. 2019. doi: 10.7903/IJECS.1547.

[2] S. C. Chen and C. P. Lin, “Understanding the effect of social media marketing activities: The mediation of social identification, perceived value, and satisfaction,” Technol. Forecast. Soc. Change, 2019, doi: 10.1016/j.techfore.2018.11.025.

[3] S. V. Jin, A. Muqaddam, and E. Ryu, “Instafamous and social media influencer marketing,” Mark. Intell. Plan., 2019, doi: 10.1108/MIP-09-2018-0375.

[4] B. M. A. Almohaimmeed, “The Effects of Social Media Marketing Antecedents on Social Media Marketing, Brand Loyalty and Purchase Intention: A Customer Perspective,” J. Bus. Retail Manag. Res., 2019, doi: 10.24052/jbrmr/v13is04/art-13.

[5] M. L. Cheung, G. D. Pires, and P. J. Rosenberger, “Developing a conceptual model for examining social media marketing effects on brand awareness and brand image,” Int. J. Econ. Bus. Res., 2019, doi: 10.1504/IJEBR.2019.098874.

[6] J. Abbas et al., “The effects of corporate social responsibility practices and environmental factors through a moderating

role of social media marketing on sustainable performance of business firms," Sustain., 2019, doi: 10.3390/SU11123434.
[7] S. Vinerean and A. Opreana, "Social Media Marketing Efforts of Luxury Brands on Instagram," Expert J. Mark., 2019.
[8] N. Poddar and D. Agarwal, "A comparative study of application effectiveness between digital and social media marketing for sustainability of start-ups.," Int. J. Bus. Insights Transform., 2019.
[9] E. L. E. De Vries, "When more likes is not better: the consequences of high and low likes-to-followers ratios for perceived account credibility and social media marketing effectiveness," Mark. Lett., 2019, doi: 10.1007/s11002-019-09496-6.

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The Impact of Social Media on Consumer Behavior

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Abstract*— Consumer behavior is the study of the processes and factors that influence individuals or groups in making purchasing decisions. This abstract will explore the various factors that impact consumer behavior, including personal, psychological, social, and cultural factors. Personal factors such as age, income, and lifestyle can influence purchasing decisions, while psychological factors such as motivation, perception, and attitudes can affect how consumers perceive and respond to marketing messages. For customers, social media is very significant. More than half of shoppers use social media to research products before making a purchase. Your potential customers are more likely to think about your business with just a little social media marketing effort.

***Index Terms*— Culture, Demographics, E-commerce, Family, Influences.**

I. INTRODUCTION

Social media is important to the tourism and hospitality industries because it has changed how travelers look for, generate, and share information on travel-related items online as well as how they choose hotels. Despite the typical function of social media's usage and effect in many other industries has received a lot of attention, but it is still unclear how it affects how travelers choose which hotels to stay at. The purpose of this research was to understand how social media affects customer behavior while booking hotels. Before the "era of social media," customers often had few options for gather information on services and goods, with travel agents and brochures serving as the primary sources for purchasing accommodations [1],[2].

Social media has displaced conventional information sources in recent years as travelers began to utilize UGC (user-generated content) there to plan and choose their hotel stay. Consumers utilize social media in the tourism industry for a variety of purposes, including sharing their travel-related experiences, interacting with others, making connections with people from other places, and purchasing travel-related goods and services.

Web 2.0 has significantly changed how tourists choose and pay for tourism services online, though the proliferation of information and communication technologies (ICTs has always had a significant impact on consumer behaviour in the tourism industry. The hotel industry is a good example of this. Decision-making in the hotel industry has undergone a major transformation as a result of the usage of social media at every level of the decision-making process for customers. Social media has an impact on potential visitors since the information shared by previous travellers may mould, direct, and change their original judgements [3],[4].

Yet, there is still much to learn about the "how" and "why" visitors utilize social media as well as how these platforms affect consumers' DMPs generally and in the hotel industry in particular. Aiming to get a better knowledge of social media's role and effect on consumer behaviour in the tourism and hospitality sector, this study explored how social media affect customer behaviour throughout the hotel Experience. The primary contribution of the study is the creation of a social media facilitated consumers' hotel DMP model, which describes the nuances of the hotel search process, its benefits and drawbacks, the reliability of social media in the search for hotel information, and their impact on the overall hotel DMP. The first part of this research examines social media usage in tourism and how it affects the travel Industry. After the findings of the research, which show the social media-enabled hotel DMP, it then offers the methodology of a qualitative in-depth inquiry. The study's limitations are discussed, and a number of theoretical and practical implications are provided for the IT, tourist, and hospitality domains before conclusions are formed [5],[6].

Social media and Web 2.0 have given businesses and consumers more ability to interact. People engage in more service-related activities than ever before. The role and applications of social media have been extensively discussed in the literature on marketing, information systems, consumer behaviour, and tourism as their importance has grown across a variety of industries. Social media have drawn a lot of interest in the tourist industry due to its use in operations, marketing, management, and the decision-making process [7],[8].

For instance, from the perspective of the consumer, studies have examined social media and their function as information-sharing and searching platforms in facilitating consumers' autonomy and creating value through the exchange and sharing of personal experiences through electronic word-of-mouth. . In the business world, social media have drawn attention as technological advancements that connect a variety of stakeholders, reshape traditional marketing and advertising, and provide practitioners with online communication, interaction, and content sharing tools [9].

Social media definitions, typologies, and areas of application have been defined via a large corpus of multidisciplinary research. Some academics have identified the most common forms of social media in an effort to

untangle this complexity. For instance, Constantinides and Fountain divide online media into five broad categories: blogs, social networks, content communities, forums, and message boards. Kaplan and Haenlein categorise six different forms of social media based on their a) degree of social presence and media richness, and b) degree of self-presentation and self-disclosure. The usage of microblogs, consumer review and rating websites, and Internet fora, some of which are especially significant for tourism-related service, has been evaluated in recent research in the tourist sector, advancing our understanding.

A. Social Media's Role in Tourism

Social media now play an essential part in tourism, in addition to playing a big influence in people's everyday lives and social surroundings. The term "Travel 2.0" describes the transformation of the travel industry towards a new generation of online platforms and social interactions, which has altered how consumers search for, rate, and use goods and services online. Although a variety of social media platforms are utilized, TripAdvisor, Facebook, YouTube, Twitter, MySpace, and Flickr are the most popular ones. It is evident from a summary of current travel-related social media work that social media are crucial before, during, and after the trip. Though it has been argued that social media play their most important role in the pre-travel stage, when tourists use social media for travel planning, information search, and DMP, many scholars concur that travelers use different social media for online information depending on each travel stage.

Social media are reshaping how consumers seek, detect, read, trust, and share information online throughout these important information search and decision phases. Travel-related user-generated content serves as a crucial resource for aspiring travelers to comprehend previous travellers' experiences with locations, amenities, and eateries. In fact, according to Cox et al. , the majority of people who use social media for travel-related purposes examine online hotel and travel reviews while looking for information on trip destinations and lodging . Social media is specifically employed in this process to help decision-making processes. Customers trust user-generated content, which is more reliable than content from official tourist websites, travel agencies, and mass media advertising, on social media. While the advantages of social media are well known, there is considerable debate over the influence of UGC on these platforms, raising questions about the reliability and authenticity of the information. This is significant because Lopez and Sicilia contend that a source's perceived credibility influences its ability to influence consumer behaviour and, therefore, the consumer DMP.

II. DISCUSSION

Social Media's Impact on Hotel Customer Decision-Making. Within the larger Consumer Decision Journey, which consists of four steps that customers must go through, the DMP takes place in the pre-travel phase. Consider, evaluate, buy, enjoy, advocate, and bond are the first four steps. According to Court et al., customers add and remove companies from a "group of favorites" throughout the "Evaluation stage" rather than methodically reducing their options until they have decided what to buy. Before making a purchase choice, customers begin to gather and digest information from a variety of sources to satisfy their demands for purchases. This is known as the "Evaluation Stage". Yet, this review procedure reveals new challenges in the hotel and lodging choosing.

The intangible nature of hotel goods and services makes consumer choice very emotive and challenging to imitate. The undisputed authorities on the qualities and characteristics of brands and goods are no longer hotel providers. Instead, by giving both good and negative evaluations as well as indirect customer-to-customer contact via blogs and review sites, internet reviews regarding hotels play a big part in supporting modern customers' assessment stage. This is based on the fundamental tenets of consumer behaviour, namely, that customers may influence one another. Although it is acknowledged that social media may affect travelers' ultimate buying decisions, little research has been done on the intricacies of how this process could play out and how behaviour may be influenced.

Hotel reviews are used to create a "consideration set" of potential options, while social media are largely utilized to help customers for inspiration, restricting choices, and confirming selections. Both good and bad evaluations from guests may have an impact on a hotel's decision-making process since they raise knowledge of the property and alter guests' perceptions of it. Discovered that hotels with unfavorable reviews are less likely to be booked by potential guests that better review ratings may influence consumers' choices to buy.

Recent research has established the major role of social media in the DMP, but the exact details that define the CDJ, particularly the "Assessment Stage," are still little understood. One of the most ambiguous and understudied subjects is the function of UGC in traveler behaviour and DMP. While a substantial body of research has examined the impact of online reviews or particular platforms on decision-making, there are still few studies that consider the CDJ's use of broader social media platforms. This research consequently supports the need for a more nuanced knowledge of how different social media platforms affect the CDJ and how they affect the ultimate decision-making process for hotels. Although earlier research created frameworks for the CDJ, there are currently no models that capture the hotel consumer decision journey via social media while taking the unique characteristics of the hospitality setting into account. Based on this justification, this research seeks to investigate the hotel DMP using a qualitative in-depth method to improve consumer behaviour

in the hospitality industry and provide an effective model for the decision-making process of hotel guests using social media.

Consumer purchasing behaviour is the term used to describe the decisions and behaviour people make when they purchase and utilize a product. The end customer's purchasing patterns are those of the consumer. Companies need to evaluate and change their anticipated future buying patterns. In order to enable consumer purchases of what, where, when, and how, firms must develop a marketing mix (MM) that will appeal to (use) their consumers, according to this marketing philosophy. How consumers react to a company's marketing strategy has a big influence on both its product and success. You must evaluate what you're doing since marketers can more readily forecast how customers will respond to marketing initiatives.

A. The six phases are as follows:

Issue Recognition/Need Awareness - At the first phase of the process, consumers truly attempt to distinguish between the desired state and the actual condition. They question if the things are really needed.

Informational Research - The consumer search process starts after an issue is identified. They are seeking a remedy because they are aware that there is a problem.

Introspection - They think back on their previous contacts.

External search - They ask their friends and family if they need more information. aggressively advertised online resources, public forums, comparison shopping, etc. A buyer is presented prospective alternatives, or the evoked set, after a successful information search.

Looking for Alternatives - Consumers look for alternatives to help them evaluate things because they want to. Kids may experience this, learn what they want and don't want, and learn what to anticipate. Price and rank/weight alternatives are employed as a search stimulus. Businesses may affect this via the commercial marketing of alternatives and consumer research.

Deciding to buy after carefully weighing all pertinent factors, including quality, price, packaging, service, etc.

Buy - Even though it could seem that this is the last step, a sudden shift in the situation, such as the availability of a better option or external pressure, may nevertheless lead the choice to be modified at that same time.

Post-Purchase Evaluation/Cognitive Dissonance - As a result of the poor service, customers may get depressed and start to regret their purchase. Businesses are in a difficult condition, but it may be improved by offering assistance via warranties, programmes, and top-notch customer service. Social media are websites and programmes that place a focus on interaction, collaboration, sharing of information, and community-based feedback.

B. Social Media Platforms

The internet. Consider LinkedIn and Facebook, bookmarking a website, media dialogue, Microblogging.

C. More customers are making direct transactions on social networking sites.

Social networking is nearly as popular for discovering new products as radio and TV commercials, as well as word-of-mouth advertising. In the future, this is how three out of ten customers stated they would want to learn about companies. Yet, customers are using social media more and more to research businesses and make purchases from them.

D. Consumer behaviour is significantly influenced by social media reviews.

A dynamic source of social evidence, which is a crucial factor to take into account while making purchases, is social media. More than half (51%) of customers check reviews on forums or social media before making a purchase to evaluate a product or service. Only one or two unfavorable reviews might put off a prospective customer.

E. Consumers want companies to communicate with them both ways.

Social media has given the connection between a company and its clients a new dimension. An object with no name or distance from us that we only learn about in books or on Google is no longer a brand. You may assess a brand's values, current news and goods, and connection with its target market by analyzing its network.

F. Consumers utilize social media for customer service.

Before social media, how did you envision interacting with a brand's customer support department? You may reach them by phoning, writing, going in person to meet them in person, visiting, etc. Nowadays, customers choose to contact businesses on social media to voice their complaints or concerns about their services.

G. Internet influence on buying behaviour

The increased variety and quantity of information available online has improved consumers' capacity to make better consumption decisions and created new possibilities for information search due to cheap search costs. The influence of the internet varies depending on the stage of the decision-making process. Originally, just the information search stage was helped by the internet (Karimi, 2013), but more recent developments in social media, online decision aids, and recommender systems have expanded the influence of the internet to all decision stages.

Other contributing elements for the quality of online decision-making, in addition to time costs and the cognitive costs of gathering and processing information, include perceived risk, product knowledge, and trust. Internet or online skills have also become more significant; the more often people use the internet, the more probable it is that they will utilise it to make decisions contends that the

technology readily available online, including access to the various information sources and decision aids, which have the potential to aid consumers in making better quality decisions, is to blame for the fundamental difference in decision quality between offline and online settings.

H. Social media's effect on customer choices

Recently, a number of scholars have examined how social media affects consumer behaviour, but often not from the perspective of the decision-making process. Consumers utilize social media to their advantage since it provides instant access to information at their convenience, assisting them in making decisions about what to purchase or learning more about new goods or companies whenever and wherever they choose. Consumer product selection and purchase behaviour have been found to be causally influenced by online user reviews.

Social media has created a "participatory culture" where users connect with others who share their interests to participate in an ongoing cycle of information sharing, monitoring developments, and soliciting feedback and ratings on a wide range of goods, services, and endeavors. Consumers' purchase intentions are shown to be significantly positively influenced by the perceived amount and quality of online product evaluations, which are measured by perceived in formativeness and persuasiveness. As compared to business communications and ads, social media is seen as a more reliable source of information. The mainstream media is often viewed with suspicion. As a result, customers are no longer using conventional media, such as television, magazines, and newspapers, to inform their buying decisions.

A major problem with making decisions online is information overload. It is challenging to navigate all the information accessible due to the sheer volume of information available on social media, which has caused consumers to experience analysis paralysis. There is a limit to the quantity of reason that can exist. Individuals have a limited capacity for processing the amount of information, thus it is not practical to thoroughly assess every option.

III. CONCLUSION

Social media has become an integral part of our daily lives, changing the way we communicate, interact, and consume information. It has provided a platform for people to connect with each other regardless of their geographical location and has given a voice to those who were previously marginalized. Social media has also brought about numerous benefits, including the ability to promote businesses, spread awareness about important issues, and create social change. However, it has also brought about several challenges, such as the spread of misinformation, cyberbullying, and addiction. Therefore, it is crucial that individuals, organizations, and governments work together to address these challenges and ensure that social media is used in a responsible and ethical manner. This includes educating users on how to navigate the online world safely, regulating harmful content, and promoting digital literacy. A significant relationship between advertising medium characteristics and customer purchase behaviour. Also, it showed that although internet media were determined to be statistically unimportant with regard to consumer buying behaviour, printing, outdoor advertising, and social media were statistically significant.

REFERENCES

[1] K. White, R. Habib, and D. J. Hardisty, “How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework,” J. Mark., 2019, doi: 10.1177/0022242919825649.

[2] N. Amberg and C. Fogarassy, “Green consumer behavior in the cosmetics market,” Resources, 2019, doi: 10.3390/resources8030137.

[3] S. K. Dixit, K. H. Lee, and P. T. Loo, “Consumer behavior in hospitality and tourism,” J. Glob. Sch. Mark. Sci. Bridg. Asia World, 2019, doi: 10.1080/21639159.2019. 1577159.

[4] M. Alghizzawi, “The role of digital marketing in consumer behavior: A survey,” Int. J. Inf. Technol. Lang. Stud., 2019.

[5] A. Rizvandi, F. Tojari, and Z. S. Zadeh, “Sport consumer behaviour model: Motivators and constraints,” J. Hum. Sport Exerc., 2019, doi: 10.14198/jhse.2019.14.Proc5.48.

[6] S. Castro-González, B. Bande, P. Fernández-Ferrín, and T. Kimura, “Data to model the influence of CSR on consumer behaviors: A process approach,” Data Br., 2019, doi: 10.1016/j.dib.2019.104713.

[7] A. Géci, Ľ. Nagyová, S. Mokrý, and J. Rybanská, “Investigation of consumer behaviour at selected market commodity,” Potravin. Slovak J. Food Sci., 2019, doi: 10.5219/1230.

[8] S. bashir, M. G. Khwaja, J. A. Turi, and H. Toheed, “Extension of planned behavioral theory to consumer behaviors in green hotel,” Heliyon, 2019, doi: 10.1016/j.heliyon.2019.e02974.

[9] M. A. Hawkins, “The effect of activity identity fusion on negative consumer behavior,” Psychol. Mark., 2019, doi: 10.1002/mar.21186.

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Using Social Media to Engage Customers

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***Abstract*— Social technology is increasingly seen as a "given" in business due to Web 2.0's obvious influence on global markets or, more precisely, the global market. There has been a sort of stampede to establish communities and brand outposts on websites like Facebook and Twitter as a result of the widespread belief that social media and having a presence on the Social Web are "must haves," often without fully understanding the long-term organizational impact and the business opportunity that these efforts done methodically actually offer. The fundamentals of how social business operates are covered in this chapter.**

***Index Terms*— Authenticity, Community, Content, Customer service, Empathy, Gamification Social Media.**

I. INTRODUCTION

Use of social media often starts with marketing, public relations, or a similar office or department with a direct line to clients and stakeholders for many organisations, including commercial, nonprofit, and governmental institutions. This makes sense given that a slew of unfavorable comments, a desire for "virality," or an increase in overall awareness in the marketplace, particularly among those customers who are increasingly cut off from interruptive (also known as "traditional") media, are typical drivers for engaging in social media. In a nutshell, social media is seen by many organisations as the path to obtaining the "engagement" they want [1],[2].

There are several ways in which the introduction of Web 2.0 and the Social Web has changed the game. Given the haste with which they are implemented and the initial emphasis on marketing specifically rather than the business as a whole, many "social media projects" end up being treated more like traditional marketing campaigns than the truly revolutionary ways in which a savvy business can now connect with and prosper through collaborative association with its customers. When so many "social media initiatives" run their course and then fade out, the exact goal—engagement, reinterpreted in a wider social context—is ignored [3],[4].

Whether or not that is correct is a different thing, but the fact remains that many brilliant concepts have resulted in the development of creative, successful, and quantifiable social enterprise programmes. Yet they still stand apart, which is terrible since social technology is accessible to almost everyone. The "social media," "Social Web," or "Web 2.0" technologies, together known as the collaborative technologies that currently characterise modern markets, provide a workable strategy for bringing about changes in more fundamental business procedures across a variety of applications. There is something here for the majority of organisations, and it goes well beyond marketing and communications [5],[6]. Beginning with the Social Feedback Cycle, this chapter establishes a connection between the fundamentals of social media marketing and the more general concept of social technologies used at a "whole-business" level. This more in-depth, client-driven link between operations and marketing might be thought of as "social business" as a kind of early, simplistic description.

The long-standing standards of business marketing have been forced to change ever since Web 2.0 technologies first came into existence. These technologies are a collection of tools that make it simple for people to create and publish content, share ideas, vote on them, and recommend things to others.

Consumers have turned to the Social Web in an effort to share among themselves their personal direct experiences with brands, products, and services in order to provide a more "real" view of their research experience because they are no longer content to rely solely on advertising and promotional information to learn about new products and services. In parallel, customers are using other people's experiences as a resource before making their own purchases. To put it mildly, there has been a tremendous influence on marketing [7],[8].

Social Web through "digital word-of-mouth" (aka social media). Almost every purchase or conversion process now includes this cycle, which goes from anticipation through trial to rating to sharing of the actual experience. People look to others like themselves for the knowledge they need to make wise decisions, regardless of whether their interactions are B2B, consumer-facing, for-profit, or charity. Consumers turn to these new information sources as well as traditional media for advice; advertising and conventional communications are still a significant component of the total marketing mix. A new screening has emerged as a consequence, which is influencing—in some cases favorably, other times unfavorably—the attempts of companies and organisations to expand their market share [9].

A. Access To Information Freely

Since it serves as the cornerstone of social business, the social feedback cycle is crucial to comprehend. The social feedback loop really illustrates how Internet-based publishing and social technologies have brought individuals together for business-related or business-like activity. This

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new social connectedness extends to interactions between companies and their clients (B2C), between businesses themselves (B2B), and among consumers themselves (as in support communities and other social apps), as well as between staff. As a result, information has been made more widely available due to this increased sharing.

Knowledge that was formerly exclusive to a small group of privileged individuals is now accessible to everyone. If you were looking for information about a hotel or rental home for a vacation: Unless you were fortunate enough to have a buddy in your particular social network who had specialized information relevant to your intended trip, you had to see a travel agent and essentially take whatever advice they gave you. If not, you faced a mound of labour doing your own research as opposed to relying on luck to have a positive.

Keeping with this scenario, the travel agent may not have had in-depth knowledge of rental vs hotel properties, for instance, or may have had limited domain experience. To correctly advise you on whether to rent a vacation home or make a hotel reservation, this knowledge—or lack thereof—would be essential. In order to empower customers looking for vacation rentals as an alternative to hotels and resorts, Austin's Homeaway, which brings tens of thousands of rated and reviewed vacation properties within a click of booking, has built an entire business around it.

II. DISCUSSION

A transaction's intermediary may or may not have your best interests in mind when making buy suggestions, which is much more pertinent and goes beyond the question of specialised expertise. The same is undoubtedly true for any business or group trying to sell you anything. Pharmaceutical and insurance sales have long been plagued by this problem, whether it is true or not: Is the advice made in response to the client's requirements, the inducement provided by the drug's producer or insurance underwriter, or a mix of all three? The distinction is crucial from the consumer's point of view.

We introduced a direct-to-consumer insurance product as an alternative to plans offered via agents at Progressive Insurance, where I worked for a number of years as a Product Manager. For clients who wished to be in charge of their purchases, we particularly designed this product. From a commercial standpoint, this made sense for Progressive since trust in the sales process is essential to developing a long-lasting, reliable relationship with its insured clients. Although many insurance clients have strong and enduring relationships with their agents, it is also true that a lot of them are looking for extra information, second views, and outright self-empowered alternatives. This reality is now widespread across several industries, and it is fueled by the options that readily available, web-based information delivers.

Just ten years ago, it was somewhat difficult to acquire information outside of what was given to you at or around the point of sale. Now, it is simple. You need go no farther than the car sales process to see how important ratings, blog entries, and picture and video uploads are to networked, scalable self-publishing. The ability to access information and other people's ideas and experiences, as well as the blatant generation of new information by users who are prone to evaluate, review, and post their own experiences, is what is causing social media to have an even greater influence on the organisation.

A. Social Enterprise: The Natural Extension

Social business is directly related to the flurry of interest in and activity around social media and its direct use in marketing: The natural progression of social technology in the industry is social business, which is also known as the Social Feedback Cycle. All areas of the company are affected by social business, which applies social concepts including sharing, rating, reviewing, connecting, and cooperating. Social behaviour and the growth of internal knowledge communities that link individuals and their ideas may result in the creation of more streamlined and effective company operations, from customer service to product design to the promotions team. If social business is seen in this light, change management replaces marketing as the primary focus. That's a substantial idea.

Back up a bit: When done well, social media marketing aims to include clients in the online social spaces where they already naturally congregate. In contrast, social business listens to what customers are saying and what interests them, then connects that information back to the company so that it can be processed and applied to the development of the upcoming iteration of customer experiences and, consequently, the upcoming iteration of conversations.

It's critical to comprehend the function of the customer, which is defined here as someone "on the other side" of a commercial transaction: It might be a shopper at a store, a client at a business, a gift to a charity, or a voter in a poll. All of these archetypes have one thing in common, and it's important in the context of social business: they all have access to information that may either confirm or deny the messages you've spent time and money developing. This information isn't limited to what you put into the market. But there's more, as we like to say. Beyond the marketing messaging, consider any innovations or ideas for changes that could come from your customers: Your consumers have unique knowledge about your company's procedures as a consequence of their real interactions with your brand, product, or service. They also likely have some suggestions for how your company may be able to better serve them in the future.

Take into account the following, which are all representative of the types of "outputs" a client or business associate may have created after a transaction and may silently walk away with unless you take concrete measures

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to gather this data and feedback: Early warning of possibilities or difficulties; Awareness aids (testimonials); Market expansions (ideas for new product uses); Customer service hints that circulate among users; Public opinion over legislative action or inaction; Competitive threats or revealed flaws; This is by no means a complete list, but it is representative of the types of information that customers often communicate among themselves and would be happy to share with you if you asked. Strangely, when it comes to product and service policy designers, this knowledge seldom makes it all the way back, where it may really help. Moreover, this might be

Social Media and Customer Engagement information that you don't have and that, because you are so involved in your company, you may never see. The best course of action is to compile this knowledge and use it methodically. As an example, a user could discover that your software product doesn't seamlessly interact with a certain software programmer that this consumer might also have installed. How are you to know? You may gather this information (as well as the accompanying cries for assistance made in internet forums) using social analytics (tools and procedures). It may then be used in conjunction with your own processes and domain expertise, as well as the experiences of other customers, to enhance a specific customer experience before being made available broadly as a new service. With the same community and collaborative tools, this new solution might then be distributed to your larger customer base, improving your company's perceived value to them and fostering a closer bond with the clients who first encountered the issue.

The transition from social media marketing and social analytics to social business is made possible by the information sharing that follows—publishing a video or writing a review—and its use inside the company. This shared consumer knowledge may be highly beneficial in persuading others to make a similar purchase from a strictly marketing perspective—as used here, meaning the MarCom/advertising/PR domain. It may assist a marketer fine-tune their message by illuminating which advertising claims are accepted and which are rejected. Also, it may provide a channel of communication with the client—consider online product evaluations or support forums—so that marketers can better understand what is working and what isn't.

This listening and information gathering, which is covered in detail in Chapter 6, "Social Analytics, Metrics and Measurement," comes under the category of "more information," which necessitates the use of improved social analytics tools to help make sense of it. You should pursue it. If you have access to user feedback, your product or service will adjust more quickly. Your company receives favorable attention when you share the improvements and ideas that arise from this while providing credit to your consumers.

Customer feedback may be a priceless source of knowledge, but you should be mindful of the effect anonymous and sometimes unfavorable comments can have. Understanding your customer's function as a producer and receiver of material that is shared on the social web is crucial. The same is true: You must be aware in order to prepare a suitable reaction. The Social Web as a whole is moving away from anonymity and towards identification, but no particular identity has been validated, at least not yet. This implies you have to do more research.

This ongoing anonymity creates a space for "comment and rating abuse," but social media also allows for a general lifting of the bar when it comes to proving genuine identity. More and more individuals are posting comments in the hopes of being noticed. Social business and the analytical tools that assist you sift through identification problems are crucial to understanding what is occurring around you on the Social Web given the increased interest in and significance of genuine identity, in addition to market information. The identification of influencers and the utilization of the "social graph," or the internal structure of the connections between individuals and the status updates that reveal what they are doing right now, are later sections' formal connections to business. Your identity isn't always as it seems for the time being, but keep in mind that most customer remarks are made to inform you of what occurred, whether it was good or bad, and to let you know that it happened to a certain person. Since they want you to identify them, they signed their name. "As people gain control over their data and expand their online presence, they are not seeking privacy but rather individual identification. This will ultimately transform the whole advertising industry.

B. Social Business Is Comprehensive:

The bigger role of the Social Feedback Cycle and the practice of social business develops when you mix identification, ease of posting, and the propensity to publish and utilize shared information in purchase-related decision-making processes: The Social Feedback Cycle encircles the whole company, dwarfing the loop that links sales and marketing, one of the components of conventional Customer Relationship Management (CRM).

Think of a company like Motorola's spinoff Freescale. Freescale use YouTube for a number of authorized reasons, one of which is to allow current employees to post films about their engineering jobs: The intention is to persuade potential workers to more seriously consider working with Freescale by giving them the opportunity to view "inside Freescale". Instead, consider a company like Coca-Cola: In order to engage with consumers, Coke is relying less on branded microsites and more on user-driven social networks like Facebook. Via its Coca Cola Freestyle vending machines, which let customers to blend their own Coke flavours, Coke is also directly addressing consumer desires. Comcast and several other businesses increasingly utilise Twitter as a means of customer service. Outside marketing,

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there are increasingly more instances of direct corporate integration of collaborative and shared publishing tools.

Each of them has a wider impact than marketing, is the response. To create an experience that is shared and positively discussed throughout the company, each directly integrates several disciplines. These are instances of social business activities rather than social media marketing. These are also examples of a reversed message flow, which is significant: Consumer participation and, therefore, market data are flowing from and going to the company. Over mass media, it has often been the other way around. The company is the one listening to the client in each of the above instances of social business ideas and implementations. After this listening and involvement, corporate resources are used to adjust, maintain, or enhance certain client experiences. The use of social business becomes really comprehensive if it is connected to corporate goals.

C. The Networked Consumer

As a result, the customer is now playing a key role in innovation as a source of forward-looking knowledge about taste and preference, and as such, they might be the foundation for competitive advantage. Maybe because there is a difference between consumers having thoughts or ideas and really learning anything beneficial from them and utilizing it. Social business and associated technologies enter the picture once more: In contrast to social media marketing, which often ends at the listening stage and may also include actively addressing concerns, social business goes two stages farther.

First, social business practices create official, obvious, and transparent connections between clients and the company as well as internal connections between staff members and clients. One of the main components of social business is this: The "social" in "social business" refers to the fostering of relationships between individuals, which are then used to support business, product creation, service improvement, market knowledge, and other endeavors. Second, the company is able to react to what its consumers are saying via social media channels in an effective, trustworthy way because workers are linked and able to interact – social business and Web 2.0 technologies apply inside as well as outside.

A word about fear before we go any further: the fear of the unnamed, the unsaid, the unidentified, and even the uneducated stating unfavorable things about your company, product, or service that aren't even true! Be less afraid, or do not fear. You may really make significant progress in reassuring your team, who may be a little anxious about social media, by joining, understanding, and connecting with them. The party visited an aircraft carrier that was engaged in Pacific operations. One of the things Jake saws was that, while being one of the world's most hazardous workplaces, an active aircraft carrier's deck was remarkably fearless despite seeming chaotic to inexperienced eyes.

D. The Social Web and Participation

The next section offers a conceptual framework for comprehending how social technology adoption and related processes allow the crucial activities of engagement and reaction. Beware: It differs from the perspective that governs "engagement" in conventional media. When customers participate in an open, participatory social environment, engagement is redefined by them. Take the time to comprehend the four levels of engagement since the context in which conventional media defines "engagement" is extremely different from this one.

Customers or stakeholders who are actively participating on the social web are no longer just watchers. It's the distinction between attending a screening of "The Rocky Horror Picture Show" and watching a movie. Participation makes a distinction. In the context of social business, engagement refers to your customers' willingness to invest time and effort into interacting with you and sharing their thoughts on you throughout conversations and during business-related operations. They are prepared to participate, and on the Social Web, participation is what is meant by engagement.

So, the engagement process is essential to the development of effective social business practices as well as successful social marketing. Participation in a social setting suggests that your target market has developed a personal interest in what you are offering. In a broader sense, this refers to any stakeholder and conveys the same idea: It has been established that this individual has a personal interest in the success of your company. This rule applies to anybody who can voice and share an opinion or an idea along your road to market, including clients, business partners, and staff.

There is a bigger consequence when client dialogues go into the buying cycle during the contemplation stage of the sales process: Your marketing team now includes your consumer. In truth, the core of any company or organisation is built on the opinions and interactions of your consumers. The effects are both subtle and significant: Subtle in the sense that much of "social business" is just doing business as it should be conducted on the surface.

Companies exist eventually to satisfy the needs of their customers, whose business ensures the future of its founders, workers, owners, and other stakeholders as well as generates revenue for them. Yet, sometimes it seems that the client is removed from that set. By using the hashtag #FAIL on Twitter, you can often find the outcome on any given day.

Yet there has also been a significant shift in the perception that consumer satisfaction now carries considerably more risk. In circumstances of over- or under-delivery, customers are better equipped to let others know about it since they are more informed, more outspoken, and more aware of what they want. Moreover, buyers not only observe what the company and its industry are doing, but

they also create their own expectations for your company based on what every other company they do business with is doing. It is anticipated that American Airlines would prominently display customer ratings on every flight it flies if Walmart can swiftly use Bazaar voice to add ratings and reviews to every product it sells. Consider this: How would the overall flying experience alter if flight attendants were assessed based on service and manner by previous passengers and that data was utilized to choose future flights similarly to on-time performance?

Restaurants are where it occurs: Every one of us has a favorite waiter. If you think this is a reach, keep in mind that Southwest, Alaska Airlines, and Continental have all prioritized this service point, and they all have better than average Net Promoter ratings in part because of it. In order to build goods and services in a way that not only satisfies consumers but also inspires them to spread their joy to others, social business entails empowering your whole company to listen, engage, comprehend, and react immediately via dialogue. Social business is the interstate system that allows social media to enter your company if it is the vehicle for success.

III. CONCLUSION

Better social media interaction indicates that your clients are more engaged with your brand. This therefore gives you additional chances to foster brand loyalty, boost word-of-mouth recommendations, and boost sales. These approaches can help foster brand loyalty, increase customer satisfaction, and ultimately, drive sales. However, it is important to note that successful customer engagement requires a deep understanding of the customer, their preferences, and their needs. Businesses that take the time to understand their customers and deliver authentic and meaningful experiences are better positioned to succeed in today's highly competitive marketplace. By engaging customers in meaningful ways, businesses can build stronger relationships, increase customer loyalty, and ultimately, drive long-term success.

REFERENCES

[1] J. Song, H. Moon, and M. Kim, “When do customers engage in brand pages? Effects of social presence,” Int. J. Contemp. Hosp. Manag., 2019, doi: 10.1108/IJCHM-10-2018-0816.

[2] Y. K. Kim and P. Sullivan, “Emotional branding speaks to consumers’ heart: the case of fashion brands,” Fashion and Textiles. 2019. doi: 10.1186/s40691-018-0164-y.

[3] E. Kim, L. (Rebecca) Tang, and R. Bosselman, “Customer Perceptions of Innovativeness: An Accelerator for Value Co-Creation,” J. Hosp. Tour. Res., 2019, doi: 10.1177/1096348019836273.

[4] I. Assiouras, G. Skourtis, A. Giannopoulos, D. Buhalis, and M. Koniordos, “Value co-creation and customer citizenship behavior,” Ann. Tour. Res., 2019, doi: 10.1016/j. annals.2019.102742.

[5] D. Kemp, “Using Smart Speakers to Engage with Your Customers,” Harv. Bus. Rev., 2019.

[6] J. Braojos, J. Benitez, and J. Llorens, “How do social commerce-IT capabilities influence firm performance? Theory and empirical evidence,” Inf. Manag., 2019, doi: 10.1016/j.im.2018.04.006.

[7] S. Peeroo, M. Samy, and B. Jones, “Trialogue on Facebook pages of grocery stores: Customer engagement or customer enragement?,” J. Mark. Commun., 2019, doi: 10.1080/13527266.2018.1482559.

[8] C. K. . Sandunima, H. K. Kodagoda, H. B. J. Bandara, N. R. D. Viduranga, and K. K. N. . Jayasuriya, “The impact of social media marketing on customer purchase intention: with Special Reference to Fashion- Wear Industry in Sri Lanka,” 16th Int. Conf. Bus. Manag. (ICBM 2019), 2019.

[9] V. Filimonau, H. Fidan, I. Alexieva, S. Dragoev, and D. D. Marinova, “Restaurant food waste and the determinants of its effective management in Bulgaria: An exploratory case study of restaurants in Plovdiv,” Tour. Manag. Perspect., 2019, doi: 10.1016/j.tmp.2019.100577.

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Using Social Media to Engage Customers

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***Abstract*— Social technology is increasingly seen as a "given" in business due to Web 2.0's obvious influence on global markets or, more precisely, the global market. There has been a sort of stampede to establish communities and brand outposts on websites like Facebook and Twitter as a result of the widespread belief that social media and having a presence on the Social Web are "must haves," often without fully understanding the long-term organizational impact and the business opportunity that these efforts done methodically actually offer. The fundamentals of how social business operates are covered in this chapter.**

***Index Terms*— Authenticity, Community, Content, Customer service, Empathy, Gamification Social Media.**

I. INTRODUCTION

Use of social media often starts with marketing, public relations, or a similar office or department with a direct line to clients and stakeholders for many organisations, including commercial, nonprofit, and governmental institutions. This makes sense given that a slew of unfavorable comments, a desire for "virality," or an increase in overall awareness in the marketplace, particularly among those customers who are increasingly cut off from interruptive (also known as "traditional") media, are typical drivers for engaging in social media. In a nutshell, social media is seen by many organisations as the path to obtaining the "engagement" they want [1],[2].

There are several ways in which the introduction of Web 2.0 and the Social Web has changed the game. Given the haste with which they are implemented and the initial emphasis on marketing specifically rather than the business as a whole, many "social media projects" end up being treated more like traditional marketing campaigns than the truly revolutionary ways in which a savvy business can now connect with and prosper through collaborative association with its customers. When so many "social media initiatives" run their course and then fade out, the exact goal—engagement, reinterpreted in a wider social context—is ignored [3],[4].

Whether or not that is correct is a different thing, but the fact remains that many brilliant concepts have resulted in the development of creative, successful, and quantifiable social enterprise programmes. Yet they still stand apart, which is terrible since social technology is accessible to almost everyone. The "social media," "Social Web," or "Web 2.0" technologies, together known as the collaborative technologies that currently characterise modern markets, provide a workable strategy for bringing about changes in more fundamental business procedures across a variety of applications. There is something here for the majority of organisations, and it goes well beyond marketing and communications [5],[6]. Beginning with the Social Feedback Cycle, this chapter establishes a connection between the fundamentals of social media marketing and the more general concept of social technologies used at a "whole-business" level. This more in-depth, client-driven link between operations and marketing might be thought of as "social business" as a kind of early, simplistic description.

The long-standing standards of business marketing have been forced to change ever since Web 2.0 technologies first came into existence. These technologies are a collection of tools that make it simple for people to create and publish content, share ideas, vote on them, and recommend things to others.

Consumers have turned to the Social Web in an effort to share among themselves their personal direct experiences with brands, products, and services in order to provide a more "real" view of their research experience because they are no longer content to rely solely on advertising and promotional information to learn about new products and services. In parallel, customers are using other people's experiences as a resource before making their own purchases. To put it mildly, there has been a tremendous influence on marketing [7],[8].

Social Web through "digital word-of-mouth" (aka social media). Almost every purchase or conversion process now includes this cycle, which goes from anticipation through trial to rating to sharing of the actual experience. People look to others like themselves for the knowledge they need to make wise decisions, regardless of whether their interactions are B2B, consumer-facing, for-profit, or charity. Consumers turn to these new information sources as well as traditional media for advice; advertising and conventional communications are still a significant component of the total marketing mix. A new screening has emerged as a consequence, which is influencing—in some cases favorably, other times unfavorably—the attempts of companies and organisations to expand their market share [9].

A. Access To Information Freely

Since it serves as the cornerstone of social business, the social feedback cycle is crucial to comprehend. The social feedback loop really illustrates how Internet-based publishing and social technologies have brought individuals together for business-related or business-like activity. This

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new social connectedness extends to interactions between companies and their clients (B2C), between businesses themselves (B2B), and among consumers themselves (as in support communities and other social apps), as well as between staff. As a result, information has been made more widely available due to this increased sharing.

Knowledge that was formerly exclusive to a small group of privileged individuals is now accessible to everyone. If you were looking for information about a hotel or rental home for a vacation: Unless you were fortunate enough to have a buddy in your particular social network who had specialized information relevant to your intended trip, you had to see a travel agent and essentially take whatever advice they gave you. If not, you faced a mound of labour doing your own research as opposed to relying on luck to have a positive.

Keeping with this scenario, the travel agent may not have had in-depth knowledge of rental vs hotel properties, for instance, or may have had limited domain experience. To correctly advise you on whether to rent a vacation home or make a hotel reservation, this knowledge—or lack thereof—would be essential. In order to empower customers looking for vacation rentals as an alternative to hotels and resorts, Austin's Homeaway, which brings tens of thousands of rated and reviewed vacation properties within a click of booking, has built an entire business around it.

II. DISCUSSION

A transaction's intermediary may or may not have your best interests in mind when making buy suggestions, which is much more pertinent and goes beyond the question of specialised expertise. The same is undoubtedly true for any business or group trying to sell you anything. Pharmaceutical and insurance sales have long been plagued by this problem, whether it is true or not: Is the advice made in response to the client's requirements, the inducement provided by the drug's producer or insurance underwriter, or a mix of all three? The distinction is crucial from the consumer's point of view.

We introduced a direct-to-consumer insurance product as an alternative to plans offered via agents at Progressive Insurance, where I worked for a number of years as a Product Manager. For clients who wished to be in charge of their purchases, we particularly designed this product. From a commercial standpoint, this made sense for Progressive since trust in the sales process is essential to developing a long-lasting, reliable relationship with its insured clients. Although many insurance clients have strong and enduring relationships with their agents, it is also true that a lot of them are looking for extra information, second views, and outright self-empowered alternatives. This reality is now widespread across several industries, and it is fueled by the options that readily available, web-based information delivers.

Just ten years ago, it was somewhat difficult to acquire information outside of what was given to you at or around the point of sale. Now, it is simple. You need go no farther than the car sales process to see how important ratings, blog entries, and picture and video uploads are to networked, scalable self-publishing. The ability to access information and other people's ideas and experiences, as well as the blatant generation of new information by users who are prone to evaluate, review, and post their own experiences, is what is causing social media to have an even greater influence on the organisation.

A. Social Enterprise: The Natural Extension

Social business is directly related to the flurry of interest in and activity around social media and its direct use in marketing: The natural progression of social technology in the industry is social business, which is also known as the Social Feedback Cycle. All areas of the company are affected by social business, which applies social concepts including sharing, rating, reviewing, connecting, and cooperating. Social behaviour and the growth of internal knowledge communities that link individuals and their ideas may result in the creation of more streamlined and effective company operations, from customer service to product design to the promotions team. If social business is seen in this light, change management replaces marketing as the primary focus. That's a substantial idea.

Back up a bit: When done well, social media marketing aims to include clients in the online social spaces where they already naturally congregate. In contrast, social business listens to what customers are saying and what interests them, then connects that information back to the company so that it can be processed and applied to the development of the upcoming iteration of customer experiences and, consequently, the upcoming iteration of conversations.

It's critical to comprehend the function of the customer, which is defined here as someone "on the other side" of a commercial transaction: It might be a shopper at a store, a client at a business, a gift to a charity, or a voter in a poll. All of these archetypes have one thing in common, and it's important in the context of social business: they all have access to information that may either confirm or deny the messages you've spent time and money developing. This information isn't limited to what you put into the market. But there's more, as we like to say. Beyond the marketing messaging, consider any innovations or ideas for changes that could come from your customers: Your consumers have unique knowledge about your company's procedures as a consequence of their real interactions with your brand, product, or service. They also likely have some suggestions for how your company may be able to better serve them in the future.

Take into account the following, which are all representative of the types of "outputs" a client or business associate may have created after a transaction and may silently walk away with unless you take concrete measures to gather this data and feedback: Early warning of

possibilities or difficulties; Awareness aids (testimonials); Market expansions (ideas for new product uses); Customer service hints that circulate among users; Public opinion over legislative action or inaction; Competitive threats or revealed flaws; This is by no means a complete list, but it is representative of the types of information that customers often communicate among themselves and would be happy to share with you if you asked. Strangely, when it comes to product and service policy designers, this knowledge seldom makes it all the way back, where it may really help. Moreover, this might be

Social Media and Customer Engagement information that you don't have and that, because you are so involved in your company, you may never see. The best course of action is to compile this knowledge and use it methodically. As an example, a user could discover that your software product doesn't seamlessly interact with a certain software programmer that this consumer might also have installed. How are you to know? You may gather this information (as well as the accompanying cries for assistance made in internet forums) using social analytics (tools and procedures). It may then be used in conjunction with your own processes and domain expertise, as well as the experiences of other customers, to enhance a specific customer experience before being made available broadly as a new service. With the same community and collaborative tools, this new solution might then be distributed to your larger customer base, improving your company's perceived value to them and fostering a closer bond with the clients who first encountered the issue.

The transition from social media marketing and social analytics to social business is made possible by the information sharing that follows—publishing a video or writing a review—and its use inside the company. This shared consumer knowledge may be highly beneficial in persuading others to make a similar purchase from a strictly marketing perspective—as used here, meaning the MarCom/advertising/PR domain. It may assist a marketer fine-tune their message by illuminating which advertising claims are accepted and which are rejected. Also, it may provide a channel of communication with the client—consider online product evaluations or support forums—so that marketers can better understand what is working and what isn't.

This listening and information gathering, which is covered in detail in Chapter 6, "Social Analytics, Metrics and Measurement," comes under the category of "more information," which necessitates the use of improved social analytics tools to help make sense of it. You should pursue it. If you have access to user feedback, your product or service will adjust more quickly. Your company receives favorable attention when you share the improvements and ideas that arise from this while providing credit to your consumers.

Customer feedback may be a priceless source of knowledge, but you should be mindful of the effect anonymous and sometimes unfavorable comments can have. Understanding your customer's function as a producer and receiver of material that is shared on the social web is crucial. The same is true: You must be aware in order to prepare a suitable reaction. The Social Web as a whole is moving away from anonymity and towards identification, but no particular identity has been validated, at least not yet. This implies you have to do more research.

This ongoing anonymity creates a space for "comment and rating abuse," but social media also allows for a general lifting of the bar when it comes to proving genuine identity. More and more individuals are posting comments in the hopes of being noticed. Social business and the analytical tools that assist you sift through identification problems are crucial to understanding what is occurring around you on the Social Web given the increased interest in and significance of genuine identity, in addition to market information. The identification of influencers and the utilization of the "social graph," or the internal structure of the connections between individuals and the status updates that reveal what they are doing right now, are later sections' formal connections to business. Your identity isn't always as it seems for the time being, but keep in mind that most customer remarks are made to inform you of what occurred, whether it was good or bad, and to let you know that it happened to a certain person. Since they want you to identify them, they signed their name. "As people gain control over their data and expand their online presence, they are not seeking privacy but rather individual identification. This will ultimately transform the whole advertising industry.

B. Social Business Is Comprehensive:

The bigger role of the Social Feedback Cycle and the practice of social business develops when you mix identification, ease of posting, and the propensity to publish and utilize shared information in purchase-related decision-making processes: The Social Feedback Cycle encircles the whole company, dwarfing the loop that links sales and marketing, one of the components of conventional Customer Relationship Management (CRM).

Think of a company like Motorola's spinoff Freescale. Freescale use YouTube for a number of authorized reasons, one of which is to allow current employees to post films about their engineering jobs: The intention is to persuade potential workers to more seriously consider working with Freescale by giving them the opportunity to view "inside Freescale". Instead, consider a company like Coca-Cola: In order to engage with consumers, Coke is relying less on branded microsites and more on user-driven social networks like Facebook. Via its Coca Cola Freestyle vending machines, which let customers to blend their own Coke flavours, Coke is also directly addressing consumer desires. Comcast and several other businesses increasingly utilise Twitter as a means of customer service. Outside marketing, there are increasingly more instances of direct corporate

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integration of collaborative and shared publishing tools.

Each of them has a wider impact than marketing, is the response. To create an experience that is shared and positively discussed throughout the company, each directly integrates several disciplines. These are instances of social business activities rather than social media marketing. These are also examples of a reversed message flow, which is significant: Consumer participation and, therefore, market data are flowing from and going to the company. Over mass media, it has often been the other way around. The company is the one listening to the client in each of the above instances of social business ideas and implementations. After this listening and involvement, corporate resources are used to adjust, maintain, or enhance certain client experiences. The use of social business becomes really comprehensive if it is connected to corporate goals.

C. The Networked Consumer

As a result, the customer is now playing a key role in innovation as a source of forward-looking knowledge about taste and preference, and as such, they might be the foundation for competitive advantage. Maybe because there is a difference between consumers having thoughts or ideas and really learning anything beneficial from them and utilizing it. Social business and associated technologies enter the picture once more: In contrast to social media marketing, which often ends at the listening stage and may also include actively addressing concerns, social business goes two stages farther.

First, social business practices create official, obvious, and transparent connections between clients and the company as well as internal connections between staff members and clients. One of the main components of social business is this: The "social" in "social business" refers to the fostering of relationships between individuals, which are then used to support business, product creation, service improvement, market knowledge, and other endeavors. Second, the company is able to react to what its consumers are saying via social media channels in an effective, trustworthy way because workers are linked and able to interact – social business and Web 2.0 technologies apply inside as well as outside.

A word about fear before we go any further: the fear of the unnamed, the unsaid, the unidentified, and even the uneducated stating unfavorable things about your company, product, or service that aren't even true! Be less afraid, or do not fear. You may really make significant progress in reassuring your team, who may be a little anxious about social media, by joining, understanding, and connecting with them. The party visited an aircraft carrier that was engaged in Pacific operations. One of the things Jake saws was that, while being one of the world's most hazardous workplaces, an active aircraft carrier's deck was remarkably fearless despite seeming chaotic to inexperienced eyes.

D. The Social Web and Participation

The next section offers a conceptual framework for comprehending how social technology adoption and related processes allow the crucial activities of engagement and reaction. Beware: It differs from the perspective that governs "engagement" in conventional media. When customers participate in an open, participatory social environment, engagement is redefined by them. Take the time to comprehend the four levels of engagement since the context in which conventional media defines "engagement" is extremely different from this one.

Customers or stakeholders who are actively participating on the social web are no longer just watchers. It's the distinction between attending a screening of "The Rocky Horror Picture Show" and watching a movie. Participation makes a distinction. In the context of social business, engagement refers to your customers' willingness to invest time and effort into interacting with you and sharing their thoughts on you throughout conversations and during business-related operations. They are prepared to participate, and on the Social Web, participation is what is meant by engagement.

So, the engagement process is essential to the development of effective social business practices as well as successful social marketing. Participation in a social setting suggests that your target market has developed a personal interest in what you are offering. In a broader sense, this refers to any stakeholder and conveys the same idea: It has been established that this individual has a personal interest in the success of your company. This rule applies to anybody who can voice and share an opinion or an idea along your road to market, including clients, business partners, and staff.

There is a bigger consequence when client dialogues go into the buying cycle during the contemplation stage of the sales process: Your marketing team now includes your consumer. In truth, the core of any company or organisation is built on the opinions and interactions of your consumers. The effects are both subtle and significant: Subtle in the sense that much of "social business" is just doing business as it should be conducted on the surface.

Companies exist eventually to satisfy the needs of their customers, whose business ensures the future of its founders, workers, owners, and other stakeholders as well as generates revenue for them. Yet, sometimes it seems that the client is removed from that set. By using the hashtag #FAIL on Twitter, you can often find the outcome on any given day.

Yet there has also been a significant shift in the perception that consumer satisfaction now carries considerably more risk. In circumstances of over- or under-delivery, customers are better equipped to let others know about it since they are more informed, more outspoken, and more aware of what they want. Moreover, buyers not only observe what the company and its industry are doing, but

they also create their own expectations for your company based on what every other company they do business with is doing. It is anticipated that American Airlines would prominently display customer ratings on every flight it flies if Walmart can swiftly use Bazaar voice to add ratings and reviews to every product it sells. Consider this: How would the overall flying experience alter if flight attendants were assessed based on service and manner by previous passengers and that data was utilized to choose future flights similarly to on-time performance?

Restaurants are where it occurs: Every one of us has a favorite waiter. If you think this is a reach, keep in mind that Southwest, Alaska Airlines, and Continental have all prioritized this service point, and they all have better than average Net Promoter ratings in part because of it. In order to build goods and services in a way that not only satisfies consumers but also inspires them to spread their joy to others, social business entails empowering your whole company to listen, engage, comprehend, and react immediately via dialogue. Social business is the interstate system that allows social media to enter your company if it is the vehicle for success.

III. CONCLUSION

Better social media interaction indicates that your clients are more engaged with your brand. This therefore gives you additional chances to foster brand loyalty, boost word-of-mouth recommendations, and boost sales. These approaches can help foster brand loyalty, increase customer satisfaction, and ultimately, drive sales. However, it is important to note that successful customer engagement requires a deep understanding of the customer, their preferences, and their needs. Businesses that take the time to understand their customers and deliver authentic and meaningful experiences are better positioned to succeed in today's highly competitive marketplace. By engaging customers in meaningful ways, businesses can build stronger relationships, increase customer loyalty, and ultimately, drive long-term success.

REFERENCES

[1] J. Song, H. Moon, and M. Kim, “When do customers engage in brand pages? Effects of social presence,” Int. J. Contemp. Hosp. Manag., 2019, doi: 10.1108/IJCHM-10-2018-0816.

[2] Y. K. Kim and P. Sullivan, “Emotional branding speaks to consumers’ heart: the case of fashion brands,” Fashion and Textiles. 2019. doi: 10.1186/s40691-018-0164-y.

[3] E. Kim, L. (Rebecca) Tang, and R. Bosselman, “Customer Perceptions of Innovativeness: An Accelerator for Value Co-Creation,” J. Hosp. Tour. Res., 2019, doi: 10.1177/1096348019836273.

[4] I. Assiouras, G. Skourtis, A. Giannopoulos, D. Buhalis, and M. Koniordos, “Value co-creation and customer citizenship behavior,” Ann. Tour. Res., 2019, doi: 10.1016/j. annals.2019.102742.

[5] D. Kemp, “Using Smart Speakers to Engage with Your Customers,” Harv. Bus. Rev., 2019.

[6] J. Braojos, J. Benitez, and J. Llorens, “How do social commerce-IT capabilities influence firm performance? Theory and empirical evidence,” Inf. Manag., 2019, doi: 10.1016/j.im.2018.04.006.

[7] S. Peeroo, M. Samy, and B. Jones, “Trialogue on Facebook pages of grocery stores: Customer engagement or customer enragement?,” J. Mark. Commun., 2019, doi: 10.1080/13527266.2018.1482559.

[8] C. K. . Sandunima, H. K. Kodagoda, H. B. J. Bandara, N. R. D. Viduranga, and K. K. N. . Jayasuriya, “The impact of social media marketing on customer purchase intention: with Special Reference to Fashion- Wear Industry in Sri Lanka,” 16th Int. Conf. Bus. Manag. (ICBM 2019), 2019.

[9] V. Filimonau, H. Fidan, I. Alexieva, S. Dragoev, and D. D. Marinova, “Restaurant food waste and the determinants of its effective management in Bulgaria: An exploratory case study of restaurants in Plovdiv,” Tour. Manag. Perspect., 2019, doi: 10.1016/j.tmp.2019.100577.

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Selecting the Best Social Media Platform for Marketing

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Abstract— Choosing the best social media platform for marketing can be a challenging task for businesses. This abstract will explore various social media platforms and their suitability for marketing based on factors such as target audience, content type, and marketing goals. Facebook, with over two billion active users, is a popular platform for businesses to connect with customers, build brand awareness, and drive sales. Instagram, with its focus on visual content and younger audience, is ideal for businesses in industries such as fashion, beauty, and food. Marketers may connect with and interact with prospective clients on social media sites like LinkedIn, Twitter, YouTube, Facebook, Instagram, and even some of the more recent ones like TikTok. Marketers can captivate their audience with a solid social media strategy and the ability to provide interesting content.

Index Terms— Consumer, Marketing, Social Media, management, Social Media Marketing

I. INTRODUCTION

Social media is trendy, the current fad is social media. Moreover, it offers corporations a chance to sell their products directly to clients by cutting out the conventional intermediary. This is why almost all companies from global leaders like Starbucks and IBM to small local ice cream shops are looking into social media marketing campaigns. A year ago, companies had mixed feelings about social media. Companies are quickly embracing social media marketing now that it is a permanent fixture. Social media is the next marketing trend, just too how websites and email originally gave companies power [1],[2].

Online communities, social networks, blog marketing, and other online marketing tools are all part of social media marketing [3],[4]. That is now the "buzz" in marketing. India was likely one of the early adopters of social media marketing. Since businesses try to connect with their audience via internet channels, the organisational cause has taken the place of the social cause these days [5],[6]. That and the social media phenomenon's exponential growth make it both mind-boggling and frustrating [7],[8]. Social networking is built on the principles of trust and kindness, and while promoting on social media, these core ideas must be upheld. It is perhaps the only marketing channel that promotes responsibility and error-free communication between merchants and customers. Multinational corporations have acknowledged social media marketing as a possible marketing platform and have used it to fuel their advertising campaigns with innovative techniques [9].

Online social media interaction is happening. Social media, according to Wikipedia, are internet-based methods for communicating and exchanging information among people. All of social media is about networking, and it's about networking in a manner that promotes trust between the people and groups involved. Any website that promotes community development, engagement, and the sharing of material, ideas, and opinions may be categorised as a social media. Facebook, YouTube, Twitter, Digg, MySpace, StumbleUpon, Delicious, Scribd, Flickr, and others are some examples of well-known social networking websites. From the two terms that make up the phrase "social media," we may infer its meaning. Media, in general, refers to advertising and the dissemination of ideas or information through outlets or publications. Social refers to how people interact with one another in a group or community.

By referring to social media as a whole, we simply mean platforms for communication and publishing that are created and maintained via interpersonal contact between people using a particular medium or instrument. According to Wikipedia, the phrase means: By turning individuals from content consumers into content makers, social media is democratising knowledge. It is the transition from a broadcast method to a many-to-many approach that is based on discussions among writers, individuals, and peers. The "wisdom of crowds" is used by social media to link knowledge in a cooperative way. Internet forums, message boards, weblogs, wikis, podcasts, images, and video are just a few examples of the many various formats that social media may take. User-driven websites with a particular emphasis or function are what make up social media. Sometimes the biggest draw is the community itself.

Social media, which use highly accessible and scalable publishing mechanisms, are media for social interaction. Web-based technologies are used by social media to convert communication into dialogues that are interactive. Social media is described by Andreas Kaplan and Michael Haenlein as "a series of Internet-3 based apps that expand on the theoretical and technical underpinnings of Web 2.0, which facilitates the production and sharing of user-generated content." In order to swiftly spread knowledge and information to a large number of consumers, social media uses web-based technologies. They enable the production and sharing of user-generated content. Social media is the umbrella term for websites like Facebook,

Twitter, Instagram.

Social media is an example of an inexpensive instrument that combines spoken communication with technological and social engagement. Like Twitter, Facebook, MySpace, and YouTube, these technologies are often web- or mobile-based. Social networking sites have evolved into a channel for merchants to expand their marketing efforts to a larger audience in today's technologically advanced world. Social media marketing is described as a "link between companies and customers, delivering a personal channel and currency for user-centered networking and social engagement".

Due to the significant changes in consumer communication methods and tools brought about by the rise of social media, companies must learn how to utilize social media in ways that are compatible with their company strategy. This is particularly true for businesses looking to obtain a competitive edge. This study looks at recent writing that discusses how retailers might establish and employ social media as an addition to their marketing plans. Social media research has mainly concentrated on defining the phenomenon through the explanation of new terminology and concepts that compose its foundations, and examining the impact of a company's integration of social media on consumer behavior because this phenomenon has only recently emerged within the last ten years. This essay starts out with defining the terms used to describe social media marketing. It then goes on to analyze the four major themes that have been identified in recent research studies: virtual brand communities, consumer attitudes and motivations, user-generated content, and viral marketing.

While social media marketing is a well-researched subject, it has only ever been explored via theoretical and experimental study, leaving no exact descriptions of the advantages this marketing strategy offers to businesses. Reviewing the extensive body of multidisciplinary literature, it is evident that studies are concentrating on defining social media marketing and looking at the variables that influence customer behavior in relation to social networking. Despite the early gains achieved by scholars, this field of study has not advanced much. The knowledge of the long-term promotional benefits shops get from social media marketing has to be deepened via further research. In order to go beyond theoretical or expected results and obtain understanding about real-world applications, more structured investigations are also required. This review of the literature discusses the research gaps in social media marketing and emphasises the need for further studies that examine the advantages of social networking site marketing, particularly for small shops.

A store has to be familiar with all facets of social media before considering it as a marketing strategy. It is impossible to comprehend social media without first describing Web 2.0 is a term used to describe a new way that users interact with the World Wide Web, where content is constantly changed by all users in a sharing and cooperative manner. It has more to do with how people are using technology than with the technology itself since users are increasingly producing and consuming content instead of just obtaining it, giving value to the websites that allow them to do so. From straightforward information retrieval to interactivity, interoperability, and collaboration in Web 2.0.

Individuals are more prone to migrate their interactions to virtual platforms as social media apps become a bigger part of their everyday lives. This in turn favourably reflects on their attitudes and behaviours towards all types of social media technology. Therefore, social media applications have been observed as one of the most efficient and influential implications that have been progressively engaged in \smost aspects of people's lives.

In terms of marketing goals and strategy, social media has mainly been recognised as a successful instrument, particularly in areas like communication, customer relationship management, and consumer engagement. For instance, social media might intentionally improve two-way contact between businesses and consumers, which would lead to customers being more attached to the organizations' brands. Moreover, social media would be able to deliver the uploaded material audibly, graphically, or textually, or by combining text, visual, and verbal content. Businesses have been eager to use social media in a variety of situations to connect with consumers in ways that facilitate information discovery, interactivity, marketing, and improved purchasing habits, among other things. As a result, organisations have created a number of interactive techniques and processes to improve both their brand identity and marketing effectiveness. In order to draw in more consumers, both in terms of engagement and online customer relationships, a significant amount of effort and resources have been focused on this area. The majority of corporate organisations throughout the globe have embraced and used such cutting-edge platforms and tools in their process to connect with and serve their clients.

Researchers and practitioners alike have generally focused their attention on social media to learn more about how these applications may be effectively accepted and deployed. This is because it's important to understand the prerequisites for successfully implementing such technology as well as if investing in such applications is financially viable. In this respect, Hutchins strongly endorsed the need to consider how social media functions in many situations in order to broaden our understanding of these crucial social media challenges. In a similar vein, Pedersen, Knoll, Pegoraro and Rowe pointed to the innovative nature of these technologies as well as the current state of research over this area as being over initial, exploratory stage which, in turn, required further interest and understanding to explain the importance of addressing the related issues of using social media platforms. Additionally, Filo et al. argued in their recent review study that despite the large number of studies that have looked at social media and its applications across

various fields of interest, it is still necessary to propose a theoretical model that covers the most crucial factors that could have a positive or negative impact on the success of implementing such systems.

In fact, researchers have been taking a particular interest in evaluating and investigating the key characteristics of social media applications at various settings, cultures, locations, and from different viewpoints. The great majority of social media studies were found to be in the field of marketing, that have taken into account the challenges with social media marketing have tested and explored several constructions, a variety of dimensions, and worthwhile aspects. Moreover, scholars have used a variety of methodologies and strategies in their efforts to investigate and study this topic. As a result, this research recognizes the need of doing a thorough evaluation and analysis of the existing literature on social media marketing. So that it will be able to have a better understanding of the most crucial topics discussed as well as which areas need more attention.

The primary goal of the current study, in light of the discussion above, is to systematically scan and review related studies of social media in the marketing field as well as to synthesize and organize the key elements taken into account throughout these studies and how such studies have addressed the related issues of social media marketing. It's crucial to differentiate between social media and social networking. Social networking services are described as "an electronic service, application, platform, or site utilized by persons who have a similar interest, belief, attitude, culture, activity, and genuine life connections" by Wikipedia. On the other hand, Wikipedia addressed the idea of social media as means of communication since they allow individuals to broadcast as well as to approach more people and have greater influence over them. Therefore, Wells defined social networking as the use of social media to directly contact and connect with people one has a genuine relationship with or would want to contact.

Social networking sites, consumer review sites, content community sites, wikis, Internet forums, and location-based social media" are good examples of social media applications. By literally defining social media as "new media technologies facilitating interactivity and co-creation that allow for the development and sharing of user-generated content among and between organizations and individuals offered a second definition.

The idea of social media has been embraced in a variety of diverse situations, in fact. Yet, as the present research is focused on how social media affects marketing, it is necessary to approach the topic from a marketing viewpoint. Social media marketing is "a dialogue often triggered by consumers/audiences, or a business/product/service that circulate among the stated parties to set in motion a revealing communication on some promotional information so that it allows learning from one another's use and experiences, ultimately benefiting all of the involved parties,". The use of social media tools, channels, and software is to "develop, communicate, deliver and trade services that have value for an organization's stakeholders".

We shall examine numerous social networking site possibilities that are beneficial for your marketing requirements throughout this guide. You will evaluate a variety of factors pertaining to the various social media platforms to determine what is successful. You may, of course, use any or all of the social media platforms we've listed here to promote your brand. But, it does not imply that each and every one of them is practical for your requirements, much alone simple to use. Every social media platform differs from the others in terms of its audience and organisational structure. Every social networking platform is different.

While organizing your social media strategy, make wise choices. In fact, having accounts on many social networking platforms is ideal since it provides you the chance to do more. This chapter examines several social media platforms depending on what you may use them for. Consider your primary social media campaign objectives. Determine your initial motivation for using social media. Maybe you want more people to know about your brand. Maybe all you're doing is attempting to obtain more leads. You can be attempting to get customers to visit your physical location or download an app.

Your objectives should guide the social media platform that you choose to use. If you want people to know more about your job, Facebook is perfect. LinkedIn is ideal for generating leads. If you want people to download an app, Snapchat is perfect. In any event, before using a social networking site, consider what you may gain from using it. Make sure the campaign is set up properly and that you are aware of the social media platforms that are ideal for it. You should carefully consider how each solution could fit with your different demands.

Take into account the target market you're attempting to attract. Every social media platform has a distinct audience. A superb site called LinkedIn is well-liked by professionals, specifically those who make decent salaries. Younger individuals may benefit from Instagram, which is popular with today's millennials. The Pew Research Center discovered some intriguing demographic data on social media websites in 2015. While not conclusive, the following information gives a general indication of what to anticipate from certain social media platforms:

Facebook has a very diversified user base. Facebook is used by many types of people, including both the wealthy and the poor, young and elderly. Black, white, Hispanic, and Asian audiences as well as other racial categories find it to be popular. Women are more interested in utilising Pinterest. LinkedIn is not just popular with wealthy individuals but also with those who have college degrees. Persons from suburban regions are also more interested in it than others. Also, those who live in cities utilise LinkedIn

more often. Twitter usage is more prevalent among younger individuals. Urban residents will also utilise it more often. This is only a small sample of the information you will learn about social networking websites. These websites all operate differently in terms of who they draw to them. Try out several social media platforms to see if you can't obtain anything worthwhile and significant out of your campaign. Be careful when using several alternatives for your campaign, as you will soon learn.

Consider how often users could engage with social media platforms. Many social media platforms have varying expectations for how often users engage with them. The sites that individuals are most likely to check daily or every other day are Facebook, Twitter, and Instagram. People typically check their feeds on Pinterest and LinkedIn three to five times each week, while others may do so more often. If you want to improve brand awareness, you may want to create a website that gets frequent visits. Sites where users do not often check their profiles are beneficial if you're looking to generate leads or build lasting relationships with industry experts.

When attempting to communicate with someone on social media, it is crucial to understand how they behave. Be careful to ascertain how good and how simple a site's communication with users is. You can communicate with individuals and find others who share your interests more easily as a result of this.

Examine what your rivals are doing. More than likely, your rivals are using social media now or plan to in the near future. Despite the situation, you need to keep an eye on what your rivals are doing. To discover what your competitors are doing, visit their websites. Be sure to compete with them and make your website more distinctive and original. By doing this, it will be simpler for your page to stand out and seem more appealing. Be sure your marketing is succeeding and that you are not just duplicating what others are doing. As long as your material is unique, using the same social media platforms, using related keywords, or using other posting techniques is OK. Not everything your rivals do has to be exactly the same as yours. To have a clear understanding of what you should do yourself, be aware of what others are doing. During the process, keep an open mind, but at the very least, consider what others have accomplished.

Consider the material you want to produce. The message you work with on each social media platform varies. A social media page may be anything, but you need to find out what the guidelines are for each platform: If you want to promote products using images, Tumblr, Pinterest, Snapchat, and Instagram are fantastic. These social media platforms are ideal for marketing that uses images. If you want to be more technical, LinkedIn is excellent. The website is fantastic for folks who wish to let others know what they think. For video material, YouTube and Snapchat are great. Quora is intriguing if you want to respond to inquiries individuals may have regarding a certain idea your company uses.

Twitter is helpful when you want to communicate with others about news or opinions. Yet, only if you're attempting to exchange fewer pieces of info at once. Go through the situation before selecting a social media platform. All of this is about gaining some control over your job and having things organised in a clever and beneficial way. Keep an eye on how effectively you can create this information so that it is simpler for you to build something that is simple to understand and use.

Consider your content's format. Every social networking platform has guidelines for posting material. Instagram is certainly more concerned with photos than YouTube is with videos. Twitter is for brief communications, but Facebook and LinkedIn allow for more detailed posts. Choose your topic and the visuals you'll use to demonstrate it. This will help you manage your task more effectively. Consider the topic you plan to use as well. Some content kinds may be more effective for certain firms than others. For example, a tax preparation business would perform best with blog entries outlining changes to tax legislation. Videos of players practising their abilities or learning the game might be useful for a baseball training facility. You must have a well-thought-out strategy and have your work well arranged.

Be cautious while preparing them. Run fewer social media initiatives than necessary. Understand your capacity to manage each one without becoming overburdened. You may work with as many social media platforms as you choose, but only commit to what you feel confident managing at once. You shouldn't overlook certain sites. To observe what is happening with your pages, you can always utilise the analytical services offered by many social media platforms. Analytics looks at how many people visit your website or engage with your articles. Analytics may be used to evaluate the success of your sponsored advertising efforts. You may use this study to decide if you should stick with one platform or move on to another. Considering that your task will only grow more challenging, avoid using anything that is too intricate or tough to understand.

If necessary, you may also network with other people in your industry to collaborate on other initiatives. For example, you may engage one individual to manage a Facebook campaign while another manages a LinkedIn campaign. Check to see how successfully those individuals manage certain campaigns and whether they are familiar with the operation of specific social media sites. If necessary, let many users to operate various channels at once, but make sure they are aware of what they are dealing with. The goal is to maintain consistency and control throughout your social media strategy. Keep in mind that all of the concepts discussed in this chapter are only recommendations. Any of the social media platforms described in this tutorial might be used by you. Think about the features that each of these websites provides so you can

get more done with your task. All of the individual websites for internet marketing are covered in depth in this book. For suggestions on what will serve your social media requirements the best, have a look at these points. Learn how to utilize these locations, the many sorts of audiences you may reach, and the benefits and drawbacks of a website.

II. CONCLUSION

Platform for placement. Each social network has unique requirements for content. It has its own specifications for text or the sizes of images or videos. In light of this, the first thing you should consider is the site's needs. traits of the intended audience. Various customer groups have distinct tastes. You must understand what has the ability to capture consumers' attention in order to create effective content. Choosing the best social media platform for marketing is a critical decision for businesses seeking to connect with their target audience, build brand awareness, and drive sales. With so many platforms available, each with its unique features and audience, businesses must carefully consider their marketing goals and the type of content they plan to create before deciding which platform to focus on. Facebook, Instagram, LinkedIn, Twitter, YouTube, and Tikka are some of the most popular platforms for marketing, each offering distinct advantages based on factors such as target audience, content type, and marketing goals. By selecting the right platform and creating compelling content that resonates with their target audience, businesses can effectively reach their marketing objectives, whether that is to drive sales, build brand awareness or create viral content. Ultimately, the key to success in social media marketing is to understand the target audience, create relevant and engaging content, and stay abreast of trends and emerging platforms to stay ahead of the competition.

REFERENCES

[1] E. C. Tandoc, C. Lou, and V. L. H. Min, “Platform-swinging in a poly-social-media context: How and why users navigate multiple social media platforms,” J. Comput. Commun., 2019, doi: 10.1093/jcmc/zmy022.
[2] Y. Sun, X. Zhou, A. Jeyaraj, R. A. Shang, and F. Hu, “The impact of enterprise social media platforms on knowledge sharing: An affordance lens perspective,” Journal of Enterprise Information Management. 2019. doi: 10.1108/JEIM-10-2018-0232.
[3] J. Gangneux, “Logged in or locked in? Young adults’ negotiations of social media platforms and their features,” J. Youth Stud., 2019, doi: 10.1080/13676261.2018. 1562539.
[4] M. Alghizzawi, “A survey of the role of social media platforms in viral marketing: The influence of eWOM,” Int. J. Inf. Technol. Lang. Stud., 2019.
[5] C. D. Ham, J. Lee, J. L. Hayes, and Y. H. Bae, “Exploring sharing behaviors across social media platforms,” Int. J. Mark. Res., 2019, doi: 10.1177/1470785318782790.
[6] A. Budree, K. Fietkiewicz and E. Lins, “Investigating usage of social media platforms,” African J. Inf. Syst., 2019.
[7] J. Carlson, S. P. Gudergan, C. Gelhard, and M. M. Rahman, “Customer engagement with brands in social media platforms: Configurations, equifinality and sharing,” Eur. J. Mark., 2019, doi: 10.1108/EJM-10-2017-0741.
[8] C. Schreurs, “Self-presentation and interaction on romance social media platforms: Networked intimacy, sexual arrangements, and dating practices,” J. Res. Gend. Stud., 2019, doi: 10.22381/JRGS9120199.
[9] A. Singh and S. Mathur, “The Insight of Content Marketing at Social Media Platforms,” J. Manag. Sci., 2019.

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Relation to Consumer Protection in Social Media Selling

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***Abstract*— The process of defending the general public against unethical business activities is known as consumer protection. The media plays a key role in raising public understanding of the laws that apply to consumers and their place in the marketplace. The public is made aware of consumer regulations by government marketing and current events involving them. The government and several Organizations run media-based awareness campaigns.**

***Index Terms*— Advertising, Consumer rights, Deceptive practices, Fair Trade, Fraud, and Social Media.**

I. INTRODUCTION

Nowadays, social selling has expanded quickly. Most business owners consider social media to be a practical and affordable tool for marketing their goods and services. Customers gain from such social selling since it allows them to choose from an array of products and services at affordable pricing [1],[2]. Yet, it is crucial that information disclosure be taken seriously and that rules are developed to provide a secure experience while purchasing online in light of the inadequate information standards in social selling and taking into account the industry's fast expansion [3],[4]. Businesses that conduct online transactions should provide comprehensive information on their products and cater their information to the demands of their customers. Digitization advances have transformed the business paradigm from a simple marketplace to a market space. Online stores, smartphone applications, and social media have nearly become a necessity for companies to sell their products and services [5],[6]. Businesses and consumers may collaborate on a dynamic platform thanks to the design of internet commerce. Customers have access to a wide variety of products and services available anywhere in the globe, at any time.

To meet the continuously changing and new difficulties in the field of e-commerce, businesses are continually developing new technologies. More than two billion individuals are connected to one another globally thanks to the Internet. Seven major conclusions about the effect of and prospects for the Internet in India in the context of the Indian Internet environment. India presently has the third-largest Internet user base in the world, with roughly 120 million users, according to the research. With 600 million Internet users in 2019, India is predicted to grow into the second-biggest user base in the world and the greatest in terms of incremental growth [7],[8].

Social networking has been a useful tool for the retail sector in recent years. Social networking is seen as a component of developing customer connections as part of the sales process by anybody wishing to launch a retail company or simply enhance their online sales success. Social selling refers to the process of making a transaction via social media platforms like Facebook, Twitter, and Pinterest. The virtual nature of the Internet and social media, however, presents fresher challenges to customer confidence. Consumers have a range of choices to choose from when a disagreement develops during a face-to-face transaction to assist them in resolving the matter. The customer often returns the product to the place where he bought it, shows the seller the issue, and they work out a solution together. If the vendor doesn't reply appropriately, the buyer has two options: report the issue to a traditional law enforcement agency or file a lawsuit against the seller in a consumer court. These mechanisms for quick redress have been built by societies all across the globe. Yet making purchases online is not quite as simple as this. It is impossible for customers to return to the shop where they made their purchase to seek a refund. However, it might be quite challenging for a consumer to depend on local law enforcement to address the situation if the seller is unresponsive to the buyer's issue. When sellers provide little to no information on their social media pages regarding their actual presence, terms and conditions, and transaction policies, social selling becomes even more difficult.

Although some companies augment their online shopping portals with social media, other merchants utilize social media only to market their goods and services. Customers seeking a resolution to their product or service complaint may find it challenging in such circumstances to locate enough and relevant information about the company and its rules. In order to offer their goods and services, online merchants use social media platforms. This study looks at market trends in the conduct of due diligence by these online retailers. The study also makes an effort to investigate the current Indian legal system with regard to the information that web portals supply to their users. Inference is also derived from some of the worldwide best practices of sustaining customer trust and confidence in internet commerce in general, including social selling. This essay opens with an overview of internet purchasing and how it

has evolved in the context of India. The second section of the essay briefly describes the e-commerce and consumer protection legislation that are now in effect in India. The information concerning online consumer contracts is evaluated in the third section. The fourth section examines worldwide norms and recommendations about the sufficiency and reliability of information in consumer transactions conducted online. The paper's conclusion aims to determine if there is a need to strengthen regulation on information standards via state machinery by drawing conclusions from the aforementioned investigation.

Research Review The notion of consumerism has been ingrained in business writing. Customers should get accurate quality and quantity for the money they spend. Consumers continue to be the focal point of all commercial and industrial activities in every civilization. Legislation across the globe has long recognized the need of preserving fundamental rights to consumer welfare. The adoption of the United Nations General Assembly's consumer protection guidelines in 1985 sparked a strong consumer movement that resulted in the passing of specific laws and the creation of distinct institutions to address consumers' complaints in many different nations. A new age of consumer protection and rights identification with a formal enforcement framework has been ushered in by modern law. A vigorous consumer protection movement in India got its start with the Consumer Protection Act of 1986. A consumer is protected by the Act against subpar products, subpar services, and unfair business practices. The Act also includes a three-tier, quasi-judicial system to resolve consumer complaints in a way that is straightforward, quick, and affordable [9],[10].

When consumer law was created, business-to-consumer transactions using information technology were an unheard-of phenomenon. The Internet was first created and utilized as a tool for knowledge and information transmission between institutions and research centers or between cultural and research centers. It has now evolved into a potent tool for corporate communication. Manufacturers of products and services now have many sales opportunities thanks to the rise of social media. The unfortunate customer is the target of this media bombardment! When it first became extensively utilized in the middle of the 1990s, the Internet has produced a number of legal challenges, primarily in the area of consumer rights and protection. In issues including privacy, cybersquatting, and electronic signatures, legislation impacting consumer and company rights has been enacted. These regulations are only the first steps in regulating the online market. These new regulations are undoubtedly not the final in terms of Internet control since the Internet is constantly developing. The following are some recent changes to India's legal system that are related to e-consumer protection: 1. The Consumer Protection Bill, 2015 included a clause on "deficiency in service") to cover any act of omission or conduct on the part of a service provider in withholding "relevant information," which may result in harm to the customer. 2.

Under Section 2 of the 2015 Consumer Protection Bill, it is also being considered for inclusion as a "unfair trade conduct" when a company fails to provide a 30-day cooling-off period after the purchase of goods or services. The same clause makes an effort to secure the personal data of customers that is shared on internet storefronts. 3. Internet marketplaces are covered under Section 2 of the Information Technology Act of 2000, which defines intermediaries. The Act also shields online market intermediaries from certain obligations, so long as they follow any additional rules that the Central Government may impose and do due diligence. The Information Technology Regulations of 2011 require intermediaries to post rules and guidelines, a privacy policy, and a user agreement for consumers to access or utilize their online services. The Guidelines compel intermediaries to take action within 36 hours to delete any content that is found to be gravely hurtful, harassing, defamatory, obscene, illegal in any way, or in violation of any presently in force legislation. They must also save those details and any related data for at least 90 days in order to conduct an investigation. The Regulations also mandate that intermediaries include the name and contact information of their grievance officer on their websites so that users who suffer as a consequence of exposure to that harmful online resource may file complaints with the grievance officer.

II. DISCUSSION

Improving consumer circumstances may help the economy as a whole in addition to enhancing consumer welfare. By comparing offerings, switching providers, filing complaints, and seeking restitution when their rights are violated, customers who act as market drivers when they have the confidence and expertise to do so reward the most productive and inventive businesses and promote competition.

Effective consumer regulations on the supply side provide fair competition for businesses, boost legal clarity, and cut down on compliance costs. Although ecommerce is becoming more prevalent and more significant in the EU, there is still a lot of room for development. Social media is beginning to play a significant part in this circumstance in order to educate customers about products and services and to collect pertinent customer feedback for the seller or supplier. Web-based and mobile technologies are constantly evolving, enabling dynamic connection between individuals who create social media and their readers, followers, members, and clients.

According to behavioural economics, individuals often lack complete rationality and independence and instead prefer to imitate the decisions made by their peers. The majority of sectors today employ social networks, social networking, and social media as business tools globally. Social media platforms, however, are not only useful for e-

commerce. Social media is helpful for learning about the features, quality, pricing, and references about other people's experiences of buying products and services in the direct retail sale and in the locations where services are provided.

The degree to which consumers believe that their rights are upheld and safeguarded varies greatly throughout the EU. It is crucial that customers have faith in the organizations in charge of upholding and/or protecting their rights, since a lack of confidence may make them less likely to participate actively in the market. Consumer Conditions Scoreboard indicates that 71% of respondents are convinced that service providers and merchants respect their rights as customers. This metric is lower in Latvia in 2014 compared to the EU-28.

In the last 12 months, around 22% of customers claim to have run across an issue while using or purchasing products, which they thought entitled them to complain about. Of them, 76% intervened to address the issue, while 24% took no action. Consumers seem to have had a few less issues compared to 2012, but they also appear to be less engaged in attempting to resolve them. The typical complaint process is requesting the merchant to rectify the matter to the consumer's satisfaction or, if direct resolution cannot be reached, turning to a third party.

The best course of action is to come to an agreeable agreement with the merchant since it benefits both sides in terms of expenses and results. According to these hypotheses, the majority of respondents who believed they had a good reason to complain actually contacted the merchant or service provider. Consumers were somewhat less likely in 2014 than in 2012 to complain to a store or service provider. The vast majority of channels via which consumer complaints are received are internal customer service. The seller of the goods or the service provider is the party most likely to be contacted according to the Market Monitoring Survey conducted in 2013 , making them the immediate and known point of contact and durable goods) the party legally responsible for any flaws in the product.

Since that the e-commerce architecture is virtual, consumers' trust and confidence depend on accurate and reliable information. This necessitates that consumer in the "information society" be more educated and aware than those who shop offline. In the context of consumers, conflict avoidance is as crucial to dispute resolution, if not more so. Often, consumer complaints are the consequence of miscommunications rather than supplier contract violations. Promoting ethical business practises so that consumers are well-informed about the transaction is a key component of consumer law. The anonymous nature of the online market in all of its forms necessitates a larger requirement for clear information at each technological stage leading up to the conclusion of the contract, as well as an efficient method to detect and fix input mistakes prior to the contract's conclusion. Cross-border buying comes with the added danger of having to file a complaint with foreign businesses. The Consumer Protection Law recognizes a number of unfair trade practises, including false and misleading representations of goods and services in terms of standard, quality, grade, and other factors; misleading the public materially as to the price at which the goods are typically sold; disparaging of goods; and making false claims about a product's warranty or guarantee, among other things. Nevertheless, in the case of distance selling, the law does not address a company's failure to adequately disclose information on the address of the supplier, the qualities of products and services, their availability, shipping charges, price, withdrawal, and other matters. In other words, conventional consumer law does not address additional issues such a lack of information, poor product/service quality, or ambiguous information offered by the vendor. Most customer complaints in the internet setting include claims of non-performance or subpar performance of the supplier's product or service, and very few involve complicated legal issues. A large percentage of social selling sites provide information that is typically of poor quality, and there are also relatively few social media pages that are completely information-compliant. It will be expensive to administer a legal framework for unfair commercial practises or deficiencies in service, and a decision-maker will need to use judgement to decide whether such behaviour is covered by the framework. Although social media is increasingly being used for business purposes nationwide, there does not seem to be enough regulation and few rules addressing the quality control of such businesses, which is what alarms us about their fast expansion. So, it is doubtful that social selling will address the problem of consumer welfare and consumer sovereignty in an effective manner. The majority of companies that use social selling conceal themselves behind the social media platform and offer very little to no information about their physical location, the areas in which their goods and services are available, their cancellation and return policies, their refund and payment options, and other pertinent information.

Information disclosure standards are governed by international standards and guidelines. Several international organisations have long recognised the necessity to control consumers' access to information online. With its regulation on the protection of consumers with regard to distant contracts, the European Union took the initiative to establish a legislative framework for proper information in distance selling. Distance contracts between professionals and consumers for the supply of products or services are covered by the Directive. The Regulation places a strong focus on the need that companies using distance selling provide transparent and understandable information prior to the signing of consumer contracts.

Such information must at the very least include the following: Identity and possibly address of the supplier; Specifications of the goods or services and their price, including all taxes; Delivery costs; Arrangements for

payment, delivery, or performance of the contract; Existence of a right of withdrawal; Period for which the offer or price remains valid and possibly the minimum duration of the contract; Cost of using the means of distance communication, where it is necessary; and Cost of using the means of distance communication itself, where applicable The Directive also effectively addresses the right of cancellation and fulfilment of such contracts for distance selling by consumers. The main characteristics of the goods or services, the identity of the trader, geographical address, and contact information, the total price of the goods or services including taxes, and the cost of using a distance communication method to conclude the contract where that cost is calculated are all listed in detail in the new directive on consumer rights , which was adopted on June 13, 2014.

The 1999 Guidelines for Consumer Protection in the Context of Electronic Commerce from the OECD Council provide consumers and companies a clear roadmap for what information disclosure and ethical business practises should look like in the context of internet commerce. The Council emphasises the need of accurate, understandable, and readily available information by online retailers for the reasons listed below: Business name and address Details about the products or services Details about the pricing and terms of a transaction Confirmation procedure Payment Dispute resolution process Privacy Education and awareness The United Nations is now considering updating its roughly 25-year-old Guidelines on Consumer Protection from 1985 in accordance with the digital paradigm, with a focus on information disclosure standards in online transactions. The international organisation for consumer rights, Consumer International, and the United Nations Conference on Trade and Development proposed certain modifications to these rules in 2013. The idea emphasises consumers' right to information in the digital era. The recommendation highlights the significance of information regarding the identification of the business, effective channels of communication with consumers, effective dispute resolution, and clear information about terms, conditions, and costs of a transaction, among other things, to enable the consumer to decide whether to undertake a transaction or not. In a similar vein, self-regulatory organisations have created tools that allow consumers to check on the legitimacy of these internet companies.

For instance, the Better Business Bureau, which was founded in 2000, created a Code of Internet Business Practices to serve as a standard for B2C e-commerce ethics. In order to reassure electronic customers of the dependability of e-retailers' goods and services, the EU's Euro Label initiative enlists the cooperation of national providers of Internet trust marks. The National Trust Council also launched Trusts, a national trust mark effort, to improve Singapore's e-commerce environment. In determining whether the e-commerce company conforms with information requirements established by the individual country's legal and regulatory structure, these self-regulating organisations operate as impartial third parties.

Redress for an unpleasant Internet transaction and leveraging market gatekeepers: Redress for an unsatisfactory Internet transaction may be problematic for consumers, especially since it often raises cross-border difficulties. For the welfare and sovereignty of consumers, this is a crucial prerequisite. Other methods of resolving disputes should be offered by social selling, particularly when it involves international transactions. Consumers would be less likely to get involved in these conflicts if consumer protection organisations had more authority to prevent "rogue merchants" from undertaking online transactions. Improving reputational tools via trust marks: Trust marks from organisations like the Better Business Bureau, Trusted Shops, TrustSg, and others serve as impartial verifiers that online firms adhere to regulatory norms in both letter and spirit. These trust marks carry out inspections of the commercial communications, fair business practises, payment and security, data protection, grievance management, and alternative dispute resolution procedures of e-tailers. State machinery should take the initiative to establish these trademarks on a national scale. Moreover, it should be required that e-businesses who use these trust marks disclose their registration certificate on their web portals. This would increase customer confidence and trust in consumer contracts made online.

III. CONCLUSION

Consumers will feel more comfortable making purchases from online retailers if they get the information they need. In the future, social selling will only see an increase in "cons" rather than ".coms" due to a lack of control on information releases. The Internet's technical and international aspects need regulatory innovation in the following fields: Requirements for information disclosure and a grace period: Nothing on social media company profiles shows the veracity of their information and real location. When identifying the location of the vendor, e-tailers' website domains and email addresses are insufficient and perhaps deceptive. A regulatory framework for adequate disclosures regarding the geographic location of the supplier or intermediary, pricing details, description of the goods or services offered for sale, delivery costs, contract duration, cancellation rights, return and refund policy, availability of after-sales service/warranty, and other factors, is urgently needed.

REFERENCES

[1] D. L. King, P. H. Delfabbro, S. M. Gainsbury, M. Dreier, N. Greer, and J. Billieux, “Unfair play? Video games as exploitative monetized services: An examination of game patents from a consumer protection perspective,” Comput. Human Behav., 2019, doi: 10.1016/j.chb.2019.07.017.

[2] S. Cascino, M. Correia, and A. Tamayo, “Does Consumer Protection Enhance Disclosure Credibility in Reward

Crowdfunding?," J. Account. Res., 2019, doi: 10.1111/1475-679X.12289.
[3] L. Procter, D. J. Angus, A. Blaszczynski, and S. M. Gainsbury, "Understanding use of consumer protection tools among Internet gambling customers: Utility of the Theory of Planned Behavior and Theory of Reasoned Action," Addict. Behav., 2019, doi: 10.1016/j.addbeh.2019.106050.
[4] M. Kriese, J. Y. Abor, and E. Agbloyor, "Financial consumer protection and economic growth," Int. J. Emerg. Mark., 2019, doi: 10.1108/IJOEM-05-2018-0229.
[5] H. J. Mwakatumbula, G. C. Moshi, and H. Mitomo, "Consumer protection in the telecommunication sector: A comparative institutional analysis of five African countries," Telecomm. Policy, 2019, doi: 10.1016/j.telpol.2019.02.002.
[6] Y. Nie and X. Han, "Research on consumers' protection in advantageous operation of big data brokers," Cluster Comput., 2019, doi: 10.1007/s10586-018-1837-4.
[7] A. Palanissamy and R. Kesavamoorthy, "Digitalization of transactions and consumer protection in wrap contracting," Int. J. Eng. Adv. Technol., 2019, doi: 10.35940/ijeat. F9282.088619.
[8] M. Muhajir, "E-Commerce Consumer Protection At Tokopedia," Al-Amwal J. Islam. Econ. Law, 2019, doi: 10.24256/alw.v4i2.1582.
[9] S. Shidarta and S. Koos, "Introduction To A Social-Functional Approach In The Indonesian Consumer Protection Law," Verit. Justitia, 2019, doi: 10.25123/vej.3292.
[10] H. Jacquemin, "Consumers contracting with other consumers in the sharing economy: Fill in the gaps in the legal framework or switch to the blockchain model?," Rev. Internet, Derecho y Polit., 2019, doi: 10.7238/idp.v0i28.3179.

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Measuring and Analyzing the Social Media Marketing

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Abstract— When it comes to social media and business, measuring is my specific area of expertise in Section. The section of "social anything" that most concerns change agents and process advocates is covered in this section. This section examines the justification for developing the precise metrics needed to understand the Social Web and measure progress, as well as the tools and platforms that supply and evaluate these data in the context of your object.

Index Terms— Adverting, Marketing, Platform, Social Media, Server.

I. INTRODUCTION

A foundation for understanding how social media and Web 2.0 technologies are redefining the interaction between Marketing, where the promise is produced, and Operations, where the promise is delivered, has been established in the earlier chapters. This chapter introduces the beginnings of true measurement, building on the fundamentals of controlling conversations by deliberate action rather than clumsy control measures. Building social media adoption across an organisation beyond the marketing department requires measurement. There is no denying the value of Facebook pages and Twitter accounts as marketing extensions. But at this point in the book, I'm hoping that the truly important uses of social technology—reshaping goods and services, building strong, collaborative, two-way relationships with consumers, and applying what you learn throughout your organization—are beginning to become clear [1],[2].

This chapter's overarching subject is on the importance of measuring and how it contributes to calculating return on investment (ROI). When you read this chapter, keep in mind that questions like "What is ROI" must be answered before asking "How do I assess ROI?" and "Is ROI really relevant for this activity?" Don't put too much emphasis on ROI unless you've already determined that it is the right end measurement for your planned usage of social technologies. For instance, if there isn't a clear "investment" or financial return in the form of new, extra income or expenses saved as a result of your project, a key performance indicator, or KPI (see sidebar), may be more relevant and instructive. ROI is significant, but knowing why (and when) ROI is the right metric will help you succeed even more [3],[4].

A. Quantitative Analysis

At this time, it should be quite evident that without accurate, quantitative measurement, your business has almost no chance of ever adopting social media and Web 2.0 technologies. It's a consumer-driven, mobile social application that gives users real influence over brands.

You have no chance of winning without the coordinated, committed assistance of the entire organisation, and without quantitative measurement—the common language used by the majority of organizations—it will be virtually impossible to persuade your larger team that their involvement—beyond marketing—is crucial [5],[6].

The key to using the social web for business is social media analytics. The Social Web is turned from a source of primarily unstructured qualitative data to a conversational framework that can be examined and monitored statistically when time is spent to comprehend the quantitative tools and measurement points [7],[8]. Due to this quantitative rigour, two crucial best practises for integrating social media into your company or organisation are made possible:

Interpreting conversations in a manner that yields prioritised insights in the context of conflicting capital initiatives. Linking these talks to the outcomes of your initiatives intended to improve them by addressing negative dialogues and enhancing positive ones [9].

Press clippings and reporting, focus groups and consumer research, so-called pre- and post-campaign marketplace surveys, and similar activities are examples of conventional communications practices that mimic the analysis of conversations via social media analytics.

Each of these has a unique data collection, identification, and outcome procedure that forms the basis of an essential learning process. The goal of this learning process is to ground the brand, product, or service in the requirements, wants, and responses of consumers, influencers, and other people whose views are relevant to what is discussed in the market. There is a specific set of metrics or an established way of articulating a learnt or observed result in each of these measuring procedures.

II. DISCUSSION

The foundation of social media analytics is based on many of the fundamental techniques used in conventional media, such as who is speaking and what they are saying, but now applied to the (digital) interactions taking place on the Social Web. What then is different? To begin with,

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social media is defined in some way as leveraging the massively scalable publishing capabilities available to every Social Web participant. To put it another way, this means realising that it is simple for reasonably well-connected people to command a reach that rivals TV within local markets or to reach more precisely defined social circles and niches. This implies that anybody with a strong interest and a basic understanding of social media publishing may build a genuine following and have a meaningful impact on it. This includes well-connected homemakers, hobbyist bloggers, and anyone else. The Social Web is no different from any other location in that it requires quantitative measurement of its reach and influence. These chats also provide a substantial body of data that is highly helpful in operating your company since each communication is physically time and date stamped, signed by what is almost always a genuine person, and connected with a unique URL that is eternally discoverable. This is the main goal of social media analytics.

Consider sentiment, source, and volume as a place to start when using social analytics but also the degree to which they feel this way. Sentiment is a measure of the polarity of the conversation positive or negative with respect to the topic. This is useful, for instance, when refining a tactical endeavour focused on brand supporters and detractors. The identification and comprehension of the author—discussed in more depth in the next section, "Know Your Influencers"—as well as the cataloguing and monitoring of the locations of posts—are the two elements of source analysis. Understanding the latter—what is being said on Twitter as opposed to Orkut or Facebook as opposed to a blog—leads to an understanding of where you should be engaging on the Social Web, knowledge that is crucial when planning, for example, a brand outpost programme.

To evaluate the general degree of discourse about your brand, product, or service, volume measurements are employed: How many individuals are discussing a certain subject or repurposing information? The majority of the time, volume analysis is used to examine conversational patterns, such as changes in the proportion of positive to negative discussions over time, the number of conversations over time, or the abrupt spike in unfavourable rumours. An expanded set of metrics that are more useful and clearly defined may be produced by elaborating on the fundamental measurements of sentiment, source, and volume. In an article on Nick O'Neill's blog Social Times, which tracks the technological tools and expertise in social media.

A. Decide Who Your Influencers Are

Simple monitoring is not enough to understand your influencers: You must be aware of the unique individuals affecting people in your marketplace. You may learn more about the intricacies that underlie what motivates their opinion by finding them and then developing a genuine connection with them. This is a crucial realisation, but it begs the question of how to create these connections. They come to you.

You may converse with or interview influencers when you come across them. You may delve into their interactions and learn precisely what they like and dislike about your company, product, or service. It's okay if you don't like what you hear. You may intelligently create an overall company plan by comprehending the nuance of the dialogues and the dynamics over time—is the bad sentiment growing or declining, is it cyclical, is it driven by your firm or driven by your industry? In summary, there is much more you can learn from your influencers than merely recruiting them to spread your message (as if they'd really do that).

Sorting out who is related to whom, who is influential, and who is not is the first step in finding influencers. Your insight and marketing expertise will pay off when you go through the quantitative data that is accessible and then combine it with your own industry knowledge, for example, as the process is not entirely automated. Use the personal connections you may make to your benefit as well. If a discussion in a specific community piques your attention, introduce yourself to the webmaster or community manager in charge by sending them an email or tweeting them. See whether this individual or group will help you comprehend the other influencers in that community by sharing your area of interest. More details are better, and even if nothing else, you'll develop a friendly relationship with a community manager that might be beneficial in the future.

Building on what you've learned or the knowledge gained from community managers you've met, tools like Buzzstream or Sysomos, or retaining a services firm like Oxyme will help you to quickly dig deeper so that you can then take the steps of building relationships with those individuals within the community who are relatively more \sinfluential or more connected. By sifting through the social networks of the individuals identified as the origin of certain talks, Buzzstream collects this data. You are being given a list of all the potential publication points connected to this individual. The list may then be further refined by rapidly searching these publishing websites for the individuals you are interested in. After that, you enter the data you've acquired into a contact database and start developing a real connection.

B. The Function of Trust

This type of connection must be established. The function and sources of trust in consumer interactions. The same idea underlies every business transaction and is connected to what is today known as social capital. In a nutshell, social capital is to social media what economic capital is to your CFO and your company. It also refers to the reputation of your business on social media. Influencer relationships are influenced by social capital: You may discover more about how your brand, product, or service is seen in the market by, for instance, identifying who your potential influencers are

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and really attempting to understand their perspectives. You also have the chance to build social capital by doing this.

How? For instance, if you work in the industry, you probably have a broad understanding of the subject matter. You will build up your social capital if you share this honestly and without regard for your own interests. Here's an illustration: When an influencer asks you to speak, but you have other commitments, you decline. You have three options: change your schedule, respectfully reject, or recommend a rival who you know will likewise perform an excellent job. It would be fantastic if you could change your timetable. If you are unable to help, the most socially acceptable course of action is to recommend another eligible individual since, as opposed to a mere refusal, this action really benefits the person who has asked for your aid. Similar to the cliche used in shopping, "Do you have this shirt in blue?" The answer that is remembered and appreciated is one like "We don't, but I know where you can get it. The process of constructing social capital is the same, and it most definitely applies to intercultural interactions.

C. Use Your New Informational Knowledge

You'll want to take action with this information after you have a quantitative understanding of the stakeholders or market participants that are important to your business or organisation. The social graph and the tools that let users traverse it are used for a lot of the things that may be done with internet knowledge. The social graph may be used to identify the individuals talking about your brand, product, or service using tools like Buzzstream and Sysomos MAP, as examples. You may examine how influence truly flows by combining this with data that demonstrates the relationships between individuals. This may be monitored over time and connected to your social media marketing initiatives. You may further prioritise your efforts using influence rating. Like any other programme, there are costs associated with implementing it that may be calculated based on the possibilities lost. The same holds true for establishing connections, with one exception. It's crucial to consider more than just the numerical influence score when prioritising your efforts utilising influencer ratings. Although it's beneficial to having influential individuals in your contact database, it's also crucial to understand that influence doesn't always flow from the influential straight to your prospects or other people you want to reach. In fact, a significant amount of influence flows via what are referred to be weak relationships.

Weak links are the ad hoc connections among community members

"Knowing someone who knows someone who ..." is an example of a weak connection. For instance, there are individuals you know personally and people who are linked to the people you know in a normal Facebook or LinkedIn network. These kinds of connections are crucial to understanding how information travels across a network and, ultimately, how information about your brand, business, or organisation reaches those who are evaluating some part of an offer. Weak ties are used by community tools like Ripple6 and by websites like LinkedIn.

By enabling the exchange of information between individuals (profi les) who are not already directly linked, ripple6 helps community members connect. It does this by making it simple to ask questions, for instance, of those you are linked to, who may then publish those questions to others in their networks who might be able to provide you with an answer. While helping with introductions, LinkedIn employs this practise. LinkedIn presents the social network connecting individuals quite clearly. When a member of LinkedIn requests an introduction to a particular person, LinkedIn first displays the chain of contacts between the user's network and the target contact and then sets up the "pass along" procedure at the intermediate level.

Influence spreads precisely the same manner on the Social Web. You may significantly improve the possibility that the discussions you engage in will eventually include these individuals by paying close attention to your influencers' connections to areas of your market that you would not otherwise have direct access to. The following quantitative data is very helpful for adjusting an outreach programme: Knowing who is talking about the topics that important to you and how these individuals are related to others is essential whether the objective is to further disseminate your message—think blogger outreach efforts—or develop your customer-driven intelligence programme.

D. Google Analytics

Basic metrics for the Social Web were specified in the sections before this one. Social media analytics aid in placing the discussions in a numerical perspective. The same is true for the conversation's origins in terms of influencer metrics. Between them, you have the foundation for determining success in accordance with the company goals and KPIs (Key Performance Indicators) that you have specified. The next action is to connect them to your company, starting with its internet appearance.

E. Website Efficiency

Web analytics, which is primarily concerned with the functionality of your website or online apps, with a typical view of Google Analytics. What is commonly meant by "performance" is how successfully visitors to your website convert into paying customers, donations to your cause, volunteers, or any other comparable transition that takes them through your acquisition or purchase.

The measuring points offered by web analytics are many. A representative selection of the most common indicators related to website performance in a commercial setting are included and going beyond them are essential for getting the most out of your web analytics software. Too many businesses analyses the fundamentals, such as bounce rate, time spent, and page visits, but stop short of really analyzing what drives these metrics and why they matter. The

measuring points offered by web analytics are many. Understanding the various indicators listed and going beyond them are essential for getting the most out of your web analytics software. Too many businesses analyse the fundamentals, such as bounce rate, time spent, and page visits, but stop short of really analysing what drives these metrics and why they matter. Social media's relationship to business is—or ought to be—the driving force for its corporate applications. The connections between social media analytics and web analytics were discussed in earlier sections, and as a consequence, a methodical testing procedure was developed with the goal of discovering the connections (correlation) that influence results and then extracting the crucial.

Business analytics procedures (causation) that you may imitate in order to expand your company. the connection between social analytics, web analytics, and the foundation of your business analytics, together with the metrics for their respective commerce pipelines. These strategies may initially be restricted to marketing and your use of the social web as a platform for marketing, as is frequently the case with social media marketing initiatives created to create additional outreach points or locations where people within your organisation can engage with customers on behalf of the brand. The second segment, which focuses on business analytics, takes the marketing-related strategies and applies them to the whole company. Particularly with regard to social media and the Social Web, there is a quantifiable link to business, as shown by a performance against a list of pre-established corporate goals. The ultimate objective must be reaching that level of comprehension, and you must work tirelessly to do so.

F. Business is everything

Applications for social business have a fundamentally stronger relationship to the company itself. In the most basic sense, Operations more so than Marketing is what drives the dialogues; as a result, the emphasis shifts from how effectively the firm is promoted to how it is managed. True social business applications are more likely to have operations or information systems budgets than marketing departments covering the costs of social processes and the software or technology that supports them. In contrast, the marketing division may foot the bill for campaigns that highlight the ways in which consumers gain from the deployment of a social business programme or that develop the platforms for outreach and listening that power them.

The manner in which the analytics are needed to roll up are made evident when considering social business technology and software as a company infrastructure investment rather than as a marketing expense. Because these are the metrics that matter to the managers of the budgets and cost centres who will almost certainly be footing the bill for the expense of putting a social business programme into place, social media analytics, web analytics, and influencer assessments must all be viewed in the context of their relationship to basic business analytics. Social, influencer, and online analytics are combined with business analytics on two fronts:

Business analytics offers the entry point into Social CRM, particularly when it comes to applications connected to commerce, by offering an extra set of indicators that may be utilised in the entire endeavour to record success and provide insights for improvement. Due to the fact that business analytics are related to actual business operations, combining them with social and web analytics offers a complete picture of the customer experience, which manifests itself as conversations on the Social Web, along with the internal business processes that led to the conversations.

The business indicators connected to your online commerce pipeline are the ones that are most similar to web analytics (assuming you have one). The commerce pipeline provides a variety of assessment points for companies whose operations are entirely or mostly conducted online ("pure online plays"). Social commerce solutions from companies like Bazaarvoice excel in enhancing closure rates, raising checkout values, and cross-selling related items. They also continuously provide real-time quantitative feedback that you can utilize to steer and improve your company's product offering.

III. CONCLUSION

A working knowledge of social media and the appropriate approach. Each social media platform has benefits and drawbacks that companies need to be aware of in order to fully take advantage of it. The optimal course of action would be to combine engagement with intelligence to promote, support, and assess brand activities at each stage and to establish a perfect social synergy for co-existence, collaboration, and co-creation. By selecting the right platform and creating compelling content that resonates with their target audience, businesses can effectively reach their marketing objectives, whether that is to drive sales, build brand awareness or create viral content. Ultimately, the key to success in social media marketing is to understand the target audience, create relevant and engaging content, and stay abreast of trends and emerging platforms to stay ahead of the competition.

REFERENCES

[1] I. P. Chiang, R. Wong, and C. H. Huang, “Exploring the benefits of social media marketing for brands and communities,” International Journal of Electronic Commerce Studies. 2019. doi: 10.7903/IJECS.1547.

[2] S. C. Chen and C. P. Lin, “Understanding the effect of social media marketing activities: The mediation of social identification, perceived value, and satisfaction,” Technol. Forecast. Soc. Change, 2019, doi: 10.1016/j.techfore.2018.11.025.

[3] S. V. Jin, A. Muqaddam, and E. Ryu, "Instafamous and social media influencer marketing," Mark. Intell. Plan., 2019, doi: 10.1108/MIP-09-2018-0375.
[4] B. M. A. Almohaimmeed, "The Effects of Social Media Marketing Antecedents on Social Media Marketing, Brand Loyalty and Purchase Intention: A Customer Perspective," J. Bus. Retail Manag. Res., 2019, doi: 10.24052/jbrmr/v13is04/art-13.
[5] M. L. Cheung, G. D. Pires, and P. J. Rosenberger, "Developing a conceptual model for examining social media marketing effects on brand awareness and brand image," Int. J. Econ. Bus. Res., 2019, doi: 10.1504/IJEBR.2019.098874.
[6] J. Abbas et al., "The effects of corporate social responsibility practices and environmental factors through a moderating role of social media marketing on sustainable performance of business firms," Sustain., 2019, doi: 10.3390/SU11123434.
[7] S. Vinerean and A. Opreana, "Social Media Marketing Efforts of Luxury Brands on Instagram," Expert J. Mark., 2019.
[8] A. S. Arora and S. A. Sanni, "Ten Years of 'Social Media Marketing' Research in the Journal of Promotion Management: Research Synthesis, Emerging Themes, and New Directions," J. Promot. Manag., 2019, doi: 10.1080/10496491.2018.1448322.
[9] R. Anggraeni and D. Diana, "Analisis Pemanfaatan Social Media Marketing Terhadap Customer Loyalty Yang Menggunakan Brand Trust Sebagai Variabel Mediasi," J. Ris. Manaj. dan Bisnis Fak. Ekon. UNIAT, 2019.

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Making Business Decisions Using Social Technologies

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Abstract ***Social media in and of itself doesn't provide a significant business problem; rather, it's how it interacts with the organizational or commercial processes that produce the experiences that are the subject of first discussion. The key to transforming your company into a social business is to understand how your internal processes influence the discussions that take place on the Social Web and how social analytics can be utilized to guide business choices and prospective process changes that are related to them.***

Index Terms— Business, Decision, Social Media, Marketing. Web.

I. INTRODUCTION

The engagement strategies and the ways that participation and interaction with social material may link your audience with your brand (for better or worse!) were covered in Part I of this book. Recognizing the changing position of the customer, who is now much more of a participant in the marketplace and increasingly in the companies and organisations that service it, is a key component of the engagement process [1],[2]. The social business ecosystem and its collaborative processes, which served as the last pillar of Part I, revealed the collective knowledge of the Social Web and demonstrated how to utilize it to create, manage, and advance your company or organisation. A social business consists of both the company as a whole and its clients working together [3],[4].

In the context of social business, collaboration may signify several things. It first implies teamwork, which is very evident. Who is collaborating with whom is less clear. Social business indicates a collaborative process that extends beyond the already challenging relationship between the company and its customers to include communication across "silos" inside the company as well as between different consumers. It is logical—yet deceptively easy—to implement social business by using dialogues and active listening to direct your company planning process. The processes of organisational transformation, dismantling silos, and effectively sharing and extensively disseminating knowledge offer the actual problems more frequently than not. It is imperative that you avoid using the catchphrase "Our customers are at the center of everything we do" in your company's operations while largely operating without their input and without formally integrating your customers' experiences, thoughts, and ideas into your internal business processes. It is only a "social business" when this takes place—when client suggestions and feedback are integrated into the company or organisation in a clear, significant manner [5],[6]. The secret to effectively merging listening data from apps like support forums and similar ones with other information gleaned from direct customer contact is that it must be tied to your company's overall business plan and the procedures that support it. In other words, market research—both pre and post—that informs a message—is a major emphasis of conventional marketing. Simply said, listening lets you know to what extent the message was in line with stakeholders' and consumers' real experiences, even some that may not have been in your initial plans [7],[8]. An outbound marketing campaign can state, "Made for working moms like you!" as one example. If it also transpires that the company does not fairly promote women in the office, this discrepancy will unavoidably come to light and likely spread via social media. This highlights the need of active listening and the need to integrate client input into your company's operational procedures: Any engagement in the Social Web will be confined to listening (but not reacting) and utilizing social media platforms like Twitter or Facebook for chatting without a strategic foundation (as opposed to participating). Both of these are subpar and won't provide the intended results [9].

A. The Cycle of Innovation

Social CRM is effective when used in conjunction with social media marketing. A consumer-driven innovation cycle is produced by connecting customer information and what is discovered via active listening deeply into your organization. Your ultimate aim should always be to steer your company or organisation in the direction of your business goals. Your company goals, in conjunction with an awareness of your audience, are what determine the precise activities you must do.

A strong, relevant relationship to the Social Web is established when social technologies are used to establish a presence for your brand on the Social Web, whether via an intelligent application that a community finds helpful or your own place designed around the lives of your customers. The supplementary connection for your company is social CRM. Customers are encouraged to share insights, opinions, and ideas about how you may better serve them using social CRM technologies like ideation platforms and support networks. You need to know this knowledge specifically if you want to achieve in the long run.

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A fresh perspective of the client in the context of interaction is what all of this adds up to. provides a look at the innovation cycle that Kaushal Sarda, cofounder of Uhuroo and a 2020 Social teammate, and I jointly built. It integrates the engagement processes of a social company. The core loop—Learn, Abstract, Do, Offer—offers a paradigm for engagement that is based on knowledge about the endpoint usage or application of the product, programme, or service you give. A continuous cycle that promotes long-term innovation via listening and cooperation is established by closing the loop—by iterating.

Social business and its accompanying procedures, such as Social CRM, are directly relevant to the relationship between innovation and social engagement. This connection encompasses the phases of learning, applying new concepts to design, and iterating to progressively enhance (often in drastic ways) what is provided to consumers or other stakeholders in a cause in the marketplace. Social CRM differs from conventional sales-cycle-focused CRM in the following ways: The creation of a social company and the integration of customer-powered collaborative involvement are made possible by Social CRM.

II. DISCUSSION

Social CRM soon transforms into a more conventional company-driven marketing and commercial development endeavor without collaborative methods. It's critical to comprehend the need of cooperation in developing a social business: If not, it's simple to make the mistake of thinking that "this (Social CRM) is the same as what we've been doing...only now our customers are a formal part of it."

There are comparisons to current processes, just as there would be in any development of a business process, thus the issue with this way of thinking is not that there aren't any. Instead, it's because the "same as..." is precisely the justification used to resist significant change inside your company or organisation, a justification that internal inertial forces will frantically seek. Does this seem a little dramatic? It isn't. Moving towards a social business attitude requires fundamental process change and an understanding of the need for cooperation on several fronts, just like any other component of company transformation. It's crucial to establish these expectations right away since this is different.

It is more important to develop an internal culture of change, collaborative workflow, and ideation than it is to use a specific tool set to adopt Social CRM correctly and effectively use it to build a relationship that is actually collaborative and uses customer knowledge. For instance, in my social media marketing training, the exercises and workshops do not start with social media tools; rather, they conclude with them. The sessions begin with an overview of company goals, clientele, and social media dynamics. When you have this insight, picking the specific instruments that are most likely to provide the required outcomes is simple. Instead of starting from the perspective of tools, the outcome would be an infinite pursuit of similar ideas. Although it is true that this strategy sometimes succeeds, this copycat strategy fails far more often.

Use of Social CRM adheres to the same guidelines: Your attempts to reshape your innovation process will fizzle out soon without a foundational, business-driven structure. By linking the experiences that develop around the goods and services offered in the market with the business processes that produce and support them, social CRM has a direct influence on management and decision-making procedures inside a company. Innovation in goods and services, where concepts come to life, unquestionably falls under this category. Processes for providing customer care, where the inevitable post-purchase problems are resolved, are also important. The same may be said for your delivery system, supplier chain, and human resources department. You see what I mean.

When selecting a Social CRM toolset, start with your company, your culture, and your internal procedures to develop the overall platform that offers connections to your customers, supports the formal processes of active listening, and encourages your customers to share their ideas on how they'd like to see your business evolve based on their personal experiences with your product or service.

A. Recognize the Conversations Matter

Becoming a company that fully incorporates client feedback begins with listening to the discussions taking place in your industry. As more thorough analytics are applied to these discussions, it becomes clear how a business may utilize this information to enhance a product or service. It also demonstrates the need of the strongly advised cross-functional work team approach to managing the Social Web.

In a social business initiative, listening is an intuitively reasonable and virtually risk-free starting point. Nobody but you is aware that you are listening until you let them know. Your stakeholders and consumers will almost certainly notice when you are not paying attention, which is another motivation. If you've ever yelled for assistance in a room full of people, you know how clear it is—and how it feels—when no one is paying attention. Even worse, any lack of reaction will be noticed by surrounding clients as well—in the social sense, which means involved in the conversation or in close proximity to the person or people at the heart of it. If someone makes a statement that is noteworthy, they are likely to concur, emphasize it, and form a similar unfavorable conclusion if the issue is not addressed by the proper party inside the company or organisation mentioned in the comment.

Also, listening is often accepted in your company. You're under no obligation to act on what you hear just by listening. This may work in your favor when you initially begin. Before you actively engage your consumers via social technologies, it's a fantastic idea to get your company up to

speed on what people are saying about your brand, product, or service. This is particularly true at the beginning of your social media and social business initiatives. Yet, failing to answer also conveys a message to your audience. Arrange to join in as soon as you've begun listening; priorities and focus on the discussions that are easiest for you to engage in.

When taken as a whole, listening is by far the most straightforward way to learn about the Social Web. As you listen, especially when utilizing a dashboard-style monitoring programmer, you may see what is being said about your company, its goods, or services in a flash. Also, you may do the same actions for your sector and competitors, which is excellent intelligence, even if it is qualitative. You may acquire valuable insights into how your audience sees you in the context of your industry by starting with that foundation.

You may expose the rest of your organisation to the Social Web in a manner that makes the link to the company evident based on this kind of upfront work and research, as well as with knowledge of where these discussions are taking place. This will assist you in creating the internal constituency that you will eventually need.

You probably have this thought if you've ever looked at conversational data that has been extracted from the Social Web—for example, if you've used Google Alerts. "Sounds fantastic, but who's going to sift through all of this?" you may be asking. You may only hear from a limited number of people in discussions that interest you or need your attention if you run a tiny brand, work in a niche market, provide professional services like consulting or real estate, or anything similar. If your sector is presently making headlines or is generally interesting to speak about, you may find yourself having hundreds (or orders of magnitude more) discussions every day if you're Coca-Cola, Boeing, or Bank of America. Google "Gatorade social media mission control" to get a sense of how seriously companies are taking social analytics. From a technical standpoint, it's an outstanding installation (I worked in Mission Control with NASA/JPL) and a strong indicator of how crucial social analytics and knowing what's occurring on the Social Web have become.

B. Social CRM and Support for Decisions

The present interest in social analytics is mostly driven by the need to monitor and assess the dynamics of a marketplace debate in order to identify sources of influence, identify issues, and develop devoted supporters. Beyond this, the burgeoning field of social CRM is defined by the connection between the impacts—or, more accurately, the underlying cause—of these dialogues on business processes. You saw a brief summary and straightforward definition in Chapter 3, "Creating a Social Business": The term "Social CRM" refers to a corporate strategy that explicitly acknowledges the importance of the consumer in comprehending and controlling dialogues about a company's name, products, and services. The fundamental definition of Social CRM will be operationalized in this part, expanding on the practises that firmly centre the consumer in the product or service experience.

The five components that make up social CRM are as follows:

A sincere attempt on the part of the company or organisation to comprehend and take into account the viewpoint of the stakeholders or consumers for whom the business or organisation operates.

A comprehension and mapping of the social networks, groups, and apps that link people in your target audience to one another (rather than to you), giving your insight into how you fit into their universe.

The precise distinction between the tasks that your clients desire to handle on their own and those for which they come to you for direction, comfort, support, and other services that enhance their quality of life.

The improvement of your commerce or conversion procedures in light of the importance of stakeholders and customers in conversion-related dialogues.

the interactions—touchpoints—between your actions and those of your customers, as well as the internal business procedures that underlie those interactions and shape the experience that takes place there.

Table 5.1's first column lists the fundamental decision-support components connected to Social CRM. When you put these five components together, you have the framework for a feedback process that can be used company-wide and is based on consumer insights gained via active listening and then harnessed and utilized to drive your business. This is the main goal of social CRM.

It provide a place to start when analyzing and researching some of the top technologies that may be used to develop the quantitative foundation for a Social CRM programmer. An end-to-end view of your commerce pipeline is created by fusing social analytics (conversation analysis), source identification (social graph analysis), and commerce feedback (ratings and reviews). You can gain the business insights you need to evolve your company in a way that is in line with your customers by going one step further and connecting sources, conversations, and commerce data to the internal business or organisational processes that underlie the experiences that your stakeholders and customers talk about. This can be done through touchpoint analysis or a similar process.

C. The Perspective of the Client (POV)

Even in a purely qualitative form, social analytics provide valuable insights into the individual perspectives of your clients. The analytics platforms gather a lot of data, allowing you to go beyond focus group anecdotes. You can go beyond one-time surveys since the tools are continuous and real-time (or almost real-time). Further, organize the largely unstructured qualitative data into themes or categories in

exchange for the time you spent configuring these tools so that you can make sense of the conversations.

Beyond marketing, the knowledge you receive about what consumers are saying might help you understand how they feel about your product or service in the marketplace. This is a crucial point to keep in mind the marketing department is frequently the center of attention for organisations adopting social media-based programmers.

These are the reasons behind this and why it's critical to look beyond marketing.

If one thinks about how a favorable or bad post may affect sales, then connecting social media with marketing makes logical. It is obvious that these uncontrollable remarks about brands, whether helpful or not, keep sales managers and marketers up at night for the very same reason. But when a company as a whole moves beyond marketing in its collective understanding of "social business," the conversations become more predictable and as a result, it becomes possible to manage them (in the direction of "more favorable").

When taken into account throughout a company or organisation, social media goes well beyond marketing. the buying funnel demonstrates that it is really a better assumption that social media has nothing to do with marketing. The origin of the conversations themselves has more to do with Operations, HR, and Customer Care—all of whom contribute in a tangible way to what is talked about on the Social Web—and relatively less to do with marketing per se. This is true beyond creating a platform in which marketers—certain caveats respected—are welcome to participate along with everyone else in appropriate conversations.

Here is where Social CRM steps in and explicitly acknowledges that the dialogues that were happening on the Social Web, for example, originated in Operations but eventually impacted Marketing (by encouraging or dissuading sales). Once again, this is a completely distinct procedure from the mostly unidirectional flow of outbound communications that is connected to typical campaigns.

Social CRM is so effective and timely because of this. Long-term success may be achieved through including consumers in the company's operations and by knowing their viewpoint and what draws or turns them off of your brand, product, or service. Social CRM combines quantitative tools and a flexible framework for defining and expanding your company with the insights of Fred Reichheld's Net Promoter, which is itself a benchmark indicator for long-term success.

D. Map social network

Understanding who said what comes next in the implementation of a Social CRM programmer after you have a grasp on what is being said. While you may sometimes be able to determine this information from real customer data or another comparable source, I'm not referring to the precise personal information of a particular person when I say "who said it."

Instead, I'm talking about profile and social graph data, which may help you figure out who is talking about you by also knowing the other websites where the same individual produces information and the people they share it with. You may priorities your next actions for reaching out to and reacting (or not responding) to that particular person by seeing a profile in the context of that person's social graph, which gives you a far more full picture of that person's motivation, influence, reach, and connectivity. The social connections that individuals have inside social networks are defined by the social graph, which was originally discussed in Chapter 2 and then examined in Chapter 11, "The Social Graph." The social network also contains links to the numerous other websites where this person writes or engages in other activities. To construct a map of these interactions and links in a business environment, social CRM and the more targeted source identification tools explore this social network.

You may develop new connections and get valuable insight into the discussions you've found that particularly mention your company, product, or service by understanding where someone posts and interacts on the social web. An example map produced by BuzzStream for a possible contact based on an initial keyword search. Consider what occurs when you discover a post that is positive to your brand, product, or service on Twitter as an illustration of how social analytics may be used in conjunction with a knowledge of the social network. a new social graph mapping illustration, this time including the original tweet associated with the social network map. I was able to get in touch with the individual who made the initial remark by combining BuzzStream, Tweetdeck, and Alterian's SM2 (as a real-time search engine). That leads to the creation of a new friendship and professional link at The Hub Network in Vancouver. What if you were able to do this with everyone who was important to your company? Indeed, and Social CRM is how you go about doing it.

These techniques may be implemented in your company or group using tools like Alterian's SM2, BuzzStream, and Tweetdeck—none of which are prohibitively costly. For instance, you may actively watch Twitter for mentions of your brand or a competitor's and determine the social impact of individuals talking about your goods and services by combining Tweetdeck (which is free) with BuzzStream (which costs less than $100 per month). Given what is being said and who is saying it, this provides you with the exact information you need to prioritise your real response effort, which is unquestionably not free. Directly derived from this data are useful key performance indicators (KPIs) like follows: There are several KPIs you may include into your current dashboards, such as the quantity of Twitter mentions, the balance of good and negative feedback, the average influencer rankings, and the average reaction time.

Prioritizing your replies enables you to establish more meaningful connections with specific consumers, whether it be via a one-time conversation about a particularly positive or negative experience or the establishment of a longer-term partnership with a key figure in your client base. Think about how it would feel if, for example, the brand manager personally thanked you after you left a positive review—or any comment, for that matter—about a brand, product, or service. People often write because they have something to say and want to be acknowledged for doing so. Particularly when individuals provide encouraging remarks, they are showing their gratitude for the event that inspired the writing. Although it's customary to respond to a praise from the person next to you by saying "Thank You," the sad reality is that most compliments on brands go unreturned. These are missed chances to determine what motivated the compliments and build a strong fan base based on them. I demonstrated how employing a basic listening platform (for instance, using Tweetdeck as a real-time monitor for Twitter in conjunction with BuzzStream for social graph mapping) might provide useful KPIs in the part "Social CRM/ Mapping of Social Graphs" that came before it. The utility of the KPIs as drivers of business processes that link what is learnt on the Social Web with how the company functions demonstrates the progression in business value from listening/monitoring to actively listening and reacting along with measuring.

Of course, reacting is a commercial process in and of itself: Yet, it truly depends on whether you have a listening programme in place and does not suggest a "social business" perspective in and of itself. Indeed, listening is preferable than not listening, and it makes sense to combine hearing with replying. But you need to go one step farther to experience the benefits of a social business programme inside your company.

III. CONCLUSION

Social media may help you connect with other companies in your field in addition to allowing you to interact with your prospects. Follow the accounts of your colleagues and other people working in your field, and interact with their postings. After that, you may leverage these encounters to establish connections and network. By removing the need for manual and duplicated processes, it helps you remove bottlenecks that are holding up your decision-making, provides correct data that strengthens the reliability of your decision-making process, and improves customer experiences. Business decisions are critical for the success of any organization. These decisions may range from strategic planning, financial management, marketing, product development, and customer service. Effective decision-making requires a deep understanding of the business environment, the target audience, and the competitive landscape. Business leaders must have the necessary skills, knowledge, and tools to make informed decisions that align with the organization's goals and objectives. Additionally, risk management is an essential aspect of business decision-making, as decisions can have far-reaching consequences for the organization's performance and reputation.

REFERENCES

[1] P. Kotler, L. A. Manrai, D. N. Lascu, and A. K. Manrai, “Influence of country and company characteristics on international business decisions: A review, conceptual model, and propositions,” Int. Bus. Rev., 2019, doi: 10.1016/j.ibusrev.2018.11.006.

[2] L. Metcalf, D. A. Askay, and L. B. Rosenberg, “Keeping humans in the loop: Pooling knowledge through artificial swarm intelligence to improve business decision making,” Calif. Manage. Rev., 2019, doi: 10.1177/0008125619862256.

[3] A. Yousfi, K. Batoulis, and M. Weske, “Achieving business process improvement via ubiquitous decision-aware business processes,” ACM Trans. Internet Technol., 2019, doi: 10.1145/3298986.

[4] E. Hughes-Cromwick and J. Coronado, “The value of US government data to US business decisions,” J. Econ. Perspect., 2019, doi: 10.1257/jep.33.1.131.

[5] C. Guermat, I. U. Misirlioglu, and A. M. Al-Omush, “The long-term effect of economic value added adoption on the firm’s business decision,” Account. Res. J., 2019, doi: 10.1108/ARJ-01-2018-0018.

[6] L. Xu, R. Gao, Y. Xie, and P. Du, “To be or not to be? Big Data business investment decision-making in the supply chain,” Sustain., 2019, doi: 10.3390/su11082298.

[7] S. Ganesan and S. Gopalsamy, “Business intelligence and advanced analytics: Impact and behavior of business decision making process,” Int. J. Recent Technol. Eng., 2019, doi: 10.35940/ijrte.C1080.1083S19.

[8] A. Svigir, “Behavioral Economics and Making of Business Decisions,” Interdiscip. Manag. Res. Xv, 2019.

[9] A. Dixit, C. Clouse, and N. Turken, “Strategic Business Location Decisions: Importance of Economic Factors and Place Image,” Rutgers Bus. Rev., 2019.

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Ecosystem for Social Business in Social Media Marketing

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***Abstract*— It brings together the components of the social business ecosystem profiles, applications, communities and forums, and more and thus lays the groundwork for understanding how to connect current and potential customers with the inner workings of your company or organization, where collaborative processes can take hold and generate long-term benefits. This section introduction to social technology applied to business.**

***Index Terms*— Advertising, Customer, Ecosystem, Social Business, Marketing.**

I. INTRODUCTION

A. Facebook Profiles

The online identities of members are at the heart of the Social Web and the shared activities that characterize it: As social participation is often motivated by an individual's desire to be recognized as such, true identities are more valuable in a commercial environment than previous anonymous discussion boards or shrouded avatars. Even if "trusted friends" or coworkers are the only people who often have access to comprehensive personal information, it is becoming more and more normal to include a real name or picture in one's social page. The outcome provides a foundation for knowing who is truly participating, together with any voluntarily offered information [1],[2].

Hence, the profile serves as the foundation for social engagement since without it, any contact would just be transactional between the participant and the online application or other unidentified third party. In this perspective, what sets social platforms and apps apart from (online) interactive applications is the presence of a profile or an equivalent. Consider a typical website as an example of an interactive application. The user may interact with the programmer by going to a help file, downloading a PDF, or adding anything to their shopping cart. In each of them, a user interacts primarily with an application created to simplify a certain job [3],[4].

Beyond the needs for basic security or commerce validation, identity in this context is only marginally significant. The identity of the participant is mostly irrelevant beyond what is necessary for the work at hand since the individual participant is controlling the whole process and because this is often a task-oriented transaction [5],[6]. By contrast, in a social setting, interaction takes place between participants just as much as it does (overtly) between a particular person and the programmer or platform. It's not enough if someone is using a transaction site to carry out their activity: On the social web, that individual wants to be seen, heard, or associated with when engaging in that activity. With the exception of simple operations like uploading a picture, most interactions take place via profile-based relationships or exchanges: curating a photo, extending and confirming a friend invite, editing a wiki page, or sharing a review. Each of these calls for some level of confidence that the identity of the other person or people involved is relatively well known, and at least partially so that the person executing the act will be noted by someone for having done that specific activity [7],[8].

As a result, sharing is a rather superficial activity in an online network without a strong profile—the primary bearer of visible identity. People who participated in older forums and discussion boards, which frequently lacked more formal or detailed descriptions of who was who, frequently based their identity solely on their signature. They then added to that by examining the writing style or particular interests of different members, slowly piecing together an understanding of the other participants. Humans are social creatures, and they will attempt to establish social order in almost any circumstance. Successful social business apps are ultimately driven by the connections and exchanges they enable [9].

Profi les are crucial components of contemporary forums, discussion boards, support groups, or other online social spaces since they essentially enable connections, which greatly speeds the process of social bonding within a network. Profi les provide participants a human foundation for connecting with one another, including any profi les connected to a particular company, brand, or group. On the social web, members who can be easily identified are beneficial. Take into account what occurs when identify is added to a previously anonymous web application.

Together with other factors, identification increases a person's feeling of general personal accountability: Participants behave more temperately than they would without this feeling of identification and personal responsibility if they are aware of who the people around them are and that their own identity (at least insofar as it is expressed via their profession) is also known. All other things being equal, communities with a strong implementation of identification are less prone to have flame wars, for instance. That reminds me a lot of driving in

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traffic: It's not unusual for one driver to exhibit overt signs of annoyance towards other drivers when within a soundproof, air-conditioned cabin. This same driver's attitude often changes for the better when they learn that the cause of their annoyance is a friend, coworker, or neighbour in the vehicle in front of them. For the same reason, having a visible identity matter in an online social community.

B. The Profession as a Social Bridge

In terms of social media applications for business, the social professional's function as a connector cannot be overstated. In keeping with the previous debate, the social profession offers two crucial social components:

A framework for responsibility for one's activities, posts, and roles played in the connection that evolves; a concrete personal identifies around which a relationship may be established; When considered as a whole, the profitless significance is derived from its key position in identifying participants. People are more likely to create beneficial interactions and communicate or transmit helpful knowledge if they have that fundamental information. Of course, doing this is the main goal of creating a social business or supporting application.

Social professionals provide the groundwork for an accountable, fruitful partnership by establishing connections between the organisation and its stakeholders, whether they be businesses and their clients or nonprofits and their members.

II. DISCUSSION

The social profile's involvement in establishing and maintaining the community, in my experience working with Atlanta-based Premiere Global (PGi) on the implementation of a community, is especially illuminating with reference to the profi le's function in a community application. In order to foster the creation of fresh and cutting-edge communications apps, this specific project—a developer's community centred on PGi's communications API—was designed to bring independent developers and internal PGi specialists together.

The Jive Software community platform was used to create the PGi Connect Developers Community. It's crucial to understand that when communities and social applications are built on pre-built platforms like Jive, there are frequently opportunities to extend these platforms through the platform's API. The API is a programming feature that enables a development team to quickly build additional capability—based on specific business needs—and extend the functionality of the platform.

Jive's toolkit was put into use for PGi by Austin's FG SQUARED, and it performed well right out of the box. The ease with which a fully working community may be formed is one benefit of developing on a white-label platform. What was lacking, however, was a direct feedback system that would have told users how close to completion their personal profiles were, as well as what further actions they needed to do. A profile component was created that, taking a page from LinkedIn, offered an indicator of how complete a profile was as well as a straightforward "what to do next" prompt to advance completion to the next level.

While creating a collaborative application, make it possible for users to immediately recognise one another and determine shared objectives. A recommended practise is to make a special effort to urge that these profiles be properly developed to promote and support the establishment of connections since the social profile truly does sit at the hub of a successful community.

A. Social graph and the profile

For the time being, keep in mind that the social graph consists of the collection of profiles that identify the users of a social network as well as the communications, activities, and connections that link particular profiles on the Social Web. The social graph describes how two profiles are related to one another, maybe via friendship, in arguably the simplest sense. Notwithstanding how loosely defined the profile may have been, there is a feeling of obligation and belonging that translates into shared duty amongst people thus linked since the profile itself is attached to a person. It's possible that this connection is really asymmetric: It's possible that everyone of Robert Scoble's followers benefits from him more than they do. The value-based transaction and knowledge exchange that eventually takes place between users of the Social Web are set up by a set of norms and expectations that characterize these relationships.

In order to have an organic social presence, it is crucial to comprehend how the social network is built in the context of the profiles (people) forming around your business.

Recall the main obstacle to successful Social Web participation: How can you contribute without coming out as simply interested in yourself? If your company or organisation wants to build a strong connection with its customers that endures beyond competitions, advertising expenditures, and other direct incentives designed to encourage early involvement with the online social presence of the brand, product, or service, it must first assert its relevance and then deliver through utility, emotion, or gained knowledge some sort of tangible value.

You visit your clients where they are: Go to already-established networks like LinkedIn, Orkut, or Facebook and carve out a spot for your company or group there. You will learn where or how you may provide value as you make your way across these communities. You may observe the connections, interactions, and needs that exist within the community and which cross over with the value offer of your company or organisation by taking part, actively listening, learning, and measuring influencers. It will serve as your entrance point, and you may develop your presence from there.

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B. Applications in Society

When the four fundamental building blocks—consumption, curation, production, and collaboration—are combined, one potential paradigm for fostering engagement—among many—emerges.

By placing engagement inside the framework of the fundamental social structures—communities, social apps, and similar—and then linking these back to your company's name, product, or service, engagement may be harnessed for marketing reasons. Social applications are the main topic in this section.

Consuming material is the first step in the fundamental process of engagement, which develops into participant cooperation in the creative process. This kind of event brings the locals together as a community. Based on this, you may use certain social applications—forums, collaboration tools, competitions, and games, among others—under your own brand to guide users through the engagement stages that power your company.

Crucially, social applications are more often than not enhancers of an action or result that is beneficial to the members of a community with whom an application is related. This is true even if certain social apps do constitute communities in and of themselves. Simply told, it's important to realise that most companies, goods, or services won't be able to sustain a "community" on their own in order to comprehend how to create a successful social presence. Just why not? Consider the things you use, the causes you believe in, and the neighborhood you live in. What are some of them that you constantly and consistently think about and obsess over?

These are the only things that have the potential to become long-lasting, naturally growing "communities."

The majority of brands, goods, and services do not command enough daily mindshare to support their own communities, despite considerable time and effort being invested to the opposite. Make a quick mental inventory of the actual organisations you are a part of to understand why this is the case. The average person belongs to one, three, sometimes five, or even more organisations. After then, most people's bandwidth—a person's combined time and attention—literally runs out. One individual may only engage in so many social groups at once. Online, it's the same: How many social groups can you really participate in? What's more, how many of them will you really attend? For the majority, the ability for engagement in real life is unexpectedly comparable to (or maybe not at all surprising) the response. In response to that, consider your likelihood of joining a deodorant, toothpaste, or laundry soap community. But, quite a few CPG/FMCG brand managers have made the effort to create just these kinds of communities. Don't be misled: People join, take advantage of deals, and maybe even participate in light social activities as long as advertising expenditures continue. But keep in mind that advertising expenditure, not natural social contact, is what drives membership. You need organic growth to foster long-term community involvement rather than ad spending and incentive-driven growth.

This is not meant as a criticism on "awareness" communities or the use of social media in awareness campaigns: These groups often fulfil some of the surface promises of the Social Web, making them potentially significant components of larger marketing initiatives. Consumption of content does occur, and to some level curation—the voting or rating of what members of these communities see or do—may as well. Yet beyond that, activity often begins to decline in the more crucial activities of content production and collaboration. As was also said, the group often stops expanding when ad expenditure ends.

Think about social media apps now. Social apps are made to make it easier to achieve a shared or collaborative goal—"Look at us!"—and as a result, to provide value to a particular set of participants. A lot of Internet activities are task-oriented, but social apps go beyond that to include social activities. Interpersonal connections are developed by the provision of a service and the subsequent promotion of the sharing of outcomes. Social apps promote their own utility and durability in this manner. When you want to promote return visits but don't have infinite resources to compensate for natural curiosity and engagement, this quality is quite helpful.

Another element of social business and social application design deserves focus. By itself, a utility-focused programmer is not social. You will thus wind up with an island if you don't build your social application to be a part of the wider social framework—the ecosystem—in which your audience participates.

The "social application" is social since it is linked to the communities that its users are also a part of. The greater value of your social application arises when the application itself, or whatever it generates or accomplishes, is shared and pushed out via, for instance, a user who regularly uses Twitter, Facebook, Orkut, or LinkedIn and has built up 100, 1,000, or more actual relationships. Put aside the site's applications for media-driven awareness raising and think back to the laundry soap site. If this website were designed as a social application, how could it appear?

A stain removal chart is usually available on the regular laundry website. Knowing what kinds of pretreatments work best on what kinds of stains has obvious practical significance. There are literally hundreds of these kinds of websites as a result. The issue is that some things might be "recommended" for a variety of reasons, including "because someone paid for the suggestion," among others. The fundamental difference between conventional, marketer-driven communications and social, group, or consumer-driven communications is, of course, this. The only thing you know as a customer is that the marketer is attempting to sell you something. The remaining factors are determined by

a mix of a brand's reputation, your own experience, and the experiences of people you can trust.

first, enter social media. Curation is the initial component of the social application and the first application of the engagement mechanisms connected to it. In contrast to marketers, customers are often more honest in their evaluations (noted openness and disclosure difficulties). Reviews are a part of the solution, and reviews of reviews go even farther by assisting individuals who are interested in a certain product or service in sorting through and understanding particular reviews by highlighting those that are deemed most beneficial.

Modern social media applications go one step further: The social application makes its findings accessible to people outside of the social application itself by using the connection provided by Web 2.0 technology. The well-connected social application in the context of the current example makes the outcomes of trying a specific solution available to everyone to whom the person posting that specific solution is connected, in contrast to the basic consumer-driven reviews on the laundry site, which make pertinent information accessible to site visitors. This may have a significant effect on how beneficial information spreads, as well as sometimes less-than-useful information from the brand's perspective.

C. Content Exchange

What exactly is communicated if support forums and other social media platforms serve as the connectors between communities and your company? The tools for creating and distributing material are useful in this situation. Remember the components of engagement: invention, curation, consumption, and collaboration. When individuals review one other's works in front of a large audience during the curation stage of engagement, sharing first appears. The development of content is virtually always done especially with sharing in mind.

Considering this, social groups and programmers are often created with the notion of users generating and sharing content. "Something" might be a comment, a picture, a solution, or anything else. Expert communities are examples of "sharing," where the material contributed is relevant to a particular issue the community has. Support forums function in a similar manner, but on a different scale and generally servicing many times as many individuals.

Although determining the objective of an application is difficult when creating a compelling social application, getting people to participate in the first place is difficult when trying to drive shared content. The ease of creating and sharing material, as well as the benefits associated with doing so, nearly entirely determine how much of it gets done. By rewards, I don't only mean money; I also want respect from others. As a moderator, either your moderation guidelines or your reputation management system, make sure that everybody who contributes high-quality material is acknowledged. One of the keys to creating a potent social application is finding and nurturing experts and influencers by observing content creation and sharing.

D. Apps Designed With a Purpose

Specifically designed software, such as so-called "widgets," may make it relatively simple to swiftly incorporate social behaviour. These modest, purpose-built apps, like communities and social applications in general, are created to support certain interactions between community members or stakeholders. Purpose-built applications may be developed that literally "snap in" and can be fitted and ready for use in days or even hours, in contrast to communities and bigger social applications, which often have more than modest construction expenditures and lengthier development cycles.

What is a widget, then? Little, ready-to-use software components called widgets are designed to do extremely particular tasks: Examples of the types of things you may add to your entire social presence to enhance visitor interaction include contests, gifting, and content-sharing tools. Other examples are the "Share This with Friends" code blocks or advertising modules that you insert into a page template on your website to allow a third-party publishing or sharing service. Widgets have the benefit of being easily implemented without much concern for size or other difficulties. The key assumption here is that the widget supplier has already concerned about these things for you, so please check it. You could be surprised—as in "Oops!"—by the outcomes if you drop some clever-looking but alpha code onto your highly used programmer.

E. Brand outposts and communities

It's time to link the fundamentals and provide the groundwork for a social business structure. The fundamentals of engagement were addressed, and the new position of the client as a prospective partner in your organisation. The social graph and social CRM were also discussed, with tools like BuzzStream being highlighted as examples of how to locate and establish connections with individuals who are promoting your company's name, goods, or services and so influencing others.

Social CRM and social applications were creating a Social Company" context. A social business is a company or organisation that is operated based on direct consumer engagement. The fundamental interactions, which include building connections among community members and disseminating knowledge, are brought about through precise, repeatable acts that may be built into the organisation itself. The social behaviour previously discussed are put into practice in this portion of 4 in particular social settings, such as online communities, where the real encounters, debates, and dialogues occur. Communities are formed around the significant things that individuals choose to spend their time on, such as hobbies, lifestyles, and causes. A brand, product, or service seldom justifies its own community on its own:

Even then, just a small portion of the audience's potential participates in that specific community on a regular basis. The majority of businesses and organisations find that the places where customers willingly spend time—often conversing about the business or organization—are social networks or online communities that are focused on connecting with others who share their interests rather than on particular brands, products, or services.

But how can a firm participate? The question of how to engage your consumers in actual work with your team, where they may provide opinions and insights that can improve your product definition, cut your expenses, or set you apart from your rivals, is even more urgent. In other words, how can you join the communities your clients or members are a part of and start reaping the rewards of social computing? In order to develop the levels of trust necessary to elicit their knowledge-sharing contributions back to you, you participate in the activities they are engaged in—with full candour and openness.

The brand outpost, a location you establish for your brand inside the framework of an existing social network, serves this goal. The last step in preparing for social business is to provide valuable apps to your audience at their preferred place rather than expecting (or mandating) that they visit your website.

Author and blogger Jeff Jarvis identified three faults that many businesses make when integrating social media-based marketing initiatives into their entire communications mix in an interview with BusinessWeek. One of the three errors—complete details may be found in the sidebar—is especially relevant to brand outposts: The error is assuming that your audience will come to you, or visit your website, for information, for example. Jeff makes the argument that you must visit them at their place. Have a look at the list of usual locations for brand outposts below: You are travelling there in each of these situations. Here are a few instances of typical brand outposts: Twitter, Islands in Second Life, Instagram Business Pages, Channels on YouTube.

Most likely, it's an application, a tool, or a stated goal that fulfils a significant need for a portion of the community members nearby who are either your target market or its influencers. That sounds self-serving, yet this isn't the case: When the red tape is removed, it all comes down to giving someone you want to do business with something they can utilise, doing it on their terms and in "their part of town." It is rather easy.

Being a member of the greater community is essential to the brand outpost and its function in social business. The purpose of outposts is to provide for community members' requirements that cannot be supplied directly elsewhere. If a target audience is already present, effective brand outposts are developed: Your outpost should have an engaging activity or practical application relating to your company, product, or service that appeals to the outpost's regular visitors.

III. CONCLUSION

Social business is a business model that seeks to address social and environmental challenges while generating profits. It is a way for businesses to create a positive impact on society by addressing issues such as poverty, inequality, and climate change. Social businesses operate like traditional businesses but have a different focus and mission. They prioritize social and environmental goals alongside financial objectives and seek to make a difference in the communities they serve. Social businesses are gaining popularity as consumers become more conscious of their purchasing decisions and demand more ethical and sustainable practices from businesses. They are also attracting more investors who are looking to create positive social and environmental impacts while generating financial returns. Successful social businesses require a clear mission, effective management, and a commitment to transparency and accountability. By aligning their business objectives with social and environmental goals, social businesses can create value for both their stakeholders and society as a whole. Social media should be used to create leads, increase website traffic, or increase revenue. It is also used to foster client connections, brand recognition, and loyalty. Businesses may communicate with clients and prospective customers via social media platforms.

REFERENCES

[1] P. Spieth, S. Schneider, T. Clauß, and D. Eichenberg, “Value drivers of social businesses: A business model perspective,” Long Range Plann., 2019, doi: 10.1016/j.lrp.2018.04.004.

[2] S. H. Daud and K. Othman, “Awareness of social business in social media in malaysia,” Manag. Account. Rev., 2019, doi: 10.24191/mar.v18i1.832.

[3] M. Bull and R. Ridley-Duff, “Towards an Appreciation of Ethics in Social Enterprise Business Models,” J. Bus. Ethics, vol. 159, no. 3, pp. 619–634, 2019, doi: 10.1007/s10551-018-3794-5.

[4] M. Mahfuz Ashraf, M. A. Razzaque, S. T. Liaw, P. K. Ray, and M. R. Hasan, “Social business as an entrepreneurship model in emerging economy: Systematic review and case study,” Management Decision. 2019. doi: 10.1108/MD-04-2017-0343.

[5] J. A. Peerally, C. De Fuentes, and P. N. Figueiredo, “Inclusive innovation and the role of technological capability-building: The social business Grameen Danone Foods Limited in Bangladesh,” Long Range Plann., 2019, doi: 10.1016/j.lrp.2018.04.005.

[6] A. Jabłoński and M. Jabłoński, “Trust as a key factor in shaping the social business model of water supply companies,” Sustain., 2019, doi: 10.3390/su11205805.

[7] N. Akbulaev, Y. Aliyev, and T. Ahmadov, “Research models for financing social business: theory and practice,” Heliyon, 2019, doi: 10.1016/j.heliyon.2019.e01599.

[8] A. Pourkhani, K. Abdipour, B. Baher, and M. Moslehpour, “The impact of social media in business growth and performance: A scientometrics analysis,” Int. J. Data Netw. Sci., 2019, doi: 10.5267/j.ijdns.2019.2.003.

[9] O. V. Skudalova et al., “Efficiency of services rendered by social businesses: Theory and practice,” Espacios, 2019.

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Importance of Social Media Tools in Social Media Marketing

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Abstract*— The world of marketing has witnessed inconceivable transformations. One cannot even begin to imagine the degree of change that marketing strategies, tools, and tactics have experienced. In a traditional economy, a market was solely limited to a location with several vendors limits related to time, space, and function. Since all marketplaces are reachable at the touch of a finger, the globalization period has insured that the world market has shrunk to the size of a human hand. Obviously, social media, which first served as a platform for interpersonal communication, has evolved into one that can be utilized successfully for brand positioning, advertising, and many other facets of marketing management. Keeping up with developments in the field of marketing and marketing technologies is crucial for every firm. One of the most important marketing trends is being attempted to be presented.

Index Terms*— Business, Company, Management, Marketing, Social Media.

INTRODUCTION

Almost every company is using social media marketing as a new marketing method to connect with customers on online communities. Social media is the only option if you have an idea and want it to be seen by millions of people at a low cost. The first businesses to use social media as a promotional tool were entertainment enterprises. According to Weinberg, social media marketing is the process that enables people to advertise their websites, goods, or services via online social networks and connect with a far broader population than would have been possible through more conventional routes. Thus, to put it simply, social media marketing is the process through which businesses utilize social media websites to generate traffic to their official corporate websites. Not content with this, businesses use social media programmers to update prospective consumers on company news, the introduction of new models or products, and other developments [1],[2].

Social media marketing is similar to relationship marketing, according to Gordhamer where businesses must switch from "trying to sell" to "building relationships" with customers. Building relationships with the prospective customers is the key to recurrent purchases and increased brand loyalty, which is where this explanation of social media marketing leads us [3],[4]. Social media is a cutting-edge technique that businesses utilize to build extremely strong client relations on virtual networks. Since there are so many prospective customers on the online networks, maintaining public relations via social media has become simple [5],[6]. Also, social media makes connecting with customers simple and simply takes a few clicks. Customers nowadays are increasingly demanding and busy; thus businesses should be approachable and accessible at all times across all social media communication channels, including Facebook, Twitter, blogs, and forums. Exploiting the potential afforded by the social media communication channels is vital for any business [7],[8].

Communication and interaction are the cornerstones of learning, talking, arguing, and sharing. Throughout ancient times, they have played a crucial role in shaping our culture and way of life. They also include indirect forms like the performance and non-performing arts rather than direct modes like speaking, writing, etc. It follows that it is understandable why some people refer to humans as social creatures. Yet, there have been changes to both the communication's substance and methods. Pigeon's post was the first, followed by postal letters, mobile, and now social media and cellphones. It's interesting to note that social media both influences and modifies how individuals connect. Nowadays, social media is playing a significant role in our lives. Our day starts with checking and updating our social media profiles, and it concludes the same way [9].

Industry in the modern era is driven mostly by customer wants. People like to look at recommendations, reviews of Google search results, or websites before making a purchase. In order to follow the flow, it is crucial to understand what others think of us. Businessmen must actively engage in relevant groups in order to connect with and sway the public. They also need to use social media to interact with customers and maintain their online reputations. Social media marketing is crucial for expanding your customer base and expanding your company. Social media marketing is the process of increasing website traffic via social media platforms. As of 2019, there were 574 million active Internet users in India. After China, India has the second-largest internet market. In India, there will be around 639 million active internet users by the end of 2020. Mobile phone internet users make up the bulk of internet users in India. India's total data traffic surged by 47% in 2019 as a result of continuous 4G use. 96% of the nation's total data traffic was consumed through 4G, while 3G data traffic had its worst dip ever—a 30% drop—in use.

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Social media marketing is a tool that enables individuals to communicate with and sell to a far larger audience than would have been feasible via traditional advertising methods by using online social networks to promote their websites, products, or services. Most significantly, social media places more focus on the group than the individual. On the Internet, there are communities of all sizes and kinds, and individuals communicate with one another. Social media marketers must appropriately use these communities in order to interact with group members about certain product and service offers. Social media marketing also entails engaging with the groups as a corporate representative by listening to them and forging connections.

DISCUSSION

While social networking has been more popular recently, its roots go back to the dawn of the computer era. What we see now is the result of social media's long history of development. Usernets, which debuted in 1979, was the first social media platform, and it was a long road from Usernets to Facebook. Users might publish to newsgroups using user networks as well. Next came bulletin board systems, which allowed users log in and interact. Online services like Prodigy served as BBS's predecessors. Web utilities gave birth to instant messaging, and then internet relay chat emerged. The 1990s saw the pinnacle of networking applications and forums, which sparked the development of social networks. Nevertheless, users were not permitted to create buddy lists. Six degrees have been included to get around this flaw. It made it possible to create profiles and listing pears. After ten years in operation, it was purchased and shut down. Blogging emerged during this time, sparking the social media boom.

It is still well-known today. Some websites, including the Latino-focused MiGente and the African-American social network BlackPlanet, provide features for creating profiles and adding friends. By 2000, modern social networks started to emerge. In 2002, Apple released Friendster. Millions of people utilize it and LinkedIn were introduced in 2003. On LinkedIn, specialists may connect with one another. Myspace was established in 2003 as well and gained popularity in 2006. Similar to MySpace, Orkut, Multiply, etc., Facebook was created in 2004 and has already exceeded them all while continuing to expand.

Together with news and bookmarking websites like Digg and Delicious, this decade gave birth to media sharing websites like photobucket, flickr, YouTube, Instagram, revver, etc. Social media has exploded since 2000 and is still expanding unabatedly now. With media sharing, several other websites have emerged that provide real-time alerts, like Twitter, Posterous, Tumbler, etc. In 2007, Facebook unveiled its ad-management system.

A. Social media marketing is important:

1.1.Broad access to potential clients:

One of the major benefits of social media marketing is the quick and extensive access to target customers. Finding the ideal groups on social networking sites and posting pertinent information, however, requires some effort.

1.2.Encompassing advertising

When a marketer chooses SMM services, they get vast marketing services, many of which also function in relation to SEO. The business is advertised on social networking sites, video sharing websites, picture sharing websites, etc. This enhances the company's exposure and coverage.

1.3.Increased search engine positions

Marketers see that your website's search engine ranking is continuously rising as a result of an increase in traffic brought about by SMM businesses' effective execution of SMM and other techniques that encourage link creation. The benefits of higher ranking include improved exposure, a higher page rating, and an increase in one-way links, among many other things.

1.4.A timely return

When a marketer contacts prospective clients using social media platforms, the turnaround time looks to be shorter. This suggests that results will be seen much more quickly than they would with conventional marketing strategies. Even if results are not seen right away, the website keeps gaining advantages over time in terms of online visibility.

Effective business-to-business promotion

When used successfully, social media marketing can be quite helpful in producing quality leads for business-to-business marketing. Social media, among other things, may be utilised successfully for brand recognition and identity development. Direct engagement with other businesses through social media has shown to be one of the most effective strategies to build commercial ties.

The many social media platforms include:

Facebook, LinkedIn, and Google+ are examples of social networking.

Online journaling.

Sharing photos.

Video sharing

B. Use of Social Media

1.1.Facebook:

Facebook is a social networking website. You may share them, like them, leave comments on them, invite friends, and contact with them. Since its debut, Facebook has had phenomenal growth and is well-positioned to continue dominating the social networking space. When a marketer chooses SMM services, they get vast marketing services, many of which also function in relation to SEO. The business is advertised on social networking sites, video

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Sharing of video

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1.3.Facebook marketing:

The technique of promoting a brand and sustaining its presence on Facebook is known as Facebook marketing. Facebook marketing includes both sponsored, or "boosted," posts and organic postings and interactions. Facebook is unquestionably the most widely used social networking platform because of the numerous advantages it offers. While it is primarily a social networking site, it can be an effective tool for promoting and advertising a company. Marketers may use Facebook to promote a brand, advertise a company, or raise awareness of a service or product. For this kind of marketing to be successful, more than just a fan page and a few friends are required.

When implemented properly, Facebook marketing may provide an organisation great benefits and results. Businessmen may substantially improve their brand image and attract a larger audience by using Facebook marketing.

1.4.Google

It is a social networking site created specifically for business people. It enables you to communicate business-related information with other users and maintain an online directory of business connections. The process of utilizing LinkedIn for marketing involves sharing material, exchanging messages, and generating leads, raising brand recognition, fostering business ties and collaborations, and encouraging networking.

LinkedIn is a powerful tool that may help developers, salespeople, marketers, and even advertising greatly. You may establish relationships on LinkedIn and successfully grow your business. LinkedIn may now be used for company promotion, when before it was exclusively utilized to build professional contacts. There are two methods of marketing on LinkedIn:

Organic marketing: With this strategy, you engage with people naturally via things like your content and social media updates.

Paid marketing: By this, you may interact with customers or other individuals.

Google+: It is a Google-powered forum for social networking. Unlike other social networking sites like Facebook and Twitter, the Google+ design team wanted to more closely resemble how people connect offline. "Real-Life Sharing Rethought for the Internet" is the project's tagline. With Google+, users may easily and regularly connect with one another based on shared interests and friendships. It is not a standalone service, but rather a component of the "ecosystem" that connects all Google services.

It is a social network run by Google that aids businesses in forging connections with clients, customers, and other businesses. Similar to other networks, Google+ allows you to share information and photographs, advertise yourself as a person, and, when utilised properly, it can be a potent instrument for social media marketing. As Google+ is built on your own appeal, its relevance should be assessed individually. If you think it would benefit your brand, you should include it into your overall social media strategy.

1.5.Twitter

Twitter is a different social media platform that lets registered users read and publish 140-character messages called "tweets." It may be accessed on any device, including tablets, laptops, desktops, and cell phones. Twitter marketing is a potent tool for businesses of all shapes and sizes to attract new clients, boost their brand, and interact with other businesses. Users will learn if customers are mentioning them, and the business may take appropriate action. Tweets provide another example for the business that is shown in the search engine results. Twitter provides a strong foundation for the business to expand into other social media platforms. Twitter is a fantastic platform for showcasing your company's activities and connecting with a

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large audience, where you may promote products and events via your tweets.

1.6.Tumblr

It's a blogging and social networking platform that lets users write "tumblelogs" or quick blog entries. The platform's free-form design and users' willingness to heavily customize their own sites serve as Tumblr's key differentiators.

C. Photo Sharing

1.1.Instagram: Instagram is a website that allows users to share photos. With just one click, you can apply a variety of photo effects to your photographs and share them with others. Although though Instagram is a fairly basic service, its accessibility has contributed to its enormous popularity.

1.2.Instagram Promotion

It is a kind of social media marketing in which advertisers use the Instagram platform to advertise their brands. To accomplish a wide range of corporate goals, Instagram marketing may make use of a wide range of diverse strategies and tactics. Traditional business goals may include selling your products or services, gaining more followers and interactions, forging alliances with prospective clients and other companies, and overall enhancing a company's reputation. There are two primary areas for Instagram marketing activity: Unpaid strategies include producing organic content like posts, Instagram stories, comments, and connecting with other users' material. Paid strategies include advertising and influencer marketing.

1.3.Snapchat

It is a one-to-one and group messaging tool for transmitting instantaneous texts, videos, and images. A few of its features are Memories, Stories, and filters and stickers .

Marketing With Pinterest

Pinterest is a social networking platform similar to Instagram in that it enables users to post visual images, but it differs in that each Pin may be linked to your website or other information. As of right now, Instagram only permits links in adverts or the biography area, thus it is useless if you want to drive visitors to your website, online store, or blog. Pinterest marketing is the use of Pinterest as a strategy to increase brand recognition. In addition to bloggers, every business that employs a visual medium to grow their audience can use Pinterest marketing. Pinterest increases a website's overall exposure and drives organic traffic back to it.

D. Sharing of videos:

1.1.YouTube marketing

Internet marketers and owners of online businesses should use YouTube marketing as a primary tactic to benefit from the network's dramatic move towards video. The massive amount of daily traffic this website receives only serves to highlight how effective YouTube Marketing is in reaching your target group B. Live Facebook marketing

You may broadcast a live video from your personal profile or corporate page to your audience using Facebook Live, a technology that enables for live video streaming on Facebook. Facebook Live was introduced in April 2016, and while many marketers are still learning how to utilize it, those who do seem to be benefiting from it.

1.2.Social Media Marketing Benefits

Business can benefit from social media in the following ways: Achieve sustained competitive advantage Attract customers, get their feedback, and foster customer loyalty Expand company market reach, including international markets Conduct market research and cut marketing costs Increase revenue by creating customer networks and advertising Develop company brand Exchange ideas to improve business practices Recruit skilled staff, for instance through job networking sites list. The right to privacy and the freedom of speech and expression, which are each people's fundamental rights, cannot be illegally or unconstitutionally restricted since India is not a surveillance state. There must be a balance since the Constitutions themselves set certain restrictions on the freedom of speech and expression. Social media platforms owned by large technological companies have the power to sway information and, in turn, have an effect on democracy. They must all be held accountable for their actions that have significant societal repercussions.

CONCLUSION

Social media has taken on a key role in communication and marketing activities. The new generations of consumers are very brand conscious, they utilize the internet to do business in foreign markets, and their opinions may have a big impact on people across the globe. Thus, it is crucial for companies to provide high-quality content and accurately grasp the behavioral dynamics of users on the social network while managing the presence of fan pages and brands on Facebook in order to increase user engagement. To guarantee an effective result and create successful advertising program that meet the demands of their followers, they must be aware of the necessary drivers. Facebook posts from brand fan pages may vary in style and substance, as well as in how they affect various customers. The benefits of social media marketing are self-evident: they increase brand loyalty and close the communication gap between a business and its consumers. It serves as a creative marketing technique to attract more customers to the business. It is also cost-effective, meaning that little amounts of money for social media marketing are required.

REFERENCES

[1] I. P. Chiang, R. Wong, and C. H. Huang, "Exploring the benefits of social media marketing for brands and communities," International Journal of Electronic Commerce Studies. 2019. doi: 10.7903/IJECS.1547.

[2] S. C. Chen and C. P. Lin, "Understanding the effect of social media marketing activities: The mediation of social identification, perceived value, and satisfaction," Technol. Forecast. Soc. Change, 2019, doi: 10.1016/j.techfore.2018.11.025.

[3] S. V. Jin, A. Muqaddam, and E. Ryu, "Instafamous and social media influencer marketing," Mark. Intell. Plan., 2019, doi: 10.1108/MIP-09-2018-0375.

[4] B. M. A. Almohaimmeed, "The Effects of Social Media Marketing Antecedents on Social Media Marketing, Brand Loyalty and Purchase Intention: A Customer Perspective," J. Bus. Retail Manag. Res., 2019, doi: 10.24052/jbrmr/v13is04/art-13.

[5] M. L. Cheung, G. D. Pires, and P. J. Rosenberger, "Developing a conceptual model for examining social media marketing effects on brand awareness and brand image," Int. J. Econ. Bus. Res., 2019, doi: 10.1504/IJEBR.2019.098874.

[6] J. Abbas et al., "The effects of corporate social responsibility practices and environmental factors through a moderating role of social media marketing on sustainable performance of business firms," Sustain., 2019, doi: 10.3390/SU11123434.

[7] S. Vinerean and A. Opreana, "Social Media Marketing Efforts of Luxury Brands on Instagram," Expert J. Mark., 2019.

[8] A. S. Arora and S. A. Sanni, "Ten Years of 'Social Media Marketing' Research in the Journal of Promotion Management: Research Synthesis, Emerging Themes, and New Directions," J. Promot. Manag., 2019, doi: 10.1080/10496491.2018.1448322.

[9] A. Harun and W. H. R. Husin, "Is the purchasing behavior of suburban millennials affected by social media marketing? Empirical evidence from Malaysia," KOME, 2019, doi: 10.17646/KOME.75672.38.

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Digital Marketing and Social Media

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Abstract*— One of the most important roles in every company is marketing since it is the management process that aims to increase shareholder returns by forging bonds with loyal clients and forging a competitive edge. The world nowadays is much linked advertising and marketing are not the same creatures they were in today's world. One advantage of it is that it displays offers on the product to everyone, greatly enhancing the advertising of the items, but the reaction we get is mostly from prospective purchasers. Also, from the perspective of the consumer, it's advantageous since we may discover special discounts on the goods we wish to buy while browsing the news stream.

Index Terms*— Adverting, Business, Company, Digital marketing, social media.

I. INTRODUCTION

One of the most important roles in every company is marketing since it is the management process that aims to increase shareholder returns by forging bonds with loyal clients and forging a competitive edge [1],[2]. Nowadays, because of how well linked the globe is, marketing and advertising are no longer the same as they always were [3],[4]. This is particularly true now that social media has taken off and altered how companies interact with both current and prospective customers. Prior to digital marketing and social media, marketing was incredibly expensive but generated relatively little money [5],[6]. Now, however, marketing has become very inexpensive and effective, and all we need is a smartphone with fast internet. The remaining work is completed with the aid of social media, where we can find good customers, present them with available offers, and receive feedback right away. One advantage of this is that it allows us to show offers on the product to everyone, greatly enhancing the promotion of the goods. However, the response we receive is primarily from prospective customers. Also, from the perspective of the consumer, it's advantageous since we may discover special discounts on the goods we wish to buy while browsing the news stream [7],[8].

Nowadays, we need to put more of an emphasis on social media because, while social media is just one aspect of the larger field of digital marketing, it is the one that reaches the greatest number of people and has the greatest influence on its users. Social media now serves all company marketing goals, including finding target clients and researching the competition. It also aids in channel and approach selection and content strategy development. This is why social media has to be a bigger part of digital marketing. While everything has advantages and disadvantages, the benefits outweigh the drawbacks in this case. The drawbacks of social media include: simple access for hackers to launch assaults and perpetrate fraud, such as identity theft increasing the likelihood that individuals may be the subject of internet frauds resulting in the theft of data or documents [9].

Having a large following is not a guarantee of success since likes and comments are only visible to those who are actively using your brand. Marketing professionals must do a thorough investigation to establish a connection between social media and return on investment. People from underdeveloped regions find it difficult to utilize the network, it's tough to maintain a human connection with clients since everything is done online, and it's not readily accessible in rural places.

The everyday lives of billions of people now include using the internet, social media, smartphone applications, and other digital communication technology. It is obvious that people are becoming more and more used to social and digital media. This is done for a variety of reasons, including their consumer responsibilities as they research items, buy and consume them, and share their experiences with others. Marketers have increased their usage of digital marketing platforms in response to this crucial trend. Today's marketers' primary goal is to build long-term consumer relationships. Marketing professionals must be in continual contact with customers or potential customers in order to achieve this goal. As opposed to the trade of commodities, the service component, interaction, connectedness, and continuing relationships are now the dominating marketing principles. The subject of how businesses should communicate with their consumers is becoming more important as a result of technological advancements, new channels, and a changing media environment. This interaction's cost component must likewise be given the weight it deserves. Because of their affordability & interactivity, these digital channels make it simple to maintain a constant communication between the business and the customer. The rise of digital media has provided marketers a huge opportunity to keep in touch with their predictions.

Marketers may now communicate with their consumers more often, and personalization has increased at a reasonable price. The major thrust of this argument is that maintaining regular contact with consumers should have a favorable impact on both brand and customer loyalty. For instance, when consumers purchase or consume things, they

may be given more information and brand marketing. These may include newsletters, repurchase and maintenance reminders, help with keeping the items current, and methods for connecting with peers and networks. Because maintaining constant contact with clients is one of the main principles of CRM. According to recent research, CRM's relational information process is crucial for improving an organization's customer relationship performance. Moreover, increased customer knowledge & satisfaction are strongly correlated with the adoption of CRM tools. The majority of consumer marketing nowadays takes place online, notably on social media and mobile devices. Consumer behaviour explorers must thus look at and comprehend customer behaviour in digital contexts.

II. DISCUSSION

Social media marketing is a recent development and a fast-expanding method through which companies may quickly connect with their target audiences. The use of social media platforms to advertise a business and its goods can be summed up in one word: social media marketing. This kind of marketing may be considered to be a subset of online marketing activities that finish off conventional Web-based promotion techniques, such email newsletters and online advertising campaigns. Social media marketing has given mass communication and mass marketing a new term of exponential diffusion and trust by pushing users to share messages to personal connections (Hafele, 2011). New marketing and outreach strategies are being created, which gives firms access to more resources. The development of analytical software by official social network site platforms has improved and increased the effectiveness of social media marketing. There are many different social media platforms, and they come in a variety of shapes and with a variety of functions. Without a question, Facebook is the social networking site that first springs to mind. Facebook, Inc., the company that owns and runs Facebook, originally introduced the service in February 2004. Facebook has over 900 million active users as of May 2012. Before utilizing the website, users must register. After they do, they may establish a personal profile, add other users as friends, and exchange messages with them. They can also get automated alerts when another user updates their profile (Facebook, 2012). Users may also sign up for user groups with similar interests and arrange their connections into lists like "People from Work" or "Close Friends." Giving individuals the ability to share and fostering greater interconnectedness throughout the globe is at the core of Facebook. Despite significant differences, other social networking sites like Twitter, Google Plus, and LinkedIn operate on the same general ideas.

Social media is a phenomenon that has transformed how businesses connect with their consumers and has emerged as a key component of the marketing mix. Hence, if a company wants to build consumer trust, demonstrate knowledge, and connect with new customers, it is nearly a need that it maintains a social media presence. Just having social media accounts for your company is insufficient in the absence of a solid social media use plan. The company will have to work hard to enhance client engagement levels and revenues. The main focus of social media marketing strategies is often on the creation of attention-grabbing content that people will want to share with their social networks.

Using social media to try to convince customers that one's business, goods, and/or services are valuable is known as social media marketing. It involves marketing using social networks, blogs, online forums, and other channels. With social media platforms like Facebook, Twitter, LinkedIn, and many more, social media marketing aims to connect with potential clients and consumers while also increasing exposure and traffic. Businesses still chose to sell their products using physical media like billboards, leaflets, and direct mail since social media networks were comparatively unheard of. Twitter, Facebook, Pinterest, and other social networks have displaced tangible conventional marketing methods during the last ten years as social media has taken the globe by storm.

The main page of Digg or any other social news website is not the only goal of social media marketing. Establishing the company's influence, reputation, and brand among groups of prospective clients, readers, or supporters is a smart and rigorous process. The technique of increasing website traffic or attention by using social media platforms is known as social media marketing. The main focus of social media marketing initiatives is often on attempts to provide content that grabs readers' interest and entices them to share it with their social networks. The resultant electronic word of mouth (eWoM) is any comment that customers make about an occasion, product, service, brand, or business on the Internet (such as websites, social networks, instant messaging, news feeds). This kind of marketing generates earned media as opposed to sponsored media when the underlying message goes from user to user and is assumed to resonate because it looks to originate from a reliable, third-party source rather than the brand or business itself.

According to Barefoot & Szabo (2010) on page 13, the fundamental concept of social media marketing is "using social media platforms to promote your firm and its goods." A broader definition is "a method that enables people to market their websites, goods, or services via online social networks and to connect with and engage a much bigger group that may not have been accessible through conventional advertising channels" (Weinberg, 2009, p. 3). Above, we emphasised communication with a community. Hunt (2009) emphasizes the similarity between community marketing and social media marketing.

Social marketing is "involved with using marketing knowledge, ideas, and tactics to advance both social and economic goals. Analysis of the social effects of marketing

policies, choices, and actions is another area of interest. "SMM is described as "a kind of Internet marketing that makes use of social networking websites as a marketing tool. According to Tech Target, the purpose of SMM is to create content that people would share on social networks to aid businesses in boosting brand awareness and expanding consumer reach.

Digital marketing is the practise of promoting goods or services via the use of digital technology, primarily the Internet, but also mobile devices, display advertising, and other digital media. The growth of digital marketing during the 1990s and 2000s has altered how companies and brands employ technology for advertising. Digital marketing efforts are getting more prevalent and creative as digital platforms are being interwoven into marketing strategies and daily life and as more consumers utilize digital gadgets rather than go to physical stores.

While the word "digital marketing" wasn't initially used until the 1990s, it was really put into use in the middle of the 1980s when the Soft Ad Group (now Channel Net) created advertising campaigns for automakers. Throughout the 2000s and 2010s, digital marketing advanced significantly, thanks to the widespread use of gadgets that made it possible to access digital media at nearly any time.

According to the International Journal of Advanced Research Foundation, India MART, a B2B marketplace, was founded in India in 1996, while Flipkart was founded there in 2007. Since then, every E-marketing or commercial organisation has begun extensively embracing digital tools for their marketing aims. Hence, it is possible to date the beginnings of digital marketing in India to 1996. India will experience the Internet sector's "golden age" between 2013 and 2018 and that E-Commerce, Internet Advertising, Social Media, Search, Online Content, and Services related to digital marketing will all experience phenomenal growth opportunities and secular growth adoption.

India's digital marketing sector is now expanding quickly. There are several causes for this increase. In the recent years, there has been a significant shift in how communication technologies are used. It was thought that internet information was rife with falsehoods. No one was able to listen to any internet advertisements that did not include buying food, furniture, or clothing. There's no doubt that the plot has changed. Online activities range from sales to marketing. This is because internet communication in India now enjoys a higher level of trust. This has aided marketing campaigns. The telecom sector has taken the lead in starting a revolution. With the advent of affordable mobile phone handsets, India's population of roughly 600 million people can now access the internet, opening up exciting commercial opportunities to market to a growing populace.

Also, the movement in marketing from anonymity to identification is a clear indication of the growth of the digital marketing sector in India. In contrast to the secrecy of identification in the past, online interaction today seems more physically based. It has been determined that a number of variables have contributed to the expansion of digital marketing in India. Internet use was formerly restricted to the privileged. The middle class's way of life has recently undergone significant upheaval. In India, the vast majority of people now have internet connection. Internet and 4G adoption have completely changed how consumers and advertisers interact with one another. The amount, quality, and pattern of consumption have all grown as a result of changes in lifestyle and standard of living. In India's metropolitan areas, the standard of usage is quite high. This is due to the fact that most people lack the time to go to designated shopping areas. People prefer to do some tasks at their leisure, leaving financial concerns aside. In this regard, the development of digital marketing may be seen as a blessing in disguise.

Social media marketing is a significant participant in digital marketing. Social networking sites in the past were solely helpful for establishing connections inside society. This phrase is now Social media has altered perspectives, which could or might not be seen favorably. On the other hand, there is a dump yard of unwanted commercial messages, which has the negative effect of making the world more connected.

The technique of increasing website traffic or attention by using social media platforms is known as social media marketing. The main focus of social media marketing initiatives is often on attempts to provide content that grabs readers' interest and entices them to share it with their social networks. Since it looks to originate from a reliable source other than the brand or business itself, a corporate message travels from user to user and probably resonates. Since word-of-mouth is the primary driving force behind this kind of promotion, earned media rather than sponsored media is the end outcome.

Social networking websites enable online interaction and the development of communities and interactions between people, corporations, and other organisations. When businesses join these social media platforms, customers may communicate with them directly. Users may find such relationship more intimate than more conventional outbound marketing and advertising strategies. Social networking websites serve as an electronic version of word-of-mouth. The capacity of the Internet to connect billions of people worldwide has given online word of mouth a strong voice and a wide audience. An influential network is described as having the power to quickly alter the purchasing behaviour of a rising number of customers. It's common practise on various social media platforms for followers to "retweet" or "repost" remarks made by others regarding a product that is being advertised on social networking sites and blogs. Repeating the message makes it visible to the user's contacts, expanding its audience. More traffic is delivered to

the product/company as a result of the information about it being shared and repeated.

There are a tonne of possibilities for social media marketing, including, but not limited to, Pinterest, Instagram, Twitter, LinkedIn, YouTube, and Facebook. To support this new social media marketing trend, several campaigns have been run. Today's political scene has embraced social media marketing methods in addition to product and service marketing in order to win over the public's trust and support. One recent example of this kind of digital marketing is the US presidential election campaign on social media.

The study of social networks, where each person represents a node in a network, is known as social network analysis. Social network analysis explores and characterizes the social structure of relationships and connections between nodes and others have studied social network analysis in relation to electronic word-of-mouth, identifying influencers, examining how people influence others, the relationship between influence and tie strength, and the flow of information through social media. The research on social network analysis of social media use still has several limitations, nevertheless.

With the remarkable expansion of the influencer sector, it would be fascinating to investigate how consumers' reasons for sharing information on social media affect how other people perceive the message. Examining if and how influencers' usage of sponsored ads, sponsorships, and collaborations influences followers in the social network is a continuation of this study. To ascertain if nodes pay attention to the sponsored adverts on social media and how this may interact with the nodes' responses, shares, and comments on the influencers' non-organic postings, experimental or quasi-experimental methods may be used. Beyond influencers, it would be useful to investigate any possible drawbacks associated with a node repeatedly seeing the same social media message. Is there a threshold at which too many nodes sharing the same information has a detrimental effect? The effect of the pertinent information can be lessened by knowledge of the amount of shares, comments, and responses on social media.

The results of this kind of study might have an impact on customer comprehension theoretically and practically. Academics and professionals often concentrate on comprehending how encouraging electronic word-of-mouth signals spread via social network nodes. Yet, Pfeffer, Zorbach, and Carley advise that there is also merit in looking into unfavourable electronic word-of-mouth in social networks. The phenomenon of "waves of negative outrage on social media platforms," as described by these academics, has damaged corporations, organisations, politicians, and celebrities after the publication of unfavourable information Future studies may examine how an individual's tendency to spread damaging information is influenced by the technological capabilities of certain social networking sites, their social identity, their propensities for altruism, and their devotion to the organisation. Also, it would be intriguing to employ social network analysis to examine how in-group and out-group individuals are inclined to spread unfavourable rumours and how these nodes may be impacted by unfavourable messages.

Comparing the online social networks' ability to spread both good and negative electronic word-of-mouth might be interesting. For both good and negative electronic word-of-mouth, it is possible to assess and compare the speed of information flow, the amount of information disseminated, network clusters, and cross-posts on various social media. A social networking site that enables all visitors to see the nodes, connections, and frequency of responses and comments may be utilised to carry out this study. The nodes may be chosen using a quasi-experimental design strategy; a significant occurrence or piece of news would then be shared with these nodes. To further comprehend how viral marketing works, data on the number of times the node saw, shared, and commented on the event and the effect of these statistics may be examined.

III. CONCLUSION

Customers are happier than ever because customers can quickly select a product that meets their requirements and can readily offer information about their demands, plus they get superior after-sale services since no business wants bad press. Social media marketing costs just 15% of total marketing budget yet significantly boosts income. Hence, if we expand the investment and pay careful attention to it, we may produce a lot of income. Digital marketing is a critical aspect of modern-day marketing, and its significance is continuously growing as consumers increasingly rely on digital channels for information, entertainment, and commerce. Digital marketing encompasses a wide range of activities, including search engine optimization, social media marketing, email marketing, content marketing, and mobile marketing, among others. Effective digital marketing requires businesses to have a deep understanding of their target audience, their behavior, and the digital channels they use. With the vast amount of data available, businesses can analyze consumer behavior and use insights to create relevant and personalized content that resonates with their audience.

REFERENCES

[1] R. Langan, S. Cowley, and C. Nguyen, “The State of Digital Marketing in Academia: An Examination of Marketing Curriculum’s Response to Digital Disruption,” J. Mark. Educ., 2019, doi: 10.1177/0273475318823849.

[2] F. Diez-Martin, A. Blanco-Gonzalez, and C. Prado-Roman, “Research challenges in digital marketing: Sustainability,” Sustain., 2019, doi: 10.3390/su11102839.

[3] J. J. L. García, D. Lizcano, C. M. Q. Ramos, and N. Matos, “Digital marketing actions that achieve a better attraction and

loyalty of users: An analytical study," Futur. Internet, vol. 11, no. 6, pp. 1–16, 2019, doi: 10.3390/fi11060130.
[4] D. M. V. Desai, "Digital Marketing: A Review," Int. J. Trend Sci. Res. Dev., 2019, doi: 10.31142/ijtsrd23100.
[5] W. Ritz, M. Wolf, and S. McQuitty, "Digital marketing adoption and success for small businesses: The application of the do-it-yourself and technology acceptance models," J. Res. Interact. Mark., 2019, doi: 10.1108/JRIM-04-2018-0062.
[6] R. Nunes Cruz, A. M. Fernandes, and T. Rosário, "Determinants of Innovation in Digital Marketing," J. Rev. Glob. Econ., 2019.
[7] A. Miklosik, M. Kuchta, N. Evans, and S. Zak, "Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing," IEEE Access, 2019, doi: 10.1109/ACCESS.2019.2924425.
[8] K. H. Mkwizu, "Digital marketing and tourism: opportunities for Africa," Int. Hosp. Rev., 2019, doi: 10.1108/ihr-09-2019-0015.
[9] H. Yaseen, A. S. Al-Adwan, and A. Al-Madadha, "Digital marketing adoption among smes in Jordan: A mixed-method approach," J. Theor. Appl. Inf. Technol., 2019.

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Corporate Social Responsibility and Social Media

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Abstract— The concept of corporate social responsibility (CSR) holds that businesses should examine how their actions may affect the environment and society. Social media gives businesses the chance to interact with their target audiences and develop their corporate social responsibility (CSR) strategies. The notion of CSR is already well-established for firms in Western nations, while CSR is becoming an increasingly prominent issue in developing countries. Understanding the various CSRs and doing your real duty making decisions about public engagement with the government in this.

Index Terms— Corporate, Company, Social, Social Media, Marketing.

I. INTRODUCTION

Social media are "a series of Internet-based applications that expand on the theoretical and technical foundations of Web 2.0, and that enable the production and sharing of User Generated Content [1],[2]. Across the globe, 2.4 billion individuals utilized the Internet in 2013. It's interesting to note that there are now four billion active cellphones worldwide. With relation to the seven billion people on the planet, this equates to 34 and 57% Internet and smartphone penetration, respectively. In comparison, India has a lower Internet penetration rate of 16% with little over 200 million users and a lower smartphone penetration rate of 10% with 90 million devices. Both India and the rest of the globe seem to have a bright future for Internet and smartphone penetration [3],[4].

Social media use has significantly expanded as a result of the rise in Internet and smartphone use. In 2013, Facebook had 1.1 billion active users, a 30% increase from 845 million in 2012. The other most popular and quickly expanding social networking platforms include LinkedIn, Twitter, YouTube, Google +, and Google Plus. The global social network user penetration in 2012 was 20%. It was just 5.7% in India, but both of these trends are likely to increase, with penetration estimated to reach 31.5% globally and 17.2% in India by 2017.

It is not unexpected that marketers have swiftly reacted to the situation of changing customer behaviour and spent a significant portion of their marketing expenditures in influencing consumers via social media given the meteoric growth in social media penetration around the globe. The development of social media marketing is a result of this. Marketers in India are rapidly adopting social media marketing as a tactic to meet their marketing goals. Social media marketing is the "use of social networks, online communities, blogs, wikis, or any other online collaborative media for marketing, sales, public relations, and customer service [5],[6]. The opportunity to communicate in a timely and tailored manner while allowing immediate and direct feedback from customers and other stakeholders as well as facilitating peer-to-peer and peer-to-expert communication are just a few of the unique and enhanced opportunities that social media marketing offers to marketers. As a consequence, marketers are much more engaged with their consumers, which enables them to accomplish their communication goals.

The suitability of social media marketing tactics and technologies for different corporate social responsibility initiatives and behaviour modification campaigns undertaken by non-profit and public sector organisations has not previously been covered in the literature. The present research fills this knowledge gap. The definition of appropriateness is the alignment of the strengths of the media tool with the goal of the marketer in influencing customer behaviour. The success of media tools in achieving the media and communication goals of marketers is significantly influenced by their appropriateness. Reach and frequency goals that were attained for the lowest cost are often included in quantitative media effectiveness measurements [7],[8].

For example, effective reach, cost per million, and cost per rating point are some of these metrics. Also taken into account are qualitative characteristics. They include metrics like audience engagement, which refers to how much time users typically spend with the medium or channel, how engaged they are with the content, etc. These measurements are independent measures that are applied to assess which media and \vehicles should be included in the media strategy. The impact of fit or suitability of media alternatives, together with the relevant marketing strategy for media effectiveness, might be taken into account in addition to these factors. The earlier literature hasn't looked at this link [9].

The current research conceptualizes the suitability of media tools for marketing strategy as the first step in that approach. A marketer has access to a variety of media alternatives, including television, radio, newspapers, magazines, outdoor advertising, and more. The most significant media possibilities now accessible to marketers are online and mobile media. The research focuses on available new media. Please see the section headed

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"Classifying Social Media Tools Based on Social Media Strategy" for further information on appropriateness and social media possibilities.

The importance of corporate social responsibility in an organization's overall strategy is expanding. Corporate social responsibility is the term used to describe how businesses voluntarily uphold their social and environmental responsibilities. Basically, the idea is that businesses choose freely to make contributions to a better world and a cleaner environment. It is a notion wherein businesses voluntarily incorporate social and environmental issues into their everyday operations and interactions with stakeholders. It is shown by the social investments and economic operations that corporations make in society. The principle of sustainability, which contends that businesses should base their choices not just on financial criteria like earnings or dividends but also on the immediate and long-term social and environmental effects of their actions, is closely tied to CSR.

The term "corporate social responsibility" (CSR) refers to an organization's obligation to consider how its actions and choices will affect society, the environment, and its own profitability, or the "Triple Bottom Line" of people, planet, and profit. According to the triple bottom line idea (3P), a company must focus on the following areas in order to survive over the long term: People connect to ethical and advantageous corporate practices towards employees, the local community, and the area in which a firm operates. Corporate sustainability depends on support from the general public (society) in the business sector. Corporations must commit to provide the greatest benefit to society as an essential component of society.

Planet alludes to environmentally sound environmental policies. There is a connection between companies and the environment. Corporate environmental stewardship will be advantageous to them. A company with a triple bottom line does not manufacture hazardous or destructive items like guns, poisonous chemicals, or batteries that contain risky heavy metals. Profit is the economic value produced by the organisation after all input costs, including the cost of capital invested, have been subtracted. It is the most significant factor and any business's primary goal. Profit may be enhanced through streamlining processes, eliminating wasteful operations, cutting down on processing and service times, and making the best use of resources. The goal of corporate social responsibility is to enhance community welfare. It is not charity, but rather a crucial aspect of an organization's operations. It is a strategy that balances the demands of the social, political, and economic spheres.

The organizations and activities that support good social change, those that encourage behaviors that address societal issues, are the subject of this conceptual research. We look at two different kinds of organizations: businesses that plan CSR events and nonprofits and governmental agencies that work on behavior change initiatives. Corporate CSR is defined as "do-good" activities that benefit society as a whole, with the corporation managing the influence of internal and external stakeholders, such as customers, employees, distributors, investors, and policymakers, on achieving corporate goals and maximizing shareholder value.

On the other hand, government and nonprofit groups engage in two types of behavior-change work: Changing behaviour to address social issues and persuading people to donate money and volunteer their time are examples of. The first kind of social change activities that the government and non-profit groups engaged in is the subject of this research. In other words, the research focuses on government and non-profit organizations' attempts to encourage behaviors that address social issues. Social media is becoming more important in both types of activity in order to reach media and communication goals.

The present analysis suggests pertinent social media tactics for each social media tool and suitable social media strategies and tools for each CSR and behaviour change strategy in order to fill in the research gaps. Based on this classification, the paper examines prior attempts by Indian businesses and social change organisations to implement their CSR and behaviour change campaigns through social media strategies, identifies gaps, and offers suggestions to make subsequent CSR and behaviour change attempts more successful.

II. DISCUSSION

Tools for Social Media Classification according to social media strategies

The research suggests the 7 Cs of social media marketing strategy that are pertinent to a CSR/social change campaign, based on the categorization. This is a basic explanation of them.

1. Communicate: To convey the organization's main message, particularly the CSR/social change campaign, whether it be from a corporation, nonprofit, or government agency. That is the fundamental purpose of any kind of communication.

2. Converse/connect: To engage in conversation with the customer in order to clarify the message, dispel misconceptions, and enhance communication.

3. Understand: To gather consumer input on the CSR/social change programmer and to comprehend customers. Consumer research is something that this practice is quite similar to.

4. Collaborate/co-create: To encourage customers to contribute suggestions for the development of a CSR/social change strategy's next stage.

5. Customize: Provide customers specialized CSR/social change solutions

6. Convert: To move customers through the stages of ignorance, awareness, favorable perceptions, and brand purchase.

7. Customer service: To provide post-sale and behavior-change services in order to keep current customers.

Corporations and organisations working for social change may use a variety of social media platforms. According to the research, they may be divided into three primary categories: corporate/social change agencies, consumer- or third-party-led organisations, and those in which all of these parties are active. Their different strengths. The organization's website, blogs, and microblogs, websites where businesses and social change organisations may upload films and photographs, and social networking sites are examples of corporate- or agency-led technologies. Similar to this, users and outsiders write their own blogs, Twitter feeds, YouTube videos, and Facebook postings about businesses/social change agencies, brands, brand communication initiatives, and brand experiences. These parties may include specialists who keep tabs on businesses' behaviour. More significantly, comments left by users in response to communication efforts made by businesses, peers, and experts on various social media platforms are a valuable source of information for businesses and organisations working for social change. Lastly, there are a few venues where customers, businesses, and organisations working for social change may communicate or submit content together. They consist of message boards, emails, and group projects.

Which instruments provide which advantages to businesses or organisations working for social change. Activities done by corporations or social change organisations are ideal for communication. Also, they may elicit visitor input that might be helpful in letting businesses know how well their CSR/social change strategies are working. Sharing materials inside these tools helps enhance the persuasive process to more complex levels. Based on comments, peer interactions, publishing of films and photographs featuring businesses and brand experiences, audience-led communication activities often provide corporations critical input. Expert opinions shared on blogs, websites, and microblogs may also have a significant impact on customer behaviour and serve as a valuable information source for businesses. Visitor comments published on a variety of websites do more than just provide input; they also enable businesses and organisations working for social change to communicate, work together, and convert. Lastly, there are a few social media platforms, such as message boards and online emails, where customers and businesses or organisations working for social change may communicate in real time.

These are effective tools that businesses may use to sway customer opinion on a variety of issues. The ability to contribute and amend content on collaborative projects like Wikipedia makes them fantastic forums for communication and brainstorming marketing strategies.

When it comes to social media marketing, businesses generally "communicate" via their own websites and through exchanging materials, but they underutilize blogs, microblogs, discussion forums, and joint initiatives. Also, there is little involvement from the general population about visitor remarks. As a consequence, businesses miss out on social media's true benefits by failing to communicate, work together, customize, and convert. This might lead to campaigns that are poorly designed, unsuccessful, and inefficient.

In conclusion, the research advises businesses to adopt corporate social responsibility, cause-related marketing, and other socially conscious business strategies more regularly. Companies should put more effort into sharing content, closely observing consumer-led communication, closely observing visitor comments and discussion board conversations and encouraging more in the future. Most importantly, however, companies should involve consumers in the co-creation of marketing strategies.

Organizing social media Tools and Strategies Using Behavior Change Techniques

The research then maps behavior modification techniques with social media tools and tactics. Three strategies are put out by Michael Rothschild for how social change groups may affect people's behavior. These include education. Examples include warning signs on cigarette packages that draw attention to the harmful effects of smoking but don't stimulate the environment; marketing. Examples include the marketing of "green" lanterns to encourage environmentally responsible behavior and legislation that require residents to modify their behavior or face fines.

In India, for instance, smoking is prohibited in public areas. Any social change manager-led social media marketing initiatives must be used since they provide a managed channel for communicating with the audience, regardless of the technique they decide to utilise. Similar to this, managers of social change should keep an eye on all audience-led initiatives and collect feedback. However, if social change organisations are engaged in social marketing, where audience response directly affects the success of behaviour change, they must be vigilant with visitor comments to connect, involve audience members in collaborative projects to co-create, share materials, and actively participate in discussion boards to customise efforts, convert audiences, and offer adequate and appropriate customer service.

Examining social change initiatives finds that lawmakers use social media platforms the least. They often depend heavily on the communication efforts of others. They do not make use of their own social media platforms. Also, while finalising rules, policymakers nearly never ask for feedback from the public. In educational initiatives, communication is often prioritised above other factors that may be readily

taken advantage of using social media platforms. Although gathering audience input is given some consideration, it is mostly focused on assessing audience awareness and very little on real behaviour modification. Also, the input is often non-systematic and anecdotal. The present attempts at social marketing are once again centred on communicating mostly via social change agencies and third-party-led initiatives. The importance of relating and understanding has diminished. The other components, such as collaboration, customization, conversion, and customer support, are given even less priority.

Policymakers might use these techniques to get in touch with audience members before of enacting a legislation in order to increase the effectiveness of future social change efforts utilising social media. It would be helpful for this reason to keep an eye on and promote visitor comments as well as audience-led dialogue. Focusing on co-creating, customising, and converting is crucial for educators, necessitating a concentration on collaborative projects, the use of algorithms to give information that is specifically tailored to each student, and being actively involved in monitoring visitor comments and discussion boards. Lastly, social marketers need to do what teachers would do in addition to offering customer service via message boards and email exchanges.

The management implications include examining how Indian businesses utilise social media platforms and making suggestions for future enhancements that will help these businesses better meet their aims and goals. Companies may successfully accomplish their goals by using social media platforms in the right way. Businesses and society profit when organisations accomplish their aims and goals. This research is the first to link social media tools and tactics. This is also the first effort to link CSR and behaviour change initiatives with social media tools and tactics. However, also show a number of shortcomings that have to be addressed in follow-up investigations.

Initially, the evaluation was limited to social media marketing initiatives carried out by government, nonprofit, and commercial entities with a focus on India. Consistency in the nation of origin was preserved by doing this. Multinational firms' social media marketing initiatives, both commercial and nonprofit. Examples include from the business sector, such as Procter & Gamble, and the nonprofit sector, such as Population Services International. Even foreign governments' assistance agencies, like USAID, have begun utilising social media marketing tactics on a number of instances in recent years. Multinational companies are probably bringing social media tactics from their corporate headquarters. The social media marketing strategies used by global corporations and contrast them with those used by businesses with Indian roots. Second, although the existing paradigm for coupling CSR, social media, and behaviour modification tactics is provided in a conceptual framework, its efficacy has not been experimentally evaluated. The influence of appropriateness on social media efficacy should be contrasted with the effects of popularity, expense, and qualitative indicators. Finally, based on social media alternatives, the theorized the appropriateness of media options and consumer behavior. Although social media platforms are becoming the most significant media alternatives, traditional media tools, particularly television, newspapers, and magazines, are still vital. Since every firm must continue to operate over a longer period of time, they do so by using fundamental or societal resources that help them maintain their operations. So, a corporation has a responsibility to give back what it has stolen from the general populace

There are really just two distinct categories of CSO to take into account. The first involves groups providing funding and resources for commendable humanitarian purposes, such as offering gifts or agent freedom. This is the definition of corporate commitment that is used by certain individuals. Yet, another kind of CSR involves assembling a verifiable strategy to provide goods or provide services that are to the greatest advantage of society. They include practises like employing safe materials in planning and production, corporate routine activities, and diverse factors including job creation and unanticipated financial growth.

The finest corporate social responsibility initiatives combine these two types of CSR to demonstrate a verifiable dedication to an issue. One organisation that demonstrates a genuine commitment to the environment that goes beyond any single CSR movement is one that uses sensible materials in its products, donates funds for environmental causes, and permits workers to set aside compensated time for volunteering at public establishments.

Promotion is a fantastic tool for forming consumer perception and enhancing an organization's reputation. Organizations that properly progress their social responsibility policies regularly know how to use the media to publicize their initiatives. Spreading the word about business donations, employee volunteer projects, and other CSR initiatives is a fantastic monitoring tool that may increase your visibility in print and online media.

Businesses that prioritise corporate social responsibility often work more easily with politicians and government authorities. Unexpectedly, organisations that provide a reckless justification for their lack of social responsibility often find themselves able to resist numerous demands and tests that are frequently imposed by organisations that are involved in providing public assistance. The more the public perception that a company prioritizes social responsibility, the less likely it is that lobbying groups would send out public missions and seek demands from the government against it.

How to Create a Good Workplace Environment Finally, the welcoming atmosphere you provide for your delegates is perhaps the ideal space for fostering social commitment in the workplace. Delegates and the board will likely be more

enthused and more active in their roles if they believe they are representing an organization with a true internal voice. This may create a sense of community involvement that unites everyone and encourages happier, more productive delegates.

III. CONCLUSION

Corporate social responsibility was used for this rationale in particular. A portion of the net benefits in the public sector's administration support and benefit society are provided through associations. Execution of these duties and updated CSR guidelines may vary depending on the association's size, the executives' mindset, the corporate system, industry characteristics, the state of the economy, and other similar mitigating circumstances, but updated CSR guidelines will enable the board and company to increase transparency and responsibility of the Company. It has become an essential aspect of modern-day business, as companies recognize the importance of contributing to society and the environment while generating profits. CSR involves businesses taking responsibility for their impact on society and the environment and integrating ethical, social, and environmental concerns into their business operations. Companies that prioritize CSR are more likely to build long-term, sustainable relationships with customers, employees, and communities. CSR can also enhance a company's reputation, improve employee morale, and attract investors who value socially responsible businesses.

REFERENCES

[1] L. H. N. Thao, D. N. P. Anh, and J. Velencei, “Measuring corporate social performance,” Serbian J. Manag., 2019, doi: 10.5937/sjm14-18009.
[2] H. A. Riyadh, E. G. Sukoharsono, and S. A. Alfaiza, “The impact of corporate social responsibility disclosure and board characteristics on corporate performance,” Cogent Bus. Manag., 2019, doi: 10.1080/23311975.2019.1647917.
[3] S. M. Hizam, Z. I. S. B. Othman, M. M. Amin, Z. Zainudin, and M. F. A. Fattah, “Corporate social responsibility in Malaysia,” Int. J. Financ. Res., 2019, doi: 10.5430/ijfr.v10n5p381.
[4] M. Chabachib, T. U. Fitriana, H. Hersugondo, I. D. Pamungkas, and U. Udin, “Firm value improvement strategy, corporate social responsibility, and institutional ownership,” Int. J. Financ. Res., 2019, doi: 10.5430/ijfr.v10n4p152.
[5] S. Y. Cho and C. Lee, “Managerial Efficiency, Corporate Social Performance, and Corporate Financial Performance,” J. Bus. Ethics, 2019, doi: 10.1007/s10551-017-3760-7.
[6] E. Akben-Selcuk, “Corporate social responsibility and financial performance: The moderating role of ownership concentration in Turkey,” Sustain., 2019, doi: 10.3390/su11133643.
[7] G. Ruwanti, G. Chandrarin, and P. Assih, “Corporate social responsibility and earnings management: The role of corporate governance,” Humanit. Soc. Sci. Rev., 2019, doi: 10.18510/hssr.2019.75172.
[8] N. T. Canh, N. T. Liem, P. A. Thu, and N. V. Khuong, “The impact of innovation on the firm performance and corporate social responsibility of Vietnamese manufacturing firms,” Sustain., 2019, doi: 10.3390/su11133666.
[9] F. Li, T. Morris, and B. Young, “The effect of corporate visibility on corporate social responsibility,” Sustain., 2019, doi: 10.3390/su11133698.

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Concepts of Social Media Marketing

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Abstract— Social media marketing refers to the use of websites and social media platforms to advertise a product or service. Social media marketing is growing in popularity among practitioners and scholars, despite the fact that the phrases e-marketing and digital marketing still have sway in academia. The majority of social media networks provide data analytics capabilities, allowing businesses to monitor the development, effectiveness, and engagement of marketing efforts.

Index Terms— Advertising, Business, Company, Marketing, Management.

I. INTRODUCTION

Communication and interaction are the cornerstones of learning, talking, arguing, and sharing. Throughout ancient times, they have played a crucial role in shaping our culture and way of life [1],[2]. They also include indirect forms like the performance and non-performing arts rather than direct modes like speaking, writing, etc. It follows that it is understandable why some people refer to humans as social creatures [3],[4]. Yet, there have been changes to both the communication's substance and methods. Pigeon's post was the first, followed by postal letters, mobile, and now social media and cellphones. It's interesting to note that social media both influences and modifies how individuals connect. Nowadays, social media is playing a significant role in our lives. Our day starts with checking and updating our social media profiles, and it concludes the same way [5],[6].

Industry in the modern era is driven mostly by customer wants. People like to look at recommendations, reviews of Google search results, or websites before making a purchase. In order to follow the flow, it is crucial to understand what others think of us. Businessmen must actively engage in relevant groups in order to connect with and sway the public [7],[8]. They also need to use social media to interact with customers and maintain their online reputations. Social media marketing is crucial for expanding your customer base and expanding your company. Social media marketing is the practise of increasing website traffic via social media platforms.One individual may now speak with hundreds or even thousands of people worldwide because to the lack of Internet-based social media. The number of individuals creating material, sharing it, bookmarking it, and networking on social media has skyrocketed. The chance to market oneself and one's goods to active groups and potential customers is provided by all forms of social media [9].

Using technical jargon, social media encompasses a number of programmes that let users "post," "tag," "digg," "blog," and other actions. Consumers who want to enlighten one another about goods, services, brands, and issues produce, share, and utilise this social media content, which is a sort of freshly generated resource for online information. Facebook, MySpace, Digg, Twitter, LinkedIn, and Google+ are a few examples. Social media has established trends in a variety of fields, including politics, technology, the environment, and the entertainment sector, because to its accessibility, speed, and reach. Users of social media basically promote themselves via spreading. Social media's ability to go viral makes it a desirable tool for companies to sell their goods and services. The use of social media in marketing is currently growing.

Marketers are starting to comprehend how to include social media into their plans and campaigns to connect with clients. Social media may be used in the following marketing subdisciplines: promotions, marketing intelligence, sentiment analysis, public relations, marketing communications, and product and customer management. Understanding each social media platform's relative significance and how it relates to other social media platforms is crucial since each of these platforms—such as blogs, online forums, and online communities—has an impact on marketing performance, such as sales. Also, social media users nowadays are highly driven web users. State of the Media: Social Media, online shopping accounts for 70% of social media users' activities. Just simply sitting in front of a computer screen and using online websites, consumers may quickly acquire what they want. While social media marketing offers many advantages for both consumers and marketers, it also has drawbacks for both. Due to the ease with which information may be accessed and the absence of oversight and regulation, it is clear that it favours various hazards and cybercrimes.

Features of social media marketing: Social media marketing is a recent development and a fast expanding method through which companies may quickly connect with their target audiences. The use of social media platforms to advertise a business and its goods can be summed up in one word: social media marketing. This kind of marketing may be considered to be a subset of online marketing activities that finish off conventional Web-based promotion techniques, such email newsletters and online advertising

campaigns. Social media marketing has given mass communication and mass marketing a new term of exponential diffusion and trust by pushing users to share messages to personal connections. New marketing and outreach strategies are being created, which gives firms access to more resources. The development of analytical software by official social network site platforms has improved and increased the effectiveness of social media marketing.

There are many different social media platforms, and they come in a variety of shapes and with a variety of functions. Without a question, Facebook is the social networking site that first springs to mind. Facebook, Inc., the company that owns and runs Facebook, originally introduced the service in February 2004. Facebook has over 900 million active users as of May 2012. Before utilising the website, users must register. After they do, they may establish a personal profile, add other users as friends, and exchange messages with them. They can also get automated alerts when another user updates their profile. In addition, users may join common-interest user groups; organise their friends into categories such as "People from Work" or "Close Friends". Giving individuals the ability to share and fostering greater interconnectedness throughout the globe is at the core of Facebook. Despite significant differences, other social networking sites like Twitter, Google Plus, and LinkedIn operate on the same general ideas.

The technique of increasing website traffic or attention using Social Media platforms is known as social media marketing. Social media marketing initiatives often focus on making an effort to provide material that grabs readers' interest and entices them to share it with their social networks. Since it looks to originate from a reliable source other than the brand or business itself, a corporate message travels from user to user and probably resonates. Since word-of-mouth is the primary driving force behind this kind of promotion, earned media rather than sponsored media is the end outcome. Everyone with internet connection may now quickly access social media platforms. Organizations that communicate more regularly promote brand recognition and often provide better customer service. Also, social media provides businesses with a very low-cost platform to run marketing initiatives. People may communicate with one another and create communities via social networking sites, according to Journal of Organizational Management. People are able to engage with items and businesses when they join such sites. Because of their prior connections on social networking sites, individuals see this conversation as being personal.

Individual followers may "retweet" or "repost" remarks made by the product being advertised on social networking sites and blogs. Repeating the message allows it to be seen by all of the user's connections, therefore reaching a larger audience. Social media marketing makes use of social media platforms to increase online presence and advertise goods and services. Social media platforms are helpful for establishing both personal and professional networks as well as for transferring information. Social media marketing gives businesses a method to communicate with their clients. Yet, businesses need to safeguard their data and keep a careful eye on criticism and issues raised on the social media platforms they use. According to a quick survey of 1225 IT professionals from 33 different countries, social media errors cost businesses a total of $4.3 million in 2010. Employees disclosing excessive amounts of material in public forums, the loss or disclosure of secret information, and heightened litigation risk were the top three Social Media issues a business dealt with the previous year. Owing to the internet's viral nature, it has sometimes been shown that a single employee's error may have disastrous effects on a corporation.

II. DISCUSSION

Throughout the last 20 years, there have been significant changes to both marketing as an academic study and a managerial activity. Several academics and practitioners agree that some of the traditional marketing principles are fading away, while the mass marketing techniques that were so successful in the 1960s and 1970s are losing their potency. The spread of media, the globalisation of markets, and the emergence of a new generation of information and communication technologies, the most prominent of which is the Internet, are altering the marketing rules and market dynamics by reducing corporate competitiveness and enhancing individual empowerment.

A fresh discussion about the need of a new marketing direction has gained traction in light of these changes. An agreement on the need of redefining marketing strategies seems to be developing. In the past, academics have advocated for relationship-focused marketing as an alternative to traditional marketing strategies, while others have proposed a customer-focused paradigm based on openness, engagement, collaboration, cocreation, and an inclination to aid consumers rather than dominate them. The Internet's function, particularly the advancements made during the Web 2.0 period, as well as the function of social media, play a vital role in the evolving marketing setting. The takeaway for marketing strategists is clear: understanding how technology shapes the market and, more importantly, integrating social media into one's toolkit of marketing techniques, become strategic imperatives in order to survive in the age of the empowered consumer and reduce reliance on conventional mass-marketing techniques. The pressure on marketers to change how they connect and communicate with their consumers in the dynamic marketing environment, where technology is playing an increasingly significant role, is the subject of this study. It examines the research on the nature of the Web 2.0 domain and real-world examples, finds and groups potential use for social media as marketing tools, and discusses how these

tools help customers become more empowered.

Although social media advances are often seen by marketers as strategic threats, the article contends that there are a number of ways they might be seen differently and turned into opportunities. Businesses have new potential to strengthen their competitive position and develop new types of customer value in the social media space, both of which will help them draw in new clients and foster long-lasting connections with them. The article suggests classifying the main social media programmes and outlines their functions in the marketer of the twenty-first century's toolkit. 2. Explaining Web 2.0 and social media There is no universally accepted definition of what Web 2.0 and Social Media exactly signify since they are new concepts in the Internet and marketing language. The next phase of the Internet's development is known as Web 2.0, and Tim O'Reilly popularized the term by describing it as a large group of online applications that share a number of common traits: "The Web as a platform, Harnessing of the Collective Intelligence, Data is the Next Intel Inside, End of the Software Release Cycle, Lightweight Programming Models, Rich User Experiences." The somehow fuzzy nature of the terms describing the Web 2.0 lead to a new definition attempt: "Web 2.0 is a set of economic, social and technology trends that collectively form the basis for the next generation of the Internet, a more mature, distinctive medium characterized by user participation, openness, and network effects".

Even after the second definition, there was still some debate over the precise nature of Web 2.0, but this did not stop Silicon Valley insiders from endorsing it, which was then followed by the media, corporations, and the general public. Academic publications, news stories, and white papers all provide different definitions of the Web 2.0; a Google search for the phrase returns more than 300 million results. There is likewise no consensus on the definition of the word in scholarly literature. The reason for this is because Web 2.0 is undoubtedly a complicated topic; computer methods and methods, software programmers, and social consequences are often mixed together, leading to ambiguity and misunderstanding. By oversimplifying the issue, some definitions aim to clear up the misunderstanding. We contend that, given the complexity of Web 2.0, it is necessary to distinguish between its three primary dimensions—the key Application Types, the Social Impacts, and the Enabling Technologies—in order to provide a comprehensive picture of the domain. Provides further information on the nature of these dimensions. The intricacy of the problem and how difficult it is to identify a phenomena where marketing, psychology, and information technology coexist are highlighted by the multifaceted nature of the Web 2.0 sector.

Application Types and Social Impacts are the crucial and pertinent themes from a strategic and marketing standpoint, which is seen in the definition that follows: Web 2.0 is a collection of interactive, open-source, and user-controlled Internet applications that increase user experiences, cooperation, knowledge, and market power as participants in corporate and social activities. By enabling the effective production, distribution, sharing, and modification of material, Web 2.0 apps foster the development of informal user networks that facilitate the flow of ideas, information, and knowledge as well as innovation and creativity. As the most significant components from a marketing standpoint, this definition concentrates on the Application Types and the Social Impacts. The use of software tools in the various Application Types is the subject of the third Web 2.0 dimension. A frequent source of ambiguity when describing Web 2.0 is the blending of Application Types and Enabling Technologies. Despite the fact that the phrases are sometimes used interchangeably, social media and web 2.0 have separate definitions. The Social Media, as defined by the online encyclopaedia WIKIPEDIA, "are media meant to be distributed via social interaction, developed utilising highly accessible and scalable publishing mechanisms.

By using Internet- and web-based technology, social media, in contrast to broadcast media monologues, supports people's demand for social connection. Networking and conversation are supported by social media. Communication and social networking enable the democratization of knowledge and information, converting people from consumers to creators of material. Many academics likewise hold this perspective, and the majority of practitioners similarly equate the word "social media" with user-generated material. The term "Social Media" is thus defined for the purposes of this essay as Web 2.0 apps that allow for the production, modification, and distribution of user-generated content. In Figure 1, which represents the first Web 2.0 dimension—the Application Types—these apps are shown. Third, Social Media Offers Marketers a Strategic Chance Customers were more intelligent as a result of social media, and they learned new methods for finding, assessing, and selecting products and services. New consumer behavioural tendencies based on social media use have been discovered through recent study. Customers are eager to participate in more stages of the business process, which is shown in the growing demand for personalised goods and their readiness to actively participate in the product creation process.

Such innovations have a significant impact on how marketers conduct their business and have a tactical and strategic impact on marketing strategies, posing tough decisions and difficulties to them. Marketers start to be more receptive to the idea of providing products that can be tailored to the preferences of the final consumer. They also start to be more receptive to the idea of creating the conditions that permit customer collaboration in the development and testing of new products, or co-creation. Additionally, the need to remain competitive and marketers' recognition that they need to reclaim some control over the

customer-controlled Social Media space have led many companies to invest in their social media presences or to develop plans to begin conducting marketing campaigns there in the near future. About half of firms aim to use social networks as part of their marketing strategies in 2010, according to a 2009 research by the Center for Media Research. Using social media as part of a marketing strategy The Company's "Web 1.0" history must be in excellent condition for Social Media to be used as an effective aspect of the corporate marketing plan. The corporate website must be ready to act as the corporate platform and match the expectations of the online consumer. This is due to the fact that the majority of the strategic goals of social media marketing need the existence of a perfect corporate website that is customer-focused, reliable, efficient, and organised. The company must convey its business positioning, quality, customer-oriented culture, and image via its internet presence.

A well-designed website is a must, but it is by no means a guarantee of success; another crucial need is that the marketing team and the back office of the business are in top form and capable of handling the task. It is crucial that customer focus be represented not just in online marketing but also in conventional marketing and fulfilment operations. By providing clients with high-quality goods and services, the marketing organisation must be designed to provide them with high value. Marketers need to be aware that consumers using social media can easily check out and verify a company's claims about product quality or price, look for alternatives or replacements, and last but not least, review goods or services and share their own personal experiences with a large audience of peers. Nowadays, no hotel marketer should make an effort to advertise his services by posting gorgeous images of his hotel rooms or lovely surroundings or by making unfounded promises about the hotel services. Millions of individuals who are looking to book a trip peruse the more than 15,000,000 traveler-generated reviews, images, and comments on the website Tripadvisor.com on almost all hotels, resorts, restaurants, and other places associated with the leisure business on the earth.

Customers may compare items and learn more about them before they purchase relatively quickly because to web logs and online forums like epinions.com, reviewcenter.com, and consumersearch.com that publish thousands of customer-generated evaluations about a wide range of goods and services. So, using social media as a marketing tool is not a standalone procedure but rather the culmination of an ongoing strategic effort to enhance the organisation, the company, and the conventional corporate website. The E-Marketing Pyramid model, which depicts how social media marketing fits into the overall marketing strategy, serves as an illustration of this. The Social Media marketing endeavor is the apex of an integrated marketing strategy; failure to adequately handle the challenges that arise at the base of the pyramid may result in disappointments, resource waste, and a loss of client goodwill. Four layers may be seen in the E-Marketing pyramid: Initially, the Goods and Services: The effectiveness of the company's services and goods, as well as its focus on the market and customers, form the cornerstone of its marketing strategy. The goal statement, USP, product value, market image, and market positioning of the organisation should all describe these challenges. In the age of social media, it's hazardous to supply subpar products since customers are able and eager to learn the truth by speaking with other users, reading tech blogs, or checking for product evaluations. The strategic pillars of this stage are ongoing innovation and quality assurance procedures.

A. The Marketing Company

Building and sustaining a business-focused organisation that can assist with both offline and online marketing initiatives is described as the second level of the pyramid. This indicates that organisational procedures including manufacturing, shipping, customer service, sales, and procurement provide high customer value and are adaptable enough to support the operations of the online business. Several examples show that conventional organisations embracing internet marketing often struggle to change their organisational structure and develop the degree of complexity needed for working online. Depending on the enterprise, organisational change may be necessary.

When Dell Computers was prospering as an online PC manufacturer in the 1990s, most of its conventional rivals like Compaq or IBM never achieved even nearly the levels of Dell's online efficiency and sales levels mostly owing to organisational issues. The reason for this is that Dell's current operating model could very simply be modified to include the Internet. Given that their production and distribution structures were centred on series manufacturing and sales / distribution via intermediaries, IBM and Compaq had significant difficulties in adapting their operations to the internet model. In other sectors, comparable circumstances have been noted.

Several established airlines struggled for about 10 years before they were able to change their internal structure in a way that allowed for the effective use of e-ticketing. E-ticketing was first made available by the low-cost rivals EasyJet and Ryanair, who were smaller and more adaptable companies, in their international alliances in 2004, and by the Dutch airline KLM in The Netherlands in 2002. This was much later than the introduction of this service by British Airways, Quantas, and American Airlines. Rapid and successful integration of e-ticketing into low-cost airlines' business models resulted in significant cost reductions and enhanced customer service. Online travel services like expedia.com and travelocity.com have seized significant market shares in the tourism sector, driving out of business thousands of high-street travel agencies across the globe. This is because incumbents in the industry have found it

difficult to adapt their businesses quickly enough to the online model.

B. Social Media Marketing Foundations

How to distribute their message is a crucial consideration for marketers when creating marketing strategies. Using both free and paid methods, social media aids in getting those messages to the appropriate individuals at the right time. Also, marketers may use social media to discover more about the demographic, geographic, and personal characteristics of their audience. Because of this, businesses can tailor their message and content to increase engagement.

C. Social technique

Each marketing campaign or activity should have a predetermined plan in place. Organizations must decide the program's objectives, the distribution methods, and the kinds of material that will be employed. These are a few instances:

Set objectives. Social media marketing objectives have to be tightly related to those of the company and other marketing initiatives. Increasing brand recognition, generating website traffic and leads, and raising income are some objectives that firms may use to gauge their performance.

A few social networking sites. There are several social media channels, but it is not practical for companies to utilise them all. Companies must understand their target market in order to choose the platform(s) that best serve that group.

Combination of content. Each social media site has its own own style for disseminating material, including links, images, videos, and direct messages. So, marketers must determine which material their target consumer is most likely to interact with.

D. Organization and publication

It's time to start publishing after a plan has been established. A fresh blog post, information about a future event, or a new product video might all be used to achieve this. Yet maintaining consistency is essential for a successful SMM campaign.

Organizations should update their page often in order to grow their audience. The audience will continue to visit your site if you continuously provide relevant information. Social media posts from businesses should complement other marketing campaigns. Marketers may plan their posts to go live at the right moment using tools like Hootsuite, HubSpot, and Sprout Social.

E. Attention and participation

Companies who use social media to engage customers might experience an increase in talks about their goods and brand. Users will leave comments on and share content, mention the brand in their own postings, and even start chatting through the instant messaging features. Since there are alerts in place to inform social media administrators, these interactions are excellent. This makes it possible for them to provide excellent customer service, which enhances the client experience.

In social media, users may talk about a corporation, its name, products, or services without mentioning them specifically or addressing them by name. Brandwatch, NetBase Quid, and Sprinklr are just a few of the social media listening tools available to remain informed of the discussion. Marketers may get notifications when their firm is referenced using free solutions like Google Alerts.

F. Reporting and analytics

Continuous performance monitoring is a good idea when more material is released and the audience grows. Every marketing program's data and analytics outputs are essential to its success. This data may be used by a marketing team to plan out future initiatives more intelligently and capitalize on what works. While each social media site has its own analytics data, there are other applications that may gather information from several channels and place it in one place. Marketers may use this to assess the general success and failure of their advertising initiatives.

G. Promotion

With the exception of resource time and specialized equipment, a large portion of social media marketing is free. A wonderful approach to accomplish marketing objectives is by creating an audience and sharing content on free social media platforms, but as the programmer expands, so does the expense. For businesses, paid marketing features may be quite beneficial. Companies may target audiences with their ads based on a variety of facts, such as habits, retargeting, and demographic data. While there are solutions to assist with managing social media marketing at scale, starting with the native advertisements feature is sufficient to promote posts, gather leads, and guarantee messages reach the intended demographic.

H. Social media marketing has both pros and cons.

Every organization's sales and marketing strategy now includes social media marketing. More people may access material and communications via this extra channel than through a personal contact list could ever hope to reach. Although launching a social media marketing campaign has benefits, there are drawbacks as well.

I. Social media marketing benefits

Broaden your audience: Almost 3.6 billion people utilize social media on a global scale. The visibility of a brand may be greatly increased by only one post share.

increased client satisfaction: In social media, businesses engage with their clients as well as advertise to them. One-on-one interactions and customer service may both benefit from this.

instrument that is economical: The expense of running a social media operation might be little when done properly.

Once the people, programmer, and expertise are in place, marketing teams find it to be simple to utilize with little overhead.

Boost traffic to the website: A brand website may get a lot of attention from social media updates. Users may be persuaded to click through and interact with a company more by promoting blog material, landing page deals, and other things.

Improve your insights: Each social media network has analytics and reporting tools that may be used to learn more about page followers, the material they are interested in, and how they interact with brands.

J. Social media marketing's drawbacks

Procedure that takes a long time. Social media initiatives may take a lot of work to make sure they are successful. Also, marketing teams must continuously add fresh material to the schedule and reply to requests. Due to this, it may be challenging for small marketing teams to use SMM to its maximum potential.

Need competent resources. To manage a social media marketing campaign, you need the proper individual or group of people. Entry-level personnel do not benefit social media marketing campaigns. Instead, effective social media marketers are crucial. The ROI will have to wait. A long-term investment, SMM. Social media platforms provide a significant return on investment, but not right away. An SMM program's success isn't based on just one piece of content, but rather a number of them spread out across time.

market research conducted by rivals. Social media posting is done in a public space where everyone can view it, including the rivalry. Reputational risk exists for brands. SMM might expose a brand to negative publicity and public humiliation. As more and more consumers turn to social media to express their annoyances, negative reviews may be abundant. Moreover, since the platforms are public, whatever a firm says or does will be viewed and discussed. Brands need to respond more quickly to lessen this danger.

III. CONCLUSION

The importance of social media has grown in both communication and marketing plans. The new consumer generations have extremely high brand awareness, they participate in global marketplaces through the internet, and their opinions may have a significant impact on individuals across the globe. So, it is crucial for businesses to provide high-quality content and precisely understand the user behavioral dynamics on the social network while managing fan pages and brands' Facebook presence in order to achieve the highest potential user engagement. You may interact with other companies in your field using social media in addition to connecting with your prospects. Follow the accounts of your business partners and other people in your field, and comment on their postings. You may then utilize these encounters to network and establish connections.

REFERENCES

[1] A. Puspaningrum, “Social Media Marketing and Brand Loyalty: The Role of Brand Trust,” J. Asian Financ. Econ. Bus., 2020, doi: 10.13106/JAFEB.2020.VOL7.NO12. 951.

[2] B. Wawrowski and I. Otola, “Social media marketing in creative industries: How to use social media marketing to promote computer games?,” Inf., 2020, doi: 10.3390/INFO11050242.

[3] R. S. Ebrahim, “The Role of Trust in Understanding the Impact of Social Media Marketing on Brand Equity and Brand Loyalty,” J. Relatsh. Mark., 2020, doi: 10.1080/15332667.2019.1705742.

[4] K. Mukherjee, “Social media marketing and customers’ passion for brands,” Mark. Intell. Plan., 2020, doi: 10.1108/MIP-10-2018-0440.

[5] J. Jacobson, A. Gruzd, and Á. Hernández-García, “Social media marketing: Who is watching the watchers?,” J. Retail. Consum. Serv., 2020, doi: 10.1016/j.jretconser.2019. 03.001.

[6] T. Puangmaha, T. Taiphapoon, P. Vadhanasindhu, and S. Sinthupinyo, “Innovative social media marketing communication application for Thai hotel SMEs,” Int. J. Interact. Mob. Technol., 2020, doi: 10.3991/ijim.v14i16.15199.

[7] Y. Sun and S. Wang, “Understanding consumers’ intentions to purchase green products in the social media marketing context,” Asia Pacific J. Mark. Logist., 2020, doi: 10.1108/APJML-03-2019-0178.

[8] P. M. Aji, V. Nadhila, and L. Sanny, “Effect of social media marketing on instagram towards purchase intention: Evidence from Indonesia’s ready-to-drink tea industry,” Int. J. Data Netw. Sci., 2020, doi: 10.5267/j.ijdns.2020.3.002.

[9] S. Chatterjee and A. Kumar Kar, “Why do small and medium enterprises use social media marketing and what is the impact: Empirical insights from India,” Int. J. Inf. Manage., 2020, doi: 10.1016/j.ijinfomgt.2020.102103.

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Reasons for the Importance of Social Media Marketing

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Abstract— Building a brand is simple and successful thanks to social media. Compared to conventional media, social media has the advantage of making your brand more accessible to consumers quicker. Moreover, even when people aren't considering your brand or product, it captures their attention. Social media comes in a variety of formats, such as blogs, microblogs, wikis, social networking sites, picture and video sharing platforms, instant messaging, podcasts, widgets, virtual worlds, and more.

Index Terms— Advertising, Business, Marketing, Social Media, Server.

I. INTRODUCTION

In your sector, your product could be the greatest. That may be the best item ever created, and it would affect someone's life. It does not guarantee that anyone will notice your work, however. You may not sell a lot of your goods or services. Without effective promotion, nobody could be aware of what you have to offer. You must advertise your business vigorously in order to get people to notice your goods or services. One of the most challenging aspects of owning a company is marketing. More than just informing folks what you have to offer will be involved in marketing your company. In the first place, you should let them know that you are there. It all comes down to letting people know that you have something worthwhile to offer and that you're open for business [1],[2].

You want them to understand what your offering is and what makes it unique. Also, explain to individuals what makes your service valuable. Most significantly, you must differentiate yourself from the competition. The audience must understand how and why your products or services are superior to those of competitors. Nevertheless, avoid self-promotion on any platform. To advertise your company, you must go online. Due to the declining popularity of newspapers and other print media, traditional marketing channels are beginning to disappear. It won't be long until consumers solely conduct their searches for products they are interested in online [3],[4].

Online company promotion is not always simple. You need to get out there and demonstrate to others your value. It all comes down to letting people know what you do and what you have to offer. Getting noticed online might be difficult. Even if you have the most brilliant company plan ever, it won't matter if you can't effectively advertise your goods. The issue with the current economy is that a lot of companies provide the same services that you provide. They could have more people visiting their websites than you do. Others are promoting themselves considerably more than you are since they started earlier than they did [5],[6].

You must learn how to establish an online presence whether you want to operate a physical store or an online retail business. Using social media for your advantage is one strategy. Never before have so many people used social media. Social media allows users to communicate online with one another.

In some of the most unusual digital spaces in the world, they can discuss anything. Even more significant, individuals are discussing the goods and services they provide with one another. Social media has become a well-liked promotional tool, maybe even more effective than more conventional media [7],[8].

You must use social media marketing for your benefit. It aids in highlighting your company in a unique way. Social media marketing has become crucial for a variety of reasons. With time, social media has taken over in the internet space. People and companies are using a wide range of websites nowadays to emphasize what they have to offer.

Individuals use mobile applications on their tablets and smartphones in addition to desktops to access social networking sites. People may access the internet through devices like online-connected smart televisions and similar-connected video gaming consoles. The amount of social media services that are accessible on these devices has also been growing [9].

Moreover, those social media networks that run their own unique applications make it simple to access other people's devices. People are finding new methods to utilise social media everywhere they go, whether it involves a standard computer or something smaller. People can communicate and locate items more easily as a result while on the move. You may make sure you are on many websites via your marketing efforts, which will make it easier for people to find you.

A. A Variety of Layout

Social media marketing provides a wide range of locations that cater to certain demographics. There are no two social networking sites that are similar. For instance, younger generations are increasingly using Instagram. They

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use social media platforms to post pictures and gifs. Professionals, especially those who may be attempting to advertise comprehensive business programmes or work-related pursuits, find LinkedIn to be appealing.

Exploring what makes each social media platform unique is worthwhile. Twitter facilitates the sharing of communications in the fewest feasible characters, whereas Pinterest explores regional companies via distinctive online stores. It's worthwhile to explore the several fantastic social networking platforms available online.

Depending on your requirements, what you have to offer, and who you want to reach out to, there are many social media platforms where you may promote yourself. For example, financial planning services are not acceptable for Pinterest but are perfect for arts and crafts supplies. For every one of these social media platforms, you have to use a distinct approach. Depending on how well you can communicate and reach individuals, these strategies differ. Details on marketing via each of these sites are included in this guide.

B. A Favorite Method of Searching

Social media has the wonderful benefit of being a well-liked information source. Just visit a social networking website, and a search engine will undoubtedly be visible. This function will assist you in finding various companies associated with certain keywords across the website.

You may locate information on Facebook profiles that is relevant to your search when you utilise the Facebook search engine. Facebook uses this to match your search terms with relevant content. Everything you need is already on the website; you don't even need to leave. In other words, individuals are using the search features on social networking sites instead of Google and other search engines. People are aware that social media makes it simpler to communicate with others. This brings up the following idea.

Social media now includes a significant amount of localization. The social networking platform often displays local results first for users' searches. In other words, the most significant outcomes are located close to the user's position. This is equivalent to the results from a typical search engine. Marketers on social media may even design their ads to focus on a certain demographic in a particular location.

II. DISCUSSION

In today's internet environment, interactivity is a crucial component. Individuals seek for internet conversation. This covers companies that could advertise a variety of products. You will do more than simply advertise your services when you use social media websites. You'll have the chance to converse with others. People may be questioned or have their inquiries answered. In social media, people adore when users communicate with them. Consider all the fast-food restaurants with their own Twitter profiles. When customers tweet about dishes they like or to promote a promotion, these businesses often reply. These fast food restaurants like connecting since they are aware that doing so increases their appeal and favorability.

Such companies discuss what is occurring, what makes them unique, and even respond to queries, whether it is Burger King talking about a new breakfast menu or Arby's developing something new. Being honest with your consumers is crucial at all times. You need to know what customers want to operate a successful firm. Also, you ought to respond to their queries, grievances, and praises. Social media marketing gives you the chance to find out what customers want and are most interested in.

A. Constant Evolution

New social media platforms are often added, and their use is constantly expanding. These are locations that provide services to certain demographics. As an example, Major League Baseball created its Infield Chatter social media platform to enable baseball fans to discuss the sport, their preferred clubs, and players. Individuals may talk about the sport's history, the 19 hottest stars, up-and-coming players, etc. One example of how social media is evolving is this. There will be social media platforms in the future that are dedicated to almost anything. There may be social media platforms devoted to folks who like arts and crafts or even ones that concentrate on certain video game systems. Despite the situation, the social media industry will continue to develop and evolve over time.

The modern social media landscape is remarkable. This article will show you how simple it is to promote your services to others. There are several possibilities, both free and commercial, for social networking sites to use for marketing purposes. How simple it is to execute a great campaign on social media may surprise you. For your company, a strong social media marketing strategy will mean the world. Examine what you are doing to make a campaign successful and stand out if you want social media marketing to be profitable. These are some of the greatest methods for developing a successful campaign.

B. Display Your Humanity

It may be difficult to display your human side while attempting to advertise your company online, which is one of the biggest issues. Plain websites may not always be of interest to visitors. People may believe that a person with a standard website is compiling a catalogue of goods or services without being unique. It is up to you to demonstrate to others your human side. Through social media, you may let others know what you think and how you feel while also showing them that you care. You may explain in detail why your product is unique and how your customers can profit from your marketing efforts.

People will start to follow you on social media if you show your human side. People will adore you for it and

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want to hear what you have to say. Most significantly, it demonstrates that you are aware of people's needs. After all, companies cannot afford to be seen as huge, smoke-filled factories that just care about their bottom line. Businesses that put customers first will always be well-liked and profitable, often. If enough effort is put into the mix, a company may sometimes make more money than the big men.

C. Better Recognizability

It's critical that consumers recognise your brand. Your company's image, the products you offer, and your company's beliefs are all reflected in your brand. When people can recognise your brand more easily, your company will prosper. Your brand will become well-known and distinctive if you use the proper social media marketing techniques. It becomes simpler for people to recognise your brand and all you stand for as you become more active on social media. By doing this, you are communicating your message and demonstrating your alertness to others.

For starters, your social media page will feature information like your company's name or logo. After that, you will publish items on your page that highlight the unique and appealing aspects of your work. Even fresh developments in your company might be discussed as they happen. You have complete control over your online behaviour. Consumers will be more interested in your offers if they routinely hear from you and see your brand on various social media platforms. They'll take notice that you have significant things to say. Most significantly, folks will comprehend what you are presenting to them clearly. They will be aware of the essence of your brand and its core beliefs. Your success depends on your ability to get recognition on social media.

D. Increase Brand Loyalty

Your brand loyalty is enhanced through social media marketing, which is yet another fantastic benefit. Connecting with people on social media is crucial if you want your audience to take notice of what you have to offer. Making contact with them is essential if you want to get their support for your endeavours. All firm must have loyal customers in order to succeed. You need a solid clientele that will remain with you. Growing and expanding your company is made easier by social media marketing.

Social media followers will pay close attention to anything you say. Every post you make will be read by your followers, who will also engage with you in various ways. They are curious to hear and see what you have to say. They will specifically desire to use your services or purchase goods from you. What's more, social media gives you access to a captive audience that is eager to learn about all you have to offer online. More individuals can learn about what you do and what makes your company reputable. By publishing your social media messaging, you keep your current consumer base engaged.

Anybody who follows you on social media is fully aware of everything you do. Their feeds will get all of your changes, keeping them up to speed on anything you provide. Even if you are just dealing with clients who are already fans of your work, advertising what you provide is essential to your success. More than simply taking money from those folks is involved. Also, it's to build trusting connections with people who will listen to your words and trust you.

E. More conversions

Although social media makes it simple for you to contact current consumers, you need to go above and beyond that. You must also attract new customers. Make a statement and convince others that your profession is worthwhile and deserving of their confidence. It might be difficult to turn strangers you meet online into paying clients. It might be difficult to persuade individuals to utilize what you provide and why doing so is beneficial. When you first start out, nobody will take you seriously. Yet, you can easily and swiftly convert consumers through social media marketing.

People will want to listen to you when you publish things online through social media platforms and check out what you have to offer. People will engage with you by seeing your films, reading your blog entries, and other activities. By presenting in the appropriate locations, you must demonstrate to them what makes your company unique. The conversions you need will be simpler to get if you humanize your company. Consumers like seeing the feelings that a company wishes to communicate. Another advantage is that talking to individuals and responding to their inquiries can help you spread the news to additional people.

Don't forget to settle any conflicts or other troubles that individuals may be having. Using social media is crucial since it allows you to access more screens. Attract More Visitors to Your Website or Retail Shop By Understanding It, You Will Be Successful In Converting Individuals Into New Customers That You Can Trust. Your social media platforms are just a tiny portion of the internet marketing tools at your disposal. Getting consumers to visit your main website or any physical stores you operate is even more crucial. It's crucial to market oneself on social media. You may always use social media posts to provide links to your website. Your website may also be accessible via the link on your profile name or emblem. You might also add directions on how to get to any actual locations you may have.

Only when they come across anything fascinating will people click on the links to your social media accounts. They could then be sent to your website or the main profile page for your social media account as a result. A second link to your website might be included on that account page. When people realize that what you have to offer is interesting and worthwhile to them, they are more likely to click the link to visit your website. People want to know that you respect and care about their ideals and objectives. When it comes to real enterprises, people will be interested in what you have to offer and want to know where your shop is.

Reduce your marketing expenses: You will get more out of your marketing efforts if you promote on social media platforms, which is a benefit. It might be difficult to advertise your company since it is expensive to print ads, lease space in publications, or purchase online advertising.

Social networking will help you stay away from all of those problems. Using a free to use website, you will gain online page promotion. You may use social media to send messages online for free using your own account. These messages all include links to your company's website. This aspect of marketing is especially helpful since your work tends to be more engaging and human. If you're wise, you won't spend any money on advertising. Others will share, forward, or retweet the intelligent words you write. A link to your social network profile and your name will always be included in these communications. Because others are essentially marketing your work for you, this makes it simpler for you to do so.

Your success depends on individuals forwarded your messages. Even the simplest concepts have the potential to become viral within a few hours. You may definitely find articles about a firm or celebrity being the next big thing by just browsing the internet at this time. If you know how to make the marketing efforts stand out successfully, it will make all the difference in the world. Several websites do provide options for sponsored advertising. This is when a search using certain keywords may give you preferential treatment. It is optional, but you can always spend a little money on this. Thankfully, this article will show you where to find businesses that provide paid marketing solutions and help for setting up and managing a budget-friendly campaign.

F. Use a search engine.

If your website has more high-quality links leading to and from it, you will get more visitors from search engines. Assuming the connections are distinctive and relevant to your primary website. An essential component of operating a company is search engine optimization (SEO). You may connect up to several beneficial keywords with this. Work with the appropriate keywords that are both popular and relevant to your company while utilizing a search engine. It's also intriguing to note that owing to your social media platforms, your website will show up many times on a search engine. A Facebook channel, Instagram or YouTube channel, for example, will show up independently from your main website. You may repeat this as frequently as you want, but you need to understand how each arrangement works.

Also, since appropriate connections to social media sites are supplied, your main website will show up on search engines. Companies with several social media profiles are more likely than other organisations to show up on Google and other search engines. These establishments are seen as being more proactive and attentive to prospective clients. Furthermore crucial are the connections between your primary website and your social media platforms. Your main website will be simpler to browse and utilize if you have more of these connections. Since it increases your presence on a reputable search engine, this is crucial to your overall success. The advantages of social media marketing are significant and deserving of attention. With this information in mind, it's crucial to consider the potential outcomes of your campaign. We will examine numerous social media platforms in this article to help you get a sense of how to market your company.

III. CONCLUSION

Making new acquaintances or finding groups of like-minded individuals may be simple with the help of social media. Discovering a tight-knit group of people may give us a sense of worth and acceptance. Social media makes it simple to maintain ties with distant relatives and acquaintances. In addition to communicating with your prospects, you can use social media to exchange ideas with other businesses in your industry. Follow the accounts of other professionals in your industry and your business partners, and leave comments on their posts. You may use these meetings to network and build connections later on.

REFERENCES

[1] F. Li, J. Larimo, and L. C. Leonidou, “Social media marketing strategy: definition, conceptualization, taxonomy, validation, and future agenda,” J. Acad. Mark. Sci., 2021, doi: 10.1007/s11747-020-00733-3.

[2] A. Wibowo, S. C. Chen, U. Wiangin, Y. Ma, and A. Ruangkanjanases, “Customer behavior as an outcome of social media marketing: The role of social media marketing activity and customer experience,” Sustain., 2021, doi: 10.3390/su13010189.

[3] Y. K. Dwivedi et al., “Setting the future of digital and social media marketing research: Perspectives and research propositions,” Int. J. Inf. Manage., 2021, doi: 10.1016/j.ijinfomgt.2020.102168.

[4] C. Savitri, R. Hurriyati, L. A. Wibowo, and H. Hendrayati, “The role of social media marketing and brand image on smartphone purchase intention,” Int. J. Data Netw. Sci., 2021, doi: 10.5267/J.IJDNS.2021.9.009.

[5] T. S. Patma, L. W. Wardana, A. Wibowo, B. S. Narmaditya, and F. Akbarina, “The impact of social media marketing for Indonesian SMEs sustainability: Lesson from Covid-19 pandemic,” Cogent Bus. Manag., 2021, doi: 10.1080/23311975.2021.1953679.

[6] A. N. Mason, M. Brown, K. Mason, and J. Narcum, “Pandemic effects on social media marketing behaviors in India,” Cogent Bus. Manag., 2021, doi: 10.1080/23311975.2021.1943243.

[7] M. Jami Pour, M. Hosseinzadeh, and H. Amoozad Mahdiraji, “Exploring and evaluating success factors of social media marketing strategy: a multi-dimensional-multi-criteria framework,” Foresight, 2021, doi: 10.1108/FS-01-2021-0005.

[8] A. Garg and J. Kumar, “Social media marketing influence on Boutique Hotel customers’ purchase intention in Malaysia,” Tourism and Management Studies. 2021. doi: 10.18089/tms.2021.170304.

[9] A. N. Mason, J. Narcum, and K. Mason, "Social media marketing gains importance after Covid-19," Cogent Bus. Manag., 2021, doi: 10.1080/23311975.2020.1870797.

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A User's View on the Dark Side of Social Media Marketing

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Abstract*— A broad variety of materials, such as upsetting or violent material, sexual, or obscene material, might be considered annoying. Concerns about privacy include any risks to individual privacy associated with the collection, use, or exchange of personal data by third parties. Yet several studies have shown a substantial correlation between using social media excessively and a higher risk of melancholy, anxiety, isolation, self-harm, and even suicide ideation. Players in the social media marketing ecosystem covered in the chapter and a User's Perspective on the Dark Side of the Marketing of social media.

Index Terms*— Adverting, Business, Company, Consumer, Marketing.

I. INTRODUCTION

Initiatives for digital transformation are requiring businesses to think of new strategies for promoting their goods and services [1],[2]. The relatively new practice of social media marketing, which has been expedited by Web 2.0 broadcasting, has significant promise for expanding social media audiences and generating interaction in a very short amount of time with little costs. By 2020, it is predicted that there will be 2.95 billion active social media users. According to a recent poll, the two main goals of social media marketing communication are to build brand awareness and drive visitors to the organization's website and to create leads for product and service sales [3],[4]. There are numerous unresolved ambiguities about the anticipated returns, even though many small and major businesses are investing significantly in social media projects with the aim of increasing their revenues among others have examined social media marketing and its implications from a variety of perspectives, including service science, information systems, psychology, and law. Despite this, social media marketing is still a young research field with many open questions. By filling up certain important gaps, the present research seeks to increase our knowledge of the topic [5],[6].

The involvement, openness, dialogue, community, and connection of its users are the defining characteristics of the social media ecosystem, which has a variety of benefits. As a result, the majority of scholarly study and popular media on the topic concentrates on the advantages or positive aspects of social media marketing. Yet, social media marketing has a number of planned and unexpected limitations that comprise the dark side and have more significant implications for many stakeholder groups than any other phenomena mediated by technology. This digital ecosystem's peaceful coevolution of professional and public good might be hampered by such restrictions and/or immoral impacts of social media marketing, therefore they need further investigation. These restrictions are referred to as the shadow effect of social media marketing in this research. We are unable to fully take use of the affordances provided by social media ecosystems because of such shadow effects. Therefore studying social media's negative aspects will advance both research and practice [7],[8].

The concept of social media marketing is ever-evolving. Its dynamic nature really considers the relational interactions between the players, the technology, and the surrounding environmental elements. In the context of a sociotechnical system, the interaction of all three of these factors influences how affordances and restrictions are perceived. Researchers haven't made many recent efforts to explore the harmful consequences in marketing. These studies often cover the topic in broad strokes and tend to emphasize an organizational viewpoint over a user or consumer perspective. So, it is anticipated that examining the restrictions that can make it difficult to take use of the opportunities presented by social media marketing will add to this body of knowledge [9].

In this article, we first conduct a thorough literature analysis to examine the most recent studies on the negative aspects of social media marketing from the standpoint of technical limitations for social media users. Secondly, we separate the two types of limitations that are relevant to this situation. We next emphasize the need of having a meaningful conversation about the issue and outline the two documented negative consequences of social media marketing. Lastly, we emphasize how this work will advance knowledge and practice in this field.

To find significant biases and research gaps, we conducted a comprehensive literature assessment of the topic in accordance with prior recommendations. In addition to synthesizing the existing research on the topic, we also aimed to suggest new lines of inquiry. No limitations on the year and kind of publishing were put in place since social media is a cross-disciplinary field, allowing for a thorough search. The EBSCOhost interface, a multirotor search

engine that includes the databases of 116 providers encompassing the domains of management, social science, humanities, and pure sciences, was used to perform the search in digital libraries. EH was used to get rid of duplicate content as well. Popular databases including EBSCOhost, JSTOR, Science Direct, PsycINFO, ERIC, and Academic OneFile were among those covered by EH.

As a starting point, the keywords social media and marketing were selected. While the negative aspects of social media use in general have gotten some attention in the literature, we opted to restrict the research to publications that dealt with marketing in order to stay within the selected topic. There were 2194 papers found as a result of the search, of which 2053 were authored in English. By selecting articles that specifically addressed social media marketing as their main topic, we further honed this collection. Cross-citations and public search engine cross-searches helped identify a few more possible publications that were missed by the first online library search. We used these research articles as a springboard to create a conceptual framework of social media marketing limits from the user perspective. Notwithstanding the limitations of our search approach, we conclude that the present literature on social media marketing is biased towards the positive aspects of this phenomena and that little study has looked deeply into the negative aspects from a user, consumer, or customer perspective.

II. DISCUSSION

A. Participants in the ecosystem of social media marketing

In addition to other discoveries, a thorough assessment of the relevant literature assisted in identifying a number of important players that are interconnected inside the sociotechnical system. The user viewpoint will be used to evaluate the phenomena holistically using the stakeholder lens. An image of the performers based on the evaluation. In order to provide opportunities for companies and people, the top category refers to regulatory and public policy agencies, including governments that work to implement social media laws. Trade regulatory organisations that oversee antispam and antitrust offences and protect consumer interests are also actors. Additionally, larger organisations like the European Trade Commission, which issues rules and guidelines for trade and privacy protection, as well as other supranational organisations like the United Nations and regulatory bodies tasked with setting technological standards, are included in the scope of this review. These regulators' goal is to make sure that the public and private interests are appropriately balanced in social media. We categories the negative aspects of social media marketing into two major typologies of restrictions based on the findings of the systematic literature study, which are unique in terms of the causes of each. Most of the restrictions for various stakeholder groups are caused by the two main kinds of causes—structural and behavioural. The pertinent facts and highlights the salient features of the two outlined typologies.

Intended Restrictions Constraints that can be linked to a specific source or person in the social media marketing ecosystem are those that are intended for our goal. In other words, it is easy to determine what caused the symptoms. So, these restrictions might be lessened in order to encourage the harmonious coexistence of private and public goods in the marketplace. Cause Identified: Lack of Transparency and Legitimacy User ambiguity about how to handle the lack of transparency and legitimacy concerns in social media marketing is one of the elements contributing to the perception of intended limits identified from the literature research. Users, both current and future consumers, are often exposed to various adverts and promotional efforts, however they could be skeptical about the veracity of the information source and the information shared on social media. Social media marketing often uses peer- or user-produced content as a primary marketing tactic.

Some users heedlessly follow the crowd and go for the favored behaviour supported by the organisations they identify with. This strategy differs from that of a standard "rational" customer and might be damaging to the user. Such ill-informed decision-making techniques result in incorrect purchases, harming certain users personally and, in turn, potentially harming businesses over time. Unlawful and dangerous marketing was identified as the first symptom. As was said above, there are instances when the illegitimacy of social media promotional messaging results in possible health risks if the goods or services were obtained from unrestrained rogue marketers. According to Mackey and Liang, some pharmaceutical firms sold out-of-date medications and/or medications for which a prescription was not necessary on social media platforms including Facebook, Myspace, and Twitter. The research conducted between 2012 and 2014 shows that these shady vendors have been luring thousands of unwary individuals from throughout the world. By taking advantage of the absence of entrance requirements and the potential reach of such marketing platforms and activities, the study emphasises the necessity to control illegal pharmaceutical enterprises that offer potentially hazardous medications to social media users.

Legal studies have brought up the important matter of keeping an eye on the veracity of user-generated information since it may have negative impacts that are felt far and wide. In the contemporary digital era, finding answers to these fundamental concerns is extremely difficult for policy makers. Cyberturfing has been identified as Symptom 2 Cyberturfing is a kind of astroturfing that uses technology as a medium. It serves as a tool for managing reputation and gathering market knowledge. "Artificial endorsement of a product, service, or political stance, to

create the illusion of a 'grassroots' movement," according to Jacobs, is what is meant by cyberturfing . The viral and anonymous nature of communication via social media platforms makes it a common organisational malpractice.

The purpose of such a communication is to provide the impression that the information is coming from grassroots supporters, while in fact, such false support movements of user-generated material are under the control of the sponsoring business. Green marketing is another name for these unethical tactics. Well-known businesses have perpe trated such misleading techniques to alter public opinion or to slander their competitors, utilizing a smear campaign. According to certain research, the number of service sector employees who participate in such behaviour, which are illegal in many nations, is increasing. It was reported in the news that Samsung had to pay a massive punishment of 350 million USD to Taiwan's trade regulatory agency for having bribed individuals to post nasty evaluations about HTC, a competitor mobile phone maker, on social media platforms. A few reported instances of such cyber turfing efforts made by businesses with financial gain are listed by Goldschein . One of Walmart's workers is accused of fabricating a YouTube video upload in order to get attention.

Also, it was claimed that Walmart created the fictitious blog Our Community. Our Option to generate buzz about fresh shop openings. In a different instance attempted to use cyberturfing tactics to launch an information revolution against Google on the London Tube. Several of these ads were created to market vaporware in relation to a brand-new item or service. Symptom 3: Slogging, crowd-turfing, and cyborgs in the social media era we live in today, there is mounting evidence of automated, self-tweeting accounts that interact with organic accounts directly in an effort to manipulate people. These automatic manipulations may be misunderstood by customers as genuine electronic word-of-mouth exchanges.

These promotional messages are produced by cyborgs, which are human-assisted computer-bot accounts. In 2013–2015, data mining research of tweets on e-cigarettes was conducted on the Twitter platform. The research demonstrated the expansion of cyberturfing utilizing cyborgs as a vaporware marketing method, and this has important social and regulatory ramifications. The research addressed the issue of young people being addicted to nicotine because of such methods as a new medical phenomenon that is hazardous and scientifically unfounded. The report also emphasises the need for regulation of vaporware marketing techniques in order to safeguard public health and safety. The second interesting trend is slogging, which combines spamming with cyberturfing, or flogging, which is cyberturfing done via a blog. A Sony executive who created a bogus blog called All I Want for Christmas Is a PSP in an effort to boost PlayStation Portable sales was one of the first suspected incidents of flogging that was mentioned in the popular news. The site was eventually taken down. The marketing sector forbids any of these tactics. Users heavily depend on such fake peer-to-peer recommendations and information since they are unaware of the dangers of such actions. Crowdturfing is the word Wang and his colleagues used to describe the process in which a business enlists people who have been paid to launch fraudulent campaigns that often violate fair practice social media policies.

Finding out more about this supposedly untraceable occurrence hasn't attracted many academics' attention. According to a recent news item, Amazon sued 1114 people in 2015 for posting phone reviews in an effort to verify that they were honest and trustworthy. Fact-checking websites and authenticity-tracking technology solutions are becoming more necessary since the present security measures do not account for assaults by people. To maintain Tran’s parity and validity in the social media ecosystem, more focus has to be placed on technologies and rules that may calm worries about faked computer-mediated and human-perpetrated material. Educating social A. SHIRISH 71 media users on such deceptive methods and offering a mechanism of redress for those harmed by such activities is the key to establishing some order in this fairly loud market environment.

Unexpected Restrictions For our purposes, unintended restrictions are those that can't be traced to a specific source or player in the social media marketing ecosystem, may be connected to several elements of the ecosystem, and have unique features. These limitations may be seen as the knock-on consequences of social media marketing. Identification of the Behavioral Cause: Users' Developing Negative Affect, Cognition, and Conduct Our thorough analysis of the literature revealed that social media marketing's effects on users' emotive, cognitive, and behavioural consequences are what might cause the feeling of unwanted limitations. These behavioural issues may be exclusive to a person or a group of people, but they also may have wider social repercussions that need to be addressed. The user groups included in this category include those that are naturally weak and defenseless as well as those who voluntarily work with marketers for their own benefit. Users who are unaware that they are being targeted by other players in social media ecosystems make up a separate group of users.

According to the research study, social media marketing may increase users' propensity for hazardous conduct among those who are already weak. Users who already have weaknesses like alcoholism and gambling addiction had a history of engaging in hazardous, violent, or criminal activities. Social media marketing, which has quickly advanced in certain contentious areas like alcohol and tobacco, makes simple work of these susceptible individuals. Social media allows for widespread and customized marketing. Additionally, the prevalence of such tools makes it easier for marketers to reach and engage with vulnerable users, who frequently lack self-control in their

actions and are motivated by approval from virtual peers and are easily duped by concerns about their perceived social standing. The teenage population preferred photos of peers engaging in hazardous activities that had received more "likes" as compared to photos of nonpayers that had received less "likes" and were of a less interesting type. Users are known to have less cognitive control as a result of their thirst for alluring commercial messages supported by their peers, who are motivated by a need for immediate satisfaction in order to fit in with their peer groups. Due to their lowered self-control, there is a substantial danger that these users may engage in compulsive shopping, opening the door to more severe health conditions and addiction at a time.

Advertising that is divisive and taboo is symptom number two. The secret is to promote moral marketing tactics rather than depending on contentious advertising. It is well known that many businesses utilize promotional strategies that may cut through the available advertising clutter in an effort to capture even a small portion of users' attention. They leverage the idea of taboo to make marketing communications more sensitive to social media users. Previous studies have shown that taboo advertising and exposure to undesired unpleasant material may cause annoyance and negative cognition, which can have a domino effect on the bottom line of the company. Research has also shown that due to the widespread and omnipresent character of mobile social media users, the consequences of such contentious advertising are more noticeable. The best method to address social media marketing's behavioural influence on us may be via an integrated policy and regulatory shift.

Symptom 3: Informed Consent and User Personal Information Privacy Due to social media networks' rapid expansion and widespread usage by internet users, we feel that social media communication is one of the main forms of interpersonal contact in the modern world. A poll found that over 70% of American citizens had one or more social media accounts. The data driven marketplace is prospering under a system of misinformed consent that is perceived to be in accord with the rhizomatic character of such net communication models based on peer-to-peer concretion are said to be compatible with work.

Yet, the danger is in forgetting the fundamental idea of any data-driven study in the offline world, namely, the users' informed permission before a data gathering procedure. Social media market research may egregiously breach users' data privacy and even spatial privacy, which entails intrusions into one's psychological space or integrity. It is well known that social media platforms record the details of people's daily life. No one actor can be held liable for this since there is neither a legal nor a technological need for informed permission from those targeted in the many commercial data collection techniques made feasible by social media. Nevertheless, the ethical conundrum of how to effectively encourage the usage of social media for the benefit of social and economic interests poses everything of your social media activity, whether it's a public or private conversation, may be tracked. Location-based data is also provided to other parties through ION. Legally speaking, the definition of what constitutes sensitive personal information is not always precise. The need to protect privacy is implied by the possibility that cookies obtained through social media usage may be interpreted as personally identifying information. The privacy paradox is a significant issue for social media usage. Many users are unaware that they are the target of market research, and the structural design of social media networks benefits businesses or individuals who have the technological know-how to conduct such searches. As a result of our online interactions, a digital exhaust is produced, and this data might be utilized for study in the future. To yet, there is no consensus on how to control the many ways that data is collected without infringing on the users' right to privacy. In order to impose stronger protection for consumer privacy rights and personal data, the European Commission has suggested a comprehensive data protection rule. Companies will need to disclose explicit consent in order to operate in the European Union, especially in the digital space. The intended implementation date of this rule is May 2018. Notwithstanding structural efforts made to improve privacy protection and awareness by social media platform owners, social media users are still more accurately regarded as victims of privacy breaches.

IPR protections are another area where there is a lack of clarity and are often disregarded in popular literature. Users of social media may violate copyright, trademark, corporate trade secrets, or personal trade secrets by disseminating content that may be proprietary in nature, such as writings, music, films, photographs, or artwork. These infringements, often known as unknown infringements, may constitute an IPR violation. Many personnel and users have been charged with crimes for damaging companies' reputations. According to reports, a worker at a well-known pizza restaurant was charged with a crime for publishing a video prank that allegedly damaged the reputation of the firm. However, the marketing coproduction approach does not always make it clear how to safeguard the intellectual contributions made by social media users. Hence, a person may unwittingly violate the intellectual property rights of others or his legitimate intellectual property protection may be compromised. Recent research has made calls for protection ensuring a rule of law on social media platforms, but these calls have not yet been empirically supported. As a result, unexpected restrictions might harm social media users' personal and property rights while also impeding the development of social media marketing.

III. CONCLUSION

Social media platforms have exploded in popularity in recent years, used by both organizations and people for a

variety of purposes. Social media is now thought upon as an effective marketing device a thorough assessment of the literature on social media marketing indicated that the majority of studies discuss the advantages or the good things that social media have to offering. Because to its pervasiveness and ubiquity, social media may put limits on users in addition to offering affordances, which should be acknowledged. It's surprising that earlier study has been generally circumspect regarding the shadow or black side of the social media business. Using a thorough literature study as the foundation for this work, we create a framework and typology to help the dark side of the social media industry. Specifically, we categories the negative aspects of social media marketing into two categories: intentional and unintentional limitation. Using a rich discourse of literature, we construct and characterize the two forms of constrain we also discuss the need of systematically addressing these restrictions via rules, procedures, and legislation to prevent social media marketing's detrimental effects on various user groups.

REFERENCES

[1] F. Li, J. Larimo, and L. C. Leonidou, "Social media marketing strategy: definition, conceptualization, taxonomy, validation, and future agenda," J. Acad. Mark. Sci., 2021, doi: 10.1007/s11747-020-00733-3.

[2] A. Wibowo, S. C. Chen, U. Wiangin, Y. Ma, and A. Ruangkanjanases, "Customer behavior as an outcome of social media marketing: The role of social media marketing activity and customer experience," Sustain., 2021, doi: 10.3390/su13010189.

[3] Y. K. Dwivedi et al., "Setting the future of digital and social media marketing research: Perspectives and research propositions," Int. J. Inf. Manage., 2021, doi: 10.1016/j.ijinfomgt.2020.102168.

[4] C. Savitri, R. Hurriyati, L. A. Wibowo, and H. Hendrayati, "The role of social media marketing and brand image on smartphone purchase intention," Int. J. Data Netw. Sci., 2021, doi: 10.5267/J.IJDNS.2021.9.009.

[5] J. Syaifullah, M. Syaifudin, M. U. Sukendar, and J. Junaedi, "Social Media Marketing and Business Performance of MSMEs During the COVID-19 Pandemic," J. Asian Financ. Econ. Bus., 2021, doi: 10.13106/jafeb.2021.vol8.no2.0523.

[6] T. S. Patma, L. W. Wardana, A. Wibowo, B. S. Narmaditya, and F. Akbarina, "The impact of social media marketing for Indonesian SMEs sustainability: Lesson from Covid-19 pandemic," Cogent Bus. Manag., 2021, doi: 10.1080/23311975.2021. 1953679.

[7] S. I. Dubbelink, C. H. Soria, and E. Constantinides, "Social media marketing as a branding strategy in extraordinary times: Lessons from the covid-19 pandemic," Sustainability (Switzerland). 2021. doi: 10.3390/su131810310.

[8] K. Y. Koay, D. L. T. Ong, K. L. Khoo, and H. J. Yeoh, "Perceived social media marketing activities and consumer-based brand equity : Testing a moderated mediation model," Asia Pacific J. Mark. Logist., 2021, doi: 10.1108/APJML-07-2019-0453.

[9] A. Garg and J. Kumar, "Social media marketing influence on Boutique Hotel customers' purchase intention in Malaysia," Tourism and Management Studies. 2021. doi: 10.18089/tms.2021.170304.

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Build Social Business via Social Media Marketing

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Abstract— Many C-level and other corporate leaders with comparable responsibilities today have the burden of creating a social business, which is to say, a firm that is linked via purposefully collaborative procedures with both its customers and its staff. Business leadership is being tested by Web 2.0 not just in the marketplace but also on a variety of business fronts, including corporate reputation, attracting and keeping key workers, and developing new goods and services. The core ideas that define what makes a firm "social" are examined in this section.

Index Terms— Business, Customer, Social Business, Marketing, Management, Social Media.

INTRODUCTION

Understanding how your customers or stakeholders connect to your business and how to reshape your business to understand, accept, and innovate based on their involvement are the central concepts of social business, which is the application of social technologies as a formal component of business processes. Integrating your whole organization's operations—including customer service, marketing, the executive team, and more—is the goal of social business. It involves carrying out this action with the intention of fostering collaborative creativity and involvement at significant, quantifiable levels clearly and directly related to your business's goals [1],[2].

A. Social Companies Involve Customers

In the end, social business is about engaging your stakeholders and consumers in collaborative and participatory processes to build a company that is deeply linked to them. As a consequence, a social business may often adapt to market dynamics and economic prospects better than a traditionally structured and run company. Participation in social communities, forums for support or debate, or any other number of social applications and settings may result in this. Finding or developing a participation opportunity with customers, workers, or stakeholders inside a community or other comparable social applications is often the first step in the activities leading to the formation of a social company [3],[4].

It's crucial to remember that when social business practices are properly conceived of and put into action, everyone benefits. A consistent flow of eventually beneficial ideas occurs when stakeholders and consumers are actively involved in the creation and management of the organisations they are affiliated with. Regarding business comments, one of the major misunderstandings regarding social media and the Social Web is that it's all negative and that the participants are all whiners [5],[6].

According to a 2007 Zenith Optimedia survey, almost 2/3 of the 3 billion or so daily word-of-mouth conversations that take place throughout the globe contain or mention a product, brand, or piece of media. Positive remarks also much outnumbered negative ones. The Social Web most likely provides tremendous possibility for developing your company and enhancing it over time, unless your business plan is to produce bad comments—I can think of a few firms for whom that could genuinely be the case [7],[8].

Establishing a community or other social presence around or in which your brand fits seamlessly is the first step in creating a social company, whether via a casual Twitter presence, an active Facebook business page, or your own community created for vendors, partners, or clients. Engineers who use Element 14's catalogue have access to a community that promotes idea sharing, shared ratings, and cooperation on hardware solutions. Element 14 is an Indian supplier of electronic components. Now, a key element of Element 14's B2B go-to-market strategy is the community: More applications, more rapid information sharing among engineers, and a more solid relationship between Element 14 and its corporate clients are all influenced by the engineering community [9].

B. Develop with customer involvement in mind

Strong communities are best developed around the things that are truly important to the people of the community: interests, lifestyles, causes, and similar fundamentally linked needs. This is true regardless of who the community is designed to serve. This holds true regardless of whether the target market is primarily business-related or a community with a personal interest, a nonprofit, or a cause-related community.

In any event, the primary components of a social company must be things that will compel the community's members to connect naturally and, as a consequence, inspire them to ask others to join.

The unique set of difficulties experienced by small companies is the unifying factor in Dell's "Choose Your Own Way" campaign. If you've ever interacted with a small company owner, you are aware of their fervor for their work. By understanding and meeting the requirements of the small company owner—for instance, by promoting conversation about finances and investments in business

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hardware—Dell has discovered a highly efficient approach to tap into this via the principles of social business.

Similar to smaller communities, where particular interests foster deep connections, social business activities are best suited to address extremely specific client groups: Consider once again Dell and their "Digital Nomads" programmer, which is targeted at a certain group of Dell customers who live and die by the availability of an internet connection. Digital nomads are productive both inside and outside of the workplace, keeping in contact with friends and colleagues through social media from the closest WiFi-enabled coffee shop or hotel and updating them on work in progress. The mix of lifestyle and digital technologies, as well as the ability to stay connected in almost any circumstance, is one of the traits that "Digital Nomads" have in common. This is powered by Dell hardware, which takes advantage of the mobile working style of these mobile workers. It's crucial to note that communities like "Digital Nomads" and "Choose Your Own Way" are determined by the wants and wishes of the individuals who participate in them rather than by a corporate, consumer, or nonprofit motive—call this your point of view or need.

C. Passion Motivates Participation

It is essential to get people talking about something bigger than your company's name, product, or service if you want to successfully promote social behaviour among your clientele or stakeholder group as well as inside your company or organisation. Employees at Southwest Airlines are united in the service of the customer by a strong conviction that everyone should have the freedom to fly.

So much so that, when necessary or appropriate, the staff dons the personalities of "Freedom Fighters" and actively works to defend the "right to fl y" for its clients. As Freedom Fighters, they maintain the vibrant Southwest spirit: This instantly translates into the favourable discussions about this feature of Southwest Airlines that can be found on the Social Web. The type of compelling vision that unifies companies and clients and the kind of passion—for travel, discovery, or the capacity to go forward and take on new markets as a business executive—that drives Southwest is being a Freedom Fighter. It's the type of enthusiasm that may inspire a group of business travellers to get together.

DISCUSSION

The whole account of how Southwest Airlines created their illustrious service teams can be found in Roy Spence and Haley Rushing's book "It's Not What You Sell, It's What You Stand For," published by GSD&M. A company cannot expect to engage its consumers in ways that result in cooperation if it does not tap into their passions and areas of interest.

While community development was presented as an example in the earlier section, the following is the social business summary point: You can choose the finest social connections to make with your product, brand, or service by knowing the interests, lifestyles, and issues that are important to your consumers. Several otherwise well-intentioned attempts fail in this area: Building a community around a brand or product often fails because participation is predominantly driven by advertising spending and promotions instead of by natural interest created by and among the members themselves.

A. Looking for a Higher Calling

In other words, anchoring your endeavors in something bigger than your company, product, or service is the best approach to prevent falling into this trap: In a sense, appeal to a "higher calling," one that has been deliberately chosen to draw in the individuals you want to identify with and to provide a natural home or connection to your company, item, or service. The conventional business structure You produce it, inform your clients about it, and they purchase it . This works just fine as long as your product or service fulfils its promises quickly or not at all. It also helps if it is promoted in an environment where conventional media is effective and reaches the bulk of your target audience.

Traditional media is interruptible and has a large audience: As a result, a convenient route to attentive consumers and new markets is provided. The drawback is that conventional media is becoming more and more costly—TV advertising expenses have climbed by over 250 percent in the last ten years—and that it is growing more difficult to reach your whole audience. According to current estimates and measurements, it currently takes more than 100 to do what it took three locations to do in 1965. This fundamental strategy, which has governed business over the last fifty years.

B. Organizational Client

1.1.Standard Business

An evolving perspective on business and a shift away from a merely transactional understanding of the customer: When a consumer buys a product or service, enrols in your organisation, or otherwise responds to marketing communications, they may also choose to offer feedback later on, whether it be via a survey card, a CRM or other comparable system, or a listening programme that records and analyses conversations. The difference is that there is a feedback system. As a result, compliments may come your way and worries can be conveyed without escalating into angry outbursts, provided that appropriate action is taken to address them. Remember that engaging with consumers, whether via conventional ways or as of right now, on the Social Web, directly benefits from the chance to listen and comprehend in order to build a response.

The customer-business connection the concept of a higher calling is brought up. The higher calling serves as a point of connection between the company or organisation, clients,

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and other stakeholders, particularly in the context of social engagement with a business. Indeed, clever marketers have used this great approach in their conventional efforts as well: We linked the brand with the consumer at GSD&M | Idea City, where I worked with clients including the Air Force, Chili's, Land Rover, Walmart, and AARP. This shared value and purpose was something that was bigger than the brand itself and to which the brand and the customer concurrently aspired. This established a really strong connection that went beyond the traditional brand-consumer relationship. On the Social Web, an identical form of appeal to a shared goal or value that is bigger than the brand itself may be made.

This technique is advanced by social media. Passions, lifestyles, and causes—the higher calling that defines more significant social objects to which participants relate—are at the centre of social media by nature. This same bigger ideal must serve as the foundation for social media initiatives that connect customers to shared social spaces and activities that are focused on the brand, product, or service.

Higher Calling Business Customer

The Greater Call

Here is a practical illustration: Tupperware, and particularly Tupperware gatherings. A Tupperware party appeared to me to be nothing more than a dozen or so people coming together to spend a couple of hours laughing and chatting about plastic tubs since I had seen more than a few of them as a youngster. Apparently, I didn't understand it: Tupperware had tapped into the fundamental human need for sociability, and a Tupperware party gave the ideal opportunity to connect this need with its product line. Tupperware has developed a company that is as timeless and enduring as the products it sells thanks to a winning combination of great products that satisfy both the practical and human needs of its customers and their social needs .

Another illustration of how this greater calling and common purpose works is Pepsi's "The Juice" campaign. The campaign's concept demonstrates just how well social media programmes really function, as well as the astute companies that have the know-how to use this platform effectively. The Juice, a key component of the advertising platform for Pepsico's low-calorie Trop50 brand orange juice, was built on BlogHer. According to the notion of a greater purpose, BlogHer co-founder and CEO Elisa Camahort Page gave the following observation. The sponsoring company is not the campaign's focal point—the social motivation—for BlogHer and The Juice. That is really something bigger: The anchor is found in the shared desire of all women to discover methods to improve their health, balance, and knowledge of practical advice. Being both a sponsor and a supplier of Trop50, PepsiCo's value offer to its consumers and the greater BlogHer community easily fits inside this.

The Juice benefits from the organic alignment of brands, hobbies, lifestyles, passions, and causes as well as the particular tasks, inquiries, and topics that people are interested in learning more about. This successful social programme is driven by the queries they want answered, the memories they want to share, and the issues they want resolved.

C. $pend How to Be Socially Present

What encourages organic involvement and development in online social groups is the appeal to a greater calling—to a way of life, a passion, or a cause. The benefits include reduced recurring costs, increased "stickiness," involvement, and community advocacy. Considering the higher social object's prominent position, the following question arises: What drives social marketing platforms, groups, and websites that don't have a link to a cause, a passion, or a way of life like Pepsi's "The Juice"?

Spending is usually the solution. Not to discount the fantastic creative work that goes into marketing campaigns, but rather to point out that programmers that are spend-driven rather than purpose- or values-aligned will frequently lag in the organic growth that actually drives social media and the waves of activity that take place on the Social Web.

To understand why this is the case, contrast the basic social appeal of Facebook, Orkut, or other social networking sites, where participation is largely motivated by a desire to interact with other users of these networks, with the social appeal of the Old Spice Deodorant social media campaign shown in 3.4. People join them to network with others and to share stories about the businesses they adore, among many other reasons.

Excellent social networks develop naturally when users discover a purpose for using them. Facebook and Orkut, for instance, both fulfil users' fundamental needs to connect with others and interact. Members eagerly urge their friends to join because they see the benefit of having "more members." These websites' fundamental appeal and clear purpose work together to promote organic development.

Participation and organic growth afterwards happen spontaneously, without the need for expensive promotions: Individuals will sign up for social networks like Facebook and Orkut and use these services independently, without compensation, for hours at a time.

In contrast, the Old Spice deodorant campaign is powered by awareness advertising and a constant stream of promotions and competitions, all of which come at a direct expense to Old Spice. This campaign also uses many of the same fundamental social features, such as a blog, send-to-friend, and similar. This need not be a bad thing. From a marketing standpoint, this campaign may be highly successful. Having said that, it is obvious that the social drive for the campaign will likely wane when the advertising backing for the Old Spice social site ceases. This is because the campaign lacks a true way of life, passion, or cause at its core. This is likely to be a more costly and less interesting option compared to the continued organic expansion of a passion- or lifestyle-driven community, and it is less likely

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to produce the kinds of collaborative behaviors that are connected to successful social business projects.

Customers collaborate with one another and with staff in two different settings when it comes to social businesses. In the latter, collaboration often only happens if your customers and staff have established enough trust and visibility to start a dialogue.

on potential improvements that may be made to the company. Make sure to distinguish between social media marketing campaigns like the Swaggerize campaign and social business initiatives that more closely tie customers' personal interests, passions, and lifestyles to the company and its goods and services, as was done with Pepsi's "The Juice," when planning your social business strategy. Marketing initiatives centred on social media, like Swaggered, may increase awareness, which has value. Yet, The Juice capitalizes on the inherent engagement and organic development of the BlogHer community by seamlessly integrating its product into this setting. It also has a strong value for the brand.

Create Your Social Presence a social business programmer does not concentrate on communities that are campaign-centric. If you find yourself thinking "campaign," you are either headed towards traditional/digital marketing that is designed to "look like" social media or marketing based on social media.

Beware: Social business, which differs from social media marketing, focuses on using the Social Web for business in ways that are fundamentally driven by organic rather than sponsored processes and that are designed to benefit your firm generally rather than sell specific items.

With the potential exception of early planting, organic communities and Social Web activities established around a company are intended to survive without direct marketing investment. They are designed to educate the company, link it with its audience, and promote customer and employee engagement with the goal of enhancing the company. They are also designed to maintain this over time with the intention of generating better business outcomes. A social business program's software and associated infrastructure costs are just as likely to be covered by operations or IT budgets as by marketing budgets.

Again, this is not to imply that societies that are based on spending have no value. Measuring success in relation to marketing and advertising objectives may have significant promotional value. To put it another way, social business programmers are focused on fundamental company objectives and conveyed via an appeal to the lives, passions, and causes of customers in addition to these kinds of marketing initiatives. These kinds of initiatives are specifically designed to promote group engagement. The core of social business is the interaction that takes place between consumers and employees.

D. As a Social Participant, Business

Individuals congregate around a common hobby, cause, or way of life in search of a feeling of shared experience. It's crucial to realize that they often seem to be driven by a desire to discuss a brand, product, or service experience with one another, connecting this to what they have in common. They may share that brand, product, or service in part, but there is usually something more that unites them. Apple products are a fantastic illustration of this, as are the following: Owners of Apple goods may seem to be related because they use Apple products, but they are really related because of the brand's philosophy and the intelligent, independent lifestyle it represents.

Together with a number of other fan-made websites, forums, and blogs, LUGNET.com hosts a meeting for LEGO fans, and in especially adult LEGO fans. While discussions sometimes seem to center on LEGO items, the true higher calling is the common love of creating that LEGO encourages. While members may join the community via LEGO building, and although it may serve as the unifying factor among a seemingly dissimilar group, the friendship is what keeps members together for years on end. A company or organisation is in many ways social in and of itself. In a similar vein, the social company is an environment where staff members and clients come together with the aim of developing the goods and services that define—and are often thereafter defined by—the brand and its greater purpose. By cooperation, consumers and employees build the experiences they desire; together, they are in charge of the company. If the discussions that follow reflect this common interest of both consumers and employees, the discussions themselves are probably strong statements that advance the company or organisation.

An expression of enthusiasm for a company, a product, or a service is the sort of outcome that is connected to the latter phases of engagement. Beyond information consumption, involvement in the form of content production, community interaction curating, and participant cooperation are the activities that lead to advocacy. Think about the function that cooperation plays in fostering a feeling of ownership via the joint efforts of staff and customers who work together to produce a shared result. No matter how delicately it may be conveyed, this feeling of shared ownership is indeed a valid and even necessary consumer attitude that finally "cuts through the clutter."

CONCLUSION

Building a social business is a powerful way to create a positive impact on society and the environment while generating profits. Social businesses are unique in that they prioritize social and environmental goals alongside financial objectives. By doing so, they can create sustainable solutions to some of the world's most pressing challenges, such as poverty, inequality, and climate change. Successful social businesses require a clear mission, effective

management, and a commitment to transparency and accountability. Building a social business requires a deep understanding of the community's needs and the social and environmental impact of the business's activities. Social media marketing is quickly becoming a crucial component of advertising firms due to the quick development of marketing tactics. Social networks provide more client reach for less money. So, businesses will need to look for tools to suit client expectations on whichever platform they choose to operate. Also, companies must be cautious about the information posted on social media to avoid seeming preachy and upsetting customers.

REFERENCES

[1] A. Devine, A. Jabbar, J. Kimmitt, and C. Apostolidis, "Conceptualising a social business blockchain: The coexistence of social and economic logics," Technol. Forecast. Soc. Change, 2021, doi: 10.1016/j.techfore.2021.120997.

[2] F. Higgins-Desbiolles and M. Monga, "Transformative change through events business: a feminist ethic of care analysis of building the purpose economy," J. Sustain. Tour., 2021, doi: 10.1080/09669582.2020.1856857.

[3] N. K. Tiwary, R. K. Kumar, S. Sarraf, P. Kumar, and N. P. Rana, "Impact assessment of social media usage in B2B marketing: A review of the literature and a way forward," J. Bus. Res., 2021, doi: 10.1016/j.jbusres.2021.03.028.

[4] J. Son and L. S. Niehm, "Using social media to navigate changing rural markets: the case of small community retail and service businesses," J. Small Bus. Entrep., 2021, doi: 10.1080/08276331.2021.1871711.

[5] F. N. van der Vlist and A. Helmond, "How partners mediate platform power: Mapping business and data partnerships in the social media ecosystem," Big Data Soc., 2021, doi: 10.1177/20539517211025061.

[6] B. Gligorijevic and B. Leong, "Trust, Reputation and the Small Firm: Building Online Brand Reputation for SMEs," Proc. Int. AAAI Conf. Web Soc. Media, 2021, doi: 10.1609/icwsm.v5i1.14166.

[7] L. D. Q. Pham, T. Coles, B. W. Ritchie, and J. Wang, "Building business resilience to external shocks: Conceptualising the role of social networks to small tourism & hospitality businesses," J. Hosp. Tour. Manag., 2021, doi: 10.1016/j.jhtm.2021.06.012.

[8] L. Meng, "Using iot in supply chain risk management, to enable collaboration between business, community, and government," Smart Cities, 2021, doi: 10.3390/smartcities4030052.

[9] Z. Tóth, P. Naudé, S. C. Henneberg, and C. A. Diaz Ruiz, "The strategic role of corporate online references: building social capital through signaling in business networks," J. Bus. Ind. Mark., 2021, doi: 10.1108/JBIM-02-2020-0101.

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Data Mining Strategies for Social Media

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***Abstract*— Data mining strategies for social media involve extracting and analyzing data from social media platforms to gain insights into user behavior, preferences, and trends. With the growing popularity of social media, companies are increasingly turning to data mining strategies to develop more targeted and effective marketing campaigns. The process of data mining involves collecting, analyzing, and interpreting large volumes of data from social media platforms to identify patterns and trends. Strategies for data mining on social media include sentiment analysis, social network analysis, and text analytics, among others. These strategies can help businesses to understand their target audience's needs and preferences, improve their products or services, and enhance customer engagement. Social media data mining is the process of gathering user-generated content from social media networks. Social media data mining aims to gather useful information from users, spot trends and patterns, and draw commercial conclusions. Information gathering through social media: These are a few instances of data mining techniques: Analytics and social media data mining are covered.**

***Index Terms*— Business, Big Data, Data Mining, Social Media, Marketing.**

I. INTRODUCTION

Globally, there are more than a billion users of social media, many of whom are active on a regular basis and may connect via their smartphones and tablets. Social media has undoubtedly taken over as the primary means of communication for individuals all over the globe, producing vast amounts of data that are just waiting to be analyzed. In reality, social media is now the primary and largest source of customer data, publishing thousands of postings daily regarding a company's goods or services. Big data is essentially used to describe the exponential growth and availability of both structured and unstructured data. Good big data management can actually result in great insights that allow relationships to be found in terms of identifying business trends, research quality, connecting legal citations, and regulating concurrent roadway web traffic conditions [1],[2]. Big Data, according to McKinsey, is a term used to describe datasets that are too large to be recorded, stored, managed, and analyzed by conventional database software tools. Although data that cannot be managed by standard database systems is referred to as Big Data, there is no formal definition for the dataset that may be deemed to be Big Data [3],[4].

The "Big" in big data, according to Gartner Group, also refers to a number of other features of large data sources, such as greater velocity and expanded diversity, which also contribute to higher complexity. Data must be managed in alternative ways since it is too huge, producing too quickly, and not fitting into the structures of present database designs. Big Data may significantly benefit the global economy, increasing the productivity and competitiveness of businesses and the public sector, according to research. Large amounts of user-generated data are explored by social media, and this data may be utilized for data mining. User-generated material from online social media also includes information from forums, online groups, web blogs, social network sites for images and videos, and social games. Text analytics and sentiment analytics are commonly used for social media analytics of consumer opinions. There would be a scarcity of millions of data-savvy managers who are capable of analyzing Big Data to make wise choices, as well as a sufficient quantity of employees with deep analytical abilities [5],[6].

Data mining extracts information like trends, patterns, and rules from extremely big databases. In order to find intriguing patterns and correlations in big data, big data analytics collects and analyses big data. Predictive and descriptive tasks are included in data mining. Classification, regression, and deviation detection are examples of predictive tasks. Clustering, summarization, association learning, and sequential patterns are examples of descriptive tasks. In order to address the various social media issues, a variety of data mining techniques are used, including influence detection, community or graph detection, expert finding, link prediction, recommender systems, predicting individual trust and distrust, behavior and Mood Analysis, opinion mining, and more. The three types of data mining approaches are unsupervised, semi-supervised, and supervised [7],[8].

Without a question, the tangible impact of social media is causing the globe to become a little village. It brings together individuals of various ages, races, and nations and enables them to communicate and share ideas, memories, and sentiments as well as photos, videos, and interests. Public and commercial entities from all sectors may now promote, profit from, evaluate, and with the information supplied via social media, they may learn and enhance their companies. As a result, the importance of social media for business and academia is evident in the volume of study that these two fields do to find answers to important problems [9].

Social media data is exhibited in a variety of formats, including text, voice, photos, and videos, and its

organizational structure is disorganized. Apart from that, typical statistical approaches are inappropriate for analyzing the vast amounts of continuous real-time data that social media platforms give. Data mining methods may thus be quite helpful in solving this issue. Few studies evaluate data mining approaches in terms of accuracy, performance, and applicability, despite the abundance of empirical research on data mining techniques and social media. For instance, it has been shown that different machine learning approaches assess accuracy in different ways, which makes it challenging to determine if a strategy is appropriate for data mining.

Several researchers have chosen their data mining methods simply based on professional opinion. There aren't many studies in this field that don't fully justify the use of data mining methods in social media. Nonetheless, other research covered specific topics about the data mining methods utilized in social media. The information collection, knowledge sharing, and information sharing for businesses. The efforts and difficulties associated with brief text analysis. Similar to this work, the sentiment analysis and opinion mining development and provided an overview of the suggested approaches for contradiction analysis. Sheela Gole and colleagues explored the issues of mining big data from social media and the characteristics of big data, such as volume, velocity, variety, veracity, and value. As far as we are aware, no prior study has intentionally focused on the use of data mining tools in social media research, which is what inspired the creation of the current survey.

II. DISCUSSION

In the past, social media platforms were their only purpose. It performed the simple task of facilitating online communication between friends, families, and even complete strangers. Nevertheless, social media is not as straightforward nowadays. Doors have opened for businesses as having at least one or more social media accounts has become a requirement for many people. Social media is a potent tool for building an online presence, regardless of the size of the business, whether you're a small business looking to grow your market or an individual opening an online store. But only if you understand how to effectively use social media for your business. We'll assist you with the first and most important phase, social media data mining, to save you the pain of trying to decide where to start and which direction to go. The techniques for mining social media will be covered in this article, along with examples of the top data mining software platforms you can use in your business plans.

A. Methods for data mining

Data mining may aid in the comprehension of big data sets. When it comes to data mining, there are two methods: supervised and unsupervised methods. These methods provide algorithms that may be used to your data to find hidden patterns. The supervised technique is dependent on information gathered from historical data. Unsupervised methods, on the other hand, automatically categorise data by grouping comparable parts together. Clustering is an example of an unsupervised method in data mining. Without any previous knowledge of the kind of patterns the algorithms would produce, the provided data is described in clustering algorithms. In other words, it groups together homogeneous items that are comparable in a data collection. This algorithm's primary purpose is to separate and organise groupings of related objects into clusters. Yet, we do have options for the supervised approach, such the classification method. Using this method, the algorithm picks up new skills through practise data. The newly discovered data is then automatically categorised into the many classifications created by the first batch of data that was previously acquired.

B. Collecting information from social media

Large data sets may be understood with the use of data mining. When it comes to data mining, there are two methods: supervised and unsupervised methods. These methods provide algorithms that may be used to your data to find hidden patterns. The supervised technique is dependent on information gathered from historical data. Unsupervised methods, on the other hand, automatically categorise data by grouping comparable parts together. Clustering is an example of an unsupervised method in data mining. Without any previous knowledge of the kind of patterns the algorithms would produce, the provided data is described in clustering algorithms. In other words, it groups together homogeneous items that are comparable in a data collection. This algorithm's primary purpose is to separate and organise groupings of related objects into clusters.

Yet, we do have options for the supervised approach, such the classification method. Using this method, the algorithm picks up new skills through practise data. The newly discovered data is then automatically categorised into the many classifications created by the first batch of data that was previously acquired. Software examples for social media data mining: There are software options for social media data mining that are available on the market, and they make it simpler to spot typical trends and the connection of diverse data points in big quantities. Data mining software platforms' primary job is to provide significant metrics and formulae that can be used to do calculations and comparisons. Data mining, like the majority of business intelligence technologies, may assist in determining the connections between various business indicators. Examples of data mining software solutions include the following:

C. Sisense

The best business intelligence software, Sisense, can instantly transform your data into insightful knowledge. The programme offers dynamic business intelligence dashboards

that let you filter, go deeper, and further examine your data. The software's features make it simple to prepare and analyse large or diversified data sets. Sisense is another AI-driven business analytics tool that has a user-friendly interface that was created specifically to allow for a more in-depth investigation of your data.

You can build completely interactive dashboards and combine many data sources into a single data model using an intuitive drag-and-drop online user interface. In order to swiftly try out new ideas, the platform also provides tools that let you add new data sources to already-governed models. You may quickly learn more about the platform if you wish to by signing up for a free Sisense demo.

D. RapidMiner

With more than 1,500 native algorithms, data preparation features, and data science capabilities, RapidMiner is an incredibly fast analytics solution. Any third-party ML libraries may be supported, and it integrates with user-written Python and R code. You may ingest and alter your data from many sources with our end-to-end collaboration platform. A streamlined solution accelerator with pre-made use-case templates is offered by the software.

Moreover, RapidMiner enables the deployment and optimization of models in production workflows in addition to automating the optimal ML model selection and validation. The programme may assist you in increasing income, reducing financial expenses, and reducing risks. You may share predictive analytics techniques and useful, repeatable data pipelines with your team by planning team-based data science projects.

E. SharePoint by Microsoft

One of the most intelligent analytical alternatives for business and non-commercial consumers is Microsoft SharePoint. It works wonderfully well with all Microsoft Office products in one smooth integration, enabling an assortment of unique development opportunities. Microsoft Sharepoint enables you to execute self-service predictive analytics and build robust data models. You have access to many development scenarios thanks to the information management and security features included in the program. You may use it to explore and view your data. You may get reports from your mobile devices wherever you are thanks to its mobile compatibility.

F. Apple Cognos:

IBM Cognos is a smart business intelligence tool and self-service analytics solution that enables you to identify and transform your data into insights. You can display, analyse, and share the insights you discover from your company data with IBM Cognos. Strong governance guidelines are also included with the programme to further safeguard your systems and data. In addition, IBM Cognos offers a variety of stunning dashboards that are interactive, along with engaging reports, all on a single platform. As the programme is cloud-based, it won't be difficult for anybody on your team to get the information they need.

G. BI Dundas:

A data analytics platform called Dundas BI offers dashboards, multi-page reports, and visual data analytics for tailoring your reports and drawing useful conclusions from your data. Ad-hoc queries may be run by the programme, and the data collected can provide accurate results. Moreover, Dundas offers simple drag-and-drop capability that makes it easy to evaluate your data and add new data files. Dundas BI gives you the ability to provide design ideas to your team members using an exploratory designer tool. Also, you may have more flexibility over your reports, scorecard views of your data, and dashboards.

H. Social media data mining strategies

Social media data have three difficult characteristics: they are big, loud, and dynamic. Consequently, using social media data mining tools might greatly simplify your BI procedures. Data mining methods may help you enhance your search engine results as social media becomes an increasingly common component of marketing and commercial operations. You can even use your data to uncover fresh insights. Moreover, it might direct you in tailoring services for your clients.

I. These are some examples of data mining methods:

One of the most fundamental data mining approaches is association. You must utilise machine learning models in this data mining approach. This is useful for looking for trends in data and locating co-occurrences across a group of databases. It has a dependent relationship with a number of data set variables. The association approach also includes two sections since it uses if-then patterns. The first is the antecedent "if," where a data point is located. The consequent "then," which is an element that is also present in the antecedent, makes up the second component.

J. Classification

While classification is a rather complex data mining approach, it is employed in many different domains. It involves gathering diverse features in a data collection and combining them into easily recognisable groups. The produced classifications of the data elements may then be used to make deductions and acquire insights. Some important categories of classification techniques include Bayesian networks, decision tree induction, and k-nearest neighbour classifiers.

K. Monitoring Patterns

A data mining approach called tracking patterns particularly finds the patterns and rules in the data based on their relational properties. This method entails locating abnormalities that appear in your data on a frequent basis. It may also highlight the ups and downs of a particular

variable within a collection of data. This approach is particularly useful for identifying when seasons a certain product is most often purchased by your clients.

L. Prediction

The social data mining prediction approach is used to forecast the kind of data you'll probably see in the future. You will be covering the predictor and predicted variables from your data in this method. This entails identifying trends and patterns and making predictions based on them. For instance, reviewing consumer behaviour may help you anticipate what your consumers will want in the future. The majority of prediction approaches are based on mathematical models. They include neural networks, RBFs, non-linear statistics like power series, as well as straightforward statistical models like regression and others.

M. Social media data mining and analytics

These techniques allow you to take use of the strength that social media data offers your company. But business intelligence has two main subsets: data mining and data analytics. While they are two extremely similar parts, they also have a few distinctions. The systematic process of finding and identifying information is known as data mining. Also, it enables you to spot obscured patterns in a huge body of data. Data mining is essentially a more advanced and integrated kind of data analysis. It is a superset that includes operations such as data extraction, sorting, transformation, organisation, and visualization in order to reveal otherwise concealed and significant information.

Data analysis is the process of acquiring and organising the raw data to transform it into useful insights, as opposed to data mining, which is the process of extracting data from a certain set of patterns from massive data sets. Yet when you combine them, a potent tool that may forecast customer behaviour emerges. By doing so, you may spot customer trends and patterns and increase sales.

N. Data Analytics vs. Data Mining

Association, categorization, pattern monitoring, and predictions are some of the key social data mining methods that you should be familiar with by this point. That is, if you want your social media interactions to result in conversions. Being proactive in connecting and talking with your clients on your social media accounts is a smart technique. Yet, there's a lot more you can do to keep one step ahead of your rivals. Social data mining is undoubtedly an additional chore on top of all your marketing strategies, but you'll quickly discover that it's well worth the extra work. Social media sites provide many chances, so it's crucial to understand how to make the most of the information you can get from them. These methods for harvesting social media data are not just there for no purpose. You can get the insights you need for data-driven business choices using these tools and strategies. Check out the top platforms for data analytics software, which can help you better understand your consumers and boost sales.

III. CONCLUSION

Social media now produces more data in a shorter amount of time than it did in the past, necessitating new technologies and approaches for Big Data mining to overcome obstacles. MapReduce is one of the Hadoop framework's components that may be subjected to big data mining methods. There is promise for accelerating scientific progress in many fields and enhancing the profitability and performance of many businesses via improved analysis of the enormous amounts of data that are becoming accessible. Applications for a universal integrated framework to address all Big Data concerns are many. Current technologies are not scalable and have problems dealing with big data's volume, velocity, variety, veracity, and value. This presents an opportunity to develop effective big data mining approaches that would help people succeed in this cutthroat environment by overcoming big data problems.

REFERENCES

[1] Ł. Huminiecki, “Models of the gene must inform data-mining strategies in genomics,” Entropy. 2020. doi: 10.3390/E22090942.

[2] Q. Fu et al., “Flavonoid aglycone–oriented data-mining in high-performance liquid chromatography–quadrupole time-of-flight tandem mass spectrometry: efficient and targeted profiling of flavonoids in Scutellaria barbata,” Anal. Bioanal. Chem., 2020, doi: 10.1007/s00216-019-02238-7.

[3] S. S. Weng, Y. Liu, J. Dai, and Y. C. Chuang, “A novel improvement strategy of competency for education for sustainable development (ESD) of university teachers based on data mining,” Sustain., 2020, doi: 10.3390/su12072679.

[4] J. Ma and B. Lund, “A cluster analysis of data mining studies in library and information science from 2006 to 2018,” Proc. Assoc. Inf. Sci. Technol., 2020, doi: 10.1002/pra2.413.

[5] J. W. Zhu, S. J. Zhang, W. G. Wang, and H. Jiang, “Strategies for Discovering New Antibiotics from Bacteria in the Post-Genomic Era,” Current Microbiology. 2020. doi: 10.1007/s00284-020-02197-8.

[6] M. K. Kumar and D. K. Bhargavi, “An Effective Study on Data Science Approach to Cybercrime Underground Economy Data,” Journal of Engineering, Computing and …. 2020.

[7] L. Hong, Y. Li, M. He, C. Zhao, and M. Li, “An algorithm to calibrate ionic isotopes using data mining strategy in hyphenated chromatographic datasets from herbal samples,” J. Chromatogr. A, 2020, doi: 10.1016/j.chroma.2019.460668.

[8] W. Matcha et al., “Analytics of learning strategies: Role of course design and delivery modality,” J. Learn. Anal., 2020, doi: 10.18608/JLA.2020.72.3.

[9] X. Yao et al., “Mining and visualizing high-order directional drug interaction effects using the FAERS database,” BMC Med. Inform. Decis. Mak., 2020, doi: 10.1186/s12911-020-1053-z.

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An Overview of Medicinal and Aromatic Plant Extraction Methods

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***Abstract*—Active ingredients and essential oils may be extracted from medicinal and aromatic plants using a variety of procedures. The decision is based on the process's economic viability and applicability to the specific circumstance. This research examines the many procedures involved in producing medicinal plant extracts and essential oils. Medicinal and aromatic plants are extracted using traditional methods. As was previously noted, Soxhlet extraction, maceration and hydro distillation are the standard methods most often employed to extract the active components of aromatic and medicinal plants.**

***Index Terms*— Aromatic Plant,Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

When employed in a pharmaceutical context, the word "extraction" refers to the typical extraction processes used to separate the medicinally active components of plant or animal tissues from the inert or inactive ones. The somewhat impure liquids, semisolids, or powders produced in this way by plants are only fit for external or oral consumption. Decoctions, infusions, fluid extracts, tinctures, pilular extracts, and powdered extracts are some of the preparation types that fall under this category. These remedies are known as "galenicals," after the Greek physician Galen, who lived in the second century. Standardized extraction techniques are used to get the therapeutically required amount of crude medicines and to remove the inert material using a selective solvent called menstruum. The resulting extract can be processed further to be included in any dosage form, such as tablets or capsules, or it can be fractionated to isolate specific chemical entities, such as the modern drugs ajmalicine, hyoscine, and vincristine. The resulting extract can also be ready for use as a medicinal agent in the form of tinctures and fluid extracts. Thus, uniformity of extraction processes has a considerable impact on the herbal drug's ultimate quality[1].

General Techniques for Extracting Therapeutic Plants Maceration

In this method, the solvent is added to the entire or coarsely powdered crude medication, which is then let to stand at room temperature for at least three days while being frequently stirred to dissolve the soluble material. The mixed liquids are then clarified by filtration or decantation after standing. The combination is then strained, the marc is pressed, and the process is repeated.

Infusion: To make a fresh infusion, the raw medication is briefly macerated in water that is either cold or hot. The easily soluble components of crude medicines are present in these diluted solutions. Digestion: This is a kind of maceration where the extraction is done at a very low heat. When a somewhat high temperature is acceptable, it is employed. As a result, the menstruum has a higher solvent efficiency.

Decoction

In this procedure, the raw medication is boiled for a certain amount of time in a specific amount of water, cooled, and then filtered or refined. This method works well for extracting components that are heat- and water-stable. The "quath" or "kawath" Ayurvedic extracts are commonly prepared using this method. The initial ratio of the crude medication to the water is fixed, for example, 1:4 or 1:16, and boiling is used throughout the extraction process to reduce the volume to one-fourth of what it was initially. The concentrated extract is then altered, utilized as is, or put through further processing.

The method most often employed to extract active components in the creation of tinctures and fluid extracts is percolation. Typically, a percolator is used. A suitable quantity of the specified menstruum is used to moisten the solid components, which are then allowed to rest for about 4 hours in a tightly covered container before the mass is packed and the percolator's top is secured. The combination is mixed with more menstrual fluid to create a thin layer over the bulk, and is then allowed to macerate for 24 hours in a closed percolator. The percolator's outlet is then opened, allowing the liquid within to trickle gradually. When the percolate reaches roughly three-quarters of the end product's needed volume, more menstruum is added as necessary. The liquid from the squeezed marc is then added to the percolate. The necessary amount of menstrual fluid is added, and the resulting mixture is purified by filtering or by standing followed by decanting[2].

Continually Hot Extraction

This technique uses a porous bag or "thimble" composed of sturdy filter paper, which is put in chamber E of the Soxhlet apparatus, to contain the finely powdered crude medication. The condensed extractant drops into the thimble holding the crude drug and extracts it via contact while the

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extracting solvent in flask A is heated. The liquid in chamber E siphons into flask A when the liquid level in chamber E reaches the top of siphon tube C. This operation is carried out continuously until an evaporated drop of solvent from the siphon tube leaves no residue. This approach has the benefit over the previously described methods in that significantly more medication may be extracted using much less solvent. Time, energy, and subsequently money inputs are all greatly reduced as a result. It is only used as a batch process at small scales, but at medium or large scales, it may be transformed into a continuous extraction process, which is considerably more cost-effective and feasible.

Fermentation-based Aqueous Alcoholic Extraction

Ayurvedic medicine uses fermentation as a method of extracting active ingredients in certain formulations. The crude medicine is soaked for a certain amount of time, either as a powder or a decoction, to allow for in-place fermentation and the production of alcohol, which makes it easier to extract the active ingredients from the plant material. Thusly produced alcohol also acts as a preservative. If fermentation is to take place in an earthen jar, it shouldn't be brand new; the vessel should first be used to boil water. Earthen vessels are replaced in large-scale manufacturing by wooden vats, porcelain jars, or metal containers. These preparations include karpurasava, kanakasava, and dasmularista, as few examples. This extraction process is not yet standardized in Ayurveda, but given the extraordinary level of improvement in fermentation technology, it shouldn't be too difficult to do so in order to produce herbal medicinal extracts.

Against-the-Flow Extraction

In counter-current extraction, wet raw material is ground into a thin slurry using toothed disc disintegrators. This method involves moving the material to be extracted in a cylindrical extractor where it comes into contact with the extraction solvent. The extract gets increasingly concentrated the more the starting material is moved. Thus, when the solvent and material amounts and their flow rates are adjusted, full extraction is feasible. The procedure is quite effective, takes little time, and doesn't include any danger from high temperatures. Finally, the extractor's other end drops the marc while the suitably concentrated extract emerges from the other[3].

II. DISCUSSION

This extraction method offers many key benefits:

When compared to techniques like maceration, decoction, and percolation, a unit amount of plant material may be extracted using a significantly less volume of solvent. Why Since CCE is often conducted at room temperature, the thermos labile components are not exposed to the heat that is used in the majority of other procedures. Since the medicine is being pulverized in damp settings, water balances the heat produced during comminution. Once again, this protects the thermos labile components from heat. Compared to continuous heat extraction, the extraction process has been shown to be more efficient and effective.

Extraction by ultrasound

During the treatment, ultrasound is used at frequencies between 20 kHz to 2000 kHz, which causes cavitation by making cell barriers more permeable. The method may be helpful in specific situations, such as the extraction of rauwolfia roots, but its large-scale applicability is limited by the higher costs. One drawback of the process is the infrequent but well-known harmful impact of ultrasonic radiation on the active components of medicinal plants, which results in the production of free radicals and unfavorable alterations in the drug molecules[4].

Extracting Supercritical Fluid

An alternate sample preparation technique called supercritical fluid extraction aims to utilize less organic solvent and process samples more quickly. Temperature, pressure, sample volume, analyte collection, modifier addition, flow and pressure control, and restrictors are some of the variables to take into account. For SFE, cylindrical extraction containers are often used, and their performance is unquestionably excellent. Another crucial phase is the collection of the extracted analyte after SFE. Significant analyte loss might happen during this step, giving the analyst the impression that the actual efficacy was low. The use of CO2 as an extracting fluid has several benefits. In addition to having good physical characteristics, carbon dioxide is also widely available, cheap, and safe. However, while being the favored fluid for SFE, carbon dioxide has a number of polarity restrictions. When extracting polar solutes and in the presence of strong analyte-matrix interactions, solvent polarity is crucial. To overcome the polarity restrictions, organic solvents are commonly added to the fluid used to extract carbon dioxide. Recently, argon has been utilized in place of carbon dioxide since it is less costly and more inert. The component recovery rates typically rise as the pressure or temperature rises; for argon, the maximum recovery rates are attained at 500 atm and 150° C.

The extraction process has many clear benefits:

i) Low temperature component extraction, which carefully prevents heat and some organic solvent degradation.

ii) No traces of solvent.

iii) An extraction method that is beneficial to the environment.

The fast rise of SFE's applications has been the area of development that has seen the most growth. Pesticides, environmental samples, food and fragrance extraction, essential oil extraction, polymer extraction, and the extraction of natural products all find wide use in SFE. The extraction technique' expensive capital cost is the main barrier to its practical implementation[5].

Phytonics Method

For the production of high-quality natural fragrant oils, flavors, and biological extracts, a new solvent based on

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hydrofluorocarbon-134a and new technology to optimize its remarkable properties in the extraction of plant materials offer significant environmental advantages and health and safety benefits over conventional processes. This patented method, known as the "phytonics process," was created by Advanced Phytonics Limited. The majority of the products produced by this procedure are bio-logical or psychopharmacological extracts that may be utilized directly without additional physical or chemical processing, as well as aromatic components of essential oils.

The procedure has the benefit that the solvents may be adjusted. By utilizing modified solvents containing HFC-134a, the extraction of a particular class of phyto components can be done in a very selective manner. Similar to this, other modified solvents may be utilized to extract a wider range of constituents. The residual solvent in the biological products produced by this technique is quite minimal. The residuals are almost always below thresholds of detection and are always less than 20 parts per billion. These solvents have very little potential for reacting with the plant ingredients since they are neither acidic nor alkaline. The whole processing facility is sealed, allowing the solvents to be entirely collected at the conclusion of each manufacturing cycle and recycled continuously. These systems simply need power to function, and even then, they don't use a lot of electricity. The solvents have little chance of escaping. Even if any solvents do escape, the ozone layer is not endangered since they don't contain chlorine. These plants produce dry, "ecofriendly" waste biomass that is easy to manage.

Benefits of the Method

The phytonics method is calm and mild, in contrast to other procedures that use high temperatures, and its products are never harmed by exposure to temperatures over ambient. There is no need for vacuum stripping, which in other methods results in the loss of valuable volatiles. The products never experience acid hydrolysis damage or oxidation since the procedure is totally conducted at neutral ph. The method allows for a wide range of working circumstances and, therefore, end products. It poses less of an environmental danger. It uses the least amount of electrical power possible. The produced waste products are harmless and don't cause any issues with wastewater disposal. It doesn't emit any dangerous pollutants into the atmosphere. The process does not utilize any harmful or ozone depleting chemicals, nor are they flammable. Within the system, the solvents are totally recycled.

Applications

The phytonics extraction method may be used to the biotechnology, herbal medication, food, taste, and essential oil sectors as well as the creation of other pharmacologically active goods. It is specifically utilized to make high-grade pharmaceutical-grade extracts, pharmacologically active intermediates, antibiotic extracts, and phytopharmaceuticals. Its use in all of these areas does not, however, exclude its use in other areas. High-quality essential oils, oleoresins, natural food colors, flavors, and aromatic oils are extracted using this method from a variety of plant sources. The method is also used to refine raw materials that come from other extraction procedures. Without waxes or other impurities, it offers extraction. It helps contaminated biomass get rid of a lot of biocides[6].

Factors to Consider When Choosing the Right Extraction Technique

Before doing extraction, plant material should be verified. Any foreign substance must be entirely removed. Use the appropriate plant portion, and note the age of the plant as well as the moment, season, and location of collecting for quality assurance reasons. The plant material's drying conditions are mostly determined by the makeup of its chemical components. For drying, hot or cold airflow is often recommended. Appropriate weight adjustments need to be introduced if a crude medication with a high moisture content is going to be utilized for extraction. Specific grinding procedures should be used, and approaches that produce heat should be avoided if feasible. To get the necessary uniform-sized paper, powdered plant material should be run through the appropriate sieves.

The Components' Types:

A non-polar solvent may be employed if the non-polar elements have therapeutic benefit. For instance, the active ingredient in Crataevanurvala is lupeol, and hexane is often used to extract it. The active components of plants like Centellaasiatica and Bacopamonnieri are glycosides, hence a polar solvent like aqueous methanol may be utilized. If the contents are thermos labile, cold maceration, percolation, and CCE are preferable extraction techniques. Soxhlet extraction and decoction are effective methods for components that are thermostable. When working with ingredients like flavonoids and phenyl propanoids that break down while being stored in organic solvents, appropriate safety measures should be implemented. Avoid using greater temperatures than necessary for extracting hot materials.

Incomplete extraction results from a lack of time

Unwanted elements could also be removed if the extraction process is prolonged. For instance, tannins are removed from tea when it is cooked for an excessively long time, giving the finished dish an astringent flavor. Both the length of each extraction and the total number of extractions needed to finish the extraction matter. Menstrual fluid or water quality should be defined and under strict monitoring. The stability and safety of the active ingredients should be guaranteed throughout the concentration and drying processes. The practice of drying at lower pressure is common. Lyophilization is used more often despite being pricey. The extractor's design and construction materials must also be taken into account. To track the quality of several extract batches, analytical parameters of the final extract, such as TLC and HPLC fingerprints, should be

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recorded.

Procedures for Extracting Medicinal Plants

The following actions must be taken in order to extract therapeutic components from plant material:

1. Size diminution
2. Extraction
3. Filtration
4. Concentration
5. Drying

Size diminution

The dried plant material is crushed by putting it through a disc pulverizer or hammer mill with built-in sieves. The speed of the rotor clearance between the grinder's hammers and lining and the mill's discharge aperture may both be changed to adjust the ppaper size. The plant material is typically ground down to a size between 30 and 40 mesh, however this may be modified as needed. The goal of powdering the plant material is to disrupt its organ, tissue, and cell structures so that the solvent used for extraction may contact the medicinal components. Additionally, increasing surface area by size reduction improves the mass transfer of the active ingredient from the plant material to the solvent. The ideal mesh size is between 30 and 40 mesh; smaller paper may extract slimily and be challenging to filter[7].

The plant material is removed in one of three ways:

1. Aqueous cold percolation
2. Aqueous hot extraction
3. Solvent removal

Aqueous Cold Percolation

The water is macerated with the powdered substance before being put into a tall column. Once the powdered substance is fully submerged, cold water is added. In order for water-soluble components to achieve equilibrium in the water, it is allowed to stand for 24 hours. In multiple-effect evaporators, the enriched aqueous extract is condensed to a specific concentration. This concentrated extract is prepared for medical use after certain diluents and excipients are added.

Aqueous Hot Extraction

In an open-type extractor, this is accomplished. The extractor is a cylindrical tank constructed of type 316 stainless steel that is larger in diameter than it is taller, or roughly speaking, the H/D ratio. The vessel's bottom is welded to the dish-shaped end and has a fake bottom inside that is covered with filter cloth. The outside vessel features a bottom discharge valve and a steam jacket. 16 parts of demineralized water and 1 part powdered plant material are supplied into the extractor. Steam is injected into the jacket to heat it. The substance is allowed to boil until the water is only left with 1/4 of its original volume. By this point, the plant material's therapeutic components have been removed.

Filtration

The extracted substance is separated from the marc by permitting a trickle of it to enter a holding tank via the extractor's built-in fake bottom, which is protected by a filter cloth. The extract is received in the holding tank, while the marc is held in the false bottom. The extract is poured into a sparkler filter from the holding tank in order to filter out any fine or colloidal paper [8].

Sprayed Drying

To produce dry powder, the filtered extract is spray dried using a high pressure pump at a predetermined feed rate and temperature. By regulating the chamber's internal temperature and adjusting the pump's pressure, the required ppaper size of the product may be achieved. To create a homogenous powder that can be used immediately, such as for filling in capsules or forming tablets, the dry powder is combined with appropriate diluents or excipients and blended in a double cone mixer.

Extraction of Solvent

According to the solid-liquid extraction principle, when a solid substance interacts with a solvent, the solid material's soluble components flow to the solvent. Therefore, the mass transfer of the solvent-soluble active principle from the plant material occurs along a gradient of concentration. Up to equilibrium, when the concentrations of the active principle in the solid material and the solvent are equal, the rate of mass transfer decreases as the concentration of the active principle in the solvent rises. After then, there won't be any mass transfer of the active ingredient from the plant matter to the solvent. Heating the solvent may improve the mass transfer since the active principle's solubility in the solvent also affects the active principle's mass transfer. Additionally, the concentration gradient is altered if the solvent that is in equilibrium with the plant material is switched out for a new solvent. As a result, several extraction processes, including cold percolation, hot percolation, and concentration, are produced.

Percolation of cold

In a percolator, which is a tall cylindrical tank with a conical bottom and an integrated fake bottom with filter cloth, plant material is extracted. The receiver and condenser for solvent removal from the marc are linked to the percolator. A suitable solvent and the powdered material are introduced into the percolator. Up until the active principle reaches equilibrium, the substance is still in contact with the solvent. Miscella, a solvent extract, is removed from the percolator's bottom discharge valve. After reaching equilibrium, the miscella is drained away and new solvent is poured to the percolator. The plant material is washed four to five times in total until it is no longer absorbent. The percolator's washes are collected and concentrated. Steam is emitted from the percolator's bottom, stripping the solvent from the marc. In a tubular condenser, the rising solvent and

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steam vapors are condensed. The condensate, an alcohol and water combination, is collected in a receiver and fractionally distilled to produce 95% pure ethyl alcohol, which is then employed once again as a solvent. Due to the sluggish mass transfer rate, this form of percolation is inefficient since it takes a long time to achieve equilibrium. If any type of movement is produced between the paper and the solvent, the mass transfer rate may be increased.

This may be done by repeatedly pumping the extract back into the percolator or by providing internal agitation using a mechanical stirrer. The second approach has proved effective, although the first is laborious and energy demanding. A circulation pump that continually pumps the miscella back to the percolator's top results in a better mass transfer rate and significantly shortens the equilibrium period. Even yet, this method of percolation requires a lot of energy since it has to concentrate a lot of miscella from several washes in order to get rid of the solvent. A series connection may be made between a batteries of percolators to solve this issue. Four percolators are linked in series with their corresponding miscella storage tanks if three washes are necessary to finish the extraction[9].

When the other three percolators are operating, one percolator is out of circuit for charging and discharging the material as well as for removing solvent from the marc. All of the percolators are supplied with material, and the first percolator is filled with solvent. The extract from the first percolator is delivered to the second percolator after equilibrium has been attained in the first percolator. Refreshing solvent is added to the first percolator. Third percolator receives the extract from the second, second receives the extract from the first, and first receives new solvent. The fourth percolator receives the third percolator's extract. The extract from the fourth percolator is drained off after equilibrium has been reached. Third percolator extract goes to fourth percolator, second percolator extract goes to third percolator, and first percolator extract goes to second percolator. The first percolator's material, which has undergone three washings, is all used up. This percolator is removed from the system so that the sol-vent may be stripped and the extracted marc can be released. Repeating the process with more percolators, this is once again loaded with brand-new plant matter. In this manner, each percolator's solvent makes three contacts with solid matter and completely ingests the active ingredient. The concentrated and solvent-recovery process is used to the enhanced extract. As a result, only one volume of solvent has to be concentrated rather than three, which saves energy and makes the procedure effective.

Scalding percolation

If the active ingredient is not heat sensitive, raising the solvent's temperature increases the solubility of the active ingredient, which raises the concentration gradient and so improves the mass transfer of the active ingredient from solid material to solvent. This is accomplished by adding a heat exchanger between the percolator's feed input and circulation pump. The extract is continually injected into a steam-heated tubular heat exchanger. A steam solenoid valve and temperature indication controller work together to regulate the temperature of the extract in the percolator. Depending on the situation, this kind of setup may be added to a battery of percolators or a single percolator.

The tall cylindrical tower percolators need to be kept in sheds with quite high ceilings. Tall towers are challenging to run, particularly when material is charged and discharged from top and bottom manholes, which are labor-intensive and time-consuming tasks. In lieu of tall towers, extractors with a lower height and an H/D ratio have taken their place. The material to be extracted is charged into perforated baskets that are part of these extractors. These perforated baskets may be filled outside and then, using a chain pulley block, put into the extractor. After the extraction, they can then be pulled out of the extractor for the marc to be discharged. Some extractors incorporate an electrical hoist for loading and unloading the material, which makes the process easier, faster, and more productive.

The Soxhlet apparatus, which consists of an extractor, a distillation still, a tubular condenser for the distillation still, a tubular condenser for recovering solvent from the marc, a receiver for collecting the condensate from the condenser, and a solvent storage tank, is the other type of instrument for extracting medicinal ingredients from plant material. The extractor is supplied with the plant material, and solvent is added until the extractor's siphon point is reached. The distillation still is then filled with steam and the extract is siphoned into it. In the distillation condenser, the solvent vapors are condensed before returning to the extractor. Once again reaching the siphon point, the solvent level in the extractor allows the extract to be sucked into the distillation still. In this manner, the plant material is repeatedly in contact with new solvent, resulting in total extraction of the plant material. The distillation still concentrates the final extract, which is high in active principle, and recovers the solvent[10].

Concentration

A wiped-film evaporator concentrates the miscella, an enriched extract from percolators or extractors, under vacuum to create a thick concentrated extract. To create a solid mass devoid of solvent, the concentrated extract is subsequently fed through a vacuum chamber drier. For the following batch of plant material, the solvent recycled from the cleaned film evaporator and vacuum chamber drier is put back into the percolator or extractor. The solid mass that is so formed is either further treated to isolate its phytoconstituents or utilized as is after being ground into powder for the necessary medicinal compositions.

Extracts of aromatic plants

Essential oils, concretes, absolutes, pomades, and resinoids are examples of the volatile isolates that may be

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produced from aromatic plants economically. While other volatile isolates are produced by solvent extraction, essential oils are extracted from plant material through distillation.

Concrete

This is an extract made from fresh flowers, herbs, leaves, and plant blooming tops using a hydrocarbon solvent such petroleum ether, butane, pentane, or hexane. Concrete is devoid of water-soluble components and abundant in hydrocarbon-soluble materials. Typically, it is a waxy, semisolid substance that is black in color and devoid of the original solvent. Concretes are really made in static extractors in reality. The multiple perforated trays that are fitted with these extractors prevent the blooms from being crushed under their own weight. There is a spacer in each perforated tray, thus their number and separation are set.

A detachable cylindrical basket may contain the set of perforated trays. The spacers and perforated trays are attached to a rod in the center of the bottom tray, and there is a ring or hook at the top of the tray so that a chain pulley block may easily remove the whole contents of the extractor. Care should be used while stacking the flowers on these trays to prevent bruising and damage to the flowers, as this might cause the enzymes in the flower juice to leak, lowering the quality of the concrete. The basket filled with flowers is put inside the extractor, and the preferred solvent is added from the bottom up until all of the material on the perforated disc assembly is submerged. Until the substance is used up, four to five of these washes are administered. Pumped into an evaporator for solvent recovery, the enhanced solvent from the extractor has its volume of solvent reduced to roughly a tenth of what it was initially. Pumped into the sol-vent tanks for subsequent use is the recovered solvent. Pumping the concentrated material from the evaporator into a vacuum evaporator allows the solvent to be recovered and used again after being extracted more carefully under high vacuum. The final product, concrete, smells like the substance it was made from, except it smells harsher. It is common practice in the production of concrete to run new solvent through a set of extractors. As extraction progresses, the solvent becomes increasingly enriched with fewer volatiles with each cycle. The quantity of solvent washes and the quantity of extractors must be coordinated.

Absolutes

Concretes aren't often employed in perfumery in their natural state; instead, they're typically transformed into an absolute, a volatile concentration that may be extracted using alcohol. To create an absolute, concrete and absolute alcohol are combined and vigorously stirred in a jar with an agitator. The concrete is submerged in the mixture during agitation, which is maintained at a temperature of 40 to 60 degrees Celsius. Since waxes are often insoluble in alcohol below -1° C, the solution is cooled down to -5° to -10° C to precipitate off the wax. The precipitated wax is eliminated by rotating filtering the solution to remove it. The rotary filter's filtrate is poured into a main evaporator, where it is condensed to an alcohol level of around 10%. The alcohol is then carefully extracted under a high vacuum in an agitation type evaporator using the concentrated extract[11].

Resinoids

A hydrocarbon solvent is used to create a resinous material's extract known as a resinoid. Typically, dry materials are used to produce resinoids. Similar to how concrete is made, the extraction method involves feeding powder from dried plant material into an extractor rather than stacking the material with perforated discs.

Pomades

Enfleurage is a technique of cold fat extraction that is used to create pomades. On glass plates housed in wooden frames, the fat is dispersed, leaving a space along the edges clean. Surface grooves formed with a wooden spatula improve the fat's absorptive surface. The fat is covered with fresh flowers, and the frames are arranged in heaps. The wasted flowers are taken by hand once the perfume oils have been extracted from the blossoms. On the fatty surface, fresh blossoms are once again scattered. Until the fat surface is fully loaded with fragrance oils, this is repeated. The resulting pomade is prepared for cold alcohol extraction.

III. CONCLUSION

Numerous consumer items, including detergents, soaps, toiletries, cosmetics, medications, fragrances, confectionary products, food, soft drinks, distilled alcoholic beverages, and pesticides, employ essential oils. Essential oil and perfume production and usage are rising quickly on a global scale. The use of production technologies may significantly increase essential oil output and quality. Traditional techniques for processing essential oils are still widely utilized across the world and are of considerable value. The oldest and most often used techniques include water distillation, water and steam distillation, steam distillation, cohobation, maceration, and enfleurage. When the oil production from distillation is low, maceration is flexible. For powdered almonds, rose petals, and rose flowers, distillation procedures work well, but solvent extraction is best for pricey, fragile, and thermally unstable materials like jasmine, tuberose, and hyacinth. The preferred technique for extracting citronella oil from plant material is water distillation.

REFERENCES

[1] H. S. Elshafie, “Plant Essential Oil with Biological Activity,” Plants. 2022. doi: 10.3390/plants11070980.
[2] F. Y. Du, X. H. Xiao, X. J. Luo, and G. K. Li, “Application of ionic liquids in the microwave-assisted extraction of polyphenolic compounds from medicinal plants,” Talanta, 2009, doi: 10.1016/j.talanta.2009.01.040.
[3] M. S. L and H. El-haoud, “Screening Phytochimique D ’ Une Plante Medicinale : Mentha Spicata L . Phytochmical Screening Of A Medicinal Plant :,” Am. J. Innov. Res. Appl. Sci., 2018.

[4] P. L. B. Jain, S. R. Patel, and M. A. Desai, "Patchouli oil: an overview on extraction method, composition and biological activities," Journal of Essential Oil Research. 2022. doi: 10.1080/10412905.2021.1955761.
[5] K. Carbone, V. Macchioni, G. Petrella, and D. O. Cicero, "Exploring the potential of microwaves and ultrasounds in the green extraction of bioactive compounds from Humulus lupulus for the food and pharmaceutical industry," Ind. Crops Prod., 2020, doi: 10.1016/j.indcrop.2020.112888.
[6] J. Maitusong, A. Aimila, J. Zhang, B. Mahinur, M. Maiwulanjiang, and H. A. Aisa, "Process optimization for the supercritical carbon dioxide extraction of Foeniculum vulgare Mill. seeds aromatic extract with respect to yield and trans-anethole contents using Box-Behnken design," Flavour Fragr. J., 2021, doi: 10.1002/ffj.3643.
[7] P. K. Mukherjee, "Extraction and Other Downstream Procedures for Evaluation of Herbal Drugs," in Quality Control and Evaluation of Herbal Drugs, 2019. doi: 10.1016/b978-0-12-813374-3.00006-5.
[8] V. Šeregelj et al., "Modern green approaches for obtaining Satureja kitaibelii Wierzb. ex Heuff extracts with enhanced biological activity," J. Serbian Chem. Soc., 2022, doi: 10.2298/JSC220314043S.
[9] T. Balakrishna, S. Vidyadhara, R. Sashidhar, B. Ruchitha, and E. Venkata Prathyusha, "A review on extraction techniques," Indo Am. J. Pharm. Sci., 2016.
[10] et al., "Biodegradation of high density polyethylene using Streptomyces species," J. Coast. Life Med., 2017, doi: 10.12980/jclm.5.2017j7-94.
[11] A. Paparella, B. Nawade, L. Shaltiel-Harpaz, and M. Ibdah, "A Review of the Botany, Volatile Composition, Biochemical and Molecular Aspects, and Traditional Uses of Laurus nobilis," Plants. 2022. doi: 10.3390/plants11091209.

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Techniques for Molecular Distillation, Thermo micro distillation and Micro distillation

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Abstract*—Due to their unique qualities, medicinal and aromatic herbs have become very significant. There are several substances with excellent medicinal efficacy that are exclusively found in the plant world. Large, bulky molecules that are very sensitive to processing conditions make up the majority of the components in these extracts and oils. Such extraction procedures have often been based on "recipes". Significant improvements have recently been achieved in the unit operations that make up the recipe-based procedures. It is crucial that these developments, known as "process intensification," which are fundamentally geared at obtaining higher yields at lower costs, be included into the processing of MAPs. The issue of process intensification as it relates to the processing of MAPs is introduced in this study, along with a review of many recent technological advancements that enable quick, efficient extraction. When such cutting-edge technologies are used, the quality of the end product and the yield per weight of the processed plant material may both significantly improve. The two methods that are available for recovering dis-solved essential oil components from steam distillation condensates are thoroughly explored.

***Index Terms*— Aromatic Plant,Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

Humans have valued phytochemicals made from aromatic and therapeutic plants for a very long time. Many scent and taste molecules were derived from sources of natural origin, such as flowers, roots, and stems, prior to the development of contemporary synthetic chemistry. The modern allopathic medical system, which has become very important in the treatment of many ailments, is mostly based on synthetically produced active pharmacological substances. However, in recent years more focus has been placed on the conventional medical practices used in Asia and Africa. Only lately have several therapeutic plants and their constituents been found. There are several substances with excellent medicinal efficacy that are exclusively found in the plant world. As a result, the only plant species from which vincristine, also known as the chemotherapeutic drug Oncovin, can be produced is the periwinkle plant Catharanthus roseus. Numerous additional substances are just as important in other industries, including food flavors, perfumes, and cosmetics [1], [2].

According to long-established "recipes," MAPs have been processed to provide the necessary extracts and oils. The majority of the ingredients in these extracts and oils are big, bulky molecules that are very sensitive to the conditions of processing. To preserve the integrity of the priceless components, such techniques often use moderate settings. Even while recipe-based techniques have been around for a while, they may not be the most effective in terms of production, energy use per unit of product, etc. Modern processing methods have made it urgently necessary to review recipe-based processing, comprehend the science behind it, and create cutting-edge, efficient procedures. This paper discusses some significant developments in MAP extraction as well as post-extraction processing of the end products and byproducts.Process Acceleration

The contemporary chemical industry is going through significant changes that are mostly being driven by economic factors. Clean, energy-efficient, and material-saving methods are gaining popularity. A significant and ongoing effort has been made worldwide to concentrate on "process intensification," a completely new discipline. A specific definition of PI by Stankiewicz and Moulijn is "Any chemical engineering development that results in a significantly smaller, cleaner, and more energy efficient technology." India has not lagged behind in the creation of novel PI ideas. According to Stankiewicz and Moulijn's definition of "processing of MAPs," PI may be roughly split into two groups. These are operations that make advantage of multifunctional and equipment that intensifies processes. Multiple-Purpose Equipment [3].

This subcategory of PI makes use of machinery that can do many tasks at once. As a result, such MF technology is replacing older process facilities that needed a variety of various instruments for certain functions. The conversion of a sluggish and wasteful process for the enzymatic hydrolysis of penicillin G to 6-amino penicillin acid into an enhanced and long-lasting process is an excellent illustration of the usage of MF equipment. MF equipment-based plants have gained popularity for internationally competitive and sustainable processes because they are more compact and use less energy.Equipment that intensifies processes

This kind of PI makes use of machinery that is specifically designed to accelerate the rates of individual processes. The diffusion of the active molecules through the plant cell membrane to the surface prior to extraction by the fluid is the principal obstacle in the total extraction process in the case of MAP processing. The approach of microwave-assisted

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extraction, which is explained in more depth later, is very useful for achieving quick and thorough extraction without significantly harming the active molecules. Another option is ultrasound-assisted extraction. This strategy does not appear practical, however, given that ultrasonic waves may generate free radicals and that many active molecules are vulnerable to such highly reactive species. MAPs Solvent Extraction

This procedure involves the liquid sol-vent extraction of solid MAPs. This is a standard method of solid-liquid extraction. The thermodynamics and kinetics of the operation are two elements that influence the volume and pace of extraction.Heat Transfer in Solvents Extraction and Solvent Selection [4]. The interactions between the solutes and the solvent determine the relative sorption of the solutes in the solvent. The relative solubility characteristics of a component and the solvent determine its solubility or miscibility. The free energy of mixing between two components, Gm, must be negative for them to be mutually soluble.

Since the original regular solution theory of Scatchard and Hildebrand was limited to non-polar, non-hydrogen bonding solute-solvent systems, the solubility parameter in equation is that which results exclusively from dispersive forces between structural units of the concerned solute and sol-vent. However, it is important to take into account the contributions of polar and hydrogen bonding forces for many liquids and solutes. The resulting equation is: Transfer of Solid-Liquid Mass. The MAPs that need to be treated are solids. A typical heterogeneous mass transfer process is solid-liquid extraction. The interface area and the mass transfer coefficient are two factors that affect the rate of extraction in such processes. Both need to be high. The solid material to be treated may be ground up to provide an interface region with a high effective surface area. The friction that results from comminution may raise the solid's temperature, potentially causing thermally labile components to deteriorate. Special water-cooled roll crushers are used to prevent this.

The intensity of turbulence in the extractor and the solute's diffusivity inside the solid matrix both affect the mass transfer coefficient. Percolation or extraction in agitated containers have been the main methods used in traditional extraction. When using percolation, the solid is put within a container that is also filled with solvent. The latter is let to percolate in a stagnant environment inside the solid matrix. Different kinds of agitators are employed in the extraction process in stirred vessels to suspend the solid in the solvent and quicken the mass transfer process. The solid's matrix is first absorbed by the solvent in both percolation and extraction in agitated containers. This sorption, which results in the matrix swelling, happens slowly. However, the diffusion coefficient rises many fold or even by an order of magnitude when the matrix is swollen in comparison to the dry matrix. The solute's diffusion through the solid matrix to the solid's surface is, obviously, the regulating process.

Depending on the velocity of transit from the solid surface into the bulk of the solvent, the solvent may dissolve the solute once it is present at the surface. This latter transport occurs mostly by molecular diffusion in percolation capillaries and is thus sluggish, but not as slowly as the transport through the solid matrix. On the other hand, the stirred containers provide a lot of turbulence and so make it easier to move into the bulk solvent phase. Diffusion through the solid matrix is the main barrier in percolation and agitated containers, respectively. It becomes evident that the mass transfer process may not be accelerated even in agitated containers with large power inputs. By rupturing the cells that hold the solute or oil and bringing them directly into touch with the solvent, it is preferable to improve the rate of transport through the solid matrix rather than concentrating on the transport at the solid surface [5].

Extraction Assisted by Microwave

The Fundamentals of Microwave Heating

Polar and polarizable material dipoles interact with microwave radiation. Rapid direction changes are caused by the combined forces of the electric and magnetic components. Polar molecules strive to align themselves in the new field direction, which causes them to get heated. The heating is inadequate in non-polar liquids devoid of polarizable groups. At the molecular level, this heat effect is almost instantaneous, although it is only present in a tiny region and depth close to the material's surface. The remaining material is warmed by conduction. As a result, big paper or groups of tiny paper cannot be cooked evenly using microwave heating. High power sources could be able to improve the penetration's depth. Once a microwave-absorbing substance is present, however, microwave radiation experiences an exponential decline. Table 1 lists the main industrial heating methods utilized and demonstrates that microwaves are the most effective method when compared to the others.

MAE Mechanism

When using a microwave to aid extraction:

1. Without being absorbed by the microwave-transparent solvent, the heat of the microwave irradiation is transferred directly to the solid;

2. the intense heating of step 1 causes instantaneous heating of the residual moisture in the solid that is microwave-absorbing;

3. The heated moisture evaporates, creating a high vapor pressure;

4. The vapor pressure generated by the moisture breaks the cell; and

5. The breaking of the cell walls releases the oil that was trapped inside of it.

Therefore, it is clear that the cell bursting removes the primary barrier to solid-liquid mass transfer, the solute's passage through the cell membrane. In addition to cell breakdown, microwave heating has the following

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advantages:

Research on MAE

Recent publications on MAE include some intriguing findings. For instance, it has been documented how to extract vanillin from V. planifolia pods using MAE and ultrasound-assisted extraction. The yield of vanillin was 5 weight percent during each of the three traditional extractions carried out over a 24-hour period using absolute ethanol as the solvent at room temperature. The yield with ultrasound-assisted extraction was 9 weight percent, compared to 6 weight percent with MAE. These in-depth investigations unmistakably shown that MAE is superior to alternative extraction methods in terms of yield, vanillin purity, and the time needed to extract the same volume of vanillin from the pods. A study on the extraction of vanillin and p-hydroxyl benzaldehyde from vanilla beans using MAE found that it was more effective than the traditional, accepted process in Mexico, which includes macerating the beans in ethanol for 12 hours. In comparison to the Mexican extraction approach, extraction time was reduced by 62 times, while vanillin and PHB concentrations rose by 40% to 50%. This investigation also shown that commercial samples may be extracted more effectively than dried and lyophilized beans. This finding illustrates how moisture helps with extraction. Several further studies have shown that MAE has become popular as a moderate and manageable processing technique. MAE is a straightforward, quick, and solvent-light technique[6], [7].

Commercial-grade MAE

As was already noted, within a solid matrix, microwave radiation decays exponentially. When developing MAE for industrial use, this factor must be carefully considered. The following are the main criteria that must be satisfied: The solid bed's paper may be heated evenly thanks to the free dispersion of the paper. This criterion also improves the extent and likelihood of the substrate's closeness to the sample holder's wall, which is where the microwave exposure is greatest. Most comminuted MAP samples used for commercial extraction are not uniform in size or shape. As a result, there is a significant propensity to "segregate," which must be prevented by routine layer regeneration.

Hydro distillation Assisted by Microwave

Essential oils may also be produced by effectively heating solid materials using microwave radiation. In a microwave chamber, the herb is then exposed to microwave radiation. Compared to hydrodistillation, this method produces essential oils with comparatively low volatile fractions. For instance, tetradecanoic and hexadecanoic acid percentages rose whereas linalool percentages fell in coriander oil. Linalool, a tertiary alcohol, has a low stability, which may be the cause of this. There were more compounds with higher boiling points and fewer compounds with poorer stability in the dill seed oil produced by microwave-assisted hydrodistillation. These and other data show that MWAHD is more effective at removing components with high boiling points that are stable, while it is less effective at recovering chemicals that are chemically unstable.

Short Path Distillation or Molecular Distillation

A somewhat well-known method is molecular distillation, commonly referred to as short route distillation. Due to this, the discussion of MD is limited to its foundation, benefits, and uses in the processing of MAPs.

Fundamentals of MD

A non-equilibrium process is referred to as MD. An evaporating surface and a condensing surface are relatively near together on the still in use. This leads to a condition at extremely low pressures where the evaporating molecules' distance traveled is equivalent to their mean free route. This specific circumstance in which the purported distillation is conducted is whence the nomenclature MD is obtained.

II. DISCUSSION

Benefits of MD

MD's Separation Efficiency

Agitated fi lm MD units outperform those without fi lm agitation for high viscosity liquids dropping under gravity. This is because agitating the film renews the surface more often than when there isn't agitation, especially for high viscosity liquids. The efficiency of MD stills without mechanical control may be predicted using the surface renewal model[8].

Factors that Influence the MD Process

The effectiveness of MD is negatively impacted by the presence of low-boiling volatiles as well as dissolved air, moisture, or other gasses in the feed material. This is because the condensing surface is covered by the non-condensable components. Higher efficiency is produced by a larger temperature differential between the condensing and evaporating surfaces. High viscosity liquids produce thick liquid films and, as a result, are less efficient. In general, the relative volatility of organics rises as pressure decreases, especially in the extremely low-pressure range that is typical of MD. Low operating pressure hence typically results in improved efficiency.

Common MD Application

Concretes produced from solid-liquid extraction are often transformed into absolutes by being dissolved in aqueous alcohol solvents, and the waxes are then precipitated by cooling to below-freezing temperatures. Because refrigeration requires electrical energy, this procedure is quite energy intensive.

Recovery of Dissolved Essential Oils from Condensates of Steam Distillation

The primary requirement of the method used to produce essential oils is that the finished product must closely reflect

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the natural scent and flavor of the source, which is a mixture of many compounds with diverse organoleptic properties. The main components of the overall scent and flavor are oxidized organic compounds such aldehydes, alcohols, ketones, and esters. To mimic the natural scent and flavor of the original natural product, the generated essential oil should ideally have all these ingredients in the same ratios as in the original natural product. For instance, solvent-extracted rose oil has more than 60 wt% PEA whereas steam-distilled rose oil has less than 1 wt% PEA. The steam distillation condensate often smells like oil, which is a typical observation. This condensate thus has some value. The only way the distiller likely receives the value of the condensate is via the selling of rose water for use in weddings in the subcontinent. The condensate is squandered in almost every other situation. For several essential oils, the values of wasted oil in the condensate in India are estimated.

Because oil is not physically transported with the condensate, the estimate is cautious. Even this conservative estimate is staggering, and it is crucial in the socioeconomic context of emerging nations like India where marginal farmers are the primary producers of the nation's output. Small farmers will get a large bonus from the value of the recovered oil from central distillation facilities and the pro rata division of value, which will undoubtedly halt the downward trend. Mentha arvensis makes a significant contribution. If the relatively high-value flavor business is taken into account, the value of wasted oil for India alone may possibly top $100 million. A preliminary calculation puts the total for the South East Asian nations at above US$ 160 million. The fact that these figures are basic statistics must be emphasized. They in no way reflect the significant value that may be acquired when the recovered oil is mixed with the primary distilled oil fraction to produce a premium grade of the particular essential oil[9].

Process of Polymeric Adsorption

The literature has described a number of methods that may be utilized to recover the dissolved compounds, including cohobation, poroplast extraction, and adsorption. Utilizing polymeric adsorbents to recover dissolved essential oil constituents is advantageous. It has been conclusively shown by several investigators that adsorption is useful in this situation. According to one investigation, even though cis-rose oxide could not be discovered in the condensate, it was present in the recovered oil.

These studies demonstrate that it is possible to extract more than 95% of the oil present in the condensate. Hard cross-linked macro reticular beads, which are essentially indestructible in adsorption-regeneration cycles, are the polymeric adsorbents that are used. The breakthrough may be detected by smelling the water pouring out of the adsorbent bed, therefore the approach is easy to apply and does not need complicated apparatus. Low-boiling alcohols or ketones may be used to regenerate the used bed, and the eluate can then be distilled in a short distillation column to produce a reasonably high boiling oil fraction [10], [11].

Process of Pervaporation

In circumstances requiring recovery from somewhat diluted aqueous solutions, membrane separation methods have drawn more and more attention. One such procedure that produces very high selectivity in the much-diluted solution region is pervaporation. High organophilic polymer affinity essential oil components may be extracted with very high selectivities. In research, the Mentha condensate water was tested in the pervaporation mode and silicone rubber membranes produced bold menthol crystals. For basil water, similar outcomes were also attained. Later research revealed that phase separation occurs as a consequence of the great selectivity of well-chosen membranes producing permeate concentrations much in excess of the organics' solubility limit. It is possible to immediately recover the distinct oil layer and combine it with the main oil fraction to create premium grade oil. A schematic of the recovery of dissolved essential oils in the condensate via pervaporation. It is clear that this method uses a closed-loop system, with only treated water leaving the battery's boundaries. Another benefit for the processor is the much reduced biochemical and chemical oxygen demands of this processed water.

III. CONCLUSION

There have been discussions about a number of innovative methods for the efficient and affordable extraction of medicinal and aromatic plants. For producing extracts under moderate circumstances, microwave-assisted extraction is quite effective. Since the thermally labile active components may be retrieved with little harm, MAE is especially significant. It is estimated that valuable fragrance components are lost in steam distillation condensates on a yearly basis in India alone to the tune of US$ 50 million. Adsorptive and membrane-based pervaporation techniques are effective in recovering almost all of the oil that is lost with the condensate water. The recovered oil may either be sold on its own or combined with the main oil fraction to provide an aroma that is considerably more natural and hence valuable. Even small farmers will benefit much from the recovered oil, therefore this strategy has to be carefully evaluated.

REFERENCES

[1] O. Ketenoglu and A. Tekin, “Applications of molecular distillation technique in food products,” Italian Journal of Food Science. 2015.

[2] M. B. Santos, L. Sillero, D. A. Gatto, and J. Labidi, “Bioactive molecules in wood extractives: Methods of extraction and separation, a review,” Industrial Crops and Products. 2022. doi: 10.1016/j.indcrop.2022.115231.

[3] Y. Xiong, Z. Zhao, L. Zhu, Y. Chen, H. Ji, and D. Yang, “Removal of three kinds of phthalates from sweet

orange oil by molecular distillation," LWT, 2013, doi: 10.1016/j.lwt.2013.04.012.
[4] M. Kurkcuoglu and K. H. C. Baser, "Studies on Turkish rose concrete, absolute, and hydrosol," Chem. Nat. Compd., 2003, doi: 10.1023/B:CONC.0000011120.71479.7f.
[5] M. Kurkcuoglu and K. H. C. Baser, "Studies on Turkish rose concrete, absolute and hydrosol," Khimiya Prir. Soedin., 2003.
[6] J. Glassett and J. Rankin, "ETHANOL DEHYDRATION.," Gasoh. U.S.A., 1981, doi: 10.15446/ing.investig.v24n3.14610.
[7] M. Perrut and V. Perrut, "Towards ingredients by combining Supercritical Fluids with other processes," J. Supercrit. Fluids, 2018, doi: 10.1016/j.supflu.2017.11.019.
[8] Á. M. Idárraga-Vélez, G. A. Orozco, and I. D. Gil-Chaves, "A systematic review of mathematical modeling for molecular distillation technologies," Chemical Engineering and Processing - Process Intensification. 2023. doi: 10.1016/j.cep.2023.109289.
[9] S. U. K. Reddy Sagili et al., "Optimization of wiped-film short path molecular distillation for recovery of cannabinoids from cannabis oil using response surface methodology," Ind. Crops Prod., 2023, doi: 10.1016/j.indcrop.2023.116442.
[10] J. S. Kim, "Production, separation and applications of phenolic-rich bio-oil - A review," Bioresource Technology. 2015. doi: 10.1016/j.biortech.2014.08.121.
[11] D. M. Coutinho, D. França, G. Vanini, A. O. Gomes, and D. A. Azevedo, "Understanding the molecular composition of petroleum and its distillation cuts," Fuel, 2022, doi: 10.1016/j.fuel.2021.122594.

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Fundamentals and Applications of Supercritical Fluid Extraction of Medicinal and Aromatic Plants

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Abstract*—In light of the advancement of this separation process at an industrial scale, the key challenges surrounding the supercritical fluid extraction of medicinal and aromatic plants are explored. The functions of thermodynamics and mass transfer characteristics are highlighted after a short introduction to supercritical fluid extraction, and the impacts of the key operational variables on product recovery are briefly looked at. Economic assessment is offered together with fundamental equipment requirements and technological principles. Last but not least, a brief literature review of effective supercritical extraction methods of medicinal and aromatic plants is presented, and a look forward is provided.

***Index Terms*— Aromatic Plant,Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

Supercritical fluids have drawn more attention as alternative solvents for the extraction of naturally occurring bioactive compounds from plants in the second half of the 20th century. The ability to conduct extractions at temperatures close to ambient, avoiding thermal denaturation of the target chemical, was the fundamental driver of interest in supercritical fluid extraction. A book presents a detailed analysis of the outcomes attained up to the early 1980s. Even if the technical-economical evaluation and the design requirements for the large-scale deployment of SFE were still lacking, it is clear that the principles of this novel extraction method were already understood by that point. It is now conceivable to declare that such accomplishments are within reach after twenty years of study and development, making SFE an established unit operation for extraction and separation. Its design and working principles are also well known, making it viable for use in the extraction of aromatic and medicinal plants[1], [2].

The Supercritical Fluids

A fluid in supercritical condition, also known as a dense gas, is a fluid that is, to some extent, above both its critical temperature and pressure. For a fluid to be supercritical, the reduced temperature Tr must not exceed and the reduced pressure Pr may not be higher than the maximum permitted by technological constraints. Any fluid may attain its supercritical state under the right circumstances. The only ones that can be employed as substitute solvents for the extraction of MAPs are those with critical temperatures that are close to ambient temperature. The most alluring solvent is carbon dioxide, with TC=36° C and PC=71 bar, due to its characteristics in terms of toxicity, flammability, and affordability [3].

If high solubility is needed on the one hand to lower the amount of solvent used per unit of product extracted, selectivity must be as far away from 1 as feasible to guarantee that the target material is extracted as pure rather than mixed with other substances. In conclusion, it is crucial to appropriately address both the solubility and selectivity challenges in order to create a viable SFE method for MAPs. Returning to CO2, it is important to keep in mind that this solvent is very non-selective: if a set of related substances can be dissolved, all of them are extracted to a comparable degree as long as they have related polarities.

It may be concluded that a good and pure solvent is more selective than CO2 alone. It is also important to note that by utilizing an organic solvent as the entrainer, also known as the co-solvent, with the purpose of altering chemical interactions between CO2 and the material to be dissolved in it, CO2 capacity and selectivity may be increased. However, doing so makes the SFE process more difficult since a new chemical component has to be added. However, owing to the remarkable selectivity shown by supercritical CO2 in this regard, the co-solvent may be readily removed from the product downstream[4], [5].

Processes SFE

A SFE procedure for extracting MAPs consists mostly of two parts. In an extraction device, the feed that contains the desired material, denoted by A, comes into contact with supercritical CO2 at the proper temperature and pressure. Component A must be recovered from the supercritical solution, which is often diluted for the reasons outlined in the preceding section, in order to be selectively extracted in this straightforward technique. In the separation stage, where product recovery takes place, temperature and pressure may be changed to maximize the quantity of a generated.

It should be noted that, in order to save operating expenses, the solvent must be recycled and pumped back to the extractor after the recovery of the product of interest owing to the poor solubility in supercritical CO2. It is also noteworthy that the separator may work at the same pressure or temperature as the extractor, which is the optimal scenario determined by a financial analysis of the total cost of production. Product separation is accomplished by

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depressurization if the temperature is maintained constant, and the system needs mechanical energy to be supplied to elevate the CO2 pressure from the separator to the extractor conditions. On the other hand, by raising the temperature, extracted products may be separated from CO2; thermal energy must be provided in this scenario, where the circulation of the solvent is possible under almost isobaric circumstances. Of course, there are more complicated ways to accomplish the separation of products from CO2 for instance, by varying the temperature and pressure as the fluid moves from the extractor to the separator sectors or by using a solid to facilitate adsorption-based separation[6], [7].

If, as is often the case, a large number of chemicals are extracted by CO2 during extraction circumstances due to reduced CO2 selectivity, their fractionation may still be accomplished in the separation section by simply using several separators that are run under various conditions. As shown, a single extraction may yield many fractions with various characteristics. Finally, for the purpose of clarity, a multiple extractor system may also be imagined, depicted with only one separation step. When the substances to be extracted, like in the case of SFE of MAPs, are embedded in a solid matrix that is first put in the extraction vessel as a fixed bed, this design is very helpful. Depending on the needs, the extractors in this scenario might be linked either in parallel or in series. A book by Brunner that is referenced in the bibliography provides further information on the evolution of SFE procedures. SFE of solids is a semi batch operation that may also be used to provide continuous production in a simulated moving bed setup.

The extractor yield, or the quantity of the substance of interest extracted relative to the total amount originally contained in the solid, is plotted versus extraction time in Figure 6 to illustrate typical extraction trends from solid materials. The extraction of the material "readily available" to supercritical CO2 corresponds to a straight line, while the extraction of the component connected to the solid matrix corresponds to an asymptotic curve. The profiles, which are steeper at higher temperatures, include two sections. Solubility limits extraction in the first scenario, but mass transport qualities are significant, may be restrictive, and are essential for the success of SFE in the second scenario [8], [9].

Closures and seals need to be handled with extra care. The majority of SFE for MAPs is an extraction process from solid materials that is done in batch or semi batch mode. Therefore, multiple times during the day, extraction containers must be inflated, depressurized, opened, filled, and closed again. Gaskets like O-rings are helpful, and closure devices have been specially engineered to assure quick and secure operating processes and dependable seals. Once again, the necessary technology is already completely created. For further information, see the book by Bertucco and Vetter. The book also discusses pumps and compressors, two pieces of equipment used to move fluids under pressure. We come to the conclusion that it is not really a problem to build up a laboratory-scale apparatus with which to carry out feasibility studies about the potential to apply SFE to MAPs, and that it can be done for a relatively low capital cost. However, this does not imply that SFE of MAPs is an economically advantageous process in and of itself. Before scaling up a process whose technical viability has been shown at the laboratory level, an accurate assessment of production costs, including both capital and utility expenses, must be made. Although mainly illustrative, costs are also included in the book by Bertucco and Vetter. The reader should keep in mind that capital expenses have been declining considerably over the last several years[10], [11].

II. CONCLUSION

SFE with CO2 is a technically sound and potentially profitable method for removing bioactive components from MAPs. It is possible to get organic products devoid of organic solvents, and the low working temperature allows for the preservation of all of their inherent qualities. At the laboratory size, the feasibility study for certain goods may be completed rather quickly. To use SFE at the industrial level, nevertheless, a precise assessment of production costs, including both capital and operational ones, must be made.

REFERENCES

[1] S. Indra Wahyuni and E. Fitri Lubis, “Analisis Disiplin Kerja Karyawan Pada Pt. Kharisma Dayung Utara Pekanbaru,” Molecules, 2020.
[2] K. B. Sastrawan And K. H. Primayana, “Urgensi Pendidikan Humanisme Dalam Bingkai A Whole Person,” J. Pendidik. Agama Hindu, 2020.
[3] D. A. Ofori, P. Anjarwalla, And L. Mwaura, “Asuhan Keperawatan Pada Pasien Dengan Gagal Ginjal Kronis Yang Di Rawat Di Rumah Sakit,” Molecules, 2020.
[4] H. Gustina, “Pengaruh Minat Belajar Terhadap Hasil Belajar Siswa Kelas V Pada Mata Pelajaran Matematika Di Sekolah Dasar Negeri 68 Kota Bengkulu Skripsi,” Molecules, 2020.
[5] F. B. Lestari, “Pengaruh Online Customer Review Dan Online Customer Rating Terhadap Keputusan Pembelian Konsumen Marketplace Di Kota Tegal,” Molecules, 2020.
[6] E. E. E. Erlina, “Asuhan Keperawatan Pada Pasien Dengan Tb Paru Di Puskesmas Siak Hulu I Kabupaten Kampar,” Molecules, 2020.
[7] N. Z. Npm, “Pengaruh Pengetahuan Akuntansi, Tingkat Pendidikan, Motivasi Kerja Dan Pengalaman Usaha Terhadap Penggunaan Informasi Akuntansi Pada Pelaku Umkm (Studi Pada Pelaku Umkm Di Kecamatan Bojong),” Skripsi Akunt., 2020.
[8] D. A. Lestari, “Pengaruh Kredit Usaha Rakyat (Kur), Modal Sendiri, Lama Usaha, Dan Jumlah Tenaga Kerja Terhadap Pendapatan Umkm Di Kabupaten Tegal,” Molecules, 2020.
[9] N. Mufidah And I. Rohima I, “Pengajaran Kosa Kata Untuk Mahasiswa Kelas Intensif Bahasa Arab,” Uniqbu J. Soc. Sci., 2020.
[10] B. Waji, “Gambaran Tingkat Pengetahuan Tentang Swamedikasi Nyeri Haid Primer Pada Mahasiswi Baru Di Universitas Islam Negeri Maulana Malik Ibrahim Malang,” Skripsi, 2020.

[11] "Asuhan Keperawatan Pasien Dengan Efusi Pleura Yang Di Rawat Di Rumah Sakit," Molecules, 2020.

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Process-Scale for the Analysis of Medicinal and Aromatic Plants, High Performance Liquid Chromatography

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***Abstract*—The pharmaceutical sector and chromatographers both often utilize high performance liquid chromatography for the exact and accurate examination of substances and medications of various types. The medical and aromatic plant industries may employ the methodical scale-up from analytical to preparative and process scale and then scale-up further to industrial size to isolate and purify phytomolecules of medicinal and commercial relevance. Process-scale HPLC has grown in relevance as a purification method as the demand for phytomolecules has been steadily rising. We explore the practical features of process-scale HPLC in this paper with an emphasis on nomenclature, operational issues, benefits, and how this technology is used to medicinal and aromatic plants.**

***Index Terms*— Aromatic Plant,Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

The word "liquid chromatography" applies to a variety of chromatographic methods, including size exclusion, ion-exchange, liquid-liquid, and liquid-solid chromatography. Glass column chromatography is an illustration of traditional liquid column chromatography in which the mobile phase percolates through a glass column containing a finely separated stationary phase while flowing through it with gravity. Due to the availability of characteristics like fast separation and great resolving power in high performance liquid chromatography systems, liquid chromatography has surpassed gas chromatography[1]. Continuous monitoring of column effluent, qualitative and quantitative measures, and data management via automation are all included.

Since Csaba Horvath of Yale University built the first HPLC device in 1964, this technology has advanced significantly. Preparative mode HPLC may be used in pharmaceutical development for chemical isolation as part of a methodical scale-up process or for troubleshooting. Prep-HPLC has grown in significance as a purification technique in pharmaceutical manufacturing. Chromatographic separation may lower the amount of an enantiomer in a racemic mixture and can eliminate contaminants with various polarities. Crystallization may be utilized in each of these situations to create the pure result. The development of well-automated preparative chromatographic procedures is a crucial but difficult undertaking since bench to pilot scale manufacturing of natural products requires some level of automation [2].

The advancement of natural product chemistry was significantly aided by innovations in HPLC, from preparative to micro-analytical. In phytochemistry, HPLC is often used to check the ultimate purity of the isolated chemicals and to pilot the preparative-scale separation of natural products. Over the last 20 years, hyphenated methods linked to this effective separation method have developed, giving rise to potent new instruments including LC/UV-photodiode array detection, LC/mass spectrometry, and LC/NMR. The capture of data on an interest LC peak within a complicated mixture has been made feasible by the combination of high separation efficiency of HPLC with these various detectors.

HPLC Theoretical Elements

Chemical compounds are separated by transferring the mobile phase, which contains the component mixture, through the stationary phase, which is made up of a column filled with solid paper. Physical and chemical forces between the solute and the two phases acting on the chromatographic column are what induce retention. The difference in the strength of the forces that cause retention causes resolution and, ultimately, the separation of the separate solutes. The distribution of solutes between the two phases causes the separation of compounds[3].

Classification of Chromatography

Adsorption chromatography, partition chromatography, ion exchange chromatography, size exclusion chromatography, and affinity chromatography are the several types of chromatography that may be categorized based on the mechanism of separation. Adsorption and partition chromatography are the major factors that control separation in HPLC. In partition chromatography, separation is primarily based on the difference between the solubility of sample components in the stationary phase and the mobile phase. In adsorption chromatography, separation is based on the difference between the adsorption affinities of the sample components on the surface of an active site. According to the operation approaches, there are two types of analysis: gradient and isocratic. In an isocratic analysis, the mobile

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phase's composition is maintained throughout the elution process.

Gradient elution involves a continuous or gradual change in the mobile phase's composition throughout the elution procedure. Additionally, HPLC may be divided into subcategories based on specialized methods like reverse phase and normal phase chromatography. When the mobile phase is much more polar than the stationary phase, reverse phase elution is utilized in liquid chromatography. The stationary phase is more polar than the mobile phase in the standard phase technique, on the other hand. Oils, fats, and other lipophilic compounds are separated using normal phase chromatography. The mobile solvents n-hexane, heptane, chloroform, and alcohols are often used. Reverse phase chromatography, which uses an aqueous combination with methanol, acetonitrile, and additives, is used to separate the majority of biological compounds[4].

The following elements are found in an HPLC system:

1) Reservoir: This is intended for portable solvents. The most widely used organic modifiers are acetonitrile, methanol, heptane, isopropanol, and cyclohexane. For superior chromatographic findings, ion-pairing reagents such as trifluoroacetic acid, heptafluorobutyric acid, phosphoric acid, and triethylamine phosphate are used. Every piece of tubing and fittings have to be chemically inert. A 5-m filter unit must be used to filter the solvent.

2) Degasser: The mobile phase should be devoid of air bubbles throughout analytical processes. A degasser is used for this reason.

3) Pumps: These are the mechanisms that provide the mobile solvent to the separation system at a predetermined flow rate. Reciprocating pumps are used in HPLC; these pumps may have one or more chambers, from which the mobile phase is expelled by pistons or diaphragms that move back and forth. On a single-headed two-pump system, a chosen mixing of two solvents produces binary gradients. The microprocessor is in charge of maintaining the gradient's accuracy.

4) Injector/auto sampler: This apparatus adds a liquid sample to the chromatographic bed or the mobile phase. An auto sampler is a labor-saving tool since it can carry out repetitive tasks without an operator present.

5) Column of guards: This serves as the main column's protection.

6) Detectors: For all molecules, there is no one-size-fits-all detector. However, different detectors are used depending on the properties of the molecules under investigation.

7) A fraction counter: During the chromatographic run, this device gathers the fractions containing the target molecules.

8) Records: To get chromatographic data, a computer is utilized.

Preparedness HPLC

The most potent and adaptable technique for isolating and purifying complex chemicals utilized in drug development investigations is preparative chromatography. The following considerations must be made in order to do preparative HPLC in order to maximize sample load on a small column and optimize separation. Following the choice of the proper chromatographic mode, the separation is optimized using the stationary phase, mobile phase, temperature, and additives. The next phase is throughput optimization, which includes sample size and column overloading. To produce the desired chemical, the separation process is scaled up incrementally in the final phase[5].

The small-scale separation, packing material size, column size, mobile solvent, and instrument capabilities must all be optimized in order to achieve the necessary throughput. Normal-phase methods are the first option because: it is possible to directly transfer from normal-phase thin-layer LC or HPLC to prep-LC; the cost of RP packing materials is still high; cleaning normal-phase silica is simpler because the material is more robust; removing organic solvents commonly used in normal-phase chromatography from the final product solution is simpler than removing water from an RP chromatographic fracture and can be accomplished at lower temperatures and pressures; and The stationary phase material's ppaper size significantly affects the separation of the target chemicals. It is not possible to employ 5-m paper in a preparative column since doing so raises column pressure and is very costly. Additionally, there is no difference in the resolution capabilities of 5-m and 15-m paper when the sample size is increased[6].

Loading of Samples

A scale-up to a higher column diameter may be carried out on prep-HPLC if the testing on analytical columns with analytical loadings reveal excellent separations. Scaling up gradually is preferable than going straight to the maximum column diameter. The transfer of the analytical separation method to a 5 cm i.d. preparative LC column is the first stage in the scaling-up process. A preparative column optimization is necessary. Depending on the degree of the separation accomplished, the quality of the starting material, and the specifications for the pure result, the sample injected onto the column typically ranges from 1 g to 20 g. Start with the 1-g injection, collect fractions, and re-analyze them using the analytical procedure to check for purity since the resolution decreases as sample loading increases.

Time of Separation

The stationary phase in preparative separations is typically recovered and used once again to purify the subsequent batch of the same chemical. Instead of the packing material, the solvent is often the main operational expense in preparative LC. So, while developing and scaling up a procedure, the solvent choice is crucial. Isocratic mixtures or gradient water elution with organic solvents are used depending on the degree of separation required. Although gradient elution runs faster than isocratic elution, sometimes the quality of the isolates is jeopardized[7].

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Solvent Constituents

Oftentimes, preparative separations employ methanol. It is a cheap and highly polar solvent that is often employed in RP separations as the mobile phase in conjunction with water. To eliminate adsorbed polar pollutants, normal-phase silica columns may be flushed with methanol. It may also be readily extracted from a variety of combinations. Acetonitrile produces superior peaks in RP applications but is often too costly for process-scale separations. Finding an acceptable separation is one of the scale-up process's early objectives. The price of solvents becomes a key criterion when analysts discover many sets of relevant conditions. Typically, the choice of solvent is made when developing the original procedure using analytical-scale columns with a 4-mm i.d. Even in later phases of development, one might sometimes choose a solvent systematically when the total cost of the items is crucial to the final result.

Steps in a Wash

Impurities that are late-eluted may contaminate the collected fractions of the succeeding separation, and impurities that accumulate on the column can reduce the resolution of the subsequent separation. Washing procedures are therefore often used in between chromatographic runs. It is sometimes required to boost the resolution for challenging separation issues using solvent gradients and recycling procedures. Strongly held contaminants may sometimes be removed via temperature programming.

Recycling

For improved preparative separation of complicated chemical mixtures, gradients and recycling stages are sometimes needed[8].

Crude Extract Purity

The fact that the plant material or enhanced fraction employed during method development had been generated in analytical scale and varies in solubility and impurity from the material that is being processed in pilot scale is a frequent difficulty faced in process scale-up. The plant material used in processes may be of a worse quality, contain more of the same pollutants, or even develop new impurities in certain cases. Before beginning the process-scale separation, the chromatographer must repeat the separation procedure at the analytical scale if the impurity profile reveals higher levels of the same contaminants or new impurities.

A chemical may not dissolve well enough in the weak solvent selected during optimization if it exhibits better purity during a process scale-up. In this case, productivity may not be as high as anticipated due to the less quantity that will be separated in each cycle. Because scale-up is linear, chromatographic runs at preparative and analytical scales take the same amount of time, and the material is not overstressed in the separation apparatus.

Removal of Chromatographic Solvent

The final work-up after the separation step is removal of the chromatographic solvent. The desired fraction collected is a solution which contains the substance of interest in the range of a small percent by weight and, therefore, large amounts of solvent must be removed. The evaporation of solvents, especially water, takes time, so the purified drug substance can be changed or even destroyed during the concentration process. This step should be performed with care considering the thermal stability of the compound of interest[9].

Temperature Variation from Laboratory to Pilot Scale

It is useful to test the temperature stability of the substance during analytical method development. Temperature also influences the separation performance. For example, the mixing of organic solvents before they enter the column can result in a strong increase or decrease in solvent temperature and can influence the operating temperatures of the mixing unit and column. Temperature effects at the center of the column caused by heat dissipation can also influence the separation and ultimately the purity of isolates.

Increase in Pump Pressure Due to Accumulation of Impurities on the Column

Another problem that often occurs during the first separation in process scale is that some impurities accumulate on the column during a series of sequential runs. The quality of the separation deteriorates during the sequence. Because the fraction collection is commonly controlled by peak height, a UV detector does not detect this problem and the purity of the fractions decreases. When impurities accumulate on the column, the peak shapes or the retention times of the components of interest might change, so the chromatographer can see quality problems. Unfortunately, sometimes peak shapes and retention times show no changes. An addition-al indicator that impurities have accumulated on the column is a pressure increase; therefore, it is helpful to monitor column pressure. The increase in pressure is commonly related to instrument failure[10], [11].

II. CONCLUSION

Stepwise scale-up starting with analytical scale to process scale is an important issue that needs to be considered. Optimization of operating conditions is always useful for getting high purity phytomolecules. Thus, process-scale HPLC is the choice for isolating valuable molecules with desired purity for commercialization. Its significance will continue to grow because of the increasing requirements for high-purity molecules.

REFERENCES

[1] S. R. Amna, “Formulasi Dan Evaluasi Sediaan Nanoemul Gel Minyak Atsiri Sereh Wangi (Cymbopogon Nardus L.) Yang Berpotensi Sebagai Anti Jerawat,” Molecules, 2020.

[2] W. Darmalaksana, "Template Penulisan Artikel Hadis Dengan Pendekatan Design Thinking," Fak. Ushuluddin Uin Sunan Gunung Djati Bandung, 2020.
[3] H. O. Yeni, C. Anggraini, And F. Meilina, "Upaya Meningkatkan Hasil Belajar Siswa Dalam Pembelajaran Ipa Dengan Menggunakan Media Visual Pada Siswa Kelas Iv Sdn 002 Tebing Kabupaten Karimun Tahun Ajaran 2017/2018," J. Pendidik. Minda, 2020.
[4] Andrei-Dragoş, "Decentralized Finance (Defi) – The Lego Of Finance," Molecules, 2020.
[5] O. A. Saliem, "Analisis Pengaruh Promosi Melalui Digital Marketing Dan Labelisasi Halal Produk Terhadap Keputusan Pembelian Dalam Perspektif Ekonomi Islam," Molecules, 2020.
[6] N. Anjarwall, "Asuhan Keperawatan Pada Pasien Stroke Non Hemoragik Dengan Ketidakefektifan Pefusi Jaringan Serebral Diruang Krissan Rsud Bangil Pasuruan," Molecules, 2020.
[7] A. Wateh, "Kepuasan Pasien Terhadap Pelayanan Informasi Obat Pada Swamedikasi Di Apotek Merjosari Kota Malang," Molecules, 2020.
[8] C. V. Gesell, "Hábitos Alimentarios De Los Estudiantes De Educación Superior Chile Durante Confinamiento Por Covid-19," Molecules, 2020.
[9] Irawati, "Asuhan Keperawatan Pada Ny. R Dengan Masalah Gastritisdi Puskesmas Rawat Inap Kampar Kiri Karya," Molecules, 2020.
[10] F. N. D. D. Da Educação, "Resolução No 06, De 08 De Maio De 2020," Ministério Da Educ., 2020.
[11] L. D. Jayanti And R. T. S. Hariyati, "Pengembangan Sistem Informasi Manajemen Dengan Integrated Clinical Pathway Terhadap Mutu Pelayanan Keperawatan," Molecules, 2020.

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Regulation of Breathing, Transfer of O2 and CO2 and Mechanism of Respiration

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Abstract*—A quick method of preparative column chromatography, flash chromatography makes use of prepackaged columns through which a solvent is fed at a fast flow rate. Flash chromatography makes use of both isocratic and gradient solvent systems. In the isocratic system, the necessary separation is achieved by a single-strength mobile phase. Complex samples including substances with a wide range of column retention durations are best suited for the gradient method, in which the solvent composition varies during the elution process.

***Index Terms*— Aromatic Plant,Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

The ideal flow rate for a flash separation depends on the column's size and ppaper size. Normal phase flash chromatography typically uses polar sorbents and non-polar elution solvents. The stationary phase and mobile phase in re-verse phase chromatography are non-polar and polar, respectively. The non-polar functional groups of compounds interact with the non-polar groups on the packing surface to retain them.

As a result, the more polar molecules elute first, followed by those that are less polar in sequence. One must choose a sorbent that successfully holds the target chemicals at solvent conditions suitable for the sample's solubility in order to accomplish the required separation. Wet loading or dry loading may be used to load samples onto a flash column.

In 1901, Russian scientist Mikhail SemyonovichTsvet developed the first chroma-graphic method while studying chlorophyll. He separated plant pigments using a calcium carbonate-containing liquid adsorption column. The technique was introduced on December 30, 1901, in St. Petersburg during the XIth Congress of Naturalists and Doctors. The first written description appeared in the biology part of the Proceedings of the Warsaw Society of Naturalists in 1903. In his two studies on chlorophyll published in the German botanical magazine Berichte der DeutschenBotanischenGesellschaft in 1906, he first used the word "chromatography" in print [1].

For developing partition chromatography, Archer John Portor Martin and Richard Laurence Mil-lington Synge received the 1952 Nobel Prize in Chemistry. Since then, the method has rapidly improved. The concepts underpinning Tsvet's chromatography have been shown to be applicable in several ways, giving birth to the various types of chromatography and enabling the resolution of increasingly similar molecules.

Chromatography in flash

Medium pressure chromatography, commonly referred to as flash chromatography, is a quick method of preparative column chromatography that makes use of prepackaged, optimized columns that are pumped with a high flow rate of solvent. W. First created it in 1978. According to C. Stills of Columbia University in New York, USA, normal phase flash chromatography is presently a technique for purification and separation. A greater variety of preparative separations are now possible using the approach because to the use of reverse phase packing materials. Currently, it is thought to be a straightforward and affordable method of preparative liquid chromatography. There are two ways that flash chromatography is different from traditional methods. First, silica gel paper that are a little bit smaller are employed. Second, compressed gas is employed to force the solvent through the stationary phase column owing to the restricted flow of solvents induced by the tiny gel ppaper size. The end product is chromatography that is quick and precise.

Flash Chromatography Theory

Chromatography is a separation technique that separates the components in a mixture by taking use of the differences in partitioning behavior between a mobile phase and a stationary phase. A mixture's constituent compounds may interact with the stationary phase by adsorption, relative solubility, or charge. A substance's retention is a measure of how quickly it travels through a chromatographic system. Retention is often assessed as the retention time, or the interval between injection and detection, in continuous development systems like high performance LC and gas chromatography where the compounds are eluted with the eluents. Retention is calculated as the retention factor, or the run length of the drug divided by the run length of the eluent front, in continuous development systems like thin layer chromatography[2]:

The amount of solvent needed to completely cover all of the adsorbent pores and interstitial spaces between adsorbent paper in a particular column is known as the column volume. The number of CV is used to represent the volume needed to

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elute an interesting chemical from a column. Column volume difference is the volume that separates the elution of two substances from the same volume. The target compound of interest should elute in 3-6 CV, and the solvent system should isolate this component from others that are closest to it by a CV larger than 1. Given that the ratio of CV to Rf for a particular chemical is 1/ Rf, CV for two compounds equals 1/ Rf1 - 1/ Rf2. A weakly held, quickly eluting component with an Rf= may be removed under a certain set of separation circumstances in little over 1 CV, but a highly maintained, slowly eluting component

Solvent conditions that yield an adequate TLC separation may not always work well for flash chromatography without adjustment due to issues including change in the TLC solvent flow rate with respect to time and interference from adhesives used to bind TLC sorbents. The actions listed below assist in streamlining the process of changing a TLC solvent system into a flash chromatography mobile phase, even if some empirical testing may be necessary: Use complementary sorbent chemistries in the flash chromatography column and on the TLC plate. The chemistry of stationary phase sorbents might vary from one manufacturer to another. If the solvent systems are anticipated to provide outcomes that are comparable, it is critical to match these sorbent chemistries[3].

To obtain an Rf>0, adjust the solvent selectivity. By influencing one compound's retention in the mixture compared to the others, a solvent's selectivity may change the number of CV and Rf. The best conditions for an efficient flash chromate graphy separation are often discovered by experimenting with various solvent combinations to achieve the required TLC separation. While offering comparable solvent strengths, other solvent blends, such as hexane:ethyl acetate and hexane:dichloromethane, may have distinct solvent selectivities. Different solvent mixes have the ability to even reverse the sequence in which certain sample components elute. It's noteworthy to notice that for a certain separation, Rf and CV might differ significantly from one another. The quantity of material that can be successfully separated in a single column loading is predicted by CV. The column's effective capacity increases as CV increases.

As a result, solvent strength has an impact on both Rf and CV. Solvent strength is defined as the solvent's simultaneous impact on the retention of all chemicals in the mixture. It may be helpful to transfer some or all of the compounds off the flash column as rapidly as possible by raising solvent strength after the ideal separation has been attained by adjusting solvent selectivity. Frequently, little variations in solvent strength may have a big impact on retention. In certain circumstances, a weaker mobile phase offers better separations. It's crucial to keep in mind that the sample loading solvent should have an elution strength that is equal to or lower than the mobile phase's initial strength. To get an ideal separation and a CV3-6 and a CV>1, more changes to the flash solvent system's selectivity and strength may be required. A less polar solvent solution or a reduction in the amount of polar modifier may often accomplish this[4].

Gradient versus Isocratic Chromatography

Flash chromatography makes use of both isocratic and gradient solvent systems. The most typical separation method is an isocratic system, which uses a single-strength mobile phase combination. Chemists may use a gradient solvent system, which modifies the solvent composition throughout the elution process, if the combination is complicated and comprises chemicals with significantly different column retention durations. As an example, non-polar solvents like hexane are used to elute non-polar molecules in a normal phase system using a silica column. The more polar molecules are then eluted from the hexane using a more polar solvent, such as ethyl acetate. Up until all of the mixture's components have been eluted, the amount of the polar solvent in the mixture is raised.

The different solvent concentrations are often altered in significant steps in a step-gradient system. As an alternative, a linear gradient may be used to provide a continuous linear change in the solvent concentrations. By using gradient solvent systems, chemists may often complete separations more quickly and effectively. For usage in gradient solvent systems, chemists must choose miscible solvents. Hexane and ethyl acetate, where ethyl acetate is the more polar solvent, are a typical solvent system for flake separations utilizing polar sorbents like silica.

Selection of the Adsorbent and Separation Method

Normal phase flash chromatography typically uses polar sorbents and non-polar elution solvents. The sample is typically administered in a weak solvent, and when the elution solvent is added, separation occurs. The least polar sample component elutes first in normal phase flash chromatography, followed by progressively more polar molecules[5].

Flash Columns in Isolation

Polypropylene columns that are pre-packed with isolate flash sorbents are known as isolate flash columns. Both offline and online flow chromatography may be done with these columns. Chemists add the sample and elution solvent quantities to the top of an Isolate column fixed in a FlashVac Sample Processing Station for off-line flow chromatography. Chemists execute isocratic or step gradient separations in off-line flow chromatography. In on-line flow chromatography, an Isolate column is installed on a system that links it to an external liquid pump system to create a constant flow of solvent through the column. The solvent composition may either be isocratic or a gradient with a rising percentage of stronger solvent, depending on the pump's capacity.

Equilibration of Column

The column should be ready for the separation before sample loading by equilibrating with a suitable solvent: Off-line. Apply the equilibration solvent to the column's top

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and let gravity to carry it through the column. On-line. Equilibrate the flash column for on-line mode separation in the off-line mode by placing the column to the on-line apparatus and pumping a proper volume of equilibration sol-vent through the column, or by employing a vacuum manifold like the FlashVac system.

Common Solvents for Equilibration

Non-polar solvents, like hexane or pentane, are suitable. Preset the silica and NH2 columns before usage for optimal results. About two bed volumes are an acceptable volume for column equilibration.

A Dry Load

Polar solvent-containing reaction mixtures are best loaded onto silica or other normal phase columns using the dry loading technique. Pre-absorb the reaction mixture onto a tiny quantity of the selected sorbent's bulk material. Most of the solvent should evaporate, leaving the compounds glued to the sorbent's surface. This mix should be placed on top of the pre-packaged flash column. After allowing the blend to settle, apply a top frit to hold it in place. Using a frit inserter of the appropriate size, the top frit may be put. Isolate HM-N, a common brand of diatomaceous earth, may be employed in the same manner as the flash sorbent for dry loading but offers a number of benefits, including more effective desorption of the compounds into the mobile phase[6].

Simple Advice for Dry Loading

First, completely dissolve the material in a suitable solvent, if at all feasible. Make use of the least amount of volume. Add your preferred bulk material. The optimal volume ratio for samples to bulk materials is between 1:1 and 1:3. To guarantee uniform adsorption of the sample on the bulk material, use a rotary evaporator to evaporate out any remaining solvent. Place another frit on top of the dry blend and the flash column. To prevent the new mix from moving, press down on the new surface. Make sure the material is not crushed while loading with Isolate HM-N. Make sure the bulk silica you use for dry loading matches the material in the flash column. If this is not feasible, use a material with a reduced surface area while making sure that the pH and moisture content of the surface are as comparable to the column packing as possible. All Isolate sorbents are offered in bulk form.

Developing a Method Using Gradient Elution

It is possible to build methods without using TLC. In especially for non-silica-based flash chromatography when adequate TLC plates are not readily accessible, gradient elution analysis provides a beneficial alternative to technique development. As little solvent as possible should be used to put the sample onto a rewetted flash column; for normal phase work, this would be hexane. Gather each fraction and check it for the existence of the desired components. Determine the solvent combination that separates the components of interest and build up a step or continuous gradient using the information provided.

Tips for Gradient Elimination in Practice

If isocratic elution using the same solvent system fails to successfully separate the sample components, employing a gradient does not increase the selectivity of a separation. However, the time needed to produce a separation may be shortened by using a gradient. Chromatography separation must not be a result of the gradient beginning circumstances. With a weak solvent that corresponds to the sample loading conditions, begin the gradient. Although the flow rate at the start of a gradient might be large, it should be decreased to the ideal flow rate in the separation region for optimal outcomes. Use a faster flow rate or a steeper gradient to hasten gradient separation[7].

Improve Flow Rate

The ideal flow rate for a flash separation depends on the column's size and ppaper size. It is possible to anticipate the theoretically ideal flow rate for flake columns of various sizes. In actual practice, however, raising flow rate has not significantly affected separation and gives significant productivity benefits. The range of effective flow rates is further influenced by other variables including back pressure and the makeup of the mobile phase. For recommended flow rates.

Liquid Chromatography at Low Pressure

In low pressure column chromatography, a solvent is passed through a column of specific material, such as silica or alumina, at ambient or low pressure. Different low pressure chromatographic methods exist, including:

1. Gel-filtration chromatography
2. Ion exchange chromatography,
3. Affirmative chromatography
4. Chromatography using gel filters.

On a column with a stationary phase made of polymerized agarose or acrylamide beads with specific pore diameters, proteins of various sizes are sorted. While a big protein cannot fit through the pores in the beads owing to size limitations, a tiny protein in the mobile phase may. As a consequence, the big protein has less access to the column's total volume than the tiny protein, which stays on the column longer and is eluted by the mobile solvent after the large protein[8].

Chromatography by Ion Exchange

An agarose, acrylamide, or cellulose resin or bead that has been derivatized to include covalently bonded positively or negatively charged groups is the material utilized for this kind of chromatography. Electrostatic interactions allow proteins in the mobile phase to attach to the charged groups on the column. While negatively charged proteins flow through the column, positively charged proteins in a mixture of proteins adhere to a resin that contains negatively charged

groups like carboxymethyl or sulfopropyl. With a mobile phase that either contains a gradient of increasing salt concentration or just one higher salt concentration, the positively charged proteins are eluted from the column. The final proteins to elute are those with the largest positive charges at the highest salt concentration. Similar to positively charged groups like diethylaminoethyl or a quaternary ethyl amino group, negatively charged proteins bond to resins containing positively charged groups. Similar techniques are used to separate these proteins[9]–[11].

Specification Chromatography

In this method, a group that binds to a particular location on a target protein is added to the chromatography resin. It might be an antibody that detects a specific amino acid sequence on a protein or a group that binds to the active site of an enzyme. This technique takes use of the antibody's precise binding to antigen that is held in a solid matrix. Small, chemically reactive beads are placed into the column and covalently coupled with antigen. The antiserum is then allowed to pass over the beads. All other proteins in the serum, including antibodies to other substances, are washed away while the particular antibodies bind. By utilizing beads coated with the particular antibody, affinity chromatography may also be utilized to separate antigens from complicated mixtures.

II. CONCLUSION

For the separation and purification of organic molecules from natural sources and reaction mixtures, flash chromatographic methods have been developed. With the right choice of adsorbents, solvent systems, and flow rate of the solvents utilized for the separation, method development for separations may be maximized. Flash chromatographic procedures may easily be scaled up with the least amount of optimization. As a result, they are regarded as quick, inexpensive, and effective ways to purify chemicals.

REFERENCES

[1] D. C. Jackson and G. R. Ultsch, “Physiology of hibernation under the ice by turtles and frogs,” J. Exp. Zool. Part A Ecol. Genet. Physiol., 2010, doi: 10.1002/jez.603.
[2] B. Schönhofer et al., “Pneumology in the Model Degree Program of the Medical Faculty Ostwestfalen Lippe, Germany,” Pneumologie, 2022, doi: 10.1055/a-1934-7962.
[3] M. D. Nosworthy, “Anæsthesia in Chest Surgery, with Special Reference to Controlled Respiration and Cyclopropane,” J. R. Soc. Med., 1941, doi: 10.1177/003591574103400804.
[4] M. W. Mahowald, C. Iber, and J. K. Walsh, “Evaluation of obstructive sleep apnea: Considerations and caveats,” Oper. Tech. Otolaryngol. - Head Neck Surg., 1991, doi: 10.1016/S1043-1810(10)80201-5.
[5] S. Fernandez, S. Srikakarlapudi, and J. L. Izzo, “Blood Pressure Variability,” in Primer on the Autonomic Nervous System, 2012. doi: 10.1016/B978-0-12-386525-0.00073-1.
[6] J. Power, C. Lynch, A. Martin, and R. Jones, “A sex-biased breathing pattern influences functional connectivity MRI,” Neuropsychopharmacology, 2019.
[7] A. Doual, J. L. Léger, J. M. Doual, and F. Hadjiat, “The hyoid bone and vertical dimension,” Orthod. Fr., 2003, doi: 10.1051/orthodfr/200374333.
[8] L. A. Brewer, “Respiration and respiratory treatment. A historical overview,” Am. J. Surg., 1979, doi: 10.1016/0002-9610(79)90262-9.
[9] R. P. Millman, C. Acebo, C. Rosenberg, and M. a Carskadon, “Sleep, breathing, and cephalometrics in older children and young adults. Part II -- Response to nasal occlusion.,” Chest, 1996.
[10] L. A. Brewer, “Respiration and respiratory treatment,” Am. J. Surg., 1979, doi: 10.1016/0002-9610(79)90262-9.
[11] B. Zvone and B. Branka, “Pulmonary Function Testing Understanding By Elder People, With Interactive Multimedia Support,” Proc. Eur. Conf. Ergon., 2010.

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Chromatography in the Different Direction

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***Abstract*—Counter-current Chromatography, which relies on liquid-liquid partitioning, is a fantastic option to solid phase adsorbents for avoiding issues and maintaining the chemical integrity of mixtures exposed to fractionation. This method is distinctive because it achieves separation between two immiscible liquid phases without the assistance of a stationary phase. While the other phase is utilized as a mobile phase, one is employed as a fixed phase. The division of a sample between the two phases forms the foundation for the separation.**

***Index Terms*— Aromatic Plant,Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

New medications have mostly been discovered via the use of natural ingredients. The great chemical complexity of the extracts has traditionally made isolating the active components from a natural product difficult, but recent developments in separation sciences have made isolating these active components from natural goods easier. Activity-guided fractionation is applied to crude extracts of natural items that exhibit desired biological activity until an active component is separated and recognized. Due to the sometimes-unfavorable chromatographic conditions involved in this exploratory fractionation procedure, extreme caution must be used during the whole isolation process to prevent the loss of potentially labile components. Currently, solid supports are used for the majority of the chromatographic separations of natural compounds. SiO2, Al2O3, and reverse phase adsorbents, however, are not inert chemically. Sometimes only 70%–90% of a natural substance is recovered after separation on alumina or silica gel. Irreversible adsorption on a solid platform may sometimes cause significant losses of precious materials. Additionally, it has been shown that the chemical interactions between the substrates and solid phase adsorbents might result in the separation of artifacts[1].

Current Color Chromatography

Counter-current a separation column devoid of a solid support matrix is used in the distinctive type of liquid partition chromatography known as chromatography. This support-free methodology gives the method a significant advantage over conventional chromatographic techniques by removing a number of complications such adsorptive loss, sample deactivation, and contamination. The technique was continuously enhanced in the 1970s by increasing separation efficiency and speed. Early in the 1980s, the introduction of high-speed CCC, which can provide extremely efficient separation in a short amount of time, resulted in an epoch-making advancement. Recent research and development of the CCC technology has mostly concentrated on HSCCC, high performance centrifugal partition chromatography, and rapid centrifugal partition chromatography because of its excellent performance [2].

The use of CCC for improved separation and its applications in the separation of bio-active natural compounds from plants are explained by recent improvements in CCC instruments, which are addressed in this study. Counter-current Chromatography: Principles and Development. Anyone familiar with liquid-liquid extraction method may quickly grasp the fundamentals of counter-current chromatography, which bases separation on the distribution of solutes between two immiscible liquid phases. One of the two phases, known as the stationary phase in CCC, is kept in the column. The mobile phase, the second phase, diffuses through the stationary phase.

Extracting liquid from liquid

Large-scale material separation may be accomplished easily and with the least amount of solvent by employing liquid-liquid extraction. Following sample dilution in a two-phase solvent system, the following steps are used to achieve liquid-liquid extractions[3]:

1. Shake ferociously to completely combine the two parts.
2. Allow the mixture to separate into two stages, then keep the phases apart.

To separate the sample components, these procedures are essential. The main drawback of liquid-liquid extraction is that it only provides one plate of true separation. In order to enhance the separation, either this single-step separation must be customized to the user's demands, or numerous liquid-liquid extractions must be employed. The work done in Britain during World War II by Archer John Porter Martin and Richard Laurence Millington Synge is where CCC had its start. Martin and Synge shared the 1952 Nobel Prize in Chemistry for their groundbreaking work. Soon after their research was published, Lyman Creighton Craig and Otto Post created a device that was effectively a collection of separator funnels. The Craig-post device "automatically" transmitted the sample. In a single day, more than 1000 mixing and separating procedures might be completed. Various components were divided depending on how they behaved when partitioned. Craig and Post were fairly

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commercially successful and kept refining their device. In almost 1000 papers on "counter-current distribution" that were published between 1950 and 1970, the Craig-post device was mentioned[4].

Dividend Coefficient

The partition coefficient KA for a particular substance A is determined by dividing the concentration of A in the upper phase by that in the lower phase.

Counter-current Droplet Chromatography

Droplet Counter-current Chromatography was first established by Ito and colleagues at the US National Institutes of Health in the early 1970s. In DCCC, much as in the Craig-post device, unit gravity is the sole thing holding the stationary phase in place. The device consists of a number of vertical, straight tubes that are joined together in a series via a thin transfer tube. The original CCC apparatus had 300 glass tubes, each measuring 60 cm mm in diameter [5].

The volume in the transfer tube is included in the overall capacity, which is about 600 ml. The stationary phase of a two-phase solvent system is first filled into the whole column in the DCCC process before the sample solution is injected. In order for the mobile phase to move through the stationary phase's column due to gravity, the other phase must first be inserted into the first unit from the bottom if it is the lighter phase and the top if it is the heavier phase. As a result, the solutes are divided into groups based on their partition coefficients. Compounds that are more soluble in the mobile phase move more swiftly while those that are more soluble in the stationary phase move more slowly, as is the case with all forms of chromatography. To partition the column space into several partition units, the mobile phase generates multiple droplets in the stationary phase at the optimal flow rate. This process is repeated within each partition unit.

For DCCC to produce a droplet flow of the mobile phase in the column, the solvent systems must be chosen properly. The most often utilized solvent system is made up of different volume ratios of chloroform, methanol, and water; nevertheless, a significant separation typically takes a few days. Uses rotatory seals to feed solvent and a constant gravity field created by a single axis revolution. Separation occurs in disks or cartridges. A CPC system using cartridges or disks is in a state of hydrostatic equilibrium. A point is reached where no further displacement of the stationary phase occurs, and the apparatus contains roughly 50% of each of the two phases when the coil is filled with the stationary phase of a biphasic solvent system and the other phase is then pumped through the coil at a suitable speed. Continuous mobile phase pumping causes the mobile phase to elute by itself. The actual mixing of the two phases takes place in this fundamental system using just 50% of the effective column space [6].

Rotating the coil about its central axis while eluting the mobile phase is a more efficient technique to use the column space. The two phases quickly reach a hydrodynamic equilibrium, allowing for the utilization of almost all of the column space for mixing. An example of the latter system is CCC with spinning coil instruments. A planetary gear installed on the column holder axis is engaged with an identical stationary solar gear that is permanently fastened to the centrifuge structure to provide the planetary motion. The column holder revolves around its own axis while rotating around the centrifuge axis at the same angular velocity and in the same direction thanks to its 1:1 gear connection. Two key purposes for the formation of CCC separation are provided by this planetary motion. In the first, the mobile phase is continually eluted via the spinning separation column without the need of a rotary seal. Due primarily to the Archimedean screw effect, the second and more significant purpose is that it creates a distinctive hydrodynamic motion of two solvent phases inside the revolving multilayer coiled column. The rotation entirely separates the two phases when two immiscible solvent phases are added to an end-closed coiled column [7].

Where the heavier phase occupies one end and the lighter phase occupies the other throughout the length of the tube. Despite the fact that the origin of the bilateral hydrodynamic phase distribution of the two immiscible solvents is yet understood, it may be effectively exploited for accomplishing In the coil at the top, the two phases are distributed bilaterally according to their hydrodynamic properties, with the white phase occupying the head half and the black phase the tail half. This circumstance makes it obvious that the black phase injected at the head will migrate toward the tail and the white phase introduced at the tail end will move in the opposite direction. CCC may be carried out successfully using this hydrodynamic tendency. The coil is first completely filled with the white phase, then the black phase is pumped in from the head end. Similar to this, the coil is first filled with the black phase before the white phase is pumped in from the tail. In either scenario, a substantial portion of the stationary phase remains in the coil while the mobile phase swiftly passes through it.

Hydrophobic

Polar

When the target compounds' polarity is unknown, the search may begin with the moderately polar two-phase solvent system made up of hexane-ethyl acetate-methanol-water with a volume ratio of 3:5:3:5. By changing the volume ratio, the partition coefficient may be corrected if it is just slightly outside of the acceptable range. For instance, if KU/L is just over 2, the volume ratio could be changed to be more hydrophobic, like 5::5, and if KU/L is just under 2, the volume ratio might be changed to be the opposite, like 5::5. The search is conducted upward along the arrow if the target chemical is mostly dispersed in the upper organic phase. The search is conducted along the arrow in a downward direction if it is mostly dispersed in the lower aqueous phase. Depending on the polarity of the solvent used for the extraction, the search may begin anywhere if the

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sample is an extract of plant material.

If the sample is an ethyl acetate extract, the search may begin at 1-butanol-water; if the sample is a methanol extract, it may begin at hexane-ethyl acetate-methanol-water. Once an appropriate range of KU/L values for all of the compounds of interest is found, the search should be continued. Systems for the Separation of a Wide Range of Natural Products Using Solvents displays many solvent systems that have been utilized to separate a wide range of natural products. This information may be very helpful to researchers in their quest for an appropriate solvent system to achieve the necessary separation of natural products[8]. Aside from the examples already given, other examples include the isolation and purification of polymethoxylated flavones from tangerine peel, catechin components from five different tea cultivars, rupestonic acid from the Chinese medicinal plant Artemisia rupestris L., lycopene from tomato paste, spiramycin, gallic acid from Cornus officinalis, lutein from the microalga Chlorella vulgaris, naphthopyranone

Benefits of CCC

Really affordable. Gentle and adaptable for compound separation with a lower risk of breakdown. With the same equipment, be able to resolve measurements ranging from milligrams to tens of grams. Able to freely change between the regular phase and the reverse phase. For chemical reactions using a liquid catalyst, a CCC machine, which is a chromatographic column with a liquid stationary phase, may be utilized as a liquid-liquid reactor[9]–[11].

II. CONCLUSION

Counter-current Chromatography is a great option to solid-phase adsorbents for avoiding issues and maintaining the chemical integrity of mixtures that are fractionated. It provides effective sample resolution with a technique that just uses partition. Aqueous and non-aqueous solvent systems may be used to separate compounds with a variety of polarity. CCC is very adaptable: solvent gradients are feasible; flow rates can be changed throughout a chromatographic run; lower and upper phases can be switched out for one another as mobile phases during a separation, provided that the flow direction is also changed accordingly; and instruments can be stopped during chromatography and restarted hours later without affecting the effectiveness of the separation.

Wide pH ranges are permitted in CCC, which has ramifications for separating acidic and basic samples, particularly in the pH-zone-refining approach. It is possible to separate unprocessed plant extracts, semi purified fractions, or synthetic combinations using samples ranging in size from 100 mg to 1500 g. With these benefits, CCC is becoming more and more popular as a technique of natural product separation, particularly in the context of bioassay-guided fractionation of natural products.

REFERENCES

[1] A. M. Siouffi, “High performance liquid chromatography,” in Handbook of Food Science, Technology, and Engineering - 4 Volume Set, 2005. doi: 10.4324/9780203301869_chapter_4.

[2] A. Bhambri, M. Srivastava, V. G. Mahale, S. Mahale, and S. K. Karn, “Mushrooms as Potential Sources of Active Metabolites and Medicines,” Frontiers in Microbiology. 2022. doi: 10.3389/fmicb.2022.837266.

[3] K. M. Łącki and F. J. Riske, “Affinity Chromatography: An Enabling Technology for Large-Scale Bioprocessing,” Biotechnology Journal. 2020. doi: 10.1002/biot.201800397.

[4] V. Sagi-Kiss et al., “Ion-Pairing Chromatography and Amine Derivatization Provide Complementary Approaches for the Targeted LC-MS Analysis of the Polar Metabolome,” J. Proteome Res., 2022, doi: 10.1021/acs.jproteome.2c00030.

[5] G. Q. Chen, Y. Qu, S. L. Gras, and S. E. Kentish, “Separation Technologies for Whey Protein Fractionation,” Food Engineering Reviews. 2023. doi: 10.1007/s12393-022-09330-2.

[6] X. Li, W. Ma, H. Li, Q. Zhang, and Z. Ma, “Determination of residual fipronil and its metabolites in food samples: A review,” Trends in Food Science and Technology. 2020. doi: 10.1016/j.tifs.2020.01.018.

[7] D. S. Hage, “Analysis of biological interactions by affinity chromatography: Clinical and pharmaceutical applications,” Clinical Chemistry. 2017. doi: 10.1373/clinchem.2016.262253.

[8] Ł. Nuckowski, A. Kaczmarkiewicz, and S. Studzińska, “Review on sample preparation methods for oligonucleotides analysis by liquid chromatography,” Journal of Chromatography B: Analytical Technologies in the Biomedical and Life Sciences. 2018. doi: 10.1016/j.jchromb.2018.05.025.

[9] A. R. Mazzer, L. A. Clifton, T. Perevozchikova, P. D. Butler, C. J. Roberts, and D. G. Bracewell, “Neutron reflectivity measurement of protein A–antibody complex at the solid-liquid interface,” J. Chromatogr. A, 2017, doi: 10.1016/j.chroma.2017.03.084.

[10] X. Wang et al., “In-situ reaction compatibilization modification of poly(butylene succinate-co-terephthalate)/polylactide acid blend films by multifunctional epoxy compound,” Int. J. Biol. Macromol., 2022, doi: 10.1016/j.ijbiomac.2022.06.026.

[11] C. Da Xiao, T. Ishizuka, and Y. Xu, “Antiparallel RNA G-quadruplex Formed by Human Telomere RNA Containing 8-Bromoguanosine,” Sci. Rep., 2017, doi: 10.1038/s41598-017-07050-w.

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By Using HPLC and High Performance Thin Layer Chromatography, Medicinal and Aromatic Plants

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Abstract*—In recent years, interest in medicinal plants and their products has grown significantly. Natural medicine manufacturing and commercial activities have expanded in response to the growing public demand for these treatments. The need to guarantee the quality and safety of plant-based medicines is also growing. Contrary to active pharmaceutical chemicals, plant medications have certain intrinsic restrictions that make it difficult to set criteria for them. This element has drawn a lot of interest from a variety of sources, including policymakers, scientists, and manufacturers. The responsibilities of high performance thin layer chromatography and high performance liquid chromatography in ensuring the quality of plant products are briefly discussed in this study. These approaches' practical applications are also highlighted.

***Index Terms*— Aromatic Plant,Essential Oils, Chromatography,Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

Over the last several decades, the usage of goods made from medicinal plants has grown. Additionally, individual nations are placing more focus on promoting their usage at the behest of the World Health Organization. In addition to this, there is a significant public interest in natural goods, which may be attributed to a number of causes. These medications are less expensive, safer, and the biological system tolerates them better. As a result, there has been a rise in the consumption and cross-country transportation of medicinal plant raw materials. Traditional medicines are the sole inexpensive choice in several regions of the globe, such as various regions of Africa and Asia. On the other side, industrialized countries like Japan, the United States, and the European States favor the same medications. Despite becoming a more prevalent medical alternative in Africa, traditional medicine usage has not developed as much as was anticipated. However, several Asian nations, particularly India and China, have developed them to a point where they have helped all nations in the globe[1].

The greatest evidence-based and scientifically validated system of plant medicines has been established in Europe, which did not inherit a highly developed conventional medical system. Although North America is the most active and vibrant market for plant goods, government laws mean that, with the exception of a few plant medications, the majority are utilized as nutraceuticals or dietary supplements. The medical system in South America is similar to that in North America, which has given the world some of the best plant medicines ever, including quinine and pilocarpine. Chinese medicine has a significant influence on Australia, a continent where Western medicine predominates.

Medical Plants and Their Products' Quality Control

Consumer product quality monitoring has become increasingly difficult and demanding. Among all consumer goods, pharmaceuticals are subject to the strictest quality regulations. As impurity levels are increasingly limited, the purity of active medicinal substances has reached an all-time high. Contrarily, the situation with plant-derived medication is somewhat different, and we are currently working to establish standards to guarantee uniformity and safety. As a result, there are now developing increasingly laxer requirements for plant-based medications. The inherent issues with plant drugs are clear; unlike modern drugs, which are combinations of a finite number of known and unknown chemical molecules, they are combinations of infinite numbers of chemical molecules. Knowledge of the active components is also incomplete; due to the wide natural variations in the content and quantity of the chemical constituents, it is impractical to exert precise control; and the complete chemical profiling of plant drugs is out of the question. As a result, setting criteria for such pharmaceuticals is a difficult undertaking and they cannot be subject to a complete system of standards. The standards for plant medications will become more comprehensive and meaningful as our understanding of them grows.

When plant remedies were prescribed by physicians for their patients in the past, the problem of quality was unimportant. With the commercialization of plant medications, the problem has gained prominence. The issue has been made more difficult by manufacturers that have a strong interest in taking advantage of any gaps in the regulations and legislation regulating the creation and sale of plant medicines. Assuring the quality of plant-based medicines is a priority for several national and international organizations. A series of monographs on internationally significant medicinal plants were released after the World Health Organization's first publication of Quality control

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procedures for medicinal plant components more than 20 years ago[2].

It is impossible to guarantee the quality of a plant product without also guaranteeing the quality of the raw material. In-process quality control, final product quality control, good manufacturing practice controls, and process validation are also necessary to guarantee high-quality goods. To reduce variances in the quality of completed goods and to ensure consistency, it is crucial to set the standards of raw materials. Analytical and physicochemical analyses, identification tests, and macro- and microscopic descriptions are all included in the requirements of plant materials. These tests' and measurements' anticipated outcomes are shown as numerical bounds, a range, or a discretely observable result.

Naturally occurring variability in plant medicines must be taken into account while setting the boundaries of requirements. A plant material that complies with the requirements shall be regarded as suitable for the intended purpose. Variations in the composition and content of raw materials are caused by a number of reasons. These elements may be roughly divided into four categories: post-harvest, nutritional, climatic, and collecting aspects. Prevailing temperature, precipitation, humidity, daylight hours, and altitude of the growing area are examples of climatic variables. The creation of biomass and its composition are indicators of the nutritional elements that have an impact on the health of a developing plant. Several soil parameters, including the availability of micro- and macronutrients, pH, and cation exchange capacity, are crucial for the optimum development of plants. By paying careful attention to the age, season, collection time, and portion of the plant gathered, collecting variables regulate the concentration of active components. The collected material is still alive and continues to carry out metabolic processes and breathe; enzymatic processes continue after collection until they are stopped by drying or another suitable treatment; material crushing and cutting causes reactive chemical components of plants that were naturally contained in intact cells to become dispersed; and the collected material is directly affected by oxidation by air and lignin [3].

The World Health Organization has outlined a number of factors that are useful in ensuring the quality of plant medicines in its volume Quality control procedures for medicinal plant materials. Identification, visual inspection, sensory evaluation, macro- and microscopic features, moisture content, foreign matter, fingerprinting by thin layer chromatography, extractive values, volatile matter, microbial load, heavy metals and pesticide residues, radioactive contaminants, and, depending on the type of drug, one or more determinations for bitter value, tanning test, foaming, hemolytic, and swelling indices. The "Guideline on quality of herbal medicinal products" and "Guideline on specifications" from the European Medicines Agency more explicitly outline the problems with medicinal plant quality. The terms "herbal substances," "herbal preparations," and "herbal medicinal products" are defined and distinguished in these papers. The rules place an emphasis on quantifying analytical or active indicators and outline steps to assure the quality of raw materials, semi-finished goods, and finished goods.

Drug Biochemical and Chemical Standardization

All testing methods ultimately strive to establish a drug's inherent potency, which is related to its chemical components. Analyzing a drug's biological potency offers a clear evaluation of its quality. However, due to the difficulty of the processes and approaches, this evaluation cannot be implied. Additionally, it is not a practical choice when dealing with a lot of samples. Chemical testing is an alternative to biological testing, which employs assay processes to calculate the amount of chemical compounds preferably the active ones in order to evaluate a product's quality. In addition to other criteria like macro- and microscopic features, this is useful information[4].

Chemical Markers and Standardization

Chemical standardization calls for the identification and selection of a chemical component of a medicine, followed by the development of an assay method for the quantification of the selected ingredient. The choice of the ingredient, known as a marker, is a challenging process depending on a number of factors, including the drug's chemical profile, the biological activity of the chemical constituents, the creation of an effective test method, the simplicity of obtaining or isolating the marker, and the marker's stability.

Markers are "Chemically defined constituents or groups of constituents of a herbal substance, a herbal preparation, or a herbal medicinal product that are of interest for control purposes independent of whether they have any therapeutic activity," according to the European Union Guidelines. Markers are "components of a medicinal plant material that are chemically defined and of interest for control purposes," according to the WHO. If a marker has been quantitatively identified in the herbal substance or herbal preparation, it may be used to compute the amount of herbal substances or herbal preparations in the herbal medical product. An active marker adds to the therapeutic action of the medicine, while an analytical marker is exclusively used for analytical reasons, according to the European Medicines Agency.

First and foremost, the chemical component of the medicine that is responsible for the action should be the target of the marker. For control reasons, more than one marker may be used, either alone or in combination. A specific chemical component that is only associated with the medicine is a second option for a marker. This is valid if the drug's active ingredients are unknown, difficult to acquire, or unstable for testing purposes[5]. As a final resort, a marker might be chosen from more prevalent or all-encompassing phytoconstituents. Rarely, a chemical that is unrelated to the plant or its function may also be used as a marker. These chemical compounds enable the determination of an active plant component that would otherwise be unstable and

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unsuitable for study. The European Pharmacopoeia, for instance, suggests dantron for measuring valerenic and acetoxyvalerenic acids in valerian root. The active ingredients in medicines, valerenic and acetoxyvalerenic acids, are very unstable and challenging to separate and utilize as markers. The concentration of valerenic and acetoxyvalerenic acids in the test solutions is determined from the test response obtained for these acids in the drug using the standard dantron plot. The standard curves of dantron and these two acids have been experimentally shown to be linear and parallel throughout the estimate range.

Techniques for Quantifying a Marker via Analysis

A marker must be quantified or assessed in the test material after it has been identified for the purpose of quality control. The concentrations of the marker in the test samples can be determined using any of the major analytical methods, such as high performance thin layer chromatography, high performance liquid chromatography, gas chromatography, radioimmunoassay, ultraviolet or infrared spectrometry, and mass spectrometry. Both benefits and disadvantages may be found in these strategies. Some are used more often than others, whereas the latter have less uses. The approach and methodology must be straightforward, efficient, focused, reliable, and rapid for the assay method to work. If there are just a few crucial factors, the optimum approach may be used in several labs throughout the globe without sacrificing accuracy and precision. When feasible, the test technique should make use of straightforward, low-cost, and generally accessible equipment. The test methods are created by experimenting and drawing on existing understanding of the procedure and the medication[6].

Analytical Procedure Validation

The validation of the test technique comes after its development. Aspects including specificity, linearity, range, accuracy, precision, detection limit, quantitation limit, robustness, and system appropriateness are taken into account throughout the validation process. Guidelines for validating analytical techniques have been published by the International Conference on Harmonization and are widely acknowledged and utilized. The tools used are sometimes verified in addition to a process. Almost all manufacturers of contemporary equipment provide thorough instructions and techniques for equipment certification. A service engineer is contacted if a deviation is found and the validation record is kept up to date. The ICH validation criteria are provided online for thorough comprehension of the topic. Here is a quick overview of the validation process.

Specificity

The degree to which an assay method specifically detects the target analyte is indicated by specificity. It is not always feasible to show that a certain analytical method is appropriate for a given analyte. For the required degree of discrimination to be shown, two or more test methods may be required. Assay specificity is shown by spiking the sample with the analyte or similar chemicals and watching how the estimates are affected. The method is deemed specific if adding analyte-related chemicals to the sample has no impact on the outcome. When testing one analyte among numerous related substances in the sample, specificity is very useful. The question of specificity in relation to herbal materials is less important since, in many cases, we prefer to measure the overall amount of active compounds rather than just one active component, such as the total amount of sennosides in senna rather than a specific sennoside. In these situations, a method that can assay all sennosides simultaneously is recommended over a unique method that only estimates one sennoside and makes use of discrimination.

Linearity

The capacity of an analytical process to provide test findings that are inversely proportional to the concentration of the analyte in the sample is known as linearity. The test technique should show a linear connection over the whole range. It is advised to use a minimum of five concentrations. The correlation coefficient, y-intercept, and slope should be determined by drawing a regression line using the proper statistical techniques. The test report should provide a graphic of the data. Calculating the actual data points' divergence from the regression line is a crucial component that determines the degree of linearity. Prior to doing a regression analysis, data transformation using mathematics may be necessary in certain circumstances.

Range

The range is the range between the lower and higher analyte concentrations for which the analytical method has been shown to have an acceptable degree of accuracy, precision, and linearity. Usually, it comes from linearity research[7].

Accuracy

The degree of agreement between the computed value and the traditional actual value indicates how accurate an analytical technique is. This information reveals how near the quantity of the analyte is estimated to the actual amount present in the test sample. Across a variety of analytical procedures, accuracy should be stated and inferred from 9 measurements. The proposed analytical technique's accuracy may be shown by applying it to an analyte with known purity or by comparing the findings to those of a different, well-characterized procedure whose accuracy is already known. The accuracy of the technique is assessed by applying it to test samples that have been spiked at three different levels: 50%, 100%, and 150% of the predicted analyte concentration. Various analyses may reveal that a sample having mg of analyte also contains mg. The assay method for calculating mg is more precise than the other two methods.

Precision

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When many samples of the same homogeneous material are measured repeatedly and the findings are compared, the analytical method's accuracy is how well the results match. Changing the experimental circumstances, which are consequently supposed to be maintained constant, may reduce the accuracy. System precision may be found by repeatedly examining a sample over a brief period of time. System precision shows inaccuracy in recording the response. The findings might be correct but not exact, or vice versa. The average value of mg obtained from triplicate measurements of the mg real amount as, and is correct, but the three measurements individually are not. Similar to double measurements, triple measurements of the same amount are accurate but not exact. Measurements of, and are exact and precise in triplicate. Three levels of short, medium, and long intervals are used to describe accuracy; these levels are referred to as repeatability, intermediate precision, and reproducibility, respectively.

Repeatability

Precision over a short period of time with the same set of operating circumstances is known as repeatability. It must be shown via a minimum of 9 measurements within the procedure's specified range or a minimum of 6 measurements at 100% of the test concentration.

Intermediate Accuracy

Reproducibility

Precision at the inter-laboratory level is reproducibility. It is particularly crucial if the analytical method, such as a pharmacopoeial method, will be employed in many labs.

Sensitivity Limit

The smallest quantity of analyte in a sample that can be detected but not always quantitated as an accurate number is known as the detection limit. A minimal level at which the analyte may be consistently identified is established by examining samples with known concentrations of the analyte. The signal-to-noise ratio, the standard deviation of the response, and the slope are some more ways to calculate DL. A reasonable estimation of DL is a signal-to-noise ratio of 3:1 or 2:1. DL=/S is a formula that combines the calibration curve's slope with the response's standard deviation[8].

Quantitative Cap

The quantitation limit is the lowest concentration of the analyte that can be measured under the specified experimental circumstances with acceptable precision and accuracy. It is often calculated by analyzing samples with known analyte concentrations and figuring out the lowest level at which the analyte can be quantified with respectable precision and accuracy. The signal-to-noise ratio, standard deviation of the response, and slope of the calibration curve are further ways to define QL.

Robustness

An analytical method's robustness guarantees that it performs well and has few factors that may alter its performance. A robust HPLC analytical technique, for instance, does not exhibit fluctuation when using columns from various lots or manufacturers, when the pH or content of the mobile phase slightly varies, or when the temperature and flow rate change. The steps involved in extracting, purifying, or enriching an analyte from herbal material should be quick and easy. The analytical solutions utilized should maintain their stability for a respectable amount of time. Finally, most labs should be able to perform the process. If test circumstances may cause measurements to vary even slightly, these factors should be appropriately controlled, or the protocol should provide a warning.

Utilizing Thin Layer Chromatography to Control Plant Product Quality

The separation method known as thin layer chromatography, sometimes known as planar chromatography, has been around for more than 65 years. The method is straightforward, affordable, adaptable, and used in all labs throughout the world. Any given condition of qualitative, quantitative, or preparative separation may be simply fitted to it. The approach nevertheless lags behind other chromatographic procedures when it comes to its application as an analytical technique, despite the wide diversity and total automation of the method. However, this method cannot be replaced in circumstances when qualitative evaluations of plant extracts are necessary. TLC, whether it be for fingerprint profiling or marker analysis, has almost reached the point where it is indispensable for the standardization of plant materials. When working with plant materials, the methodology has significant benefits over other analytical methods. Without going through laborious and time-consuming steps of sample preparation, the samples may be used. The gains in convenience of assays, numerous sample analyses, and cheap cost per sample more than offset the reduction in sensitivity. Quantitative analysis of markers in plant medications and fingerprint profiling for the evaluation of a drug's chemical constituents are the two most common applications of TLC in the standardization of plant materials. The preparation of the sample, choice of the chromate graphic layer and mobile phase, application of the sample, development and drying of the plate, derivatization, and evaluation of the chromatogram are all steps in a typical TLC technique[9].

Prepare a sample

There are significant differences in sample preparation techniques used for fingerprinting and marker estimation. As opposed to fingerprinting, which only requires proportionate amounts of component extraction, marker assaying requires full and comprehensive extraction. Accordingly, in marker calculations, the solute-solvent ratio, extraction time, and the number of extractions all take increased significance. Typically, 25–50 ml of solvent are extracted from 1-2 g of

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relatively fine plant powder at room temperature using a Soxhlet apparatus or under refrigeration on a water bath. To achieve thorough and comprehensive extraction of the marker from the drug matrix, the extraction is carried out many times. The combined filtrate is filtered to remove the solvent and the extract. The solvent is altered once again, the residue is dissolved, and the volume is changed. The marker's solution concentration is calculated.

On the other side, the procedure just needs a shorter extraction strategy when comparing fingerprint profiles. It could be necessary to use a powdered sample of pharmaceutical grade as the benchmark when comparing fingerprint proficiency results. The extraction and concentration processes used to create the test and sample solutions are the same. Typically, g material is extracted for 5–30 minutes with 1–10 ml of solvent while being shaken at ambient temperature or heated to boiling. The extract is purified, amplified, and applied. The residue is sometimes dissolved in a small amount of solvent and filtered to separate the insoluble paper after the solvent has entirely evaporated. If the presence of a marker is to be determined, a solution, ideally of known strength, is needed. Using a marker with known strength adds semiquantitative information. In other instances, the extracts need to be further purified by extracting the residue with a different solvent and pH or by distillation, sublimation, or another suitable process.

Chromatographic Layer Selection

The adsorbent layer comes in a broad range of possibilities. Precoated plates, sold by various manufacturers, have replaced laboratory-made plates. Precoated plates are manufactured using a glass, aluminum, or plastic foundation that has been coated with various adsorbents. The many adsorbents include cellulose, aluminum oxide, kieselguhr, normal phase silica gel, reverse phase silica gel, normal phase silica gel, hybrid, and derivatized adsorbent layers. They are available in various sizes, from tiny strips to endless rolls. A stronger adsorbent is utilized for weakly adsorbed compounds, while a weaker adsorbent is used for highly adsorbed compounds, depending on the type of the compounds. Reverse phase silica gel is more suitable for polar constituents, which are the first to be eluted on reverse phase TLC, whereas normal phase silica gel is better suited for non-polar components. The most frequently used silica gel plates are those with fluorescent dye on an aluminum substrate; these plates account for around 80% of studies due to their high efficiency and low cost.

HPTLC Layers vs. TLC Layers

Thin adsorbent layers and more uniformly sized, smaller paper are used in high performance TLC plates. Additionally, they provide greater resolution over shorter runs, cut down on separation time, allow for more samples to fit on a plate, employ lower sample volumes with increased detection limits, and noticeably increase precision, accuracy, and sensitivity. Despite being much more costly than standard plates, HPTLC plates are an effective option when high performance is required and high sensitivity, accuracy, and precision are needed. Use of spherical paper with a narrow size distribution and ultrathin layers, which increase resolution and sensitivity and significantly cut down development time, are other advancements in adsorbent layers.

The Mobile Phase is Chosen

For TLC advancements, infinite combinations and a variety of solvents are available. TLC has no or few limits, in contrast to HPLC, which has a restricted range of options. The preferred mobile phase is one with 1-3 components as opposed to one with several components. The selection of a mobile phase is dependent on the polarity of the molecules of interest. The mobile phase's composition is chosen using a trial-and-error approach, personal experience, and available information. The constituent solvents are mixed outdoors before being transferred to the developing chambers, and the mobile phase is newly produced for each run. Unless otherwise specified, it is advisable to let the growing chamber saturate. By covering at least half of the interior walls with filter paper before pouring the mobile phase over it, the chamber's saturation is accelerated. The compartments are saturated by closing them and letting them stand at room temperature. For chamber saturation in twin troughs, a different solvent may be used in addition to the mobile phase. For example, ammonia might be put in one trough and the mobile phase in the other. The TLC findings are sensitive to changes in humidity and temperature. Every procedure that involves exposing the plate to the air should be done at a regulated temperature of 20°–30° C and a relative humidity of 50%–60%[10].

Use of the Example

There are three common ways to apply the sample solution to the plate: manually, semi-automatically, and automatically. A capillary is used for manual application and has a particular volume of 1, 2, or 5 l for quantitative applications. The touch-and-deliver method is used to apply the solution. After a brief period of use, the precision and accuracy are pretty good, according to the author's own experience. Devices like the Linomat 5 from Camag and the Applicator AS 30 from Desaga, which employ syringes that must be manually cleaned and filled, are used in semi-automatic application. Through computer instructions, the remaining portion of the application is automated. By using a touch-and-deliver or spray-on approach, the solution is administered as a spot or band of a specified size at predefined spots. In contrast to the spray-on approach, when fixed amounts are sprayed onto the plate, the needle hits the adsorbent layer's surface and delivers. In the completely automated application, every step—including cleaning the delivery line—is managed by a computer.

For qualitative analysis, the concentration of the applied samples typically varies up to 1 mg/ml, but is typically

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considerably lower for quantitative reasons, which also relies on the molar absorption of the marker. For spot applications, the normal volume is 1 to 5 l, while for band applications, it is 10 l. In HPTLC plates or ultrathin TLC plates, these volumes are significantly decreased. Since a narrow band is better suited to the optics of the TLC scanner, bands are known to provide higher resolution and outcomes than spots.

Construction of the Chromatogram

In chambers special purpose jars or straightforward containers that can store the solvent in an airtight environment plate development is carried out. There is no question that superior chromatograms are produced by special purpose chambers. In addition to using less solvent, twin-trough chambers enable the use of a second mobile phase for saturation in the chamber. The chamber's initial high cost is offset by the amount of costly solvents that are saved from being used. Pre-saturation reduces Rf values and corrects side distortions of the solvent front in the chambers. The plate is positioned in the chamber as close to vertically as feasible, making sure that the application points are above the mobile phase's surface and that the plate's edges do not contact the walls of the container. Always keep the growing chamber away of direct sunlight. If it is believed that the components under investigation are unstable, it should be shielded from light while it is being developed. Sunlight that is shining directly into the developing chamber may be refracted to varying degrees by the glass walls, causing hot spots to form on the plate and uneven flow of the mobile phase [11]. In horizontal developing chambers, the method of development has been greatly enhanced, and in automated developing chambers or automated multiple developing chambers, the method of development has been fully automated. The price of this equipment is too exorbitant, too.

The Plate is dried

Afterwards, the plate is developed and dried. In automated development chambers, this process is mechanized, however it must be carried out in ambient air at room temperature, in a vacuum desiccator, or by heating or blowing hot air over the plate's surface. In every situation, the mobile phase must be eliminated as fully as possible before derivatization or plate scanning may be performed.

Derivatization

Derivatization is the process of treating generated chromatograms with the appropriate spray chemicals to locate the contents for qualitative analysis and quantify UV-insensitive indicators. There are two techniques used to derivatize plates: spraying with a fine mist of reagent and the dip-in approach, which has recently gained in popularity. The spray approach results in regions of excessive soaking and ineffective spraying because it cannot evenly wet the plate. This has an impact on the quantitative determinations' precision and correctness. More consistent wetting is produced using the dip-in approach; specialized equipment is available for this use. The majority of the time, derivatization involves heating the plate after spraying it. Better results are obtained by evenly heating the plate outside as opposed to in an oven. The inner oven walls are harmed by the fumes produced during heating, which are very reactive. The plate is heated for about 10 minutes at 110° C, or until the spots are most visible. The producers of TLC equipment provide special purpose heating plates.

Assessment of the Chromatograms

When comparing the chromatograms of the test and standard samples, or when determining if a marker or other substances of interest are present in the test chromatogram, the TLC plate is seen in natural light as well as under short-wave and long-wave ultraviolet light. A needle has been used to indicate the center of each location. To record the Rf value or the Rr value, the distance from the center of each spot to the place of application is measured. Rf values may change based on factors including temperature, saturation level, adsorbent layer activity, and mobile phase make-up. In a TLC densitometer or scanner, the plate is scanned to perform a quantitative assessment. Depending on the available optics, the densitometer utilizes two modes of transmittance and reflectance. Depending on the choice selected, it either employs fluorescent mode, ultraviolet absorption, or visible light to quantify the marker. A scanner's usual options include ultraviolet and visible light absorption modes, while the fluorescence mode is an extra. Data is gathered and analyzed using common PC-based applications. One of the choices on the software included with the TLC scanner is multi-wavelength scanning. Other options include recording and comparing ultraviolet spectra, producing and obtaining spectra libraries, and multi-wavelength scanning. A standard plot or single or double point calibrations are used to determine the analyte concentration.

Enhancing TLC's Effectiveness

The effectiveness of TLC analysis may be increased by taking a number of measures. These include carefully deciding on the concentration range to be analyzed; using the proper instrument parameters, such as slit dimensions, wave-length selection, scanning speed, and base line correction; using HPTLC plates for high sensitivity and resolution; using the appropriate sorbent from a variety of sorption properties to optimize selectivity; using automated sample application, development, and detection; and using precise in situ recording and quantitation of chromatograms. The application of TLC in quality control of plant material is shown by the example of one of the Ayurvedic medications that follows. The TLC fingerprint technique was utilized to positively identify the plant material after one of the active components in the medication was examined.

About 5 g of plant material was extracted with 50 ml of methanol for 30 minutes at 50° C in a conical flask to create the fingerprint professional. The extract was altered, and the

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filtrate was vacuum-concentrated to a volume of about 5 ml. As a guide, one of the identified active ingredients from this plant was employed. About 5 mg of the reference material were dissolved in 1 ml of chloroform to create the solution. On aluminum base, silica gel 60 F254 mm thick TLC plates, about 10 l of each test and reference solution was manually placed in band form. Mobile phase with 95 volumes of toluene and 5 volumes of ethyl acetate was used to develop the plate. Following development, the plate was dried and examined under 254 nm ultraviolet light. To see the dots, the same plate was heated for about 10 minutes after being sprayed with anisaldehyde-sulphuric acid reagent. These skills may be used to confirm the origin of the plant material and to get semiquantitative data on the quantity of DPH-1 included in the medication.

Along with creating the drug's fingerprint property, the quantity of DPH-1 in various plant material samples was also calculated. 5 g of a relatively fine-powdered drug substance were extracted with methanol in a Soxhlet device for 4 hours in order to conduct the analysis. In a volumetric flask, the extract was filtered and the volume increased by methanol to 50 ml. A volumetric flask was used to dilute one milliliter of this solution to ten milliliters for analysis. By dissolving 5 mg of DPH-1 in 10 ml of methanol and then diluting this solution to 10 ml in a volumetric flask, a standard solution of DPH-1 was created. On a precoated TLC plate that was created using mobile phase made up of 90 volumes of toluene and 10 volumes of ethyl acetate, six different concentrations of this solution were applied in triplicate. The standard plot was created after the developed and dried plate was scanned at 305 nm in a TLC scanner. The quantity of DPH-1 in the test sample was determined from the response obtained in a TLC scanner after a comparable analysis of one microliter of the test solution was conducted under the same circumstances as used for DPH-1. The medication samples that were examined revealed significant variations in DPH-1 level, ranging from below% to cover%. The technique was approved in accordance with ICH recommendations. The TLC-based approach of analysis and fingerprint creation is efficient, dependable, and adaptable to various labs. In a similar manner, this method may be used with other plant-based medications to create fingerprint profiles and determine the proportion of marker compounds present in the raw or finished pharmaceuticals.

Extremely Effective Liquid Chromatography

In most labs across the globe, HPLC has grown to be the most frequently used analytical technique in less than 50 years. The approach has drawn a lot of attention for the advancements that have helped it grow overall in terms of both consumables and equipment. Any of the five fundamental chromatographic techniques liquid-solid, liquid-liquid, bonded-phase, ion exchange, and size exclusion chromatography can be used to create HPLC separations. The nature and characteristics of the analyte determine the mode that is chosen. The most popular method of separation is called bonded-phase chromatography, in which a stationary phase made of organosilanes with different carbon lengths is chemically attached to silanol groups. In contrast to bonded-phase chromatography, which chemically bonds non-polar hydrocarbon chains to the hydroxyls of the silica support, liquid-liquid chromatography coats the solid support mechanically with a film of high boiling point organic liquid. Compared to bonded-phase chromatography, liquid-liquid chromatography is more susceptible to changes brought about by interactions with the mobile phase due to the nature of its mechanism.

Pumping mobile phase through a narrow-bore column containing adsorbent at a fairly high pressure is a common HPLC procedure. The mixture is separated in the column, and the separated components are discovered by using an appropriate detector. A system is needed to inject the mixture into the system without lowering the pressure or changing the flow characteristics, such as rate and pressure, since the mobile phase is being pumped at high pressures. An HPLC system needs a pump to push the mobile phase against high pressure, an injector to insert a solution of a standard substance or test mixture, a column to effect separation, a detector to show the presence of analyte in the eluate, and an appropriate data processing unit in order to fulfill these requirements.

Pumps

As everything relies on the make-up of the mobile phase and the precision of its flow rate, the pump is regarded as the brains of the HPLC system. With fewer than% anticipated changes in flow rate, the pump provides a pulse-free flow of mobile phase. Online solvent mixing is superior to manual solvent mixing. However, hand mixing is preferable when preparing compositions that comprise less than 10% of a certain solvent. During the analysis, the mobile phase's composition is either held constant or modified. Modern pumps can mix up to four solvents at low pressure due to their kind and construction; otherwise, gradient operation would need several pumps, one for each solvent, and the solvents would be combined at high pressure. A typical analytical process utilizes an operating pressure between 1000 and 2000 psi and a flow rate of about 1 ml/min. higher flow rates and higher pressure should only ever be used when necessary since they shorten column life and need more frequent pump maintenance.

Analyses depend heavily on the pumps' flow precision. Long-term flow accuracy of the pumps is measured by the consistency of the retention duration of the final peak, while short-term flow accuracy is examined using the average peak areas and standard deviations of each component. To maintain accurate flow and reduce noise from bubbles, the mobile phase has to be free of dissolved gases. Degassing techniques include vacuum filtration, sonication, and helium gas purging.

Injector

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The injector enables the introduction of a specified amount of test solution into the system's flow channel without affecting the flow kinetics. Variable volume injections are often not favored over fixed volume injections. For full filling of the loop with the sample solution when employing fixed volume loops, it is suggested to flush greater volumes of the sample through the loop. If the amount of test material is not an issue, flush the loop with more than 100 l of test solution to ensure that the mobile phase close to the inner walls of the loop has been pushed out.

For example, injecting 20 l of test solution into a 20 l loop cannot ensure accurate injection. The only needle that should be used to make an injection is the right one. When administering varied injections, it's crucial to use the right-sized syringe; for any analytical procedure, a general guideline is to avoid using the volumetric equipment if less than 20% of its entire volume is being utilized. Therefore, a 25 l syringe shouldn't be used to measure or inject quantities under 5 l.

Columns

Columns occur in a variety of diameters, structural designs, and chemical compositions. Typically, stainless steel casing is used to pack the chromatographic material. Porous paper that vary in nature, shape, size, and surface modifications make up the material's composition. The kind of analysis determines which column to use. The websites of the top HPLC column manufacturers provide thorough information that may be used as a helpful reference for selecting columns for analysis.

With an increased focus on lowering the column length, diameter, and analysis time, the majority of studies are reported using reverse phase columns, often C18. The majority of HPLC separations are successful with columns kept at room temperature, although thermos stated columns kept at °C are required for repeatable results. This is because all methods of separation rely on temperature, and any change in temperature has a significant impact on the outcome.

Detectors

To meet the various demands of the analyzers, a broad range of detectors are offered. The most popular types of ultraviolet detectors are those with a fixed wavelength, a dual wavelength, or a variable wavelength. Refractive index detector, fluorescent, electro-chemical, evaporative light scattering, and chemical luminescence detectors are other choices.

Processing of Data

The detector's electrical response is digitalized and transmitted to a data processing module, which in modern times is almost always a computer, where calculations are performed using specialized software. For data processing, there are several software programs available from both manufacturers and third parties. They compute the data as well as manage the machine's overall performance.

Influences on HPLC Analysis

An HPLC analysis is affected by several factors. Although this issue is beyond the purview of this essay, certain important factors are briefly explored. In order to assure the accuracy of the outcome, more focus is now placed on maintaining the column's temperature within a small range. This is preferred because temperature has an impact on a variety of variables, including solubility, solute diffusion, mobile phase viscosity, and column plate number. Another crucial factor that influences the resolution, retention duration, and peak area is the composition of the mobile phase. Pumps are primarily responsible for variances in outcomes since only accurate pumps can guarantee the correct composition of the mobile phase and the flow rate. Gases dispersed in the mobile phase might cause inaccurate flow rates and inaccurate detector responses.

To determine the tolerable boundaries, retention time variations are often addressed. The flow rate, column temperature, molecular phase composition, and integration all have an impact on retention time. The retention time varies to the same amount that a flow rate error does. The retention time is more significantly affected by small changes in column temperature. A column should ideally be thermos stated at ° C. However, the column must be thermos stated to 4° C in order to achieve a high accuracy of% in retention duration. The retention time is more significantly affected by changes in the composition of the mobile phase. An estimated 1% variance in the composition of the mobile phase occurs in a normal isocratic elution, producing a %-% inaccuracy in retention durations. The observed differences in the mobile phase's composition are more prevalent in the gradient elution. Faulty recording by recording devices also causes fluctuations in the retention time, although the impact is considerably less noticeable.

All the elements that influence retention time have an impact on peak area. The start and end of the peak should be marked by the recorder accurately, since this has been shown to be the primary cause of inaccuracy in peak area recordings. The outcomes are also influenced by a number of other variables, including injection volume, connecting tubing, end fittings, and detector volume. The peak becomes broader as a consequence of a large injection volume and analyte concentration. The best outcome is obtained when the sample is prepared during the mobile phase, hence this method should be used first.

Utilizing HPLC to Control Plant Product Quality

Of all the analytical methods used today, HPLC is the most widely employed. Therefore, it makes sense that the majority of developments are occurring in the modernization of this method. The TLC portion of this paper covered the use of HPLC for comparable functions. HPLC has two uses: one is to produce the profile, for which TLC is favored, and the other is to estimate the number of markers, for which HPLC

is preferred. With the exception that samples for HPLC are filtered through a filter of 5 m or smaller, the early procedures of sample preparation are identical to those for TLC. Additionally, it is guaranteed that the test sample does not include any materials that are permanently retained on the HPLC column, therefore in most situations, extracts are purified before being injected into the column.

A variable wavelength UV detector is ideally used to record the response once the sample has been prepared and injected onto the column. The photodiode array detector is helpful, particularly when creating profiles of plant extracts, since the nature of all the components in the extract cannot be determined in advance. If the sample preparation was not done for quantitative analysis, the fingerprint profile of plant extracts may be utilized for identification as well as for getting semi-quantitative data. The completed product's profile may also be created and used to track batch-to-batch variances. The fingerprint profile may be used to examine changes in the completed product's composition or, to put it another way, to show how stable the product is.

The determination of markers in plant medications is the most significant use of HPLC. Fundamentally, the procedures in an HPLC analysis are identical to those in any other analytical method. To determine the amount of the marker in the test substance, the reaction of the test sample is compared to that of a known quantity of the marker. Understanding the chemistry and technique of the marker led to the development of the HPLC method.

HPLC is unmatched in chemical analysis and may be tailored to deliver the most precise and accurate findings. With stronger separations in HPLC than TLC, the predicted findings from an examination of a final product rely heavily on this method. HPLC tests typically take 15 to 30 minutes to complete, which limits their usage when a lot of samples need to be evaluated.

HPLC vs. TLC

TLC has grown to be a crucial method for standardizing plant materials. The technology is now a top option for plant medications due to its development and automation. Its application has increased in popularity in underdeveloped nations where HPLC improvements are not cost effective. TLC has a number of benefits over HPLC. In order to prevent costly columns from degrading, rigorous purification, degassing, and filtering operations are not necessary for the preparation of samples and mobile phases. On a single 20 × 20 cm2 plate, many samples may fit. Under the same circumstances, standards and test samples are both evaluated concurrently. Due to the fact that each phase of analysis is completed separately using different tools, many analysts may work at once.

Contrary to HPLC, where the use of pH extremes in the mobile phase is prohibited by the column chemistry, there is no restriction on the available solvent systems. The method makes it feasible to detect an analyte that is transparent to UV light by allowing enormous flexibility in derivatization with chromogenic spray reagents. The produced chromatogram may also be evaluated more than once, which is not feasible with HPLC. Since a new plate is used each time, there are no leftovers from one analysis to affect the next. Finally, it significantly reduces the time and expense of the analysis.

Compounds that are susceptible to light and air, which in the case of HPLC travel through an enclosed environment, degrade more quickly in an open system. In HPLC, the analyte is detected in solution, allowing for great sensitivity, but in TLC, the solid phase interaction results in less sensitive detection. Finally, more complicated separations than TLC are possible because to recent improvements and efficient flow dynamics in HPLC.

II. CONCLUSION

The analysis and quality assurance of plant material and the extracted products depend on both TLC and HPLC. Each of these methods has drawbacks and advantages of its own. TLC is quick, flexible, and affordable, but HPLC is more exact and precise. For quality assurance of plant products, one may choose to utilize either one or the other depending on personal preferences and the scenario.

REFERENCES

[1] N. HaliloviÄ‡, M. KauÄiÄ-Å kufca, Z. AdemoviÄ‡, A. BaÅ¡iÄ‡-HaliloviÄ‡, and R. OmanoviÄ‡, “Analysis of stability of naturally aged single base propellants,” African J. Pure Appl. Chem., 2021, doi: 10.5897/ajpac2020.0859.

[2] P. Prajapati, A. Patel, and S. Shah, “Application of DoE-Based Analytical QRM to Development of the Multipurpose RP-HPLC Method for Estimation of Multiple FDC Products of Telmisartan Using Enhanced AQbD Approach,” J. Chromatogr. Sci., 2022, doi: 10.1093/chromsci/bmab070.

[3] M. Maggira, I. Sakaridis, M. Ioannidou, and G. Samouris, “Comparative Evaluation of Three Commercial Elisa Kits Used for the Detection of Aflatoxins B1, B2, G1, and G2 in Feedstuffs and Comparison with an HPLC Method,” Vet. Sci., 2022, doi: 10.3390/vetsci9030104.

[4] T. G. Ambaye, M. Vaccari, S. Prasad, and S. Rtimi, “Preparation, characterization and application of biosurfactant in various industries: A critical review on progress, challenges and perspectives,” Environmental Technology and Innovation. 2021. doi: 10.1016/j.eti.2021.102090.

[5] S. Görög, “Identification in drug quality control and drug research,” TrAC - Trends in Analytical Chemistry. 2015. doi: 10.1016/j.trac.2014.11.020.

[6] . Lee, S. Gupta, J. S. Huang, L. P. Jayathilaka, and B. S. Lee, “HPLC-MTT assay: Anticancer activity of aqueous garlic extract is from allicin,” Anal. Biochem., 2013, doi: 10.1016/j.ab.2013.01.033.

[7] A. Bārzdiņa, A. Paulausks, D. Bandere, and A. Brangule, “The Potential Use of Herbal Fingerprints by Means of HPLC and TLC for Characterization and Identification of Herbal Extracts and the Distinction of Latvian Native Medicinal Plants,” Molecules, 2022, doi: 10.3390/molecules27082555.

[8] P. Yingyuen, S. Sukrong, and M. Phisalaphong, “Isolation, separation and purification of rutin from Banana leaves (Musa

balbisiana)," Ind. Crops Prod., 2020, doi: 10.1016/j.indcrop.2020.112307.
[9] A. Firmansyah, W. Winingsih, and J. D. Y. Manobi, "Review of scopoletin: Isolation, analysis process, and pharmacological activity," Biointerface Research in Applied Chemistry. 2021. doi: 10.33263/BRIAC114.1200612019.
[10] S. R. Priyanka, M. Venkataramana, G. P. Kumar, V. K. Rao, H. C. S. Murali, and H. V. Batra, "Occurrence and molecular detection of toxigenic Aspergillus species in food grain samples from India," J. Sci. Food Agric., 2014, doi: 10.1002/jsfa.6289.
[11] V. K. Bajpai, R. Majumder, and J. G. Park, "Isolation and purification of plant secondary metabolites using column-chromatographic technique," Bangladesh J. Pharmacol., 2016, doi: 10.3329/bjp.v11i4.28185.

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Methods for Extracting Phenolic Compounds from Aromatic and Medical Plants

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***Abstract*—One of the most significant substances discovered in plant secondary metabolites are phenolic derivatives. Reviewing various methods of extracting these substances from plants has garnered more attention as a result of its many uses in the agricultural, culinary, chemical, and pharmaceutical sectors. The extraction techniques that have been employed to date to isolate phenolic compounds from plants include liquid-liquid extraction (LLE), microwave-assisted extraction (MAE), ultrasound-assisted extraction (UAE), and supercritical fluid extraction (SFE). We would like to provide an overview of these techniques in this chapter.**

***Index Terms*— Aromatic Plant,Essential Oils, Chromatography,Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

Natural products are chemicals or chemical compounds created by living things found in nature. Phytochemicals are substances that may be extracted from or made by plants. Phytochemicals found in medicinal and aromatic plants may be isolated and utilized for a variety of applications across the scientific disciplines. Medicinal plants, for instance, are a rich source of pharmaceuticals for conventional medical systems, contemporary medications, nutraceuticals, dietary supplements, folk remedies, pharmaceutical intermediates, and chemical entities for synthetic drugs. However, because aromatic plants contain a variety of chemical compounds, including hydrocarbons, esters, terpenes, lactones, phenols, aldehydes, acids, alcohols, and ketones, they are a source of essential oils, concretes, absolutes, pomades, and resinoids that can be used in fragrances, flavors, cosmetics, pharmaceuticals, health beverages, and chemical terpenes. One of the main categories of phytochemicals found in medicinal and aromatic plants are phenolic compounds. They support both the functional and sensory qualities[1].

Medicinal and aromatic plants are able to reduce oxidative stress of cells, which is linked to a number of illnesses, including cancer, cardiovascular disease, and neurological disorders. This is because phenolic compounds have strong antioxidant qualities. They may also have anti-inflammatory, antiviral, anti-allergic, and anti-proliferative qualities. They may be found as aglycones or in their conjugated forms as glycosides or glucosides. Phenylpropanoids, flavonoids, flavones, flavonones, isoflavones, xanthones, aurones, quinines, and tannins are the primary subgroups of phenolics. These two groups include the 8000 polyphenols that have been identified from medicinal and aromatic plants. Figure 1 displays the chemical structures of the most prevalent types of polyphenols as well as the categorization of phenolic compounds. Extraction is the typical process of treating plant or animal tissue with specific solvents in order to dissolve the pharmaceutically active components while leaving the majority of the inert material undissolved. The first stage in the investigation of medicinal and aromatic plants is the extraction of bioactive chemical components, which is essential for their further separation and characterization. There are several different extraction methods accessible today. Many innovative processes have been created that may be utilized to produce natural extracts in addition to the traditional extraction methods. There is no one extraction technique that is considered to be the gold standard for obtaining phenolic compounds from plants since there are so many different extraction methods. Prior to selecting an extraction method, it is important to consider the type of the medication, the solvent, the cost of the drug while accounting for its medicinal value, the product concentration, and the stability of the drug. Maceration is often employed for less expensive medications and medications containing chemicals with little therapeutic value, as well as when water is needed as a solvent or the creation of a diluted solution is necessary. Contrarily, percolation is often employed for expensive medications, medications with high therapeutic value, and medications that call for a volatile solvent or a concentrate[2].

By using traditional methods including maceration, hydrodistillation, and soxhlet extraction, commonly known as hot extraction, phenolic chemicals may be extracted from medicinal and aromatic plants. Extraction that is ongoing. These techniques are regarded as standard ones and are still often employed to extract phytochemicals from both aromatic and therapeutic plants. These methods do, however, have some distinct disadvantages. For instance, a typical extraction process requires a lot of time, hence these methods are regarded as time-consuming since they demand a lot of time. Additionally, expensive, high-purity solvents must be used in large quantities, and in most situations, the excess solvent must be evaporated when the extraction process is finished. Additionally, using high temperatures results in

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thermal breakdown of thermos labile chemicals and limited extraction selectivity. Over the last 50 years, several more unconventional approaches have been created to address these issues. Because less solvents and other chemical substances must be used, these procedures are meant to be more ecologically friendly. Additionally, compared to the traditional conventional techniques, the operating time is substantially reduced, and they are also capable of achieving higher extraction yields and higher-quality plant extracts.

II. DISCUSSION

Pretreatment of the Plant Sample before Extraction

Technique the plant samples often need to be pretreated before the extraction technique. Different plant components may extract different families of chemicals. The leaves, barks, roots, fruits, flowers, and other components of medicinal and aromatic plants may all be utilized for extraction. Both fresh and dried plant samples may be utilized right away. Dried samples are often selected since the experiment design takes less time. Furthermore, to enhance the surface contact between the plant and the extraction solvent, a ppaper size reduction may sometimes be needed, either by grinding or by powdering the sample. Powdered samples are preferable over ground samples in the majority of situations described in the literature because they have more homogenized and smaller paper. The size reduction stage is believed to be very important for extraction effectiveness. Because of this, you may use an ordinary mortar and pestle or an electric blender or grinder.

For the preliminary drying of plant samples, many procedures are available. The most popular methods for drying plant samples include air drying, microwave drying, oven drying, and freeze drying. Depending on the kind of sample, airdrying may take anything from a few days to a few months or even a year, but it doesn't need high temperatures. No thermal Stable Compounds are thus retained. It is regarded as a sluggish method, nevertheless, since it takes a long time to finish. In order to speed up the drying process, microwave drying employs electromagnetic radiation with electric and magnetic fields. Although it is regarded as an established method, it may lead to the destruction of the phytochemical substances present in plant samples. Thermal energy is used during oven drying to get rid of the samples' moisture. Plant samples may be dried quickly and easily, and the phytochemical components can be preserved.

To avoid damaging the target constituents of the medicinal and aromatic plants, the drying time and oven temperature should be carefully chosen. Plant sample drying may also be done via freeze drying. In this instance, the sample is promptly lyophilized after being frozen overnight to prevent the sample's frozen liquid from thawing. The majority of the phytochemicals are maintained when this procedure is used, and a better extraction yield of phenolic contents may be attained. However, it is thought to be a more difficult and costly procedure in comparison to the drying methods previously discussed, which is why this technique is only employed for thermos labile materials of high value[3], [4].

Traditional Extraction Methods

Used for Aromatic and Medical Plants

As was previously noted, Soxhlet extraction, maceration, and hydrodistillation are the typical methods that are most often employed to extract the active components of aromatic and medicinal plants. These are detailed in more detail below.

Aqueous Hot Extraction

Franz Ritter von Soxhlet originally suggested the generalized Soxhlet extraction process in 1879, and it was initially intended to be used to extract lipids. These days, it is often employed to extract active chemicals from a variety of natural sources, not only lipid molecules. This method involves placing the plant material in a porous "thimble" composed of filter paper or cellulose, which is then put in a thimble-holder and filled with the extraction solvent. The solvent is heated in the bottom flask before it vaporizes, condenses, and falls back into the bag containing the sample. A siphon is used to aspirate the liquid content of the thimble into the distillation flask, transporting the extracted solutes into the bulk liquid, when the liquid level exceeds the overflow level. Up till total extraction is accomplished, the operation is repeated. The Soxhlet extraction method is said to offer a lot of benefits. First off, in contrast to other traditional methods, in this instance a lower amount of extraction solvent is needed to extract a significant amount of the active components of medicinal and aromatic plants. This may lead to a significant reduction in the amount of time and energy needed for the extraction process. There is also no need for post-extraction filtering since the distillation flask's heat source maintains a reasonably high extraction temperature. Fig. a typical Soxhlet setup is shown in Figure 10.8. Toxic and combustible solvents are utilized in hot continuous extraction, hence the process cannot be regarded as either operator- or environmentally-friendly. Additionally, it calls for high-purity solvents, which naturally drives up the price of the whole procedure. Additionally, because of the prolonged exposure to high temperatures and lack of agitation, it is feasible to thermally decompose the phytochemical components of medicinal and aromatic plants[5].

Maceration

Maceration, which is regarded as a steady-state extraction process, is another often used traditional extraction method. In this method, the medicinal or aromatic plant sample is put whole or powdered in a closed jar with the solvent and let to stand for at least three days at room temperature with regular stirring, until the soluble stuff has dissolved. The closed vessel is employed in order to prevent the evaporation of the extracting solvent and ensure that there are no differences between batches of the same plant. The combination is then squeezed to recover a significant proportion of occluded

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solutions from the undissolved marc left over after extraction, and the two liquid fractions are mixed. The mixed liquids are purified by filtration or decantation after standing until equilibrium is reached, and the marc may then be strained via a specialized press. The major mechanism is thought to be molecular diffusion, which is a very slow process, since the system remains static, with the exception of brief shaking. A little shaking every now and then may help with diffusion and ensuring that the concentrated solution that has built up on the surface of the paper is dispersed, bringing new extract to the paper surface for more extraction. In general, plant material that has been finely ground into a powder is never utilized since it makes it harder to clarify the extract afterwards. Although agitation is not a major issue for small volumes of solvent, it becomes challenging when the method is used on an industrial scale with large sample containers. Because of this, methods like circulatory extraction and multistage extraction, together with the necessary equipment, have been developed. Repeated maceration may be used to boost the yield of the extraction process. When the target components are very valuable and the concentrated infusion includes oil that is thought to be volatile, double or triple maceration might be very helpful. Typically, the second and third extracts must be evaporated before being combined with the first extract in order to reduce the amount of solvent used overall[6].

Hydro distillation

The third traditional extraction technique is hydrodistillation, which has long been employed to get the essential oils and active ingredients out of plant samples. This method works well for extracting volatile active substances but cannot be used to extracting thermos labile substances due to the high extraction temperature needed. Additionally, hydrodistillation is a method that may be used with both dry and wet plant samples and doesn't need the use of organic solvents. Water distillation, water and steam distillation, direct steam distillation, and distillation with cohobation are the four fundamental types of hydrodistillation. The essential oil's boiling point and the characteristics of the medicinal or aromatic plant determine which of the four modifications to use. Water distillation: In water distillation, a sample of a medicinal or fragrant plant is put in a flask and the right quantity of water is added. The flask is then heated and brought to a boil while being attached to a condenser.

The distillate, which is combined with the water-derived steam and is subsequently collected separately, is put into a tube for collection. Water hydrodistillation is still in use today, although because of its many drawbacks, it often gives way to newer procedures. First, the plant matter around the flask's base that is in close proximity to the flames might char. This may also occur if the plant becomes overheated and burned due to insufficient water supply to sustain the duration of the operation. Additionally, prolonged exposure to hot water might lead to the hydrolysis of several active chemicals. Furthermore, this technique takes a lot of time, and controlling the heat is difficult. An alternate method to hydrodistillation, water and steam distillation involves supporting the plant so it is not in direct contact with the hot furnace bottom. The rising vapor from the boiling water causes distillation to happen. This method might prevent the plant material from scorching and charring. Direct steam distillation: In this process, the steam used for extraction is produced outside of the tank, either in a steam generator or a boiler.

As in the prior instance of steam and water distillation, the plant is once again supported above the steam input. It is recommended to distill high-boiling oils and hard materials like roots and woods using direct steam distillation because the extraction time can be significantly reduced. Distillation with cohobation: Some essential oils have a high solubility in water, which can cause some of the oil to be lost in the water that is released during the distillation process. Cohobation is a solution that may be utilized to get around this issue. The process of cohobation involves transferring the condensate water from the separator back to the extraction unit's flask so that it may be boiled once again. The reduced water amount in this instance allows for improved extraction yields. However, the lengthy treatment, which may result in the product's disintegration, may have an impact on the quality of the essential oil[7].

Various Extraction

Techniques Other extraction processes that may be employed for medicinal and aromatic plants are mentioned in the literature in addition to the well-established standard extraction techniques, some of which are still frequently utilized today. For the extraction of the medicinal plants' active ingredients, the main methods include infusion, digestion, decoction, percolation, modified percolation, aqueous alcoholic extraction by fermentation, countercurrent extraction, and expression, cold fat extraction, protoplast extraction, cohobation, and phytosol extraction or phytonics process with hydrofluorocarbon solvents.

Taking Out of Medical Plants

Infusion

Infusions typically consist of diluted solutions of the active chemical components that are easily soluble in the raw plant material. Historically, fresh infusions of the phytochemicals present in the plant sample may be obtained by briefly macerating the raw plant in either cold or boiling water. The fundamental steps in making fresh infusions include moisturizing the powdered aromatic or medicinal plant, treating it with cold water for around 15 minutes, then treating it with boiling water for 30 minutes, and then filtering. Nowadays, infusions are often made by diluting a concentrated infusion by one volume with ten volumes of water. It is simple to make concentrated infusions of a plant using either maceration or modified percolation. To make such infusions match the intensity and scent of the

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comparable fresh infusion, 25% alcohol is added before or during the infusion procedure, followed by water dilution. Since infusions include a lot of water and must be consumed quickly after preparation, their primary disadvantage is that they are susceptible to bacterial and fungal development. Infusions are not very common for industrial application for this reason.

Digestion

In order to acquire extracts from medicinal and aromatic plants, digestion may be utilized when a relatively high temperature is not uncomfortable. In the digesting method, which is a kind of maceration treatment, the solvent extraction effectiveness is increased by the application of mild heat during the extraction stage. Digestion may boost extraction yield and provide higher-quality extracts[8].

Decoction

Decoction is an extraction method that has been utilized specifically for compounds that are thermostable and soluble in water. In this instance, the raw plant is cooked in an open-type extractor with a certain amount of water for a predetermined amount of time. The initial mass ratio of the crude drug sample to the water is typically one to four or one to sixteen. The boiling and evaporation that take place throughout the extraction process reduce the volume subsequently to one-fourth of its initial volume. The concentrated extract is strained or filtered and utilized as is or after being further processed after decoction extraction has come to a conclusion.

Modification and Percolation

Percolation is an extraction method preferred for thermos labile active ingredients in expensive pharmaceuticals. In order to extract the soluble active components from the raw plant material, a method known as percolation uses a continuous flow of the solvent across a bed that is not moving. The tool being used in this instance is a percolator, which is a conical-shaped jar that is open at both ends. In this procedure, the solid plant sample is moistened with the right quantity of the designated solvent and let to stand for around 4 hours in a tightly covered container. The mass is then compressed, the percolator's lid is shut, additional solvent is injected, and a thin layer forms over the bulk. The combination is then given another 24 hours to macerate in the closed percolator. The percolator's outlet is then opened, allowing the liquid within to trickle gradually. Until the percolate equals roughly three-quarters of the final extract's necessary volume, more solvent is added as needed.

The liquid is then poured to the percolate after the solid has been crushed. Filtering is an option since there aren't many fine solid paper in the extract, so it may also happen. Enough solvent is added to provide the necessary volume, and the combined liquid can be cleared by filtering or by standing followed by decanting. Additionally, since the solid material doesn't need to move in the extraction mechanism, it just needs little mechanical processing. A mechanical stirrer might be used to create agitation during percolation in order to boost extraction efficiency. Alternately, the extract may be circulated repeatedly back to the percolator. Furthermore, if the active ingredient is thermostable, the solvent temperature may rise, which will improve the bioactive components in the plant sample's solubility and extraction effectiveness[9].

Alternate Percolation

Modified percolation may be used to extract the desired phytochemical constituents of the medicinal or aromatic plant when a more concentrated product is required. This method also involves an evaporation stage, particularly when using diluted alcohol as the solvent. Ambition of the raw substance is the first step in the procedure, which also involves maceration, percolation, and the collecting of 1000 mL of percolate. Up until the medication is entirely depleted and the extraction process is finished, the percolation and collecting stage is maintained.

Fermentation-based Aqueous Alcoholic Extraction

Aqueous alcoholic extraction by fermentation is an extraction method that is based on the idea that certain medicinal plants may be used to extract their bioactive chemical components using the fundamentals of fermentation. This procedure involves soaking the unprocessed medicinal plant, either as a powder or a decoction, for a certain amount of time. The plant produces alcohol on-site at this time, which might result in the extraction of phytochemical components. Additionally, the produced alcohol serves as a preservative for the acquired extract to guard it from bacterial development. The fundamental advantage of this extraction method is that, in comparison to other methods, it may enable the extraction of a greater variety of the active components found inside the plant cell. This is because of the gradient of rinsing alcohol level. Additionally, fermentation assists in removing unwanted sugars, pesticides, heavy metals, and other impurities that might taint the extract. As a consequence, when aqueous alcoholic extraction by fermentation is utilized, substantial cleanup of the resulting extract is not necessary[10].

Against the Flow Extraction

In CCE, toothed disc disintegrators are used to grind the wet raw plant material into a fine slurry. This extraction method involves moving the plant sample within a cylindrical extractor in one direction, where it comes into contact with the extraction solvent. The resultant extract gets more concentrated the farther the starting material is moved. Complete extraction may also be accomplished by optimizing the solvent and plant sample volumes as well as their flow rates. Since it is often carried out at room temperature, this procedure's key advantages are its high efficiency, quick extraction time, and absence of dangers associated with high temperatures. Additionally, as compared

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to other extraction methods, a far less amount of solvent is required to extract the same amount of medicinal or aromatic plant material.

Using Aromatic Plants to Extract

Expression

Expression extraction is a very effective method for obtaining essential oils from plant materials that may be hydrolyzed, polymerized, or resinified and are sensitive to prolonged heating due to their thermos labile elements. Citrus fruit peel, for example, has multiple oval oil sacks from which the essential oil may be extracted, therefore pressing can result in high yields and high-quality extracts. In the case of hand expression, the plant peel is first submerged in water for a number of hours before being manually pressed with a flat sponge. This method has been used in several forms throughout history across Europe. Today, the whole procedure is automated thanks to devices that can press the peels, separate the oil from the aqueous phase, or express the oil so that it doesn't come into touch with the juice during the extraction process. Expression may be altered to maintain the thermos labile plant components, making it a helpful extraction method for essential oils.

Extraction of Cold Fat

For high-quality essential oils like jasmine, gardenia, and tuberose to give a high-quality extract without damaging their thermos labile volatile chemical components, cold fat extraction is a particularly beneficial extraction technique. Fat is highly helpful for the extraction process since it may absorb the flower's volatile oil when it comes into touch with it, so absorbing its fragrance. Although it is thought to be highly popular in France for manufacturing essential oils, this extraction method has been employed in many different nations across Europe. To maintain a low temperature during extraction, the whole process is carried out in cold rooms.

The choice of the fat to be used as the extractant will have the most impact on how well the extraction process works. The fat must have the proper consistency to make a semi-hard surface from which the flowers can be readily removed after the extraction process. It must also be odorless so that it does not change the aroma of the essential oil. A combination of lard and tallow has historically been the most popular fat mixture utilized for this purpose. Other fat solvents, such as vegetable fat, mineral oil, high-molecular-weight fatty acids, etc., have been tested for this purpose as well, but they perform less well in terms of extraction than the traditional, well-proven combination[11].

Extraction of protoplasts

Plant protoplasts are cells from which the cell wall has typically been digested by an enzyme. Cellulases and pectinases are two kinds of enzymes that are very helpful for this process. While pectinase enzymes break down the pectin that holds cells together, cellulase enzymes break down the cellulose in plant cell walls. The protoplast that is left after the cell wall has been taken out is spherical in form. Many different plant tissues, including leaves, stems, roots, flowers, anthers, and even pollen, may yield protoplasts. Due to the components of a solution having different partition coefficients between the two immiscible liquids, the constituents of a solution may be separated using a liquid-liquid extraction procedure after the isolation. With this method, aromatic components are moved from the aqueous phase to the organic phase by pumping aqueous dispersion into the column that contains the plant material. The generation of essential oils, which are found within the protoplast cells, and the extraction of aromatic plants from their surroundings both benefit greatly from this method[12].

III. CONCLUSION

The extraction of phytochemical components from aromatic and medicinal plants involves a variety of extraction techniques. These techniques may be divided between conventional techniques, which have been extensively employed up to this point, and nonconventional techniques, which are gaining popularity due to their significant advantages. Soxhlet extraction, maceration, and hydrodistillation are examples of conventional techniques. These techniques are widely known for the extraction of chemical compounds from a variety of plant materials, but they have a few limitations, such as the prolonged extraction time and the excessive use of expensive, high-purity solvents. When using high temperatures, there is also reduced extraction selectivity and thermal breakdown of thermos labile chemicals. Other extraction methods include expression, cold fat extraction, protoplast extraction, cohobation, digestion, decoction, percolation, and modified percolation, aqueous alcoholic extraction by fermentation, and phytosol extraction or phytonics process with hydrofluorocarbon solvents for the various extract types of aromatic plants.

REFERENCES

[1] V. Garg, A. Dhiman, R. Dutt, and S. Ranga, “The genus Pyrus: An update,” ~ 143 ~ Pharma Innov. J., 2018.
[2] A. R. Mahmood and M. R. Abdullah, “The Effect of Active Compounds and Trace Elements Extracted from Artemisia Fruit on Some Liver Enzymes in Humans,” Arch. Razi Inst., 2023, doi: 10.22092/ARI.2022.359354.2409.
[3] T. D. Sulistiyawati and R. A. Islamy, “Phytochemical Characteristics and Antimicrobial Activity of Medical Plant Zizyphus mauritiana Against Pseudomonas fluorescens,” Ecol. Environ. Conserv., 2021.
[4] O. Gedik, Y. Z. Kocabaş, And O. Çinar, “Mentha longifolia subsp. typhoides Alt Türüne Ait İki Farklı Varyetenin Uçucu Yağ Bileşenlerinin Belirlenmesi,” Manas J. Agric. Vet. Life Sci., 2022, doi: 10.53518/mjavl.1096208.
[5] M. M. Omar, “Phenolic Compounds in Botanical Extracts Used in Foods, Flavors, Cosmetics, and Pharmaceuticals,” 1992. doi: 10.1021/bk-1992-0506.ch012.

[6] C. L. Del-Toro-Sánchez, N. Bautista-Bautista, J. L. Blasco-Cabal, M. Gonzalez-Ávila, M. Gutiérrez-Lomelí, and M. Arriaga-Alba, "Antimutagenicity of methanolic extracts from anemopsis Californica in relation to their antioxidant activity," Evidence-based Complement. Altern. Med., 2014, doi: 10.1155/2014/273878.
[7] S. Akbar, "Ocimum tenuiflorum L. (Lamiaceae)," in Handbook of 200 Medicinal Plants, 2020. doi: 10.1007/978-3-030-16807-0_138.
[8] Kementerian Kesehatan Republik Indonesia, "Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2020 tentang Standar Antropometri Anak," Kementerian Kesehatan Republik Indonesia. 2020.
[9] M. H. Shahrajabian, W. Sun, and Q. Cheng, "Asian Journal of Medical and Biological Research Chinese star anise and anise, magic herbs in traditional Chinese medicine and modern pharmaceutical science," Asian J. Med. Biol. Res, 2019.
[10] E. L. C. OBAME, "Etude Phytochimique, Activités Antimicrobiennes et Antioxydantes de Quelques Plantes Aromatiques et Médicinales Africaines Soutenu," J. Appl. Biosci., 2009.
[11] M. G. Miguel, M. D. Antunes, and S. A. Dandlen, "Rosmarinus Officinalis L.: An aromatic plant with interesting biological properties," in Spices: Types, Uses and Health Benefits, 2012.
[12] Q. Absar, K. K. Eswar, and O. Shaista, "Feronia Limonia – A Path Less Travelled," 2010.

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Techniques for Modern-Day Assisted Extraction

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Abstract*—Maceration, infusion, decoction, hot continuous extraction, percolation, digestion, aqueous-alcoholic extraction through fermentation, counter-current extraction, microwave-assisted extraction, ultrasound extraction, and supercritical fluid are examples of common methods for extracting medicinal plants. Aspirin and morphine are completely natural compounds produced from willow bark and the opium poppy, respectively. Codeine, digitoxin, quinine, and pilocarpine came after them quickly.Many of these extraction methods are regarded as "green techniques," which are more environmentally friendly because they use less dangerous chemicals, are energy-efficiently built, require less time to complete the extraction process, and don't let the use of unsafe chemicals pollute the environment in excess.

***Index Terms*— Aromatic Plant,Essential Oils, Chromatography,Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

Other cutting-edge extraction methods have been developed and put to use in recent years for the extraction of phenolics and other bioactive chemical components from medicinal and aromatic plants. The most promising of these include the previously discussed phytonics process, as well as ultrasound-assisted extraction, enzyme-assisted extraction, microwave-assisted extraction, pulsed electric field -assisted extraction, supercritical fluid extraction, pressurized liquid extraction, also known as accelerated solvent extraction, and subcritical water extraction[1].

Extraction with Ultrasound

Ultrasound is a unique kind of sound wave that may cause compression and expansion as it travels through liquids or liquids containing solid things. Only a tiny fraction of the ultrasonic spectrum, known as ultrasound power, which has frequencies between 20 kHz and 100 MHz, is used in chemistry. The cavitation phenomena, which involves the creation, development, and collapse of bubbles, occurs when ultrasonic waves are applied. The acceleration of the mass transfer and the release of the organic chemicals from the cells of the aromatic and medicinal plants, respectively, are the mechanical effects of this process. The cell content may be extracted using the chosen solvent more readily as a consequence. The ultrasonic probe system, which is used for direct applications of the technique, and the ultrasonic bath, which is used for indirect applications, are the two basic sonication tools. Depending on the kind of plant tissue and its constituent parts, the ultrasonic-assisted extraction approach has a better extraction efficiency than the other standard extraction procedures. The necessary pretreatment as well as physicochemical events that may occur during the sonication, such as diffusion through the cell wall and the washing of the contents following the wall break, all affect how effective the extraction is. Additionally, UAE employs simpler, less expensive equipment than methods like MAE. Generally speaking, ultrasonic-assisted extraction is a quick, effective, energy-saving method that may be used to remove thermos labile substances since it doesn't need high temperatures.

However, the bioactive components of aromatic and medicinal plants may sometimes be negatively impacted by the application of ultrasonic radiation. Free radicals might arise as a consequence, which could lead to unfavorable alterations in the molecules[2].

Extraction Assisted by Microwave

Microwaves are nonionizing electromagnetic waves with a frequency of between 300 MHz and 300 GHz. They are quite helpful for accelerating the extraction process. When microwave radiation is utilized for heating, as opposed to traditional heating methods, the heating takes place in a closed system with almost little heat being lost to the environment. Dipoles made of polar and polarizable materials interact with the radiation. Polar molecules strive to align themselves in the direction of the changing field when it occurs, which causes a rise in temperature. The only frequency at which heating may occur is 2450MHz. Only dielectric materials or solvents with permanent dipoles that heat up under microwave are employed since using a nonpolar solvent without polarizable group’s results in poor heating.

Microwave-assisted extraction uses a variety of different techniques. In MAE, the heat from the microwave irradiation is transferred directly to the solid without being absorbed by the microwave-transparent solvent. This causes a rapid rise in temperature, which can instantly heat any remaining moisture that is microwave-absorbing in the solid before it evaporates. The strong vapor pressure that is produced by this moisture eventually breaks the plant cell and allows the contained oil to escape. In microwave assisted extraction, two primary groups of devices are employed. There are multimode microwave ovens first, which use closed extraction vessels and regulated temperature and pressure for extraction. On the other hand, there are focused microwave

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ovens, which solely concentrate microwave radiation on the area of the vessel that holds the sample[3].

The solubility of the bioactive chemicals may theoretically be increased by raising the pressure and the accompanying increases in extraction temperature. A closed system was used for P-MAE, and the microwave radiation was stopped after 2.7 bar of pressure had built up. By using vacuum pressure, which lowers the related boiling temperature of the solvent, vacuum microwave-assisted extraction may also be used to lessen the hazards of thermal degradation and oxidation of the active chemicals extracted from the plant cells. This suggests that thermos labile components of plant materials may be conserved when microwave radiation and pressure are utilized together. When the extraction procedure is carried out in a closed system, NPMAE—which employs nitrogen to pressurize the extraction vessel—can also be utilized to prevent oxidation of the active chemicals. When compared to yields obtained in the absence of nitrogen, the extraction yield of oxidizable chemicals under inert conditions may be much greater. Another method that increases extraction yield is UMAE, which improves the mass transfer mechanism during the extraction process by combining microwave and ultrasonic waves. UMAE is an easy, affordable, and ecologically friendly extraction technology since less solvent must be used and less extraction time must be spent. Other strategies that have been investigated include automating and streamlining the extraction process, as well as linking online with an analysis phase. Due to the fluidized condition of the extraction solvent-sample system, this procedure, also known as DMAE, facilitates rapid microwave energy transfer to the extraction solvent and the sample, resulting in quick extraction and decreased solvent consumption.

Extraction Assisted by Enzymes

According to enzyme-assisted extraction, cell rupture may facilitate the release of phytochemical components from the cells of aromatic and medicinal plants. Enzymes can generally be used as catalysts to aid in the extraction, modification, or synthesis of bioactive compounds from medicinal and aromatic plants because they have the ability to catalyze reactions with exquisite specificity and regioselectivity and because extraction can be done in aqueous solutions, where they can function under mild processing conditions. Enzymes may be employed to extract chemical substances in a wide range of ways. Among these, the enzymes that are more often documented in the literature include lactase, protease/lipase, lipase, and phospholipase. Additionally, owing to their catalytic function, pectinases, cellulases, and hemicellulases are also often utilized for extracting bioactive chemicals from medicinal and aromatic plants. The cell walls and membranes of plant materials may be broken down or disrupted by these enzymes, which improves the release and increases the extraction efficiency of the active chemicals. As a result, these enzymes may be utilized specifically to prepare plant material for other traditional extraction methods. To enhance the contact surface and, thus, the extraction efficiency of the whole process, they often call for ppaper-size reduction of the plant material. There are various parameters that need to be tuned after selecting the right enzyme. Included in this group are pH, time, temperature, and enzyme concentration. Although enzymes have an ideal temperature at which they are flexible, they may still be employed in a broad range of temperatures, making the choice of working temperature simpler. Temperature is thought to be quite crucial. In comparison to traditional solvent extraction methods, the enzyme-assisted extraction process is said to be more environmentally friendly and more productive since it uses less energy and less solvent. Additionally, it shortens the time needed for extraction; as a result, using enzymes speeds up the whole extraction process. However, there are some drawbacks to enzyme-assisted extraction, including its high cost for processing large quantities of raw plants, the challenges that arise when the process must be used on an industrial scale, and the enzymes' limited ability to completely hydrolyze the plant's cell walls. These issues need to be resolved in order to improve the extraction process' effectiveness and the quality of the extracts made from aromatic and medicinal plants[4].

Using PEF to Aid Extraction

High-intensity PEF is a revolutionary method that boosts the effectiveness of the extraction process by applying brief, high-voltage pulses between 20 and 80 kV/cm to plant materials, which are typically sandwiched between electrodes. A high-voltage generator is utilized for this. The fundamental advantage of this process is that because it is a non-thermal extraction technique, it may be used to extract chemicals that are thermos labile from the cells of aromatic and medicinal plants. Since the electric field can affect the permeability of cell membranes and result in changes like membrane breakdown, when a plant is exposed to it for a brief period of time, between a few and several hundred microseconds, the porosity of its cell wall is higher and enables the extraction of intercellular bioactive compounds. Because pores may develop on the surface of plant cells when an external electric field is applied, this process is known as electroporation. Electroporation is reversible if the pores are tiny and the intensity is not excessive. The rupture of the cell membrane, however, is thought to be permanent and may result in the creation of enormous holes when the electric field intensity or duration is increased. Both techniques have been used in several scientific disciplines. The use of high-pulse generator-generated electric pulses, the use of a treatment chamber to assure uniform treatment of the plant tissue, and the usage of electrodes are the three basic components of PEF-assisted extraction. The strength of the electric field, the length of the treatment, and the temperature are the main factors that need to be carefully regulated. Usually, the application of the electric field is accompanied with modest heating. The advantages of pulsed-electric field-assisted extraction are many[5].

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Extracting Supercritical Fluid

SFE is a cutting-edge method that is now utilized to analyze environmental, pharmaceutical, and polymer sample data. The fundamental draw of SFE was the potential to do extractions at temperatures close to ambient, avoiding thermal degradation of the target chemical by switching from employing standard organic solvents to supercritical fluids. The first industrial-scale application of SFE was in the decaffeination of coffee and tea in 1980, as well as the extraction of high-valued bioactive compounds from a wide range of natural matrices and the extraction of essential oils, oleoresins, and flavoring compounds from herbs and spices. The supercritical state, which may be reached by subjecting a material to temperature and pressure above the point at which separate gas and liquid phases do not exist, is where the SFE solvents are meant to be in. The unique characteristics of gas and/or liquid disappear above this point, which is also known as the supercritical point, and the supercritical fluid cannot be made to liquefy by changing temperature and pressure. It is thus suitable for extracting substances from medicinal and aromatic plants since it possesses features of diffusion, viscosity, and surface tension comparable to gases, but its density and solvation power are similar to liquids. In SFE, carbon dioxide is often utilized to extract the active components of plant materials.

Carbon dioxide is safe since it is nontoxic and nonflammable, has a low critical pressure and temperature, is accessible and affordable, and has a high purity. Since CO2 has a polarity comparable to that of liquid pentane, it may be used to extract lipophilic substances like plant essential oils. However, organic solvents are commonly added to carbon dioxide or other gases, such as argon, may be utilized since they are less costly and more inert when polarity restrictions apply. Cylindrical extraction jars are often utilized in SFE. The supercritical solvent is continually added from the bottom of the vessel while the dried or ground plant is put into a basket within the extractor. The supercritical solvent and extracted chemicals pass via a depressurization valve at the extractor's outlet and into a separator. Due to the decreased pressure at the separator, the extracts are separated from the gaseous solvent and collected. It is possible to further liquefy and store the gaseous solvent. From there, it may be pumped and heated to its Tc and Pc once again. Precooling the solvent is often done before pumping in order to prevent pump cavitation. SFE offers a number of significant benefits, including the fact that it is suited for non-thermostable chemicals, the extraction process leaves no solvent residues, and the process itself is thought to be ecologically beneficial[6].

Extraction of Solvents Quickly

A unique extraction technique called ASE has been created in order to address the drawbacks of the currently used traditional extraction techniques. This procedure, known as a solid-liquid extraction, is carried out at high pressures and temperatures, often between 10 and 15 MPa and between 50 and 200 °C. Pressurized solvent extraction, or PLE, may also be used to refer to the procedure since it calls for a high level of pressure. The primary benefit of using enhanced pressure is that it enables the solvents to be heated beyond their boiling points. As a result, higher temperatures can be used, which accelerates the extraction kinetics and improves diffusion rates. These changes disrupt the solid interactions between the solute and the matrix and lower the viscosity of the liquid solvent, which makes it easier for the solvent to penetrate the matrix and ultimately improve extraction. In general, increased pressure aids in maintaining the solvent's liquid form, facilitating quick and safe extractions. Additionally, it aids in forcing the solvent into the matrix pores, making it easier to extract the bioactive chemical constituents of aromatic and medicinal plants. The choice of solvent is often made based on the polarity of the chemicals to be extracted, their compatibility with subsequent processing stages, and the equipment needed for measurement. Although pressurized hot water may be utilized, organic solvents are often employed in ASE. In these circumstances, the method is referred to as SWE. Better extraction kinetics, improved technique accuracy and repeatability, reduced needed time, and reduced solvent consumption are a few advantages of ASE or PLE. Additionally, automation is a possibility, and the extraction settings may be changed to extract various components or boost selectivity. However, since ASE demands a high temperature, it cannot be employed for phytochemical substances that are thermos labile, and it also affects selectivity primarily by changing the kind of solvent. Furthermore, when the extraction is finished, a cleanup step can be required. The primary determinants of ASEs are pressure, which is required to keep the solvent in the liquid phase, temperature, which should be above the solvent's boiling point to improve the kinetics of extraction, static extraction time, which when increased results in an increase in extraction yield until equilibrium is reached, flush volume, which is typically between 40% and 60% of the cell volume, and vessel void volume.

As Extraction Solvents, DESs and NADESs

The DESs are a different class of "green" alternative extraction solvents that gained popularity in recent years. These solvents are often created by combining two or three different types of organic materials. You may combine hydrogen bond acceptors and donors, such urea and carboxylic acids. Due to the development of intermolecular hydrogen bonds, DESs have lower melting temperatures than any of its constituent parts, which is one of their key advantages. DESs offer greater advantages than ILs, including lower costs, biodegradability, simplicity of synthesis, toxicity that is acceptable for pharmaceutical use, and compliance with "green" chemical principles. The usage of DESs is however constrained by the fact that they are often solid at room temperature. NADESs have been found in this

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setting. Numerous primary metabolites that are plentiful in plants converted from solid to liquid when combined in the right proportions because NADES clearly display hydrogen bonds between the constituent parts. The synthesis of NADES is growing in popularity since there are so many different combinations of natural components that may be employed nowadays. These innovative solvents have several advantages, such as inexpensive chemicals, nontoxicity, renewable resources, and outstanding extraction efficiency for the bioactive components of aromatic and medicinal plants[7].

II. DISCUSSION

After the Extraction Procedure: Next Steps

In addition to size reduction and the extraction technique, several stages including filtering, concentration, and drying are required in order to get extracts from medicinal or fragrant plants.

Refinement of the Extracts

The built-in false bottom of the extractor, which was originally covered with a filter cloth, may be used to filter the extract by allowing the liquid to drip into a holding tank. While the extract is sent to a holding tank, the exhausted plant material, known as marc, stays at the bottom of the extraction apparatus. The extract is then poured from the holding tank into another suitable filter as a further step to get rid of the fine and colloidal paper.

The extracts' concentration

After extraction, if concentration is thought to be essential, the extract must be processed in a vacuum-operated, wiping film evaporator to create a thick concentrated extract. To create a solid mass devoid of solvents, the concentrated extract is then deposited within a vacuum chamber. This solid mass may be ground into a powder and utilized right away or after additional processing[8].

Keeping the Extracts Dry

To get a dry powder, the drying process typically uses a high-pressure pump with a regulated feed rate and temperature. Different product ppaper sizes may be achieved by varying the temperature and pressure. The dry powder may then be combined in a mixer with some diluents, excipients, or other ingredients to create a homogeneous powder.

Different Extracts

Aqueous extracts, hydroalcoholic or alcoholic extracts, soft extracts, and dry extracts are the extract types that are significant for medical and industrial purposes. To stop the development of bacteria and mold, the aqueous extract, which uses water as its solvent, must be utilized right away or stored for later use. Decoction, infusion, and digesting are the major extraction methods used to produce the extract. On the other hand, the maceration and percolation extraction methods, which use alcohol as the chosen solvent, produce hydroalcoholic and alcoholic extracts. Soft extracts may be utilized in a number of dosage forms, such as ointments and suppositories, and have a semisolid or syrup consistency. Then there are the dry extracts, which are powdered extracts or dry powder and are often produced by filtering and concentrating an extract under vacuum before thoroughly drying it by spraying or tray drying.

Bioactive Compound Isolation and Identification

Plant extracts often include a variety of different bioactive chemicals. As a consequence, certain identification and separation stages may be necessary once the whole extraction process is complete and the necessary plant extract is acquired. By employing the Folin-Ciocalteu reagent and the colorimetric technique, it is possible to estimate the total amount of polyphenols present in plants.

The smell that aromatic plants release is captured using headspace trapping methods. Odor analysis may be done directly or after the odor has been trapped on an adsorbent material and is then extracted using a solvent or desorption using heat. Static headspace sampling, vacuum headspace sampling, and dynamic headspace sampling are the three basic types of headspace trapping procedures. The analyte is retained in a closed vial while using the static headspace sampling method. This approach involves either direct analysis or the use of a gas syringe. The vacuum headspace method, which produces fragrances on a commercial scale, makes use of a vacuum pump. A stream of air or gas is used to sweep the analyte during dynamic headspace sampling. TLC and HPLC are the two chromatographic methods that are employed the most often. TLC is an easy, quick, and affordable approach that may be used to determine how many components are present in the extract. Additionally, it may aid in the discovery of the desired bioactive substances. For the isolation of natural products and the identification of their constituents, HPLC is a well-known, adaptable, reliable, and frequently used technology. One of the most effective analytical methods for isolating and purifying complex chemicals from plant extracts is preparative HPLC. Following their chromatographic isolation, the bioactive compounds are typically identified using a variety of detectors, most frequently mass spectrometers, diode array detectors, and ultraviolet detectors, which can measure the samples' absorbance at low wavelengths. A popular method for isolating and accurately identifying the bioactive chemicals present in medicinal and aromatic plant extracts is liquid chromatography linked to mass spectrometry, sometimes known as tandem mass spectrometry[9].

Additionally, it is believed that GC is a very helpful analytical instrument for the isolation and identification of the bioactive volatile chemical components in extracts derived from aromatic and therapeutic plants. With this analytical method, a chromatographic column containing a supporting solid or liquid phase is covered by a mobile phase, which is a carrier gas. The volatile bioactive chemicals travel

from the injection site to the detector, which is often an MS, as a result of the carrier gas's movement into the static phase, allowing for their separation and identification. A particularly promising method of analysis is GC, especially when paired with solid phase micro extraction. For the investigation of volatile chemicals from nonvolatile matrices, such as medicinal and aromatic plants, headspace SPME, a variant of SPME, is a very helpful instrument. Regarding non-chromatographic methods, FTIR is well recognized to be a useful instrument for the characterization and identification of substances or functional groups that are present in extracts from aromatic and medicinal plants. Phytochemical screening assay is another popular non-chromatographic method that may be used to identify the many kinds of phytochemicals present in a plant extract. It is an easy, quick, and affordable method. Last but not least, immunoassay methods like ELISA, which use MAbs with great specificity and sensitivity for certain chemical substances, have been more popular in recent years[10].

III. CONCLUSION

To extract phenolic and other bioactive chemical components from medicinal and aromatic plants, new, inventive extraction procedures have been created and are now being applied. UAE, enzyme-assisted extraction, MAE, PEF-assisted extraction, SFE, PLE (also known as ASE, SWE), and the previously mentioned phytonics method are the most promising of these. The majority of these methods are thought to be environmentally friendly because they use fewer potentially harmful chemicals, are energy-efficient, require less time to complete the extraction process, and don't pollute the environment by using unsafe chemicals in excess. The use of "green" alternative solvents like ILs, DESs, and NADESs in lieu of conventional extraction solvents including water, alcohol, acetone, chloroform, and ether is another trend in the extraction of medicinal and aromatic plants. Even though there are many developed extraction methods that have been reported in the literature, there can still be significant advancement in this scientific field because there is no perfect extraction technique. Instead, the choice should be based on both chemical and economic parameters.

REFERENCES

[1] S. Gharby et al., “An Overview on the Use of Extracts from Medicinal and Aromatic Plants to Improve Nutritional Value and Oxidative Stability of Vegetable Oils,” Foods. 2022. doi: 10.3390/foods11203258.
[2] M. Pattnaik and H. N. Mishra, “Amelioration of the stability of polyunsaturated fatty acids and bioactive enriched vegetable oil: blending, encapsulation, and its application,” Critical Reviews in Food Science and Nutrition. 2022. doi: 10.1080/10408398.2021.1899127.
[3] F. Hashempour-Baltork, M. Torbati, S. Azadmard-Damirchi, and G. P. Savage, “Chemical, rheological and nutritional characteristics of sesame and olive oils blended with linseed oil,” Adv. Pharm. Bull., 2018, doi: 10.15171/apb.2018.013.
[4] A. Dhyani, P. K. Singh, R. Chopra, and M. Garg, “Enhancement of Oxidative Stability of Perilla Seed Oil by Blending It with Other Vegetable Oils,” J. Oleo Sci., 2022, doi: 10.5650/jos.ess22013.
[5] E. Symoniuk, N. Ksibi, M. Wroniak, M. Lefek, and K. Ratusz, “Oxidative Stability Analysis of Selected Oils from Unconventional Raw Materials Using Rancimat Apparatus,” Appl. Sci., 2022, doi: 10.3390/app122010355.
[6] M. Pattnaik and H. N. Mishra, “Oxidative stability of ternary blends of vegetable oils: A chemometric approach,” LWT, 2021, doi: 10.1016/j.lwt.2021.111018.
[7] F. A. L. de Carvalho et al., “Effect of replacing backfat with vegetable oils during the shelf-life of cooked lamb sausages,” LWT, 2020, doi: 10.1016/j.lwt.2020.109052.
[8] Y. Elouafy et al., “Variations in Antioxidant Capacity, Oxidative Stability, and Physicochemical Quality Parameters of Walnut (Juglans regia) Oil with Roasting and Accelerated Storage Conditions,” Molecules, 2022, doi: 10.3390/molecules27227693.
[9] M. Machado, L. M. Rodriguez-Alcalá, A. M. Gomes, and M. Pintado, “Vegetable oils oxidation: mechanisms, consequences and protective strategies,” Food Reviews International. 2022. doi: 10.1080/87559129.2022.2026378.
[10] S. Cao et al., “Identification and Evolutionary Analysis of FAD2 Gene Family in Green Plants,” Trop. Plant Biol., 2021, doi: 10.1007/s12042-020-09276-x.

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Techniques for Herbal Drug Extraction

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Abstract*—Because they have fewer or no negative effects than contemporary synthetic pharmaceuticals, herbal medicines are a special option. Herbal remedies often call for the use of fresh or dried plant materials. A very important factor in the creation, safety, and effectiveness of herbal treatments is the precise information of such raw medications. Utilizing certain solvents, extraction procedures may separate the medicinally useful components of plant organisms from the inert ones. Maceration, infusion, percolation, digestion, decoction, hot continuous extraction, aqueous-alcoholic extraction through fermentation, counter-current extraction, microwave-assisted extraction, ultrasound-assisted extraction, supercritical fluid extraction, and phytonic extraction are some of the common methods of extracting medicinal plants. The kind of solvent employed in the extraction technique has a significant impact on the systematic research of plant species for the discovery of novel bioactive components and the effective assessment of biologically active substances from plant parts. The phytochemicals found in plants may also deteriorate as a consequence of non-standard extraction methods. It is necessary to make efforts to produce batches that are as consistent as possible and adhere to the good extraction procedures.

***Index Terms*— Botanical, Extraction, Herbal, Phytonic, Solvents, Phytochemicals**

I. INTRODUCTION

Ancient peoples employed the herb as a medicinal. Numerous medications come from various plant parts, which are also utilized by indigenous people all over the globe. It is currently believed that nature has provided a cure for every sickness in some shape or another. According to Ayurveda, plants may treat a variety of illnesses. The primary bio-supplier of medications for traditional medical systems, modern drugs, nutraceuticals, dietary supplements, traditional medicines, pharmaceutical carriers, and chemical entities for synthetic drugs is medicinal plants[1]. Herbal medicines are a wiser alternative to modern man-made pharmaceuticals. They show the fewest adverse effects, if any, and are thought to be unaffected. Herbal compositions often call for the use of fresh or dried plant materials. The precise knowledge of such raw pharmaceuticals is a crucial component in the production, safety, and efficacy of the herbal results.

The simplest and safest method for gaining a complete understanding of a drug's basic ingredients is pharmacognosy. The use of medicinal herbs poses serious risks to the health of both people and whole societies. These plants' therapeutic usefulness is dependent on a few chemical elements that have a clear physiological impact on the human body. Many of these indigenous medicinal herbs are also utilized in cuisine and spices. Due to the abundance of chemical compounds it contains, including alkaloids, glycosides, saponins, resins, oleoresins, sesquiterpene, locations, and oils, medicinal herbs are sometimes said to be "chemical factories." Both primary and secondary chemical metabolites are produced by higher plants, with the former being particularly important for a plant's regular growth and reproduction[2].

The process of extraction involves employing certain solvents to separate the medicinally useful parts of plant tissues from the inert or inactive parts. Solvents permeate into the solid plant material during extraction, solubilizing chemicals with analogous polarities. Pharmaceutical companies now start processing medicinal and aromatic flora in their systems by using the extraction of active ingredients. For the extraction of plant elements, there are several methods available, including distillation, effleurage, maceration, expression, solvent extraction, and fluid extraction. Systematized extraction techniques for crude pharmaceuticals aim to separate out undesirable material using a selective solvent called menstruum while also obtaining the pharmaceutically active components. After standardization, the extract obtained in this manner may be utilized as a medicinal agent in the form of tinctures or fluid extracts, or it may be processed to be included in any dosage form, such as medications and tablets.

These goods include a complex mixture of several therapeutic plant metabolites, including lignans, alkaloids, glycosides, terpenoids, and flavonoids. Maceration, infusion, percolation, digestion, decoction, hot continuous extraction, aqueous-alcoholic extraction through fermentation, counter-current extraction, microwave-assisted extraction, ultrasound extraction, supercritical fluid extraction, and phytonic extraction are among the common methods of extracting medicinal plants. Hydrolytic maceration followed by distillation, expression, and enfleurage are hydrodistillation procedures that may be used with aromatic plants. Headspace trapping, strong section micro extraction, protoplast extraction, microdistillation, thermos microdistillation, and molecular distillation are a few of the contemporary extraction techniques for aromatic plant life. For researchers, obtaining the bioactive plant components has often been a challenging task. This chapter aims to

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provide an overview of certain extract ants and extraction methods along with their benefits and limitations. Plant products Man is able to extract a surprising range of commercial chemical molecules from plants since they are skilled biochemists and have long been components of phytomedicine. All parts of a plant, including the bark, leaves, flowers, roots, fruits, seeds, etc., may include extra alive components.

These are known as primarily plant-based natural elements. In many labs, everyday work involves the methodical study of plant species with the goal of discovering novel bioactive components. Plant specific evaluations by science go logically. Plants are gathered either at random or by following suggestions made by local healers in areas where the flora is visible. Plant materials may be used to extract secondary plant components from fresh or dried plant materials. The production of plant extract from the supporting plant tissues has been discussed by many writers. The ethnomedical usage of pure plant materials by traditional and tribal people served as the basis for this sound assessment. However, due to the fact that many plants are utilized in their dry state by traditional healers and because various plant tissues have varying water contents, plants are typically air dried to a constant weight before extraction. Other researchers bake the vegetation for 72 hours at a temperature of around 40 degrees Celsius. When looking for bioactive chemicals with antibacterial capabilities, subterranean plant components of a plant were often utilized in contrast with other above-ground components[3].

Selection of Solvents

The kind of solvent used in the extraction method is a key factor in the successful assessment of biologically active chemicals from plant parts. Low toxicity, ease of evaporation at low temperatures, rapid physiologic absorption of the extract, preservation effect, and inability to enable the extract to form complexes or dissociate are characteristics of an excellent solvent in plant extractions. The amount of phytochemicals to be extracted, the extraction rate, the variety of compounds extracted, the variety of inhibitory compounds extracted, the ease of handling the extracts after extraction, the solvent's toxicity in the bioassay method, and the ability of the extract ants to pose a health risk are the factors influencing the choice of solvent. Utilizing what is intended for the extract serves as the foundation for the solvent preference. Since there will be traces of residual solvent in the finished product, the solvent needs to be non-toxic and need not interfere with the bioassay. Even the specific substances to be extracted will influence the desire.

II. DISCUSSION

The many different solvents that may be used during the extraction operations include:

a) Water

The most common solvent for extracting plant materials with antibacterial properties is water. Although traditional healers often employ water, it has been shown that plant extracts from organic solvents have more consistent antibacterial properties than water extract. Additionally, neither water soluble phenolics nor water soluble flavonoids have any antibacterial significance[4].

b) Acetone

Acetone is a particularly effective extractant, especially for antimicrobial research where more phenolic compounds need to be extracted since it dissolves various hydrophilic and lipophilic additions from the flora utilized, is miscible with water, is volatile, and has a low toxicity to the bioassay employed. According to a research, aqueous acetone extracts tannins and other phenolic compounds better than aqueous methanol. It was revealed that saponins, which have antibacterial properties, may be extracted using both acetone and methanol.

c) Alcohol

Because ethanolic extracts contain larger concentrations of polyphenols than aqueous extracts do, they exhibit superior efficacy when compared to aqueous extracts. This means that they are more effective in breaking down nonpolar materials like seeds and cell walls, which lead to the release of polyphenols from cells. The enzyme polyphenol oxidase, which degrades polyphenols in water extracts while being inactive in methanol and ethanol, may be a more advantageous explanation for the reduction in activity of aqueous extract. In addition, water is a better medium than ethanol for the presence of microorganisms. Due to its stronger polarity than pure ethanol, ethanol 70% has been shown to have larger amounts of bioactive flavonoid molecules. The polarity of the solvent was increased by adding water to the pure ethanol up to 30% in order to make it 70% ethanol. Additionally, it was discovered that ethanol could remove the intracellular components from the plant material more easily by penetrating the cell membrane. Because almost all of the identified plant components that are active against microbes are organic or saturated organic compounds, they may often be recovered by first ethanol or methanol extraction. Methanol is more polar than ethanol, however since it is cytotoxic, it should not be used for extraction in certain types of study because it might provide false findings[5].

Extraction method

Homogenization of plant tissue

Researchers often employ solvent-based plant tissue homogenization. Fresh plant parts that are either dried or wet are ground to tiny paper in a blender, added to a specified amount of solvent, and rapidly agitated for five to ten minutes (or left for twenty-four hours) before the extract is filtered. To ascertain the concentration, the filtrate may then be dried under decreased pressure and redissolved in the solvent.

However, other scientists centrifuged the filtrate to clarify the extract.

Thorough extraction in series

Another popular extraction technique comprises sequential extraction using solvents with increasing polarity, moving from a non-polar to a more polar solvent, to enable the extraction of compounds with a broad range of polarities. Some scientists use an organic solvent for soxhlet extraction of dried plant material. Thermolabile substances cannot be heated for an extended period of time using this procedure since the compounds may degrade[6].

Extraction of soxihlets

This technique uses a porous bag or "thimble" composed of sturdy filter paper, which is put in chamber E of the Soxhlet apparatus, to contain the finely powdered crude medication. Heat is applied to flask A's extracting solvent, which then vaporizes and condenses in condenser D. The crude medication is extracted by contact as the condensed extractant drops into the thimble holding it. The liquid within chamber E will siphon into flask A when its level reaches the top of siphon tube C. This operation is carried out continuously until an evaporated drop of solvent from the siphon tube leaves no residue. Only when the target component has a restricted solubility in a solvent and the impurity is insoluble in that solvent is soxhlet extraction necessary. If the target component is highly soluble in a solvent, it may be easily separated from the insoluble material via filtering. The benefit of this method is that only one batch of heated solvent is recycled, as opposed to several parts being passed through the sample. Compared to previous techniques, large volumes of medication can be extracted with a lot less solvent. Time, energy, and subsequently money inputs are all greatly impacted by this. On a small or medium-sized scale, it is only used as a batch process, but when transformed into a continuous extraction process, it becomes considerably more feasible and affordable[7]–[9].

III. CONCLUSION

Non-standardized extraction techniques may cause the phytochemicals in plants to degrade and may result in variances, which would prevent repeatability. The best extraction methods should be developed and followed, and efforts should be made to generate batches with the highest level of consistency feasible.

REFERENCES

[1] C. Monton, Y. Sampaopan, W. Pichayakorn, K. Panrat, and J. Suksaeree, “Herbal transdermal patches made from optimized polyvinyl alcohol blended film: Herbal extraction process, film properties, and in vitro study,” J. Drug Deliv. Sci. Technol., 2022, doi: 10.1016/j.jddst.2022.103170.

[2] J. K. Patra, G. Das, S. Lee, S. S. Kang, and H. S. Shin, “Selected commercial plants: A review of extraction and isolation of bioactive compounds and their pharmacological market value,” Trends in Food Science and Technology. 2018. doi: 10.1016/j.tifs.2018.10.001.

[3] T. Kopp, M. Abdel-Tawab, and B. Mizaikoff, “Extracting and analyzing pyrrolizidine alkaloids in medicinal plants: A review,” Toxins. 2020. doi: 10.3390/toxins12050320.

[4] M. Madhumita, P. Guha, and A. Nag, “Bio-actives of betel leaf (Piper betle L.): A comprehensive review on extraction, isolation, characterization, and biological activity,” Phytotherapy Research. 2020. doi: 10.1002/ptr.6715.

[5] G. Brusotti, I. Cesari, A. Dentamaro, G. Caccialanza, and G. Massolini, “Isolation and characterization of bioactive compounds from plant resources: The role of analysis in the ethnopharmacological approach,” Journal of Pharmaceutical and Biomedical Analysis. 2014. doi: 10.1016/j.jpba.2013.03.007.

[6] Z. Wang, Y. Cao, Y. Lu, F. Zhang, Y. Su, and Y. Guo, “Ultrasonic extraction and nebulization in real-time coupled with carbon fiber ionization mass spectrometry for rapid screening of the synthetic drugs adulterated into herbal products,” Anal. Chim. Acta, 2020, doi: 10.1016/j.aca.2020.08.045.

[7] P. Tatke and Y. Jaiswal, “An overview of microwave assisted extraction and its applications in herbal drug research,” Research Journal of Medicinal Plant. 2011. doi: 10.3923/rjmp.2011.21.31.

[8] M. Y. Heng, S. N. Tan, J. W. H. Yong, and E. S. Ong, “Emerging green technologies for the chemical standardization of botanicals and herbal preparations,” TrAC - Trends in Analytical Chemistry. 2013. doi: 10.1016/j.trac.2013.03.012.

[9] C. J. Mwankuna et al., “A HPLC-MS/MS method for screening of selected antibiotic adulterants in herbal drugs,” Anal. Methods, 2022, doi: 10.1039/d1ay01966j.

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The Principle, Strength and Challenges of the Extraction Techniques Used in Medicinal Plants

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***Abstract*—The use of medicinal plants in the treatment of common illnesses like the common cold and fever as well as other medical claims are now backed by solid scientific data, which has increased interest in these plants lately. The research on medicinal plants began with extraction techniques, which are crucial to the results of the extraction as well as to the subsequent tests carried out. Today, a variety of technologies with various extraction techniques are accessible. In order to assess the applicability and economic viability of the approaches, this study will discuss and contrast the most widely used methods based on their concept, strength, and restriction.**

***Index Terms*— Aromatic Plant,Essential Oils, Chromatography,Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

Medicinal plants are presently seen as being of great value because of their unique qualities as a significant source of medicinal phytochemicals that might result in the creation of new medications. The majority of phytochemicals derived from plants, such phenolics and flavonoids, have been shown to improve health and reduce the risk of cancer. Since Okinawans, who have the greatest percentage of centenarians, have a plant-based diet that has been demonstrated to enhance life span, modern Mediterranean and DASH diets include a phytochemical-rich diet from fruit and vegetable sources. Research and commercial use of medicinal plants are becoming more popular due to interest in using natural sources in the creation and formulation of skin products as an alternative to synthetic and conventional medications. The high levels of phenolic and flavonoids found in medicinal plants have been linked to their antioxidant properties, which help prevent the onset of age-related diseases, especially those brought on by oxidative stress. Research on medical plants in particular is crucial, just as research on conventional medications is, in light of the advantageous phytochemicals found in medicinal plants and the trend toward natural goods in the pharmaceutical and cosmeceutical industries[1].

The pre-extraction and extraction processes, which are a crucial stage in the processing of the bioactive elements from plant materials, are where the research of medicinal plants begins. In modest research settings or at the level of small manufacturing enterprises, conventional techniques like maceration and Soxhlet extraction are often used. With the objective of increasing output at a reduced cost, significant advancements have been achieved in the processing of medicinal plants, such as the current extraction technologies of microwave-assisted, ultrasound-assisted, and supercritical fluid extraction. Additionally, adjustments to the procedures are continually created. With so many different techniques available, choosing the best extraction process requires careful consideration. In order to aid in the selection of suitable techniques, this overview discusses the fundamentals, strengths, and weaknesses of the widely used methods with examples from recent years.

Plant Sample Pre-Extraction Preparation

Preparing plant samples to preserve the biomolecules in the plants before extraction is the first step in investigating therapeutic plants. Fresh or dried plant material may be used to extract plant samples such leaves, barks, roots, fruits, and flowers. The retention of phytochemicals in the finished extracts is also influenced by other pre-treatments of plant materials, such as grinding and drying.Using fresh or dried samples depends on the research being done on medicinal herbs. In most situations, dried samples are chosen since they take less time to prepare for experiments. Sulaiman et al. restrict the time between harvest and experimental work to a maximum of 3 hours in order to preserve the freshness of the samples since fresh samples are brittle and have a tendency to degrade more quickly than dried samples. There was no discernible difference in total phenolics between fresh and dried Moringaoliefera leaves, although the dried sample had a greater flavonoid concentration[2].

Compared to powdered samples, ground samples have more surface contact with extraction solvents. Grinding produced coarser, smaller samples, while powdered samples contain smaller, more homogeneous paper that are better able to make contact with extraction solvents on their surfaces. This specific pre-preparation is crucial because successful extraction requires that the solvent come into touch with the target analytes, and the optimal extraction ppaper size is less than 0.5 mm. The preparation of vegetable samples that were ground to a size of 400 m by Sulaiman et al. specifically noted this particular size of ppaper. To decrease sample ppaper size, conventional mortar and pestle or electric blenders and mills are often utilized. Research on Centellaasiaticananoppaper powder made in a planetary ball

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mill revealed an 82.09% greater yield than that of micro powder made in a maceration method over three days in 90% methanol. An important consideration while utilizing enzyme-assisted extraction was ppaper size. The ppaper size has a significant impact on the use of pectinolytic and enzymes that break down cell wall polysaccharides in sample preparation. Smaller paper boost the activity of these enzymes.

Plant sample drying methods include air drying, microwave drying, oven drying, and freeze drying. Depending on the kind of sample being dried, air drying might take anywhere from 3 days to a year. In order to expose the plant to air at room temperature, plant samples, typically plants leaves with stem, were knotted together and hung. Heat-labile chemicals are maintained since this drying process does not compel dried plant components to be heated to a high temperature. However, air-drying requires more time than microwave or freeze drying, and it may be contaminated when temperatures are unstable.Electromagnetic radiation, which is used in microwave drying, has both electric and magnetic fields. Through simultaneous heating caused by dipolar rotation, alignment on the electric field of molecules with induced or permanent dipole moments, and ionic induction, the molecules oscillate. Oscillation results in molecular collisions and a rapid heating of the samples at the same time. While this technique helps save drying time, it can sometimes lead to phytochemical deterioration[3].

Another pre-extraction technique that employs thermal energy to dry out the samples is oven-drying. One of the simplest and fastest thermal processing methods that may retain phytochemicals is this sample preparation. The maximum antioxidant activity in Cosmos caudatus extracts were obtained by oven-drying at 44.5°C for 4 hours while using 80% methanol, while a comparable result was obtained by optimizing 80% methanol extracts at 44.12°C for 4.05 hours. This technique resulted in a shorter extraction time. The antioxidant activity of Orthosiphonstamineus, however, was not significantly changed by drying, but the bioactive phytochemicals, such as sinensetin and rosmarinic acid concentration, were. This suggests that the compounds are temperature-sensitive.

A technique based on the sublimation concept is freeze-drying. A solid may transition into the gas phase by a process called sublimation without going through the liquid phase. Prior to lyophilization, samples are frozen at -80°C to -20°C to solidify any liquid. To prevent the frozen liquid in the sample from melting after an overnight freeze, it is promptly lyophilized. To prevent sample loss throughout the procedure, the test tube's mouth or any container containing the sample is covered with needle-poked parafilm. Samples were often lost by splattering out into the freeze-flask. Freeze-drying produced larger levels of phenolic contents than air-dying because the majority of the phytochemicals are maintained. In contrast to conventional air drying and microwave drying, freeze-drying is a time-consuming and costly way of drying. Therefore, only priceless, fragile, and heat-sensitive materials may be used[4], [5].

II. DISCUSSION

Maceration, infusion, percolation, and decoction: Maceration is a winemaking process that has been extensively adapted for use in studies on medicinal herbs. Plant materials were macerated by immersing them in a solvent in a jar with a cork and letting them remain at room temperature for at least three days with regular stirring. In order to release the soluble phytochemicals, the plant's cell wall was meant to be softened and broken during the processing. The mixture is crushed or filtered after three days. Heat is transported by convection and conduction in this traditional approach, and the kind of substance recovered from the samples depends on the solvent used. Similar to maceration, infusion and decoction involve soaking the ingredients in hot or cold water. For infusion, the maceration duration is shorter, and for decoction, the sample is cooked in a certain amount of water for a predetermined amount of time. Compared to maceration and infusion, decoction is only appropriate for extracting heat-stable chemicals, hard plant materials, and typically produces a higher proportion of oil-soluble compounds. Another technique that uses specialized equipment called a percolator and has a related core idea is percolation. The percolator is filled with dried powdered samples, hot water is added, and the mixture is macerated for two hours. To get concentrated extracts, the percolation procedure is often carried out at a moderate pace until the extraction is finished.

Strength and drawback: This approach is the simplest and most straightforward. However, since so many solvents are used and because adequate waste treatment is required, organic waste becomes a problem. When such a change is not unpleasant, altering the temperature and solvent choice improve the extraction process, decrease the extraction volume required, and may be included into the maceration procedure. While boiling Centellaasiatica at 90°C increased the phenolic content and antioxidant activity, the pH of the extracts was compromised due to the longer extraction times. Solvents used in the soaking procedure are essential in this approach[6], [7].

Extraction of Psidiumguajava L. studies. Compared to other solvents such petroleum ether, chloroform, and water, extracting leaves with ethanolic and hydroalcohol had the best extraction yield with the most phytoconstituents. Non-polar solvents such petroleum ether and chloroform revealed no retained active chemicals and very low tannin content in the extracts, respectively. With the exception of the absence of any alkaloids, water extracts demonstrated efficiency that was comparable to that of ethanol. Polar solvents work better in removing bioactive compounds from Psidiumguajava. The antioxidant activities of Garniciaatriviridis methanol extracts were higher than those

of the aqueous extracts, although the aqueous extracts had greater anti-hyperlipidemic activity. Based on total phenolics, the effect of various solvents employing maceration at a ratio of 1:10 w/v sample to solvent for an hour revealed that 70% acetone was an effective solvent for Portucalaoleracea and 70% methanol was an effective solvent for flavonoids in Cosmos caudatus. Compared to Soxhlet extraction and percolation using a comparable solvent, maceration with 70% ethanol powdered dried samples at 1:40 w/v showed the greatest phenolics and flavonoids concentration for Moringaoliefera.

In the Soxhlet extraction process, a finely powdered sample is put in a porous bag or "thimble" constructed from a sturdy filter paper or cellulose, and then that bag or "thimble" is placed in the thimble chamber of the Soxhlet apparatus. Heat from the bottom flask causes the extraction solvent to evaporate into the sample vial, condense in the condenser, and drip back. The procedure is repeated after the liquid content reaches the siphon arm and is then dumped back into the bottom flask[8].

Compared to maceration, this process uses less solvent, which is both a strength and a drawback. However, there are drawbacks to the Soxhlet extraction, including possible toxic emissions during extraction and exposure to dangerous and combustible liquid organic solvents. High-purity solvents are required for the extraction system, which might increase the cost. Compared to more advanced extraction methods like supercritical fluid extraction, this process is thought to be less environmentally friendly and may worsen the pollution issue. A dry, finely split solid is the optimum sample for Soxhlet extraction, but other variables like temperature, solvent-to-sample ratio, and agitation speed must also be taken into account.

According to studies, several phytochemicals, predominantly nonpolar molecules, were extracted using Soxhlet extraction from Azadirachtaindica leaf powder in methanol. The yield, phenolics, and flavonoids content of Moringaoliefera leaves after Soxhlet extraction were lower than expected. Centellaasiatica extraction was optimized using Soxhlet extraction, which produced the best results at 25°C, a sample-solvent ratio of 1:45, 200 rpm agitation speed, and 1.5 hours. The yield was 2.2% w/w after soxhlet extraction was employed to remove lypodial components from powdered Clitorea ternate flowers using petroleum ether at 60°-80°C. Alkaloids and saponins were confirmed to be present after further ethanol extraction from the marc, however the anthocyanin—the main pigment of Clitorea ternate flowers was not present, indicating that oxidation and degradation had taken place[9].

Microwave radiation is used in microwave aided extraction (MAE) to speed up the partitioning of analytes from the sample matrix into the solvent. Heat is generated at the surface of polar and polarizable materials when microwave radiation interacts with their dipoles, and heat is then transmitted via conduction. Hydrogen bonding is disrupted by dipole rotation of the molecules brought on by microwave electromagnetics, which also speeds up the movement of dissolved ions and encourages solvent penetration of the matrix. Poor heating happens in non-polar fluids because only dielectric absorption can transport energy there. It is possible to think of MAE as selective procedures that favor polar molecules and liquids with high dielectric constants. The kinds of solvents have a significant impact on all techniques that use them in operations. The physiologically active chemicals in the poplar type propolis, however, were not significantly affected by the solvent volume utilized using any of the three procedures, indicating that the use of solvents at higher ratios is not essential. The comparison only takes into account the overall yield, phenolic content, and flavonoid content.

In comparison to other contemporary extraction techniques, Vongsak et al. indicate that maceration is a more appropriate, practical, and affordable approach for small and medium-sized businesses. However, compared to MAE and UAE, which is known as the "Green method," chemical waste is a significant problem in the maceration process. The effectiveness of those crude extracts employing Nano-encapsulated processing in Centellaasiatica proved to have equal efficacy to those purified, despite the fact that all of these extraction techniques produced crude extracts that included a variety of metabolites. This specific fact implies that if correct preparation and extraction are carried out, further isolation and purification of extracts—which is fairly complicated and time consuming is not required.

Additionally crucial are the proper extraction techniques' environments. To extract thermo-labile chemicals, several parameters including temperature and light must be taken into consideration. Anthocyanin was extracted from the red and blue flowers using a slightly acidic solvent, demonstrating the importance of pH in the extraction process. In the extraction of anthocyanin from an ethanol system, hydrochloric acid was shown to be more effective than acetic acid. The solvent strength, which is 70% ethanol, is the most important factor in the extraction of Curcuma longa among other parameters including solvent types, solvent strength, extraction duration, agitation speed, sample-solvent ratio, and temperature. In both the triterpenoids extraction from the leaves of Jatropha curcas and the phenolic extractions from Moringaoliefera, 70% ethanol was shown to be the most significant parameter[10].

Solvent kinds and strength are among those optimization studies' most important parameters for almost all methods. However, it has been found that the solvent sample ratio has no statistically significant impact, indicating that solvents in excessly high volumes may be avoided. For the plants, each optimum technique is special. All the influencing parameters could be able to improve extraction, however using poor judgment might result in compound deterioration. In order to choose appropriate approaches, it may be useful to take into account those that have the fewest influencing aspects.

However, sophisticated extraction technologies like ASE should be taken into consideration if purity is an issue.

III. CONCLUSION

In the study of medicinal plants, all extraction phases, including pre-extraction and extraction, are crucial. The efficiency and phytochemical components of the final extractions were impacted by sample preparation techniques including grinding and drying, which ultimately had an impact on the final extracts. Conclusion: No one extraction technique is the best technique, and each extraction process is specific to the plants it is used on. The choice of appropriate techniques may be influenced by previously refined methods. However, the goals of the research, the samples, and the target substances will determine how to evaluate and choose the pre-extraction preparation and extraction procedures.

REFERENCES

[1] Sutrino, “Pengertian Pelatihan Kerja,” Molecules, 2019.
[2] M. F. Maulana, “Kepemimpinan Visioner Kepala Madrasah Di Ma Al-Hikmah Bandar Lampung Skripsi,” Molecules, 2019.
[3] Hasniati, “Kekosmopolitan Petani Dalam Pengelolaan Usahatani Tanaman Padi Sawah di Desa Lamooso Kecamatan Angata Kabupaten Konawe Selatan,” J. Akrab Juara, 2019.
[4] S. D. Pardede, “Analisis Pengaruh Keselamatan Dan Kesehatan Kerja (K.3) Dan Jaminan Sosial Tenaga Kerja (Jamsostek) Terhadap Semangat Kerja Karyawan Pada PT. Mitra Pratama Mandiri Jaya Perkasa Medan,” J. “JUMANSI STINDO,” 2019.
[5] F. A. Baqi, “Implementing Question-Answer Relationships (Qar) Strategy To Improve Students’ Reading Comprehension Skill,” English J., 2019.
[6] A. A. Pratama, “Pengaruh Kualitas Pelayanan Terhadap Kepuasan Pelanggan Bellagio Restaurant Di Grand Jatra Hotel Pekanbaru,” Jom Fisip, 2019.
[7] Jargalsaikhan, “Influencia del Valor Percibido de Marca Bajo la Perspectiva del Cliente en la Intención de Compra: Caso Chifa y Comida China,” Molecules, 2019.
[8] W. Y. Soto Monroy, “Implementación de un sistema de Fitorremediación de Cd y Pb en Aguas de Minería con Azolla Caroliniana,” Molecules, 2019.
[9] M. I. Syamsudin, “Hubungan Antara Persepsi Siswa Tentang Kompetensi Pedagogik Guru Dan Motivasi Belajar Siswa Dengan Hasil Belajar Pendidikan Agama Islam Di Smp Negeri 2 Kemang Kabupaten Bogor Muhammad,” J. Educ., 2019.
[10] A. Sitorus, “Gambaran Bta Positif Pada Penderita Tb Paru Yang Telah Menjalani Pengobatan Lebih Dari 2 Bulan Di Puskesmas Datuk Bandar Kota Tanjungbalai,” Molecules, 2019.

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Preparation of Bioactive Plant Extracts, Modern Extraction Methods

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Abstract*—The first important stage in preparing plant formulations is extraction. Traditional herbal treatments are progressing in development thanks to modern extraction techniques. In the overall endeavor to ensure that high-quality herbal products are available to customers globally, the development of new sample-preparation procedures with notable benefits over old methods for the extraction and analysis of medicinal plants is anticipated to play an essential role. The development of analytical techniques for the analysis of components found in botanical and herbal remedies depends critically on sample preparation. The operating principles of various extraction techniques, performance-influencing elements, research advancements, and the strengths and weaknesses of various extraction procedures are covered in this paper. The emphasis is on solvent- and energy-efficient, thermos labile phytocompound-appropriate techniques.

***Index Terms*— Aromatic Plant,Essential Oils, Chromatography,Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermolabile**

I. INTRODUCTION

For thousands of years, people have used plant-based remedies to treat or prevent ailments. Novel chemical compounds with potential for use in medicine and other fields may be found in plants. Alkaloids, steroids, tannins, glycosides, volatile and fixed oils, resins, phenols, and flavonoids are only a few of the active substances that are found in plants and are deposited in many sections of the plant, including the leaves, flowers, bark, seeds, fruits, roots, etc. Plant materials generally combine these secondary metabolites to produce their positive therapeutic effects. Farnsworth et colleagues. Discovered 119 drug-like secondary plant compounds in 1985. 11% of the 255 medications that the World Health Organization considers to be basic and necessary come from plants, and many synthetic medications also start off as natural precursors. Due to their anti-inflammatory, antibacterial, antifungal, antidiabetic, antioxidant, an arthritic, and radioprotective characteristics, phytochemicals are often employed for therapeutic purposes.

The hunt for novel antimicrobial medicines, mostly within the plant kingdom, has been prompted by the emergence of drug resistance and the unfavorable side effects of several antibiotics. The goal is to uncover leads with distinctive chemical structures that may exert a hitherto untapped mechanism of action. The identification and extraction of plant material, the separation and isolation of the important components, the characterization of the separated chemicals, and the quantitative assessment are all processes in a phytochemical examination of a plant. Researchers have put a lot of work into developing effective extraction techniques in order to achieve high effectiveness and efficiency. Efficiency and effectiveness both relate to the yield of the extraction process, however efficacy refers to the extract's strength. One of the most sustainable methods for biological component separation is plant extraction. One must adjust the processes for more efficacy to acquire superior quality and high extraction efficiency from herbs[1]. During research on plant seed extracts, a significant positive linear association between extraction efficiency and overall antibacterial activity was discovered. Numerous crucial phases are included in the analytical methods, such as sampling, sample preparation, quantification, statistical assessments, etc. The fact that extraction effectiveness might fluctuate greatly when using various techniques on the same plant material with the same solvent makes it clear that choosing the best suitable extraction process is necessary. Additionally, the most effective procedure must be standardized in order to attain a respectable level of repeatability. It should be emphasized that selecting the right solvent and using a suitable extraction technique are both crucial.

The "like dissolves like" idea is useful when choosing solvents. As a result, polar solvents will extract polar chemicals, whereas non-polar solvents will extract non-polar materials. The most common extraction technique is solvent extraction. Due to the increased polarity range of hydroalcoholic solvent combination, high extraction yields are often thought to be achieved. The first and most important stage in the analysis of herbs is sample preparation since it is vital to separate and characterize the desired chemical components from the herbal material. Various solvents, including water, ethanol, chloroform, ethyl acetate, and methanol, are often employed to extract therapeutically required active components. To improve the effectiveness of the extraction process, combinations of solvents are sometimes utilized.

Modern sample preparation procedures provide a number of benefits over traditional approaches, including less organic

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solvent usage and less sample deterioration. Additionally, they cause unwanted and insoluble components to be removed from the extract. Modern extraction techniques include those aided by microwave, ultra-sonication, supercritical fluid, solid phase micro, and Sox wave, among others. The latter uses a Soxhlet and microwaves together. This combines the microwaves' quick heating ability with Soxhlet's ease of use. In this situation, solvent recovery is also an option, which is not the case with regular MAE. However, it hasn't yet been widely used.

Traditional techniques are still used widely and are very straightforward and conventional, but they may also be inadequate and sluggish, require a lot of organic solvents, and degrade components that are sensitive to heat. While employing traditional approaches, quality related difficulties viz. The problems also include a lack of effectiveness, safety, and consistency. Modern processes also have the advantages of improving extraction efficiency and selectivity as well as eliminating additional sample clean-up and concentration steps before chromatographic analysis.

The goals of standardizing extraction procedures for the production of crude drugs are to obtain the therapeutically desired portion and to remove the inert material through the use of selective solvents and techniques. Herbal manufacturers strive to produce extracts of defined quality with the least batch-to-batch variation possible in order to meet the growing demand for herbal medicinal products and natural health care products around the world. This can also aid in scaling up extraction. The ultimate quality of the herbal medication is substantially influenced by the standardization of extraction processes. It becomes vital to improve the extraction process in order to get the greatest variety of phytochemicals in order to fully understand the bioactivity of crude extracts. The nature of the compounds and the raw material that will be treated heavily influences the technique used to separate active components from natural sources with the greatest yield and highest purity[2], [3].

II. DISCUSSION

Extraction Methods of Advancement

Assisted Microwave Extraction

The electromagnetic energy of microwaves is transformed into thermal energy upon absorption by a substance. The most popular frequency for commercial microwave equipment, with an energy output of 600–700 W, is 2450 MHz. MAE is an easy, environmentally responsible, and cost-effective method for removing physiologically active chemicals from various plant sources. Smarra and. In 1975, al. utilized home microwave ovens for the first time to treat biological samples for metal analysis. Ganzler and colleagues published the first study on the use of MAE for plant materials in 1986. Magnetic and electric fields in microwaves are perpendicular to one another. Dipolar rotation and ionic conduction are two concurrent methods by which the electric field induces warmth. Dipolar rotation results from the alignment of molecules with a dipole moment on the electric field in both the solvent and the solid sample. As a result of collisions with nearby molecules caused by this oscillation, thermal energy is released into the medium. This effect happens 4.9 109 times quicker at a frequency of 2.45 GHz, which causes the heating to occur extremely quickly.

In fact, the heating happens more quickly the higher the solvent's dielectric constant. So, unlike traditional conductive heating techniques, microwaves simultaneously heat the whole sample. The benefit of microwave heating in the extraction scenario is the severing of weak hydrogen bonds supported by the molecules' dipole rotation. The sample's components absorb microwave radiation in line with their respective dielectric constants. The remaining moisture in plant material is instantly heated when it is submerged in a microwave-transparent solvent because the heat of the microwave radiation directly reaches the solid without being absorbed by the solvent. High vapour pressure produced by heating fractures the substrate's cell walls and releases the content into the solvent. Heating also causes moisture to evaporate. The majority of MAE procedures use solvents with high dielectric constants and significant microwave energy absorption capabilities; however, combinations of solvents may be used to control extraction selectivity and the medium's capability to interact with microwaves. Binary solvent mixtures are often used[4].

There are two ways to conduct MAE

In closed vessels operating at regulated pressure and temperature, and in open vessels operating at atmospheric pressure. Pressurized microwave aided extraction and focused microwave assisted extraction are the names of these two methods, respectively. The solvent may be heated much beyond its ambient boiling point in a closed vessel arrangement. With this method, extraction efficiency and speed are both improved. Applying the proper pressure alone may raise the temperature in closed containers. The system with a closed vessel is best for volatile substances. The boiling point of the solvent employed in the open vessel system determines the system's maximum temperature.

Essential oils may be obtained by successfully heating solid materials using microwave radiation. Comparatively speaking to hydro distillation, this produces essential oils with comparatively little volatile fractions. MAE is quite efficient at getting extracts under benign circumstances. In compared to Soxhlet extraction, MAE has a shorter extraction time, a lower demand for solvent, increased extract purity, a lower cost, and a higher extraction yield. As a result, it has been given consideration as a possible substitute for traditional techniques. When applied to chemicals of plant origin, such as ascorbic acid, microwaves have been observed to cause little to no quality degradation, while moist heat treatment led to quality degradation. It has been shown that MAE can extract phenolic chemicals more quickly than the reflux approach[5], [6].

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Extraction with Ultra sonication

UAE includes applying powerful, high-frequency sound waves and seeing how they affect various materials. UAE is a technology that has the potential to be beneficial since it doesn't call for expensive or complicated equipment. Both local and big scale applications are possible. Ultrasonic impacts of acoustic cavitation's are involved in UAE. Because solid and liquid paper are vibrated and accelerated by ultrasonic action, the solute diffuses swiftly from the solid phase to the solvent. There have been many suggested methods for how ultrasound might aid extraction, including cell rupture, greater penetration, increased swelling, capillary impact, and hydration process. Cavitation occurs when the intensity of ultrasound in a liquid reaches a degree where the molecular structure can no longer be maintained by intramolecular forces. As a result, the molecular structure breaks down and bubbles are produced. The breakdown of biological membranes caused by bubble collapse may have physical, chemical, and mechanical impacts that allow for the release of substances that can be extracted as well as improved solvent penetration and improved mass transfer. The creation and asymmetrical collapse of micro cavities close to cell walls, which results in the production of microjets rupturing the cells, is thought to be the mechanism through which sound waves have favorable effects on extraction[7].

Using ultrasonic to extract the tea solids from dried leaves improved extraction yield by 20%. When extracting carnosic acid from the UAE using various solvents, e.g. the amount of butanone, ethanol, and ethyl acetate used also decreased the extraction time. However, in one research, when UAE was used to extract is flavones from the stem of Puerarialobata, the higher extraction rate and yield was achieved for all kinds of solvents. In general, solvent type has a substantial impact on both extraction rate and the final yield of total is flavones. The extraction yield increased with increasing electrical power input in the range of 0-650 W. In comparison to the Soxhlet technique, UAE offers superior vanillin extraction in less time for various solvents. By applying ultrasound to the pre-leached combination for a brief amount of time, commercial-scale ultrasound therapy may be dependable and straightforward. Resveratrol from grapes was thought to be extremely beneficial in the UAE. With the use of UAE, the degradation of resveratrol from grapes may be minimal during a certain extraction timeframe. UAE has a holding impact on pectin and protein extraction, which enhances the tea's sensory appeal. The extraction of fragrance components and glycosidic aroma precursors was determined to be acceptable for the UAE[8].

The development and identification of novel therapeutic chemicals rely heavily on medicinal plants. When separating and characterizing various phytochemicals from herbs and searching through plant extracts for new leads, the extraction procedure is crucial. The time, energy, sample, and solvent consumption of traditional procedures is greater than that of their contemporary equivalents. By choosing a better procedure, the recovery, stability, and general quality of the extract may also be increased. Modern extraction techniques may be tailored to a specific component, and the extracted material can then be employed directly in gas chromatography or high pressure liquid chromatography. MAE has been suggested as one of the most versatile current techniques for coupling with later separation and characterization activities. An example of this is the on-line continuous sampling dynamic microwave-assisted extraction in conjunction with high performance liquid chromatographic separation and detection of the lignans in Wuweizi and naphthoquinones in Zicao. This approach is said to be speedier and more efficient than traditional extraction techniques including continuous off-line microwave assistance, ultrasound assistance, and Soxhlet extraction. Recently, it has also been reported that microwave aided extraction may be improved by utilizing high-performance liquid chromatography linked to electrospray time-of-flight mass spectrometry and electrospray ion trap tandem mass spectrometry to characterize olive leaf phenolic chemicals. Due to its effectiveness and speed, MAE is shown to be a superior alternative to the traditional approach for characterizing phenolic chemicals from olive leaves[9], [10].

III. CONCLUSION

Multiple parameters may be adjusted simultaneously and modern approaches are highly automatable. The most effective approach is chosen to minimize sample and solvent usage. The recovered extract may have a higher yield and better quality than that made using a traditional approach, and a decent extraction may be accomplished in less time. The extraction of heat labile and volatile substances is more suited to techniques like SFE, MAE, and UAE than to traditional methods, which is not the case. Considering their improved efficiency, specificity, and selectivity, the former are more promising for industrial applications. Future developments will greatly improve the efficiency and speed of the extraction of thermos labile plant materials, such as a Soxhwave operating under lower pressure. To do this, however, new technical and manufacturing obstacles must be overcome. The cost of such a gadget is now prohibitive for broad usage throughout the world. In comparison to techniques like ultra-sonication or SFE, open-vessel MAE seems to be the most practical, straightforward, and quick choice for the extraction of thermos labile phyto constituents at the moment.

REFERENCES

[1] J. Rožanc et al., "Different cannabis sativa extraction methods result in different biological activities against a colon cancer cell line and healthy colon cells," Plants, 2021, doi: 10.3390/plants10030566.

[2] V. Bankova, B. Trusheva, and M. Popova, "Propolis extraction methods: a review," Journal of Apicultural Research. 2021. doi: 10.1080/00218839.2021.1901426.
[3] A. V. Oladimeji and M. Valan, "HPLC techniques for phytochemistry," Int. J. Chem. Stud., 2020, doi: 10.22271/chemi.2020.v8.i6ak.11174.
[4] T. G. Anyamele, P. N. Onwuegbuchu, E. A. Ugbogu, and C. Ibe, "Phytochemical composition, bioactive properties, and toxicological profile of Tetrapleura tetraptera," Bioorganic Chemistry. 2023. doi: 10.1016/j.bioorg.2022.106288.
[5] D. Jansirani, R. Saradha, N. Salomideborani, and J. Selvapriyadharshini, "Comparative evaluation of various extraction methods of curcuminoids from Curcuma longa," J. Chem. Pharm. Sci., 2014.
[6] V. Kothari, A. Gupta, and M. Naraniwal, "Differential gene expression in microbial cultures subjected to sonic stimulation View project Cell sound interaction View project Modern Extraction Methods For Preparation Of Bioactive Plant Extracts," Int. J. Appl. Nat. Sci. , 2012.
[7] M. Shahid, M. Yusuf, And F. Mohammad, "Plant Phenolics: A Review On Modern Extraction Techniques," Recent Prog. Med. Plants, 2016.
[8] V. Kothari, A. Gupta, And M. Naraniwal, "Extraction Methods For Preparation Of Bioactive Plant Extracts: A Comparative Study Validation Of Traditional Medicine View Project," Lambert Acad. Publ., 2012.
[9] J. B. Jayabalan, S. Kandasamy, M. Palanisamy, P. Rangasamy, And A. Sathiya, "Bioactive Phytochemicals Synthesis: Source, Preparation And Characterization," In Aip Conference Proceedings, 2021. Doi: 10.1063/5.0068776.
[10] R. Silvana, "Pengaruh Kualitas Pelayanan Terhadap Kepuasan Konsumen Pada Hotel Pop Di Bandar Lampung," Fak. Ekon. Dan Bisnis Inst. Inform. Dan Bisnis Darmajaya Bandar Lampung, 2020.

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Extracting Plants for Natural Medicines

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***Abstract*—Green extraction is based on the discovery and design of an extraction process that will minimize unit operation, energy consumption, time consumption, and the use of organic solvents. It also ensures a safe and high-quality extract by substituting water or an agro-solvent for the organic solvent. In this research, numerous green extraction techniques were compared to traditional extraction techniques. The prior results of these two investigations on the extraction method were compared in this review. This allows us to determine the best extraction technique that won't hurt the environment, will improve patient health, and will create by-products or co-products rather than garbage.**

***Index Terms*— Extracting Plants,Green Extraction,Natural Medicines, Plants**

I. INTRODUCTION

The process of extracting different bioactive chemicals is influenced by a number of variables, including the method used, the source material, and the organic solvent. This is a common extraction technique. This approach is based on a heating process that speeds up mass transfer between system phases, however this process uses a lot of energy and might cause thermo-labile chemicals to degrade. Some bioactive substances may be found in food and plant waste. Investigated are green extraction methods to solve this issue. The use of green extraction methods reduces the need for solvents, lowers energy consumption, maximizes efficiency, and allows for the intensification of processes and the affordable manufacture of high-quality extracts. Pre-extraction and green extraction techniques are the first steps in the investigation of natural sources. There are several traditional and unconventional ways for extracting plant components. The common goals of all these techniques are to: isolate specific bioactive compounds from complex plant samples; improve analytical methods' selectivity; raise the concentration of specific compounds in bioassays; change the form of the targeted compounds so that they are better suited for detection and separation; and offer a reliable, repeatable method that is not dependent on changes in the sample matrix[1].

Ecological Extraction

Green chemistry may be broadly defined as the creation, design, and usage of a process that minimizes or completely avoids the use and manufacture of hazardous substances. This definition may be changed to the following in regard to green extraction. "Green extraction is based on the discovery and design of an extraction process that will reduce energy consumption, allow use of alternative solvents and renewable natural products, and ensure a safe and high-quality extract." Green extraction is a new idea of the twenty-first century since it provides more eco-friendly, economical, and inventive approaches while also protecting the environment and human health. Alternative technologies include green extraction methods[2].

II. DISCUSSION

Water or agricultural solvents are the main solvents. The current control of volatile organic compounds and petrochemical solvents has the effect of lowering the usage of these substances. Information on the dangers of employing organic solvents for extraction must be provided by the makers. The majority of organic solvents are flammable, volatile, and often hazardous, contributing to environmental pollution, ozone layer damage, and the greenhouse effect. Industry is being forced to utilize greener solvents as alternatives for safety reasons due to economic and environmental factors. Green solvents that may replace petrochemical solvents are agro or biosolvents. Renewable resources produced from biomass include wood, starch, vegetable oils, and fruits, for example. These bio-solvents have a high level of solvent power and are biodegradable, non-toxic, and inert[3].

Industries that extract natural products must combine process intensification with cleaner and safer extraction techniques in order to remain competitive. The utilization of energy is improved and expenditures are decreased when a process has fewer stages. It would seem that a one-stage procedure is the best. Long-term gains in the search for extraction processes that are more efficient will undoubtedly result from the introduction of new extraction technologies at the manufacturing scale. For instance, pulsed electric fields (PEF) aided extraction speeds up the extraction process by permeabilizing the cell membrane. During PEF treatments, the cell membrane is sufficiently exposed to a strong electric field for a brief period of time. PEF improves the extraction of lipids and carotenoids as a result.

Assisted Microwave Extraction

Innovative green extraction method known as microwave assisted extraction significantly reduces extraction time and rate while increasing extraction efficiency. As opposed to traditional heating, which relies on the

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conduction-convection phenomena and ultimately loses a significant amount of heat energy to the environment. Whereas in the case of MAE, heating takes place in a closed system, is focused, and selective, with almost little heat being lost to the environment. When compared to Soxhlet, this special heating system may drastically shorten the extraction time. Ionic conduction and dipole rotation convert microwave energy to thermal energy, converting electro-magnetic energy into calorific energy[4].

Assisted by an Enzyme

High efficiency and high specificity are two characteristics of enzymes. Due to the gentle extraction conditions and alternative, environmentally friendly technology that enables extraction with reduced solvent consumption, enzyme-assisted extraction has the potential to be a green extraction technique. The need for environmentally friendly extraction technology has increased interest in enzyme-assisted extraction techniques. In comparison to non-enzymatic approaches, recent investigations on enzyme aided extraction have shown quicker extraction, greater recovery, decreased solvent use, and lower energy consumption. Cellulases, pectinases, -glucosidase, and hemicellulose are only a few of the several enzymes that are often needed to damage the structural integrity of the plant cell wall and improve the extraction of bio actives from plants.

Extraction with Ultrasound

The cavitational effects of ultrasounds speed up the transmission of heat and mass through plant cell walls. Before collapsing and producing smaller bubbles that may function as new cavitation nuclei or just disintegrate, cavitation bubbles last only a few sonic cycles. The cavitation bubble's potential energy is increased and converted into kinetic energy. Cavitation changes the system's chemical reactions, mostly by speeding up the reaction rates of already-existing processes. Cavitation alters cellular architecture and speeds up mass transport. Cell wall disruption improves the release of the target molecule from several natural sources. High extracting power of ultrasounds is produced as a consequence of the radical oxidative energy that is produced during the sonolysis of the solvent.

Extraction of High Voltage Electrical Discharges

High voltage electrical discharge technology is a green extraction method since it increases the rate of extracted bio-compounds per starting vegetable material while requiring little more energy for treatment. A green extraction method is the high voltage electrical discharges aided extraction, which may increase the rate of extracted bio-compounds while requiring less time, low energy input, and temperature. Several plant food items have been processed using HVED technology to extract bioactive chemicals based on the electrical breakdown event that occurs in cell tissues[5].

Extracting Supercritical Fluid

Supercritical fluid extraction has been used for decades as a green method. SFE has the potential to be a quick, effective, and clean way to extract natural compounds from various matrices. There have been investigations into the supercritical fluid extraction of phenolic compounds, flavonoids, anthocyanins, carotenoids, lycopodines, terpenoids, and other antioxidants from food and medicinal plants. SFE has been used to preserve goods' inherent qualities after the processing or manufacturing stage and, at the same time, prevent the presence of organic solvents as impurities, raising the finished products' market value. Supercritical fluids are used as the extracting solvent in the SFE technique of extraction. The solvent may change into a supercritical state, which exhibits both liquid-like and gas-like characteristics, above the critical pressure and temperature[6]–[8].

Extraction of Liquid under Pressure

This strategy for green extraction is thought to be an effective method to boost automation, which is one of the objectives in the creation of solid samples, but it may also speed up the process and use less solvent. There are other names for this process, including "accelerated solvent extraction," "pressurized hot solvent extraction," "high-pressure solvent extraction," "subcritical solvent extraction," and "superheated liquid extraction." The extraction process in this newly patented PLE system is conducted at temperatures over a solvent's boiling point, which indicates that a high internal pressure must be maintained to keep the solvent in a liquid form. The extraction efficiency is influenced and improved by temperature and pressure[9], [10].

III. CONCLUSION

The six principles of green extraction are a novel idea designed to address the difficulties of the twenty-first century, preserve the environment, and advance patient health. Various green extraction techniques and traditional extraction techniques were examined in this review. The comparison of these two approaches demonstrates the various benefits the green extraction method has over the traditional method. Therefore, it can be concluded that green extraction techniques have the potential to replace conventional extraction methods because they require less time and energy, use water or agricultural solvents as an alternative solvent, produce co-products and/or byproducts rather than waste, require fewer unit operations, and have higher extraction yields than traditional extraction techniques.

REFERENCES

[1] M. L. F. Kumalasari and F. Andiarna, "Uji Fitokimia Ekstrak Etanol Daun Kemangi (Ocimum basilicum L)," Indones. J. Heal. Sci., 2020, doi: 10.24269/ijhs.v4i1.2279.
[2] M. Yang et al., "Chicoric Acid: Natural Occurrence, Chemical Synthesis, Biosynthesis, and Their Bioactive Effects," Frontiers in Chemistry. 2022. doi: 10.3389/fchem.2022.888673.
[3] W. long Zha and J. chen Zi, "Advances in biotechnological production of santalenes and santalols," Chinese Herbal Medicines. 2021. doi: 10.1016/j.chmed.2020.11.002.
[4] Q. Jia et al., "Utilization of Physiologically Based Pharmacokinetic Modeling in Pharmacokinetic Study of Natural Medicine: An Overview," Molecules. 2022. doi: 10.3390/molecules27248670.
[5] N. T. Mohammadian and M. Monajjemi, "Heterocyclic compounds of some natural products as anti-covid-19: Iranian plants and natural drugs of Ardabil province," Biointerface Res. Appl. Chem., 2021, doi: 10.33263/BRIAC113.1094010954.
[6] L. N. Khanal, K. R. Sharma, Y. R. Pokharel, and S. K. Kalauni, "Phytochemical Analysis and in Vitro Antioxidant and Antibacterial Activity of Different Solvent Extracts of Beilschmiedia roxburghiana Nees Stem Barks," Sci. World J., 2022, doi: 10.1155/2022/6717012.
[7] A. Popova and D. Mihaylova, "A review of the medicinal plants in bulgaria – collection, storage, and extraction techniques," Asian Journal of Pharmaceutical and Clinical Research. 2018. doi: 10.22159/ajpcr.2018.v11i3.22994.
[8] M. Li. F. Kumalasari and F. Andiarna, "Uji Fitokimia Ekstrak Etanol Daun Kemangi," Indones. J. Heal. Sci., 2020.
[9] P. Adadi, N. V. Barakova, and E. F. Krivoshapkina, "Selected Methods of Extracting Carotenoids, Characterization, and Health Concerns: A Review," Journal of Agricultural and Food Chemistry. 2018. doi: 10.1021/acs.jafc.8b01407.
[10] M. Espino, M. de los Á. Fernández, F. J. V. Gomez, J. Boiteux, and M. F. Silva, "Green analytical chemistry metrics: Towards a sustainable phenolics extraction from medicinal plants," Microchem. J., 2018, doi: 10.1016/j.microc.2018.06.007.

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Conventional Extraction Techniques for Medicinal Plants

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Abstract*—The utilization of medicinal plants to treat and cure both common and chronic ailments is generating a lot of attention. Extraction techniques, which are crucial, were the starting point of the research on medicinal plants. Today, a variety of technologies with various extraction techniques are accessible. These methods are traditional and contemporary. Traditional extraction techniques involve solvents and take a long time, however current extraction techniques are also used to extract natural compounds. Modern extraction techniques are difficult to use, expensive, and sophisticated, while traditional extraction techniques are straightforward, accessible, and affordable. Everyone is pretty acquainted with the household use of conventional extraction in daily life from brewing coffee or tea at home. It is essential to establish efficient and focused traditional extraction techniques so that professionals and researchers may be motivated and work more effectively.

***Index Terms*— Extraction Techniques, Herbal Treatments, Medicinal Plants Traditional Extraction**

I. INTRODUCTION

The selection of an appropriate extraction process is crucial to both qualitative and quantitative research of bioactive chemicals derived from plant sources. The use of plant materials in medicinal, dietary, and cosmetic applications is growing in popularity. They are the source of beneficial bioactive compounds that have been used for medicinal reasons for a very long period. About 80% of the world's population depends on herbal treatments rather than contemporary modern medicine, and the usage of traditional medicine and medicinal plants in the majority of underdeveloped nations has been well documented. Alkaloids, steroids, tannins, glycosides, volatile and fixed oils, resins, phenols, and flavonoids are only a few of the active substances found in plants. These substances are also found in their respective components, such as leaves, flowers, bark, seeds, fruits, and roots. To extract compounds from plants, a variety of extraction techniques are available.

These methods may be classified as both novel and traditional. While innovative techniques use pressure and/or increased temperatures, conventional procedures use organic solvents or water and atmospheric pressure. The separation of the active components from the originating components in plant tissues requires the use of extraction techniques and the right solvents. Solvents flow into the solid plant components during this phase and solubilize the chemicals with identical polarities. It should be emphasized that selecting the right solvent and using a suitable extraction technique are both crucial. The "like dissolves like" idea is useful when choosing solvents. As a result, both polar and nonpolar compounds will be extracted using polar solvents. Initially, plant metabolites are mixed in a complicated way in the crude extracts. The traditional techniques that are often used to extract bioactive chemicals from plants include percolation, maceration decoction, soxhlet extraction, and hydro distillation. When doing small-scale research or operating a small manufacturing business, conventional techniques like maceration and soxhlet extraction are often used. Additionally, adjustments to the procedures are continually created[1], [2]. With so many different techniques available, choosing the best extraction process requires careful consideration. The goal of the current study is to give a thorough analysis of several traditional extraction techniques for bioactive chemicals from medicinal plants. It also outlines their benefits and drawbacks to help readers choose the best techniques.

II. DISCUSSION

Methods of Extraction

The word "extraction," as it is used in the pharmaceutical industry, refers to the process of separating medicinally active chemicals from inert or inactive components in plant or animal tissues using certain solvents. The somewhat impure liquids, semisolids, or powders produced in this way by plants are only fit for external or oral consumption. Some of the first produced extracts may be suitable for use as tinctures or fluidextracts, while others need further processing. While decoction and hydro distillation procedures employ water as a solvent, traditional extraction techniques like maceration, percolation, and soxhlet extraction often use organic solvents, need a huge volume of solvents, and take a long time to complete[3].

Maceration

It is an antiquated technique for making medicines. It is regarded as a popular and affordable method of obtaining natural goods from plant material. The maceration is a technique for extracting solids from liquids. In this procedure, the solvent is introduced to a closed vessel

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containing the powdered solid components. It is permitted to stand for extended periods of time while shaking occasionally. The solvent is given enough time to permeate through the cell wall and solubilize the plant component. Only molecular diffusion is used in the process. When the necessary amount of time has passed, the liquid is strained off, and the remaining solid is compressed to extract as much solvent as possible. To stop microbial development when water is the solvent and the maceration process lasts a long time, a tiny amount of alcohol may be added. Maceration consists of three main phases. First, plant materials are ground into a fine powder. This enables excellent material and solvent interaction. A specified solvent is introduced in a sealed jar after grinding. The remaining solid from this extraction procedure is pressed to recover a significant proportion of occluded solutions after the liquid has been strained off. Occasional shaking helps extraction during the maceration process by enhancing diffusion and removing concentrated solution from the sample surface. This allows fresh solvent to reach the menstruum and increases extraction yield[4].

Decoction

It is an effective approach for extracting ingredients that are soluble in water and cannot be damaged by heat. A water-based preparation known as decoction is used to extract active ingredients from medicinal plant sources. In this procedure, the plant material and water are boiled to create the liquid preparation. When dealing with stiff, fibrous plants, barks, and roots, as well as plants that contain compounds that are water soluble, decoction is the preferred procedure. Typically, the plant material is either powdered or broken up into tiny bits. The creation of decoctions may be done in a variety of ways. The crude medication, or yavakuta, is put in earthen pots or tinned copper containers with clay on the exterior according to an Ayurvedic procedure called as kwatha. The pot is filled with water and cooked over a fire. For every one part of the medicine, four parts of water should be used if the material is soft; eight times water should be used if the material is somewhat hard; and sixteen times water should be used if the material is very hard. In the case of light drugs, the mixture is next cooked on a low heat until it is reduced to one-fourth of its initial volume, and to one-eighth in the case of moderately or very hard substances. After cooling and straining the extract, the filtrate is collected in sanitized containers[5], [6].

Extraction using Soxhlet

It is the most effective technique for the continuous extraction of a solid by a hot solvent, and it bears Franz Ritter von Soxhlet's name, a German agricultural scientist. A sophisticated glass refluxing device called a "Soxhlet apparatus" is used mostly for organic solvent extractions. Soxhlet extraction is a widely used and well-proven technology that outperforms other traditional extraction techniques with the exception of the extraction of thermos labile chemicals in a small number of applications. The soxhlet device is filled with the powdered solid substance, which is contained in a filter paper thimble. The device is attached to a reflux condenser and a flask with a circular bottom that contains the solvent. The RB flask's solvent is gently boiled, and as the vapor rises via the side tube and is condensed by the condenser, it falls into the thimble holding the material and gradually fills the soxhlet. The solvent eliminates the part of the material it has extracted when it reaches the top of the connected tube by siphoning over into the flask. Up till full extraction is accomplished, the procedure is repeated[7].

Distillation in water

A classic technique for extracting plant components without the use of organic solvents is hydro distillation. In hydro distillation, plant materials are stuffed into a still compartment with enough water to cover them, and the mixture is then heated until it boils. Another option is to introduce direct steam directly into the plant sample. The key influencing variables that liberate the bioactive chemicals from plant tissue are hot water and steam. The vaporized combination of water and oil is condensed by indirect water cooling. The extraction of essential oils from a variety of plants and their varied sections using hydro distillation has the potential to be highly beneficial. The yield depends on a number of factors, including raw material weight, water volume, raw material size, and raw material kind. Three basic physiological chemical processes are involved in hydro distillation: hydrolysis, hydrodiffusion, and heat-induced breakdown. A high temperature for extraction may cause certain volatile components to evaporate. This flaw restricts its use to the extraction of thermos labile compounds[8].

This process involves totally submerging the material in water that has been heated using direct flame, steam jacket, closed steam jacket, closed steam coil, or open steam coil. This technique' primary feature is the direct contact between boiling water and plant matter.While separated from the plant material, the steam may be produced in the still or a satellite boiler when using water and steam distillation. Water and steam distillation are both extensively utilized in rural regions, similar to water distillation. Additionally, it doesn't cost much more upfront than water distillation. A perforated grid supports the plant material above the boiling water, although the apparatus employed is often identical to that used in water distillation. In fact, it is typical for people who start with water distillation to go on to water and steam distillation.Direct steam distillation, as the name indicates, is the technique of extracting plant matter using steam produced outside the still in a steam generator sometimes referred to as a boiler. The plant material is supported on a perforated grid above the steam input, much as in water and steam distillation. The ability to easily manage the steam output is a significant benefit of satellite steam generating. Because steam is produced in a satellite boiler, the plant material is only heated to a temperature of 100° C, preventing thermal

damage. The method most often used for the industrial manufacturing of essential oils is steam distillation. It is common practice in the taste and fragrance supply industry[9]–[11].

III. CONCLUSION

The need to extract plant bioactive components is increasing, which drives ongoing research into practical extraction techniques. The foundation of traditional approaches is the solvent solubility of the solute from plant materials. As a result, it often uses a considerable amount of solvent to extract the target product, however this is sometimes aided by an increase in temperature and mechanical stirring or shaking. Conclusion: No one extraction technique is the best technique, and each extraction process is specific to the plants it is used on. The assessment of extraction efficiency is influenced by the proper use of standard methodologies. On the other hand, the growing economic importance of bioactive substances and the commodities that include these substances may encourage the development of more advanced extraction techniques in the future.

REFERENCES

[1] J. Malik and S. C. Mandal, "Extraction of herbal biomolecules," in Herbal Biomolecules in Healthcare Applications, 2022. doi: 10.1016/B978-0-323-85852-6.00015-9.
[2] L. Gámiz-Gracia and M. D. Luque de Castro, "Continuous subcritical water extraction of medicinal plant essential oil: Comparison with conventional techniques," Talanta, 2000, doi: 10.1016/S0039-9140(00)00294-0.
[3] Z. Maqbool et al., "Potential Role of Phytochemical Extract from Saffron in Development of Functional Foods and Protection of Brain-Related Disorders," Oxidative Medicine and Cellular Longevity. 2022. doi: 10.1155/2022/6480590.
[4] M. G. Rasul, "Conventional Extraction Methods Use in Medicinal Plants, their Advantages and Disadvantages," 2018.
[5] F. Esmaeili, M. Hashemiravan, M. R. Eshaghi, and H. Gandomi, "Optimization of Aqueous Extraction Conditions of Inulin from the Arctium lappa L. Roots Using Ultrasonic Irradiation Frequency," J. Food Qual., 2021, doi: 10.1155/2021/5520996.
[6] I. E. Garofulić et al., "Phenolic profile, antioxidant capacity and antimicrobial activity of nettle leaves extracts obtained by advanced extraction techniques," Molecules, 2021, doi: 10.3390/molecules26206153.
[7] "Review on Extraction and Isolation of Plant Secondary Metabolites," 2017. doi: 10.15242/iie.c0517024.
[8] J. Giacometti et al., "Extraction of bioactive compounds and essential oils from mediterranean herbs by conventional and green innovative techniques: A review," Food Res. Int., 2018, doi: 10.1016/j.foodres.2018.06.036.
[9] S. Roopashree, J. Anitha, T. R. Mahesh, V. Vinoth Kumar, W. Viriyasitavat, and A. Kaur, "An IoT based authentication system for therapeutic herbs measured by local descriptors using machine learning approach," Meas. J. Int. Meas. Confed., 2022, doi: 10.1016/j.measurement.2022.111484.
[10] A. Madani, N. Mazouni, and M. Nedjhioui, "Plants' Bioactive Metabolites and Extraction Methods," Intech, 2021.
[11] L. G. Santos and V. G. Martins, "Optimization of the green extraction of polyphenols from the edible flower Clitoria ternatea by high-power ultrasound: A comparative study with conventional extraction techniques," J. Appl. Res. Med. Aromat. Plants, 2023, doi: 10.1016/j.jarmap.2023.100458.

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Use of Plant Extracts to Enhance the Nutritional Value and Oxidative Stability of Vegetable Oils

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Abstract*—Vegetable oil oxidation, which impairs the oil's nutritional value and produces unpleasant tastes, is the principal factor limiting the quality of vegetable oils during storage. Because of these modifications, consumers find meals high in fat less appealing. Vegetable oil producers and the food industry are searching for natural antioxidants to replace synthetic antioxidants in order to address this issue and satisfy customer demand for natural foods. In this situation, natural antioxidant chemicals obtained from various medicinal and aromatic plant parts might be used as a promising and long-term solution to safeguard the health of customers. The goal of this study was to gather published research on various techniques for enriching vegetable oils as well as the extraction of bioactive components from MAPs. In reality, this study employs a multidisciplinary approach and provides a current overview of the technical, environmentally friendly, chemical, and safety elements of protecting oils.

***Index Terms*— Plant Extracts, Nutritional Value, Oxidative Stability, Vegetable Oils**

I. INTRODUCTION

Due to their health advantages, vegetable oils are being consumed more often than ever before. The primary building blocks of lipids and significant storage lipids are triacylglycerols. These triglycerides are made up of three fatty acids, whose amounts vary depending on the plant from which they are obtained, esterifying a glycerol unit. A very significant minority fraction, which includes polyphenols, phytosterols, minerals, vitamins, resinous esters, and other substances, also contains triglycerides.

Vegetable oils have a crucial function as a source of energy for human metabolic activities, vital fatty acids, tocopherols, and fat-soluble vitamins, as well as a structural role because of their biochemical makeup. Industrial oils' quality decline, which results in nutritional value loss and unpleasant aromas, is mostly caused by oxidation. These reduce consumer acceptance of VOs and foods containing VOs. Additionally, lipid oxidation produces a number of harmful substances, such as reactive carbonyl compounds, which in turn cause lipid peroxidation and its byproducts to develop. These could be harmful to human health[1].

Lipid oxidation level is also influenced by a number of VO-specific variables. The level of unsaturation, the presence of antioxidant chemicals, and metals like copper and iron are a few examples. It also relies on the external variables affecting oils, such as the storage environment. Enhancing the oil's oxidative stability during processing and storage may be done in a number of ways. The conditions for oil extraction are improved to increase the concentration of bioactive compounds and antioxidant chemicals, among other things, by preventing light, dioxygen, and high temperatures.

With the naturally occurring antioxidants found in oils. Synthetic antioxidants may enhance the quality and stability of oil oxidation. The most popular ones include propyl gallate, butylated hydroxyanisole, butylated hydroxytoluene, and tertbutyl hydroquinone. Although there are concerns regarding their health impacts, some data points to these synthetic chemicals' carcinogenic potential.

Other suggestions for enhancing VOs have been made as a result. Utilization of natural antioxidants derived from food byproducts, secondary streams, and agri-food wastes in particular. Particularly considering that 30.6 million tons of food processing waste are produced annually, 35% of which are produce. However, in addition to the extraction of phenolic compounds, these by-products need to be processed, which involves the addition of chemicals. Finding additional natural sources of antioxidants will be important since it is very possible that undesired chemicals will be extracted as well. On the other hand, it seems like a good idea to extract natural antioxidant compounds from medicinal and aromatic plants. Several ancient cultures have used them for their myriad therapeutic and medicinal benefits. The enrichment of oils with antioxidants from MAPs was the subject of many investigations[2].

The enrichment of VOs with bioactive chemicals from MAPs to prevent VOs from oxidizing in the first place is the main topic of this review. Based on a quantitative and qualitative examination of existing studies on the enhancement of oxidative stability of VOs by natural antioxidants. This review emphasizes the function of antioxidants in enhancing the oxidative stability of VOs, emphasizing their mode of action, the effects of extraction techniques on the recovery of antioxidants from MAPs, as well as enrichment techniques used to assess the oxidative stability and effectiveness of antioxidants.

II. DISCUSSION

Animal Fat Oxidation

Fats and VOs are crucial elements of our daily diet and significant components of human consumption. Depending on their source, they might be either vegetable or animal oils or fats. In 2020–2021, VOs made up the majority of global manufacturing. In actuality, 207 million metric tons of VO are produced globally. The four main VOs are palm, soybean, rapeseed, and sunflower and are made from oleaginous seeds or oleaginous fruit like olive and palm by solvent extraction or mechanical expulsion. Both the chemical and organoleptic characteristics of VOs determine its quality. These also influence consumer acceptability and agro-industrial choices. Off-flavors and off-odors in oils and fats are often brought on by oxidative and/or hydrolytic degradations of triglycerides, which are the two principal degradation processes [3].

Numerous studies have shown that VOs' oxidative stability is one of its main qualitative characteristics. The VOs oxidation is a complicated chain of events that produces rancidity, bad tastes, and aromas. This phenomenon has a significant role on VO quality throughout the manufacturing and storage phases. The ultimate nutritional and sensory quality of oils is also affected by this process, which is the most significant and obvious detrimental process. As a result, VOs' oxidative stability determines how long they may be stored. Furthermore, it is amazing how certain harmful substances, including reactive carbonyl compounds, may lead to advanced lipid peroxidation end products throughout the oxidation process. These might be harmful to human health. High temperature, storage conditions, high dioxygen availability, the content and quantity of polyunsaturated fatty acids, as well as the presence of pro-oxidants including chlorophylls, heavy metals, and metal ions, may all contribute to oil oxidation . The typical free radical chain phenomenon, which starts with radical reactions on unsaturated fatty acids, is used to explain the oil oxidation processes. The three steps of these reactions are initiation, propagation, and termination. Actually, peroxyl radicals are scavenged by antioxidants during the monomolecular phase of hydroperoxide formation at the beginning stage. While autocatalytic, monomolecular, and bimolecular reactions make up the propagation step. However, as shown in Figure 10, the termination stage is primarily characterized by the breakdown of hydro peroxides on the one hand and the enhanced generation of secondary oxidation products on the other. The following reactions provide a summary of the oxidation mechanism.The harmony of different external and inner elements is necessary for oxidative stability. Fatty acid unsaturation, environmental factors, the make-up of minor components, distribution methods, and the usage of antioxidants are a few of them. Lipid oxidation has detrimental impacts on both human health and the nutritional value of food. In order to improve the oxidative stability of lipid products and decrease oxidation, measures should be performed[4].

Extending the shelf life of oils is a great idea by increasing the VO's oxidative stability. Additionally, it enables the reduction of off flavors. The many strategies and approaches utilized to increase VO stability and boost oxidative stability have a long history. First, one method to increase the oxidative stability of VOs is to modify the content of fatty acids in plants via natural selection. Second, one of the easiest ways to increase the quality and stability of VOs is by combining them with various fatty acid compositions. Thirdly, according to some scientists, the processing method may increase the VO's oxidative stability. Indeed, according to Matthäus, cold-pressed virgin oils are immensely popular because of their distinctive color, flavor, and richness in natural antioxidants. Additionally, roasting is a beneficial process that significantly improves the quality of virgin oils like argon, cactus, and sesame oils in terms of taste, color, texture, and stability. Finally, many businesses, particularly those that are refined, employ synthetic or natural antioxidants to increase VO stability. However, because of their impact on carcinogenesis, synthetic antioxidants have been linked in a number of scientific studies to health hazards. The utilization of extracts generated using environmentally friendly ways from MAPs, food industry byproducts, and side streams may improve the oxidative stability of VOs, according to a number of recent research that create and verify safe and sustainable alternatives to synthetic antioxidants[5].

The oxidation of unsaturated fatty acids in edible oils throughout the manufacturing, shipping, storage, and final preparation of edible oils is one of the key issues with food preservation, and it is also associated to rancidity. A key goal of the food business continues to be the management of the pace and amount of lipid oxidation in foods in order to guarantee the correct preservation of food items that include fats. By preventing the creation and spread of free radicals and reducing the generation of degradation chemicals, antioxidants may be utilized as an alternative to extend the shelf life of fatty goods. According to one definition of antioxidants, they are "small-amount molecules capable of preventing the formation of rancidity or other taste modifications in meals attributable to oxidation or considerably delaying the oxidation of easily oxidized components such as lipids. Depending on how they work, antioxidants may be divided into different categories. Some of them function as free radical scavengers since these substances may also operate as free radical terminators, which can disrupt the oxidation process. Other times, they function as metal chelators that stimulate the oxidation of lipids. These substances may be synthetic or natural.

Artificial Antioxidants

Exogenous synthetic antioxidants are substances produced via chemistry. Antioxidants may improve food stability, delay food oxidation, and extend food shelf life. Foods may include synthetic antioxidants, the most common of which are phenolic antioxidants, such as BHA, BHT, PG, and TBHQ. Despite the fact that these phenolic compounds are often categorized as "accepted as safe," a number of safety

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concerns have been brought up. Long-term usage of synthetic antioxidants has been linked to a number of health issues, including digestive problems, skin allergies, and in certain cases, an increased risk of cancer, according to many published studies[6].

Antioxidants in Nature

A growing movement to replace synthetic antioxidants with natural antioxidants, which raise safety concerns, is to replace synthetic antioxidants with natural molecules that have antioxidant capabilities. As a result, it is generally recognized that fruits, vegetables, cereals, and MAPs include a variety of bioactive chemicals that have been discovered to have strong antioxidant properties. Since the dawn of time, MAPs have been employed to cure human ailments. 80% of the world's population, according to the World Health Organization, depends on traditional medicine for their primary healthcare.In this context, MAPs' antioxidant effects have recently become the subject of global scientific research. Because they include a large variety of chemical substances that may induce distinct physiological effects and serve important functions. Three major categories may be used to group natural antioxidants produced from plants: phenolic chemicals, vitamins, and carotenoids. Plants from a variety of botanical groups, including Lamiaceae, Apiaceae, Zingiberaceae, Ginkgoaceae, Asteraceae, and Myrtaceae, are among those known to contain MAPs with antioxidant activity[7].

Phenolic Substances

In the plant world, phenolic compounds are thought to be the most important and prevalent family of phytochemical substances. These phenolic substances are classified as secondary metabolites and are found in a variety of plant parts, such as the roots, seeds, leaves, fruits, stems, etc. The plant produces these chemicals to protect itself or to encourage development in difficult situations. The number of phenol subunits determines the derivatives of phenolic compounds, which have a variety of structural variations sharing a single structural characteristic, a phenol. As illustrated in Figure 12, phenolic compounds are grouped into three primary classes based on their structural characteristics: phenolic acids, flavonoids, and non-flavonoids. The two most significant classes of secondary metabolites and bioactive chemicals in plants are phenolic acids and flavonoids. Based on their potential as a center of inherent antioxidant activity, phenolic chemicals are bioactive. This contributes to the removal of free radicals, reactive oxygen and nitrogen species, and the inhibition of the enzymes that produce free radicals.

Flavonoid Substances

The flavonoids. By creating yellow or red/blue pigmentation in shoots, leaves, buds, petals, and fruits, it gives flowers their color. The purpose of this coloration is to entice pollinators to the blooms. A broad family of secondary metabolites found in plants, flavonoids are a subclass of polyphenolic chemicals. They are physiologically active plant compounds that are growing in scientific significance due to their positive health effects. The direct scavenging of oxygen free radicals or excited oxygen species, chelation characteristics, and the inhibition of oxidative enzymes may all be used to describe the antioxidant processes of flavonoids. According to the variety of species, edaphoclimatic circumstances, plant tissues, growth conditions, and level of maturity, flavonoids are divided into the following categories: flavanols, flavones, flavanones, isoflavones, and anthocyanidins.

Phenolic Compounds without Flavonoids

Tannins, also known as tannic acid, are naturally found among the non-flavonoid phenolics that are present in many plants. Condensed and hydrolysable tannins are the two primary classes into which they are often chemically separated. Contrary to hydrolysable tannins, condensed tannins have a more complex and consistent structural makeup. Another characteristic family of phenolic chemicals found in plants include stilbenes, lignans, and derivatives of stilbenes. In general, all of these different compounds have extraordinary anti-inflammatory and anti-radical effects in plants[8]. Numerous bioactive phenolic compounds with antioxidant properties are found naturally in plants. Among these are phenolic compounds, carotenoids, and coenzyme Q, lycopenes, and antioxidant vitamins.

Carotenoids

Carotenoids, sometimes referred to as tetraterpenoids, are organic natural pigments that come in shades of yellow, orange, and red. They are mostly created by medicinal plant plastids. There are many different types of carotenoids, but only six of them are known to have significant antioxidant activity. Due to its chemical makeup and interactions with biological membranes, -carotene may have biological antioxidant properties. They have the capacity to scavenge radicals produced by procedures like lipid peroxidation, including hydroxyl, peroxyl, alkoxyl, and the hydroperoxide anion. They may be employed as food colorants in addition to their antioxidant properties.

Oils are enriched with natural antioxidants

The topic of VOs enhanced with natural bioactive substances is covered here. Oils and fats lack enough oxidative stability despite having naturally occurring antioxidants such tocopherols, tocotrienols, phenolic compounds, carotenoids, and sterols. Low oxidative stability is often caused by oxidation, a serious issue. It also causes health issues including colds, cancer, heart disease, mutagenicity, and other ailments. As a result, the quality of the oil degrades. Numerous techniques are used to maintain the high nutritional content of oils while enhancing their oxidative stability and shelf life. One of the most prevalent tactics is adding synthetic substances including BHT, BHA,

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PG, and TBHQ. There has recently been a growing trend toward using natural bioactive chemicals that are isolated from plants due to safety issues around such manufactured compounds. Essential oils are also utilized to prevent lipid oxidation and flavor oily goods in addition to plant MAPs extracts.

It is also common practice to enrich edible VOs and other items as functional foods, which are valued by customers due to their health advantages. A transfer of aromatic chemicals into the food matrix improves taste while also enriching the product with nutrients. Globally, this approach is expanding quickly. For this, a variety of herbs with intriguing sensory and phytochemical profiles are used, including, but not limited to, rosemary, lavender, sage, laurel, oregano, menthe, basil, lemon, and thyme. Recently, a variety of flavored oils containing various items have entered the market. The main source of natural antioxidants used today to improve oil stability is by-products from fruit and vegetable processing, such as flower, kernel, peel, leaf, and roots, which show a high content of bioactive compounds like phenolic acids, flavonols, anthocyanidines, flavonones, carotenoids, and glycoside. Utilizing oat bran extract is another novel strategy to combat oil oxidation. The addition of natural antioxidants to edible oils has been the subject of several investigations[9].

MAPs Extracts for Enriching Vegetable Oils

MAPs are regarded as ideal sources of naturally occurring antioxidants, such as polyphenols, which are common constituents of plants and herbs and are classified as phenolic compounds. It has been observed that plants naturally contain more than 8000 phenolic chemicals. Other kinds of chemicals found in plants include phenolic acids, phenolic triterpenes, carotenoids, diterpenes, and flavonoids. These bioactive compounds are noteworthy because they have a number of beneficial health effects. MAPs may be used in the creation of novel drugs and serve as an indigenous source of molecules with therapeutic potential. Due to their health benefits, herbal extracts have been utilized as natural food additives to enhance sensory qualities for centuries. Four significant biochemical classespolyphenols, terpenes, glycosides, and alkaloids as well as several naturally occurring antioxidant chemicals are the main elements present in plants. These are currently employed in medical and pharmaceutical goods in place of synthetic antioxidants, which are thought to be a key contributor to the development of cancer.

Since plant extracts are a great source of phytochemicals, which are particularly important owing to their impact on health, using MAPs in meals is a great way to improve the flavor and scent of a variety of foods. According to Salta et al., plant extracts have been used to supplement VOs with natural antioxidants. For instance, methanolic extracts of tea leaves and oat extracts in cottonseed oil, oregano in cottonseed oil, rosemary and sage extracts in both palm and rapeseed oil, ethanolic extract of summer savory in sunflower oil, and spinach powder in soybean oil. Similar to leafy vegetable extracts from sunflower and olive leaves, which have been extensively researched for enriching VOs, virgin olive oil, and other culinary oils. Oleuropein, one of the most prevalent phenolic compounds in olive leaves and a naturally occurring product of the secoiridoid group, is abundant in olive leaves and is renowned for its ability to reduce blood pressure. The use of olive leaf extracts to enhance oils has been the subject of several investigations. Several investigations have reported the antioxidative action of extracts from plants in the Lamiaceae family. Rosemary has been regarded as one of the most effective herbs for treating poor circulation, inflammatory disorders, headaches, and physical and mental exhaustion. It was also employed in ancient medicine as a stimulant and moderate analgesic.

The effectiveness of rosemary extract was assessed generally for oils during deep fat-fraying by oils such as soybean and palm oils and also for a mixture of sunflower, soybean, and palm oils. Its extracts have been used in food preservation as they prevent oxidation and microbial contamination and also as an additive to enrich VOs. Thymus species are commonly employed in the food industry as herbal teas, aromatic, flavoring agents, and medicinal plants because to their well-known antispasmodic, sedative, antioxidant, and antibacterial properties. When thyme's preservation impact on meat, butter, and soybean oil was assessed, it was shown that the items' induction times were lengthened. In order to flavor corn refined oil and increase its oxidative stability and antioxidant activity, phenolic acids, flavonoids, and phenolic monoterpenes, bioactive components from thyme extract were utilized. Around 60 different species of oregano may be found worldwide.

The plant's significant antioxidant properties, as well as other biological properties including antibacterial activity, are due to oregano's high amount of phenolic compounds and essential oils. In order to increase its enrichment with plant-based antioxidants, it was macerated in olive oil. Additionally, its essential oil was utilized to flavor olive oil. In the culinary and food industries, laurel is a plant species from the Lauraceae family that is native to the Mediterranean area. Dried laurel leaves, sometimes known as bay leaves, and essential oil are used as important spices and flavoring agents.

Non-Traditional Extraction Techniques

Extraction aided by ultrasound

UAE has been widely used as a significant extraction efficiency in the food and pharmaceutical sectors during the last three decades. The cavitation phenomena serves as the foundation for the mechanism. Through a succession of compressional and rarefaction waves, ultrasound travels through liquid systems and has the potential to create cavitation bubbles inside fluids. Such bubbles grow in diameter over a few cycles until they cross a critical point, at which point they collapse and release a huge amount of

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energy, causing very high temperatures and pressure at room temperature. High temperatures and pressure during UAE would break down plant material's cell walls, enabling the release of bioactive substances from the walls and enhancing mass transportation. The yields and frequency of extraction are directly influenced by the ultrasound's frequency, strength, temperature, and duration. For an effective extraction, other parameters including solvent type and volume as well as sample properties like sample ppaper size and moisture content are crucial. Ultrasonic extraction has shown a number of benefits over traditional approaches in terms of extraction yields and time[10].

Extraction helped by a microwave

Three stages make up MAE: solute detachment from the active sites from the solid matrix under high pressure and temperature; solvent diffusion through the solid matrix; and solute release into the solvent. The range of microwave frequencies is 300 MHz to 300 GHz. Under microwave radiation, the solvent has to have a high dielectric constant in order to warm up fast. The benefit of this method is that it requires less solvent volume and extraction time than the standard approach. Better recoveries have been seen using the MAE approach when the proper circumstances are used to prevent heat deterioration.Because they are stable under microwave heating settings of up to 100 °C for 20 min, tiny phenolics such phenolic acids, quercetin, isoflavin, and trans-resveratrol are the only ones that can be heated using this method. The production of phenolics and flavonoids drastically decreased with more cycles of MAE. Due mostly to the compounds' oxidation, the production of phenolics and flavanones reduced. Tannins and anthocyanins may not be appropriate for MAE because they might degrade at high temperatures.

Extraction of supercritical fluid

SFE has lately seen increased use as a sustainable environmental method. The solvent may reach the supercritical state, which exhibits both liquid- and gas-like properties, above the critical pressure and temperature. Solvents are used in SFE at pressures and temperatures over their critical points. Supercritical liquid fluids have better transport properties than regular liquids, which quickly diffuse through solid materials and result in faster extraction rates. It is simple to alter the strength of supercritical solvents by altering the temperature, pressure, or by adding modifiers to lessen extraction.

Extracting liquid under pressure

The foundation of PLE is the extraction of the required component from the various matrices using solvents under high pressure and temperature. The solubility of analytes may be improved and mass transfer may be accelerated by raising the solvent's temperature in the liquid state over its typical boiling point by increasing pressure. Mass transfer may be accelerated and analytes' solubility can be enhanced by increasing pressure, which may raise the solvent's liquid-state temperature over its typical boiling point. The temperature and pressure ranges for this extraction technique are 21 to 200 °C and 35 to 200 bars, respectively. Subcritical water extraction is another name for PLE where water is the solvent. Water may be sustained in a liquid form at 200–250 °C while its dielectric constant decreases from 80 to 25, making it comparable to the dielectric constant of other organic solvents like methanol or ethanol.

Assisted Enzyme Extraction

Due to the gentle extraction conditions and environmental friendliness of EAE, it has potential to be a green extraction technique. High specificity and efficiency are characteristics of enzymes. They have the capacity to breakdown materials and disrupt the plant cell wall's structural continuity, the latter of which encourages the release of bioactive components. Hemicellulose, cellulase, pectinase, and -glucosidase are some of the enzymes employed in this extraction process. Various sources, including fungus, bacteria, fruit and vegetable extracts, or animal organs, may provide these enzymes. EAEs have been shown in several studies to enhance the extraction of antioxidants, particularly phenolics, flavonoids, and carotenoids. For oil enrichment to be more effective, new methods have recently been devised. Specifically, the enrichment of oils utilizing ultrasounds; this technique has produced effective extraction results because it permits mass transfer and penetration. Because of the cavitation principle, which promotes the development of small bubbles that are rapidly compressed and expanded during adiabatic motion. In order to enhance olive oil with phenolic compounds from olive leaves, the ultrasonic maceration technique under the following conditions: temperature of 16 °C, ultrasonic power of 60 W, and sonication period of 45 min.

During Oil Extraction, Enrichment

In the same vein, the work by Sanmartin et al. suggested an environmentally friendly, effective, and novel enriching method. Citrus and olive leaves are crushed and cryo-macerated with the olives under the experimental settings used to extract oil from the olives. In comparison to the control sample, the enhanced olive oils had a greater antioxidant content assessed, and the olive oil that had been extracted while the olive leaf was present had a higher concentration of oleuropein. In comparison to the control, the enhanced olive oils' organoleptic characteristics favorably improved in terms of overall pleasantness and odor complexity.

Essential Oil Enrichment

VOs with a plant-derived essential oil is another way. To do this, oregano essential oils were used to flavor olive oil. Samples of olive oil were spiked with 0.05% OEO and kept in light and dark storage for 126 days. Particularly at night,

samples with OEO had low levels of lipid oxidation markers. Low peroxide values were seen in olive oil with OEO in dark.

Other Methods

An alternative enrichment technique that involved first making ethanolic extracts of olive leaves and pomace, adding them to refined oils, and then removing the ethanol from the two-phase system to enrich various refined oils with phenolic extracts of olive leaves and olive pomace. The quality and stability indices of the enhanced oils saw a substantial increase. When Kozowska and Gruczyskaused the same methodology to assess the oxidative stability of soybean and sunflower oils enhanced with plant extracts, they found comparable findings.

On the other hand, Ahin et al. looked into enhancing the polyphenol content of maize oil by using olive and lemon balm leaf extracts. The extracts were dried after the extraction step's solvent evaporated, and then a solid-liquid extraction technique was used to partly dissolve the extracts in maize oil. The antioxidant activity of the oil enriched with olive and lemon balm leaf extracts was found to be almost 14 and 6 times higher, respectively, than those of the untreated oil, and as a result, the improved oil stability. The total phenolic content has been improved by 9.5 and 2.5 times compared to pure corn oil.

III. CONCLUSION

Here, we focused on the utilization of extracts from aromatic and therapeutic plants to raise the nutritional quality and oxidative stability of vegetable oils. Numerous studies discussing the value of antioxidants in defending edible oils against autoxidation were found during the bibliographic analysis conducted for this work. There have also been reports of significant antioxidant activity and thermal stability in edible VOs enhanced with natural antioxidants derived from MAPs. Utilizing natural antioxidants obtained from MAPs using long-lasting and sustainable methods is a creative solution to create a circular economy and meet customer demands for natural and healthier meals. To create a functional meal, it is crucial to choose the best extraction and enrichment techniques, as well as the most efficient concentrations. Additionally, additional research on the bioactive constituents of extracts should be done in order to identify the processes behind their impacts on the stability of vegetable oils.

REFERENCES

[1] S. Gharby et al., “An Overview on the Use of Extracts from Medicinal and Aromatic Plants to Improve Nutritional Value and Oxidative Stability of Vegetable Oils,” Foods. 2022. doi: 10.3390/foods11203258.

[2] M. Pattnaik and H. N. Mishra, “Amelioration of the stability of polyunsaturated fatty acids and bioactive enriched vegetable oil: blending, encapsulation, and its application,” Critical Reviews in Food Science and Nutrition. 2022. doi: 10.1080/10408398.2021.1899127.

[3] F. Hashempour-Baltork, M. Torbati, S. Azadmard-Damirchi, and G. P. Savage, “Chemical, rheological and nutritional characteristics of sesame and olive oils blended with linseed oil,” Adv. Pharm. Bull., 2018, doi: 10.15171/apb.2018.013.

[4] A. Dhyani, P. K. Singh, R. Chopra, and M. Garg, “Enhancement of Oxidative Stability of Perilla Seed Oil by Blending It with Other Vegetable Oils,” J. Oleo Sci., 2022, doi: 10.5650/jos.ess22013.

[5] E. Symoniuk, N. Ksibi, M. Wroniak, M. Lefek, and K. Ratusz, “Oxidative Stability Analysis of Selected Oils from Unconventional Raw Materials Using Rancimat Apparatus,” Appl. Sci., 2022, doi: 10.3390/app122010355.

[6] M. Pattnaik and H. N. Mishra, “Oxidative stability of ternary blends of vegetable oils: A chemometric approach,” LWT, 2021, doi: 10.1016/j.lwt.2021.111018.

[7] F. A. L. de Carvalho et al., “Effect of replacing backfat with vegetable oils during the shelf-life of cooked lamb sausages,” LWT, 2020, doi: 10.1016/j.lwt.2020.109052.

[7] Y. Elouafy et al., “Variations in Antioxidant Capacity, Oxidative Stability, and Physicochemical Quality Parameters of Walnut (Juglans regia) Oil with Roasting and Accelerated Storage Conditions,” Molecules, 2022, doi: 10.3390/molecules27227693.

[8] M. Machado, L. M. Rodriguez-Alcalá, A. M. Gomes, and M. Pintado, “Vegetable oils oxidation: mechanisms, consequences and protective strategies,” Food Reviews International. 2022. doi: 10.1080/87559129.2022.2026378.

[9] S. Cao et al., “Identification and Evolutionary Analysis of FAD2 Gene Family in Green Plants,” Trop. Plant Biol., 2021, doi: 10.1007/s12042-020-09276-x.

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Some Therapeutic Plants' Essential Oils

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Abstract*—Herbal medicines have a crucial role in treatment and wellness. Compared to synthetic medications, medicinal plants' bio actives have less adverse effects, and their antioxidant characteristics are what give them their many therapeutic benefits. Essential oils are a potently scented blend of active ingredients derived from fragrant plants. Monoterpenes, sesquiterpenes, oxygenated monoterpenes, oxygenated sesquiterpenes, and phenolics make up natural EOs. EOs are readily extracted using the steam distillation process from a number of natural sources due to their volatility. Due to their anticancer, antiviral, antidiabetic, anticancer, antibacterial, antioxidant, and aromatherapy properties, essential oils are one of the crucial therapeutic elements employed in creating novel therapeutic vehicles. This study draws on a variety of sources to examine the nature of essential oils, their potential as medicines, and the essential elements of distinct essential oils.

***Index Terms*— Herbal Medicines, Ingredients, Oils, Therapeutic Plants**

I. INTRODUCTION

The development of new therapeutic agents with unique health advantages uses a variety of bioactive secondary metabolites that are abundant in medicinal plants as a great source. Many different fragrant and therapeutic plants may be found in abundance in Saudi Arabia. Due to the country's unique geographic position, many Saudi plants are different in terms of their chemo-diversity and medicinal benefits from the same plants flourishing in other places and climates. Numerous fragrant plants that grow in Saudi Arabia have been identified as potential sources of EOs. Due to their well-established usefulness, aromatic plants that produce large levels of EOs may be used therapeutically to treat a variety of ailments. EOs are a chemical concoction of strongly scented aromatic elements that are derived from aromatic plants. EOs are intricate blends of bioactive compounds with many structural types, including mono-, sesqui-, and di-terpenes, phenol components, sulfur-containing substances, and phenylpropanoid elements.

The significant bacterial resistance to modern medications and the exorbitant costs of recent generations of antibiotics may be overcome thanks to the effective antibacterial capabilities of EOs. The vast array of bioactive elements in EOs interfere with different bacteria's defense systems by interacting with their cellular enzymes or cell structures, which speeds up microbial cell death. EOs and its components are used in perfumes, cosmetics, medicines, aromatherapy, sanitary products, dentistry, agriculture, food preservatives and additives, and natural remedies in addition to their remarkable antibacterial characteristics. As a consequence, with annual earnings in the billions of millions, EOs became a far more interesting topic for both study and business. As a result, EOs have developed into an intriguing source for discovering novel, potent, and secure bioactive compounds with [1], [2]a variety of therapeutic advantages, including antioxidant and antibacterial activities. By examining the characteristics of EOs, their techniques of extraction, their antioxidant, antibacterial, and antifungal properties, as well as the aromatic plants that generate EOs, this research seeks to highlight the significance of EOs.

The fragrant fluids generated by the secondary metabolism of aromatic plants are known as essential oils. They are the most important part of the plant, which is why they are referred to as "essential." EOs, which are combinations of organic substances generated from numerous plant sources, give plants their distinctive scent. Different parts of aromatic plants, such as their seeds, leaves, fruits, flowers, bark, cloves or buds, and rhizomes, are used to distill EOs. Mevalonic acid, malonic acid, and methyl-D-erythrol-4-phosphate are some of the different pathways that aromatic plants can use to synthesize EOs as combinations of organic constituents in the cytoplasm and plastids of plant cells. These compounds are then stored in epidermal cells, secreting fissures, glandular trichomes, or resin canals. The origins of the plants, species, and organs affect the distinctive scent and color of EOs.

Even while certain EOs have a vivid hue, such green European valerian and blue chamomile, most are a light yellow or colorless. The volatile substances found in Eos have a significant impact on the environment because they may protect plants from harmful bacteria, fungus, insects, and viruses. They can also attract certain insects that help pollinate plants. Geographical location, habitat, and stage of maturation are all elements that might impact plants and the amount of essential oils in them. Plant essential oils vary chemically depending on these characteristics[3].

The characteristics of essential oils

Most plant EOs are made up of two distinctive chemical groups called terpenes and phenylpropanoids. Terpenes and terpenoids are important components of many EOs, but in other species, phenylpropanoids are the main constituents of their EOs, giving them a distinctive taste and aroma. The primary constituents of EOs are produced using three different chemical processes: mono- and diterpenes are produced using methylerythritol, sesquiterpenes are

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produced using mevalonate, and phenylpropenes are produced using shikimic acid. The distinctive secondary metabolites of a plant are what primarily influence how each plant's EOs are chemically composed. Numerous isoprene units condense to generate various terpenes, including mono-, di-, sesqui-, tri-, tetra-, and poly-terpenes. Monoterpene examples shown in Figure 1 are p-cymene, limonene, sabinene, -myrcene, and -terpinene.

Some enzymes alter the chemical structure of terpenes to produce a variety of terpenoids with varying hydroxyl group positions, including menthol, carvacrol, terpineol, geraniol, and thymol. Most EOs include small amounts of phenylpropanoids such cinnamaldehyde, safrole, eugenol, and isoeugenol. Due to variations in plant parts, harvesting methods, drying, storage, distillation processes, and environmental factors, EO chemical components and concentrations vary across and among plant species as well as between comparable species. The quantity and kind of ingredients that are present as well as the stereochemical structures of EOs' chemical characteristics vary, and these factors may be altered by the extraction technique utilized. Essential oils are organic mixtures found in nature that comprise 20–100 different volatile chemicals from several chemical families. Only two or three of these molecules, which are present in high concentrations, give EOs their unique characteristics[4].

II. DISCUSSION

Essential Oil Extraction

Plant EOs are analyzed using two basic processes: chemical analysis, which takes a few minutes, and oil extraction/distillation, which takes many hours. Following the earlier work by Farhat et al., Figure 2 demonstrates how various extraction/distillation processes are used to purify plant EOs. Due to the volatile nature of EOs, the Clevenger technique of hydro-distillation is the common method used to purify EOs on a laboratory scale. While the traditional method used to purify EOs in industrial processes is steam distillation. Although solvent extraction of EOs is widely used in industrial settings, it is prohibited in the food industry due to the notable toxicity of the used organic solvents. In order to increase the effectiveness, sustainability, and economy of the applicable system, additional strategies have been investigated for the extraction of EOs. These include aided extraction using microwave and ultrasonic energy as well as ohmic hydro-distillation technology. The most important component in ensuring the quality of essential oils is the extraction technique utilized, since ineffective extraction techniques may modify the chemical compositions of aromatic oils and affect their quality and function.

Additionally, if EOs are extracted using the steam distillation method, the generated compounds will always be volatile, however if solvents are employed, the chemical composition of the extracted EOs will be different from that of an identical EO produced by distillation. Selecting the appropriate extraction process based on the properties of each plant material is crucial since the applied extraction method affects the chemical composition of any oil. To preserve consistency in chemical composition, quality, and quantity, the yearly extraction of EOs should be performed under the same circumstances, such as utilizing identical plant parts, a similar extraction procedure, and a similar harvesting season. Flowers must be chosen fresh when plant components are gathered for extraction; other plant parts may be picked fresh, partly dried, or dehydrated[5].

Essential Oils' Biological Effects

Different fragrant herbs have been used as preservatives, healing substances, and the primary source of scent and taste in the food business since ancient times. The medicinal benefits of diverse fragrant plants are mostly brought on by EOs. The diverse biological effects of EOs are thought to be caused by a combination of their active constituents, which may have a powerful synergistic impact. In pharmaceutics, essential oils are mostly used in aromatherapy and to enhance the sensory effects of pharmaceuticals. EOs are used by several traditional medical systems across the world to treat a variety of health issues. For instance, EOs of Sage and Clove limit the development of various germs, EOs of Peppermint clear out any respiratory congestion, and EOs of Anise and Peppermint are widely recognized as carminatives. EOs of Eucalyptus treat bronchitis and coughing. Various experimental investigations have indicated that EOs and their main constituents have a variety of therapeutic characteristics [6].

As Antioxidants, Essential Oils

Numerous studies have shown the diverse EOs' potent antioxidant effects due to their benign effects on human health. Recent investigations have urged using natural antioxidants like EOs due to the harmful effects of using synthetic antioxidants like butylated hydroxy anisole and butyl hydroxytoluene on human health. The powerful antioxidant molecule has the ability to destroy active free radicals, making them more stable and less hazardous. By scavenging any free radicals, antioxidants defend biological organs against oxidative damage. Several in vitro chemical assays have been utilized by several research to evaluate the antioxidant strength of EOs. The two most used assays, 2, 2′-azino-bis and diphenyl-1-picrylhydrazyl, were employed to evaluate the capacity of free radicals to scavenge oxygen and nitrogen. According to the antioxidant potency of the chemical, the DPPH radical receives an electron from electron/hydrogen-donating antioxidant compounds in EOs, changing its hue from purple to colorless. Using UV spectra, the amount of color change is computed as measurements of absorbance at 519 nm wavelength; these readings indicate the antioxidant activity, and a high absorbance value denotes a high antioxidant activity[7].

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The antimicrobial properties of essential oils

Antimicrobial chemotherapy is a significant difficulty due to the increased incidence of antibiotic resistance, which results in inadequate antimicrobial treatment. Antibiotic usage and the subsequent antibiotic selection pressure are thought to be the main contributors to the emergence of various forms of resistant bacteria. Strong antibacterial properties were shown by plant bio actives, including EOs, against a range of Gram-negative and Gram-positive bacteria. Different EOs and their main compounds achieved great recognition due to their powerful antibacterial properties, which may be employed as a variety of beneficial additives to extend the shelf life of food products and ensure consumer microbiological safety. It has been demonstrated that numerous EOs have strong antibacterial properties. These properties are often impacted by the quantity and availability of components including phenylpropanoids, terpenoids, alcohols, terpenes, aldehydes, ketones, and esters.

The EOs displayed a variety of biochemical defense mechanisms against various microorganisms, including the capacity of the EOs' hydrophobic elements to interact with the lipids of the microorganisms' cell membranes, which damaged the permeability and solidity of the membranes and caused high fluctuations in the chain of electron transport, nutrient uptake, and the synthesis of nucleic acids and proteins, which led to the induction of clotting of cellular contents and inhibited By entering the cell and blocking protein, RNA, DNA, or polysaccharides, EOs bio actives may kill bacterial cells after disrupting their membranes. Thyme, Cinnamon, Oregano, Clove, Lemongrass, and Rosewood were among the EOs that had potent antibacterial properties. The effectiveness of several EOs as antibacterial agents against E. The maximum activity of Bay EOs was at 0.02%, Clove at 0.04%, oregano at 0.05%, lemon grass at 0.06%, and thyme at 0.05%. E. coli notably relies on the concentration. While EOs of Thyme, Bay, Lemongrass, Rosemary, and Peppermint shown outstanding antibacterial efficacy against S. aureus at a concentration of 0.05%.

Similar to that, 1% of basil and eucalyptus essential oils showed a minor antibacterial effect. The potent antibacterial properties of tea tree, lemon myrtle, and garlic essential oils against methicillin-resistant S. Aureus has been mentioned. Clove, cinnamon, tamarind, black cumin, nutmeg, garlic, onion, and pomegranate seeds essential oils have been shown to have antibacterial properties against Listeria monocytogenes and Salmonella enteritidis. Different wild fennel fruits EOS from Portugal showed little to weak antibacterial properties compared to S. E. enteritidis. P. aeruginosa, E. coli, and P. mirabilis. Major compounds including eugenol and carvacrol in clove oil, as well as terpinen-4-olin in tea-tree oil, revealed improved antibacterial power compared to their crude EOs. Different major components of EOs also showed more antimicrobial potential than their basic oils. Numerous phenylpropanoids, such as eugenol, cinnamaldehyde, isoeugenol, and safrole, have shown to have significant antibacterial properties.

The use of cumin EOs against Listeria innocua and E. coli was reported by Behbahani et al. to be one of the numerous mechanisms of action of diverse EOs against various bacteria[8]. Coli made bacterial cell walls more permeable, which caused the release of cell components and cell death. Similar to this, Trachyspermumcopticum's EO shown potent antibacterial action against E. coli by creating many holes in the cell membrane and causing cell lysis. Additionally, S.'s therapy. Aureus with Artemisia argyi EO increased the permeability of the bacterial cytoplasmic membrane, which led to protein leakage, K+ ion leakage, and cell death. In contrast, treating L. Carvacrol and Citrus chagshan-huyou EOs with monocytogenes caused the bacterial cells to exhibit a variety of morphological changes, such as cracks, folded and collapsing sides, and shattered cells.

As antifungal agents, essential oils

With regard to several pathogenic fungi, including yeasts, various aromatic herbs and essential oils shown powerful antifungal properties. The target infection and the applied oil both affect how effective antifungal EOs are. At various doses of 1%, 0.5%, and 0.25%, the volatile oils of fennel, coriander, and anise had excellent antifungal activity against Candida albicans. Strong antifungal properties against C were found in the volatile oils of geranium, Japanese mint, cinnamon, clove, ginger grass, and lemongrass at various doses. An albicans. Additionally, Lavandulamultifida volatile oil demonstrated strong antifungal activity in comparison to C. an albicans. A species of Cymbopogon. Excellent antifungal performance against pathogenic yeasts was found by EO. Against several dermatophytes and their spores, eugenol, a phenylpropanoid molecule, and -bisabolol, a monocyclic sesquiterpene alcohol, had good antifungal properties.

By preventing fungal development and aflatoxin generation, the Lemon grass volatile oil had the strongest antifungal effectiveness against Aspergillus flavus at doses of. Lemon, Mandarin, Grapefruit, and orange oils have been shown to have antifungal properties against several types of Aspergillus and Penicillium molds when diluted to less than 1%. In comparison to C, several EOs and their constituent parts had the strongest antifungal effects. By inhibiting membrane ergosterol and several signaling pathways that stop yeast hyphal growth, albicans drug-resistant biofilms are created. Additionally, citral, citronellol, geraniol, and geranyl acetate significantly and strikingly inhibit C's cell cycle. During the S phase, albicans. Likewise, S is inhibited by carvacrol, eugenol, and thymol. Through interfering with the Ca2+ and H+ ion balance, cerevisiae grows [9].

There are six significant therapeutic plants that produce essential oils

African and Asian cultures have used medicinal plants in traditional treatments for thousands of years. Over the last

several decades, there has been a notable rise in public interest in and acceptance of natural medicines in both developed and developing nations. Up to four billion individuals utilize herbal medicines as an alternative to conventional drugs. Additionally, whether directly or indirectly, medicinal plants make up around 25% of all contemporary medications [10].

Research on synthetic pharmaceutical compounds reveals a variety of therapeutic properties of EOs derived from medicinal and aromatic plants. Farmers and academics have been motivated to create these substances as a consequence. In warm areas, medicinal plants may be found producing EOs. Only 300 of the 3000 recognized EOs, which are produced by plants of different genera, show signs of having potential as commercial products. Numerous plants from different families, including the Alliaceae, Lamiaceae, Myrtaceae, Apiaceae, Asteraceae, Rutaceae, and Poaceae, may synthesize large percentages of EOs and produce them in industrial quantities. These industrial-sized quantities of EOs are used in a variety of fields, namely in polishing, cosmetics, aromatherapy, food, and medicines. Among the most popular essential oils with therapeutic value are orange, basil, maize mint, lemon, camphor, citronella, eucalyptus, clove, and eucalyptus. Several significant medicinal plants that produce essential oils and the main elements of those oils

III. CONCLUSION

The usage of essential oils in several traditional medicinal systems across the globe makes them one of the natural plant products that need particular consideration. This study makes an effort to highlight the characteristics of volatile oils, their advantageous traits, their components, and the many aromatic plants that provide volatile oils. In addition to those interested in the therapeutic variety of volatile oils, particularly for treating oxidative stress ailments, the findings discussed in this review are proposed to pique the interest of researchers looking for new natural and effective agents working as antimicrobials for emerging resistant microorganisms. The updated information on the various antibacterial actions of volatile oils will aid in the development of novel applications for essential oil treatment. Therefore, additional clinical research should be conducted on essential oils and their bioactive components to aid in the creation of novel medicinal solutions.

REFERENCES

[1] M. Butnariu and I. Sarac, “Essential Oils from Plants,” J. Biotechnol. Biomed. Sci., 2018, doi: 10.14302/issn.2576-6694.jbbs-18-2489.
[2] B. Salehi et al., “Piper species: A comprehensive review on their phytochemistry, biological activities and applications,” Molecules. 2019. doi: 10.3390/molecules24071364.
[3] M. D’agostino, N. Tesse, J. P. Frippiat, M. Machouart, and A. Debourgogne, “Essential oils and their natural active compounds presenting antifungal properties,” Molecules. 2019. doi: 10.3390/molecules24203713.
[4] F. J. Álvarez-Martínez, E. Barrajón-Catalán, M. Herranz-López, and V. Micol, “Antibacterial plant compounds, extracts and essential oils: An updated review on their effects and putative mechanisms of action,” Phytomedicine. 2021. doi: 10.1016/j.phymed.2021.153626.
[5] D. J. Strub et al., “Evaluation of the anti-SARS-CoV-2 properties of essential oils and aromatic extracts,” Sci. Rep., 2022, doi: 10.1038/s41598-022-18676-w.
[6] G. F. E. Cardia et al., “Pharmacological, medicinal and toxicological properties of lavender essential oil: A review,” Res. Soc. Dev., 2021, doi: 10.33448/rsd-v10i5.14933.
[7] H. Javed, M. F. N. Meeran, N. K. Jha, and S. Ojha, “Carvacrol, a Plant Metabolite Targeting Viral Protease (Mpro) and ACE2 in Host Cells Can Be a Possible Candidate for COVID-19,” Frontiers in Plant Science. 2021. doi: 10.3389/fpls.2020.601335.
[8] S. A. Kulkarni, S. K. Nagarajan, V. Ramesh, V. Palaniyandi, S. P. Selvam, and T. Madhavan, “Computational evaluation of major components from plant essential oils as potent inhibitors of SARS-CoV-2 spike protein,” J. Mol. Struct., 2020, doi: 10.1016/j.molstruc.2020.128823.
[9] M. Butnariu and I. Sarac, “Journal of Biotechnology and Biosafety,” J. Biotechnol. Biomed. Sci., 2018.
[10] M. Zagoto et al., “Biological activities of basil essential oil: a review of the current evidence,” Res. Soc. Dev., 2021, doi: 10.33448/rsd-v10i12.20409.

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Medical and Aromatical Plant Applications

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Abstract*— Due to its many uses in medicine, cosmetics, and nutrition, among other things, medicinal aromatic plants make up a sizable plant group that is of significant interest. Additionally, they offer a crop alternative with species that are in great demand on the present global market. This document's primary goal is to impart fundamental knowledge and abilities regarding the creation, applications, and chemical properties of essences and extracts from medicinal and aromatic plants. It also aims to provide an introduction to the economic significance, uses, and harvesting procedures of the most significant medicinal, aromatic, and seasoning species of plants. The goals of this course are to classify and identify aromatic plants, seasonings, and medicinal plants; to comprehend cultivation methods and successfully apply modern problem-solving techniques; to learn and understand the most significant active constituents; and to recognize the practical applications of this type of plant in the cosmetic, perfumery, food and beverage, and pharmaceutical industries.

Index Terms*— Aromatic Plant, Essential Oils, Chromatography, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermo labile.

I. INTRODUCTION

These plants have been used since the beginning of agriculture. They were initially all collected together until a selective harvesting method and domestication of them were created. Plants have been used medicinally for over a thousand years [1]. The first known graphic record was discovered on a clay table in Mesopotamia. Other sources of information include the Egyptian Papyri, Chinese Pharmacopoeias, Indian Ayurveda Tradition, etc.

A. Basics of Organic

Agriculture The core principles of the International Federation of Organic Agriculture Movements, which are as follows, are archived by adhering to the aforementioned principles and procedures:

a. Production of sufficient amounts of wholesome food.

b. The cycles and ecological balances of nature should be reflected in organic agricultural, pastoral, and wild harvesting systems. Organic management has to be adjusted to the size, ecology, and culture of the area.

c. Preservation of the natural soil fertility

d. Inputs should be decreased via resource conservation, environmental quality improvement, and effective management of materials and energy.

e. Organic farming should improve the quality of life for all parties concerned, support food sovereignty, and lessen poverty.

f. Organic farmers may improve production and efficiency, but this shouldn't come at the expense of their clients' health and wellbeing. Therefore, any negative behavior need to be halted.

Choosing advantageous agro-organic conditions

The climate and the soil conditions have a significant impact on the physical, chemical, and organic properties of medicinal plants. One should consider the length of sunshine, the frequency of rainfall, and the temperature range while picking the climate. These elements, together with the temperature differences between day and night, have a direct impact on the physiological and biochemical processes in plants, particularly those involving enzyme reactions [2]. These elements will unavoidably have an impact on both their development and the creation of biologically active compounds. Depending on where they are from naturally, medicinal plants need varied climatic conditions to develop. They must be the same as, or at least comparable to, those in their native environments. It is quite likely that yields would be extremely low and the proportion of active chemicals would be much decreased if one ignored the environment. The majority of medicinal plants need bright, airy locations protected from high winds and late-winter frosts.

II. DISCUSSION

A. Fertilizing

Mineral or organic fertilizers fall under the category of fertilizers. Soil should be fertilized once or twice, depending on the demands, but always just before earthing up or irrigation. The dosage of fertilizer should be determined by taking into consideration the soil's reserves and the species being grown. Artificial nitrogenous fertilizers should not be used since they cause the soil to become acidic, which harms certain of the soil's microorganisms [3]. All of the organic fertilizers listed here contain a lot of nitrogen.

For several processes to function properly and govern the growth and development of plants, phosphorus is crucial. During the early phases of growth, phosphorus is heavily utilized. The synthesis of proteins, the nitrogen exchange reactions, and the synthesis of carbohydrates all benefit from potassium. Nucleic acid, ATP, chlorophyll, and protein synthesis all use nitrogen. During the flowering period, it is necessary. The enzymes are made up of microelements, which also activate them. It is a macro element, magnesium.

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It may be lacking during bud sprout because it contains both an enzymatic cofactor and the chlorophyll structure. The purpose of fertilizing is to provide plants with the nutrient materials they need throughout the duration of their vegetative phase, and sometimes even for years to come [4]. As a result, the times and kinds of fertilizer application are quite variable. Organic farming is committed to preserving and improving soil fertility by using organic fertilizers in a natural manner.

B. Choice of vegetation

Material the vegetative reproductive organs and seeds that will be utilized should have as much of an origin certification as feasible and be free of chemical treatment and contamination. Except during the project's first stages, accessible varieties of organic seed should be used to provide the vegetative material. The use of any genetically modified organism as seed or as vegetative reproduction is prohibited. From a botanical perspective, seeds, sprouts, and all vegetative reproductive organs such as roots, root systems, and tendrils need to be accurately described according to genus, species, and variety/genotype. Their genetic history should be tracked back to their origin. It is advised to use seeds or sprouts from officially recognized kinds or upgraded populations on a national basis [5]. Additionally, it is preferable that the seeds exhibit the necessary characteristics for planting, such as purity, percent germination, survival, wetness, and authenticity of species and types, and that they were collected the same year or the year before. Initially, cultivars may provide seed, seedlings, or sprouts, and then our plants can be used for propagation. It is best to be able to grow the desired medicinal plant on your own while growing this kind of crop since it is quite difficult to locate plants that are perfectly suited to the edafo-climate conditions in our region [6]. Furthermore, it is noted that European legislation require that any vegetal material used for reproduction come from a private farm, a cultivar, or an organic farm.

For medicinal plants, the following post-harvesting procedures are typical. Cutting: Since it improves surface evaporation, it is done to help drying out. The kind of plant and the technologies used both have a role. Washing: To remove dirt and other foreign matter from the plant portion that will be dried, drinking water is utilized. Disinfection is the process of getting rid of harmful microorganisms for people in various methods, up till regulated levels are reached. Chemical treatment: in order to lower the bacterial content to acceptable levels before drying, plants are submerged in chlorinated saline solutions.

Physical therapy: Gamma radiation is applied to plants before drying. This technique is employed when chemical disinfection is ineffective or when the vegetable matter originates from regions with consistent yield flows and low levels of inorganic paper. Bleaching is a technique used to stop oxidation. It involves applying a thermal shock by submerging the substance in hot water or steam to prevent the action of oxidizing enzymes. Sulphite: This method seeks to maintain the food's original flavor and color as well as to protect the vegetable matter, postpone the loss of vitamins A and C, and inhibit the development of bacteria. It entails soaking the vegetable matter for a while in a concentrated solution of sulfur dioxide that ranges from 1.2% to 2% in a sealed camera. Additionally, vegetable matter may be submerged in sodium bisulphite or sodium metabisulphite solutions for varying lengths of time and concentrations.

The first transformation

All the steps that are taken to conserve raw materials, choose the components that will be utilized, remove impurities, crush or mill the product, and extract the active compounds are considered transformation. This allows the product to be packaged and labeled in preparation for storage or delivery [7]. It is necessary to follow the stated guidelines for proper manipulation. Gathered material has to go through a transformation or manipulation procedure, depending on what the final result is supposed to be.

C. Drying

The goal of drying is to reduce the moisture content to less than 10% so that enzymatic activity ceases and bacteria and fungus can't attack and produce mould and quality degradation. Additionally, drying makes transporting the vegetable materials simpler. The issue is that not every medicine has the same level of humidity [8]. The evaporation rate is impacted by the texture of the medicines, which varies. Different sensitivities to temperature are shown by active substances. Drying should take place as quickly as possible without changing the active substance. Humidity after drying must be under 10%. The technique will vary depending on the drug's properties, including its consistency, humidity, and kind and grade of the active component. Compared to glycosides and sugars, alkaloids are more resistive. Essential oils cannot be dried at high temperatures because of their volatility. There are three techniques: suction, heating, and air drying.

D. Drying by Air

Small quantities of medications with stable active components are processed using this method in warm, dry climates. Since the light would trigger photosynthesis in the medication, drying is done in the shade. The medication is safeguarded against dampness at night. Drying is done with the medicine spread out in thin layers in ventilated, closed-off rooms. Desiccation into the air might happen as the process is sluggish.

E. Heating up

Since temperature and airflow can be adjusted, this approach, which is the most popular, has the benefit of achieving excellent desiccation. It must be made sure that humidity is quickly removed without affecting the active component. When the temperature is too high, a dry layer forms and the surface rapidly evaporates, limiting further drying. This kind of drying typically occurs at 30 to 40 oC, a

few degrees more for barks. Ventilation makes sure that air comes into touch with the medication up to the point of water saturation [9]. As soon as the air becomes saturated, it changes. Industrial drying is done in drying tunnels, whereas small-scale drying is done in ovens with air vents. The latter has a heater and a fan at each end. To accomplish progressive drying, the medicine is put in the tunnel on trolleys with many shelves. The heat that is applied to the trolley decreases as it travels down the tunnel [10].

III. CONCLUSION

This drying process is used in the industrial setting; the drying rooms were created and developed for a certain amount and kind of vegetable matter that needed to be processed. The circumstances for this procedure mostly rely on the species that will be dried. The water content of the vegetable matter, its ability to retain water, the maximum drying temperature, and the ambient humidity are the most significant elements influencing the drying process. The quantity and volume of fresh vegetable matter that must dry in a certain length of time must be considered while determining the drying equipment's capability. Forced drying, which includes forcing hot, dry air around a confined space to remove moisture and cold, is an alternative to natural drying by hanging or on trays. Although this relies on the plant's moisture level, it is significantly quicker. Between 32 and 35 oC are the ideal drying temperatures to avoid destabilizing the volatile essences or the active components. To prevent this, it is preferable to shorten the drying process. Vegetable matter may be preserved after it has dried out without fear of biological activities destroying its active components. After the plant has dried, the section that will be utilized must be removed from the remainder of the plant, along with any foreign objects. Machines with sieves or air tubes that use air currents to separate various densities may be used for the separation process. Metals may be separated as well if magnets are applied.

REFERENCES

[1] B. Zophel and W. Hempel, “Auswirkungen des anbaus von salbei und kamille auf die ackerwildkrautvegetation (dreijahrige untersuchungen in Sachsen),” 2000.
[2] A. Judžentienė, Essential Oils in Food Preservation, Flavor and Safety. 2016.
[3] P. C. Fernandes, R. Facanali, J. P. F. Teixeira, P. R. Furlani, and M. O. M. Marques, “Cultivo de manjericão em hidroponia e em diferentes substratos sob ambiente protegido,” Hortic. Bras., 2004, doi: 10.1590/s0102-05362004000200019.
[4] H. Hodhod, A. Moustafa, and M. Asar, “The Economics Of Production For Important Aromatical And Medical Plants In Beni-Suef Governorate اقتصاديات إنتاج أهم النباتات الطبية والعطرية بمحافظة بنى سويف,” J. Agric. Econ. Soc. Sci., 2000, doi: 10.21608/jaess.2000.259812.
[5] R. Kadovic, Z. Miletic, D. Obratov-Petkovic, S. Belanovic, and I. Popovic, “The quality of some soils on Kosmaj from the aspect of medicinal plants and aromatic plants,” Glas. Sumar. Fak., 2003, doi: 10.2298/gsf0388065k.
[6] F. Saber, “THE BEST DISTRIBUTION OF IMPORTANT AROMATICAL AND MEDICINAL PLANT IN FOREIGN MARKETS,” Arab Univ. J. Agric. Sci., 2019, doi: 10.21608/ajs.2019.44336.
[7] B. Zophel and W. Hempel, “Effects of the cultivation of sage and wild camomile on weed communities (a three-year study in Saxony),” Zeitschrift Fur Pflanzenkrankheiten Und Pflanzenschutz-Journal Plant Dis. Prot., 2000.
[8] L. S. Muntean, “The Use and Cultivation of Medicinal and Aromatical Plants in Romania,” Hop Med. Plants, 2010.
[9] N. Fatene, S. Mansouri, B. Elkhalfi, M. Berrada, K. Mounaji, and A. Soukri, “Assessment of the electrochemical behaviour of Nickel-Titanium-based orthodontic wires: Effect of some natural corrosion inhibitors in comparison with fluoride,” J. Clin. Exp. Dent., 2019, doi: 10.4317/jced.55601.
[10] G. E. Deligiannidou et al., “Use of Edible, Medicinal, and Aromatic Plants in Various Health Disorders: A Cross-Sectional Evaluation among Inhabitants in the Area of Thrace, North-Eastern Greece,” Int. J. Environ. Res. Public Health, 2022, doi: 10.3390/ijerph191912576.

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Aromatic Medicinal Herbs with Radio Protective Properties

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***Abstract*— Because of its therapeutic and innate pharmacological qualities, aromatic herbs are often employed as herbal remedies. A fascinating area of research in the field of drug discovery and development is the study of natural resources, especially those derived from plants. The primary use of aromatic plants is the extraction of essential oils for use in a variety of sectors, including cosmetics, flavoring and fragrance, spices, insecticides, repellents, and herbal drinks. Only a small number of research on aromatic plants are accessible, particularly for radioprotection, despite the fact that many medicinal herbs have been investigated to cure a variety of traditional maladies. According to reports, several plant extracts feature antioxidants that scavenge free radicals created as a result of radiation exposure, providing radio protective effectiveness.**

***Index Terms*— Antioxidant Function, Essential Oils, Fragrant Plants, Radiation, Radio protective.**

I. INTRODUCTION

Aromatic plants' antioxidant and antibacterial properties have been extensively studied and proved to provide health benefits in the prevention and reduction of risk of illnesses including inflammation, atherosclerosis, cardiovascular disease, and cancer. Due to their strong antioxidant qualities, many plant families, notably Lamiaceae, Apiaceae, and Zinziberaceae, have been thoroughly studied for their therapeutic usefulness. Growing conditions, extraction techniques, and, most importantly, antioxidant constituents all have an impact on the antioxidant activities of aromatic plants [1]. As a result, extraction and antioxidant capacity measurement techniques are very important.

The current analysis focuses on a group of aromatic plants with radio protective action that are significant medically. Since ancient times, aromatic herbs have been employed as herbal remedies. They are extensively employed in cosmetics, flavoring and aroma, spices, insecticides, repellents, and herbal drinks. They are presently mostly used for the extraction of essential oils. For the treatment of many ailments, including cancer, a number of medicinal plants have showed promise. However, there aren't many research on aromatic plants, particularly in terms of radioprotection. The current study focuses on a few significant aromatic medicinal herbs with a particular emphasis on their radio protective properties [2]. Medical, aromatic, and cosmetic plants would be a better phrase because many medical and aromatic plants are also used in cosmetics. Plants having medicinal or aromatic qualities that are utilized in pharmacy and/or perfumery are often categorized as medicinal and aromatic plants. Aromatic chemicals, or essential oils that are volatile at room temperature, are found in aromatic plants. These essential oils are strong-smelling, volatile, hydrophobic substances that are also quite concentrated. They are found in fruits, roots, flowers, buds, seeds, leaves, twigs, bark, wood, and seeds. Low-boiling-point phenylpropenes and terpenes make up the complex combinations of secondary metabolites that make up essential oils. These oils often include tens to hundreds of terpenoids with low molecular weight. Even minute amounts of unknown trace elements have the potential to significantly change the aroma, flavor, and bioactivity of the oil. Essential oils are often used in aromatherapy and healthcare as well as a number of other sectors, including cosmetics, flavoring and fragrance, spices, insecticides and repellents, as well as herbal drinks. Essential oils also contain distinctive taste and smell qualities and biological activities [3].

It is well knowledge that radiation is a potent cytotoxic substance. Reactive oxygen species, including the superoxide anion, singlet oxygen, hydroxyl radical, nitric oxide, hydrogen peroxide, and peroxyl radicals, are responsible for DNA and protein damage to cells produced by ionizing radiation in biological systems. Ionizing radiation produces free radicals that damage DNA, causing single strand breaks and double strand breaks as a result of oxidative stress to base and sugar moiety components [4].

Chromosome aberrations are ultimately caused by unrepaired or incorrectly repaired DSBs and pave the route for mutagenesis, carcinogenesis, and genetic disorders. DSBs are thus regarded as the radiation-induced DNA damage that is most susceptible. Major processes involved in DSB repair in eukaryotic cells include homologous recombination and non-homologous end joining. DNA-dependent protein kinase, which is made up of DNA-PKcs and the Ku70/Ku80 heterodimer, serves as the molecular sensor for DSBs in the non-homologous end joining process. Finally, DNA ligase IV, working with XRCC4 and XLF, seals DSBs [5].

In reaction to radiation, DNA-PK phosphorylates a variety of proteins, including XRCC4. The phosphorylation state of XRCC4 will serve as a marker of DNA-PK activity in live cells, even if the function of XRCC4 in DSB repair is yet unclearIn order to maintain metabolic equilibrium in the

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body, reactive oxygen species production caused by the harmful effects of radiation-induced changes in biologic systems is necessary [6]. Any deviation from equilibrium thus causes oxidative stress, which may be mitigated by adding more naturally occurring, plant-based antioxidants. Antioxidants have been demonstrated to be able to stop the oxidation process by using a variety of tactics, including scavenging, chelating, or transferring hydrogen atoms.

Although all antioxidants do not provide radioprotection, it has been hypothesized that radio protectors must also possess the ability to scavenge free radicals. Radio protectors must be present before or at the time of radiation exposure in order to be effective in protecting against radiation-induced damage to normal tissues. Recent studies have shown the significance and value of aromatic plants for their radio protective properties and capacity to be used for modifying radiation-induced oxidative stress. The current study thus concentrated on medicinally significant aromatic herbs with a specific emphasis on radio protective properties.

II. DISCUSSION

A. Use of aromatic medicinal herbs for radioprotection

A. conyzoides Ageratum: Ageratum is a member of the Asteraceae family, which has roughly 30 different species. The name is a combination of the Greek words "a geras" and "konyz," which denote longevity and resemblance to Inula helenium. Typically found in Africa, Asia, America, and Australia, it is a fragrant plant that is upright, annual, and grows up to 1 m tall. Ageratum species have not all been studied pharmacologically. Since ancient times, the plant has been used to cure a variety of infections, burns, wounds, and skin ailments. It is well recognized for its ability to heal. Different chemical components may be found in ageratum conyzoides. Polyoxygenated flavonoids are abundant in it. Friedelin is a triterpene, and stigmasterol and sitosterol are the two main sterols [7]. Two isomeric pyrrolizidine alkaloids, lycopsamine and echinatine, were identified from A. conyzoides.

C. allium: Allium cepa is a bulbous plant that can be found all over the globe and is a member of the Liliaceae family. The top three producers are the US, China, and India. It has historically been used to cure hepatitis, a sore throat, and stomachaches. It also contains antioxidant, antihypertensive, antihyperglycemic, and anti-asthmatic qualities. The oil from A. thaliana is one of the numerous phytoactive components that have been identified. Cepa has been extensively studied and includes substances including 3-1, 8-cineole, L-linalool, and camphordare. In addition, the onion bulb includes prostaglandins, ferulic acid, myritic acid, kaempferol, and ß-sitosterol. A also contains tannins and flavonoids. cepa. The bulb has been used to separate quercetin, quercetin 4-glucoside, taxifolin, taxifolin 7-glucoside, and phenylalanine [8]. Dimethyl trisulfide, propenyl propyl disulfide, dipropyl disulfide, propenylmethyldisulfide, and methyl propyl trisulfide dipropyle trisulfide are the main sulfur compounds. Along with other active chemicals that include sulfur, onions contain active substances such allyl propyl disulfide. In albino rats, the antioxidant and radiation protective properties of onion extract were investigated. In the liver, kidney, and heart, biochemical markers including alanine aminotransferase, superoxide dismutase, and catalase were measured. It was determined that there is strong radioprotective action in onion extract.

Sativa Allium: A. sativum L. belongs to the Allium genus. According to the new internal transcribed spacer region of nuclear ribosomal DNA taxonomy, the family Alliaceae has 780 species. It covers a large area of the northern hemisphere's warm-temperate and temperate zones. Today, it is cultivated in a variety of nations, with India, China, and Korea being the top producers. It has a distinctive taste because it is high in c-glutamylcysteine and other sulfur-containing chemicals. A variety of primary and secondary non-sulfur biomolecules, including steroidal glycosides, essential oil, flavonoids, anthocyanins, lectins, prostaglandins, fructan, pectin, adenosine, vitamins B1, B2, B6, C, and E, biotin, nicotinic acid, fatty acids, glycolipids, phospholipids, and essential amino acids, are also present in garlic [9]. A. Sativum extract was discovered to be efficient in dramatically lowering the micronuclei frequencies brought on by radiation and has shown radioprotective benefits in mice. It was determined that the frequency of damaged cells and chromosomal abnormalities had a dose-dependent impact, and it was advised that taking the extract for 30 days is crucial for reducing the clastogenic effects of genotoxicants. Recent studies shown that in terms of antiglycation and antioxidant activity, aged garlic is superior to fresh garlic.

Annuum Capsicum: Cayenne pepper, L. is indigenous to southern North America and northern South America and belongs to the Capsicum genus of the Solanaceae family. Its fruit properties, which varied substantially in type, color, shape, flavor, and biochemical components, have been extensively employed for taxonomy. Water, fixed oils, steam-volatile oil, carotenoids, capsaicinoids, resin, protein, fiber, and mineral components are among the various compounds found in capsicum. Carotenoids total 280 g/gm in red peppers. 60% of all carotenoids are made up of capsanthin. Additionally, they contain 20% capsorubin and 11% beta-carotene [10]. With the help of C12–18 saturated fatty acids, capsanthin is acylated phenolic glycosides found in C. Year L. were assessed for their radioprotective properties, and human lymphocytes' oxidative damage caused by X-ray exposure was investigated. These substances displayed greater radioprotective abilities while having reduced antiradical activity, and no cytotoxicity was seen. So, it was suggested that superoxide radical scavenging could be the preferred way to assess a compound's potential for radioprotection.

Asiatic centella: Centella asiatica is a member of the Umbellifere family. It is a plant that may be found not only in

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tropical and subtropical nations, but also all across India. Asiatcoside, centelloside, madecossoside, thankuniside, isothankunic acid, centellose, asiatic, centellic, and madecassic acids are among the triterpenoids found in it. Brahmoside, brahminoside, and brahmic acid are among the other components. The 2,6-hydroxy, 23-hydroxy-methyl ursolic acid has been identified as the structural formula of genin and brahmic acid. Glycerides of palmitic, stearic, lignoceric, oleic, linoleic, and linolenic acids make up the fatty oil. From the dried plants, hydrocotylin, an alkaloid, has been extracted. From the plant components, asiaticoside, madecossoside, and centelloside have been separated. The leaves have been used to isolate flavanoids, including 3-glucosylquercetin, 3-glucosylkaemferol, and 7-glucosylkaemferol. In mice, asiatica extract at 100 mg/kg body weight improved survival and protected against radiation-induced weight loss. According to the reports, C. Asiatica provided membranes and DNA with radiation resistance. The role of antioxidants was suggested as the mechanism behind this.

B. Orange aurantium

Citrus aurantium is a member of the Rutaceae family. The fragrance of C. aromatum L. var. In rats and mice, amara has anti-anxiety and muscle-relaxing properties. The flavanone glycosides hespiridin and naringin, which make about 5% of the dry weight of the leaves and fruits, are the primary flavonoids found in cultivated citrus species. These have strong antioxidant properties. Various dosages of citrus extract have shown radioprotective benefits against 1.5 Gy -irradiation in mouse bone marrow; however, the ideal amount, 250 mg/kg, was discovered to provide 2.2-fold protection. The citrus extract's flavonoids have been given radioprotective properties.

C. Aromatic Coleus

The Lamiaceae family member Coleus aromaticus, which is native to India and the Mediterranean, has a number of therapeutic benefits. The study on the chemical components of C. plant leaves. Carvacrol, thymol, eugenol, chavicol, ethyl salicylate, chlorophillin, flavonoids, and -sitosterol--D-glucoside were all detected by aromaticus. In vitro and in vivo testing was done on C's radioprotective capabilities. fragrantus extract. The extract has been shown to exhibit radical scavenging action in cell-free assays, and in V79 cells, rates of micronuclei were assessed in response to 0.5, 1, 2, and 4 Gy doses of -radiation. The extract displayed radioprotective, anticlastogenic, and antioxidant activities, according to both experiments.

D. Citratus Cymbopogon

A ubiquitous plant in tropical regions like Southeast Asia and Africa is Cymbopogon citratus, sometimes known as lemon grass. The plant's essential oil is utilized as a flavoring agent in herbal drinks and in aromatherapy. The chemical make-up of C. elegans essential oil. Citratus is made up of substances such alcohols, ketones, esters, aldehydes, and hydrocarbon terpenes. Citral, a combination of the Tran- and cis-isomeric monterpene aldehydes geranial and neral, makes up the majority of the essential oil.

According to reports, it contains phenolics and flavonoids such luteolin, quercetin, kampferol, and apigenin. Infusions of lemon grass leaves have been shown to contain glycosyl derivatives of the flavones apigenin and luteolin. Citratus demonstrated radioprotective and anti-oxidant qualities. In addition to being able to scavenge DPPH and superoxide radicals at low concentrations and guard against radiation-induced DNA damage in the pBR322 plasmid, the extract was efficient in decreasing lipid peroxidation in irradiated minced chicken flesh.

E. Cordamia Elettaria

The plant Elettaria cordamomum, sometimes known as cardamom, is a member of the Zingiberaceae family. It features scented dried fruits with light green pods that are often utilized in culinary preparation and for health reasons. Due to its cooling properties and recognized antioxidant activity, cardamom oil provides cosmetic benefits. About 1.5% -pinene, 0.2% -pinene, 2.8% sabinene, 1.6% myrcene, 0.2% -phellandrene, 11.6% limonene, 36.3% 1,8-cineole, 0.7% -terpinene, 0.5% terpinolene, 3% linalool, 2.5% linalyl acetate, 0.9% terpinen 4-ol, 0. 1, 8-cineole and -terpinyl acetate are the sources of the cardamom scent. Cardamom's radioprotective properties against -irradiation in rats have been studied, and it was discovered that it provided defense against radiation-induced oxidative damage in liver and heart tissues.

F. The licorice plant

Star anise, often referred to as Illicium verum, is a member of the Illiciaceae family and is indigenous to China and Vietnam. The essential oil is used in the manufacturing of Tamiflu, a drug that fights influenza viruses, as well as in confections as a flavoring ingredient. The two primary phenolic substances found in the aqueous portion of I were determined to be anisyl acetone and benzenecarboxylic acid. Verum.

By lowering lipid peroxidation, verum extract demonstrated radioprotective properties in irradiated minced chicken flesh. Vernum extract is used as a dietary additive to reduce oxidative damage in processed foods and also has a vital effect in boosting food taste and antioxidant activity.

G. Angustifolia Lavandula

Lavandula angustifolia is a member of the Lamiaceae family. About 35 different species of the genus Lavandula are used extensively in aromatherapy. 47 compounds in all, accounting for 98.4–99.7% of the oils, were discovered. The largest component of essential oil was 1, 5-dimethyl-1-vinyl-4-hexenylbutyrate, which was followed by 1, 3,7-octatriene, 3,7-dimethyl-, eucalyptol, and camphor. The radioprotective properties of lavandula angustifolia oil

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against UV and -irradiation were evaluated. Oil samples exposed to UV and radiation and EPR spectroscopy have both shown strong DPPH radical scavenging activity. After receiving the proper UV or radiation treatment, it was proposed that lavender oil may be used as a radio protector and antioxidant for potential applications in the cosmetic and pharmaceutical industries.

H. Mangifera sp.

Mangifera indica, often known as mango or aam in Hindi, is a member of the Anacardiaceae family. It is crucial to Ayurveda's therapeutic system. Strong anti-oxidant, anti-lipid peroxidation, immunomodulatory, cardiotonic, hypotensive, wound-healing, anti-degenerative, and antidiabetic actions are present, and these activities are significant from a pharmacological and medical perspective. The citation M. In human lymphocytes and lymphoblastoid cells, indica was tested for radioprotection. Strangely, greater dosages were shown to cause DNA damage in human lymphocytes and lymphoblastoid cells without impairing their capacity to repair the damage. However, at lower doses of M, protection against radiation-induced DNA damage was shown. Extract from indica.

I. Piperita Menthol

Mentha piperita, sometimes known as peppermint, is a perennial plant that may reach heights of 30 to 90 cm and is a member of the Labiatae family. It is used as a carminative, stimulant, and aromatic to cure nausea, flatulence, and vomiting. Due to the presence of eugenol, caffeic acid, rosmarinic acid, and -tocopherol, mentha extracts exhibit antioxidant effects. As the main radical scavengers, caffeine, rosmarinic acid, eriocitrin, and luteolin-7-O-glucoside were discovered. S-carvone, flavonoids, and phenolic acids are also present. Mice's hematological parameters and phosphatase levels were shown to be radioprotected by mentha oil. Therapy for M. Piperita extract has been found to preserve bone marrow cells in mice prior to radiation treatment; it dramatically decreased the amount of abnormal cells and various chromosomal abnormalities in irradiated animals. Also, M. Pretreatment with piperita extract was effective in preventing hematopoietic damage in mice's testicles, intestines, and bone marrow.

J. Koenigii Murraya

Moenigii Murraya L. belongs to the Rutaceae family and is a native of south Asia. It is also known as Meethi neem or curry leaf in Hindi. It may grow up to 6 meters tall, is practically universal across the Indian subcontinent, and has a fragrant character. It is specifically grown for its fragrant leaves. Proteins, carbs, fiber, minerals, carotene, nicotinic acid, and vitamin C are all present in the fragrant leaves. Oxalic acid is present in large quantities in the leaves, along with crystalline glycosides, carbazole alkaloids, koenigin, and resin. Yellow-colored volatile oil found in fresh leaves is also a good source of calcium and vitamin A. Additionally, it includes koenine, koenigine, girinimbin, iso-mahanimbin, and koenimbine. The following compounds are isolated from leaves: mahanimbicine, bicyclomahanimbicine, phebalosin, coumarine as murrayone imperatoxin, etc. The leaves contain the triterpenoid alkaloids cyclomahanimbine and tetrahydromahanmbine. The leaves of M. have been shown to contain the alkaloids pypayafolinecarbazole, murrayastine, and murrayaline. The radioprotective qualities of M. Koenigii leaf extract was tested in mouse livers exposed to 4 Gy of radiation. The liver's reduced glutathione content and levels of antioxidant enzymes were significantly increased by the leaf extract, and it also decreased the radiation-induced decrease in lipid peroxidation, suggesting that the extract's antioxidant properties may help provide radioprotection.

K. Vulgare Origanum L.

Origanum vulgare, a member of the Labiatae family, is often found growing wild in Iran and Europe. Rheumatism, muscular and joint discomfort, sores, and swellings are all treated with it as an external application. To treat toothaches, oregano oil is used. Rosmarinic acid, caffeic acid, flavonoids, and derivatives of phenolic acids and -tocopherol are antioxidants found in oregano. Additionally, oregano-A, oregano-B, and rosmarinic acid methyl ester all function as antioxidants. In mouse bone marrow and human lymphocytes, radioprotection by oregano extract was investigated in terms of both internal and exterior irradiation-induced genotoxicity. The oregano extract therapy significantly decreased the frequency of micronuclei in mice bone marrow and human cells. The DPPH test was used to examine the oregano extract's capacity to scavenge free radicals, and the results revealed that this capacity was dose-dependent. Therefore, it seems plausible that free radical scavenging is a mechanism for radioprotection.

Piper longum, a member of the Piperaceae family, is often referred to as "Pipali" in India. In Asia and the Pacific Islands, it has a long history of usage as a medication to treat conditions including gonorrhea, menstrual discomfort, TB, arthritis, as well as for analgesic, diuretic, and muscle relaxant uses. Numerous substances, including unsaturated amides, flavonoids, lignans, aristolactams, long and short chain esters, terpenes, steroids, propenylphenols, and alkaloids have been identified in the genus Piper via chemical research. Sesquiterpenes were the most often discovered components in the essential oils of eleven Piperaceae species. P-ocimene, a-pinene, and b-pinene were also common non oxygenated monoterpenes. According to a biosynthetic strategy, E-caryophyllene and germacrene D, the two most prevalent sesquiterpenes found, had E, E-farnesyl-PP as their basic precursor, and only two were produced by E, Z-farnesyl-PP reactions. In mice, the radio protective properties of P. longum fruit extract were investigated. Treatment with extracts shielded mice against the radiation-induced reduction in white blood cell counts. Mice were protected against radiation-induced damage by extract therapy, which was also efficient in reducing the

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radiation-induced elevated levels of glutathione pyruvate transaminase, alkaline phosphatase, and lipid peroxidation.

L. Rose plumbago

Rose plumbago L. Belonging to the Plumbaginaceae family, is referred to as rakta chitrak, and is widely and abundantly growing in India. It is used in a variety of ways to treat conditions including inflammation, skin conditions, stomach problems, and abdominal discomfort. Plumbagin, naphthaquinone, fatty alcohols, tannins, and sitosterol glycosides are some of its active components. It has been claimed that the roots of P. rosea contain a number of flavonoids, derivatives, and naphthoquinonoids. Plumbagin, palmitic acid, and myricyl palmitate from petrol extract as well as plumbagic acid lactone, ayanin, and azaleatin from root ethyl acetate extract are some of the chemical components. The anticancer potential of P. rosea extract was assessed. According to reports, P. rosea extract has radiosensitizing properties and when used in conjunction with radiation, boosts the tumor-killing impact.

Rosmarinus officinalis L. The Labiateae family includes Rosmarinus officinalis L. It is a fragrant and therapeutic plant that is mostly found in India's Himalayan and Mediterranean coast regions. Due to their non-toxicity and safety, rosmarinus leaves are widely utilized in the food sector and have been discovered to have considerable antioxidant activities. Rosmarinic acid, carnosonic acid, carnosol, rosmanol, isorosmanol, and epirosmanol are only a few of the antioxidants it contains. The capacity of R. officinalis leaf extract to shield mice's livers against radiation-induced histopathological changes was examined. When mice were treated with extract, there was a substantial reduction in binucleated hepatic cells and an increase in GSH content compared to untreated irradiation animals. Salvia officinalis L.

Salvia officinalis is a plant that is grown around the world and is a member of the Lamiaceae family. It is important for both personal and domestic usage. The volatile and essential oil, which contains a combination of volatile chemicals such terpenes, triterpenoids, ursolic acid, and oleanolic acid, may be the source of the fragrance and aroma. Salvinoloc acid, carnosol, carnosic acid, rosmarinic acid, rosmanol, isorosmanol, and epirosmanol are antioxidants that are found. Rats exposed to radiation demonstrated a substantial radio protective response to the aqueous extract of S. officinalis. In brain tissues, extract administration reduced lipid peroxidation, protein carbonyl, and NO levels while increasing SOD and CAT enzyme activity and GSH levels. The presence of active polyphenolic chemicals with aromatic rings and hydroxyl groups in these extracts of S. officinalis is likely what gives them their antibacterial, anticancer, antioxidant, anti-inflammatory, and radio protective effects.

M. Organic Syzygium

Clove oil, which is made from the essential oil taken from the dried flower buds, leaves, and stem of the tree, is often obtained from Syzygium aromaticum, Eugenia caryophyllata, and Eugenia aromaticum, all of which are members of the Myrtaceae family. For pain relief and healing, clove oil is administered topically. Both the fragrance and flavoring sectors as well as the medicinal sector use it extensively. The dried flower buds, leaves, and stems of the S. aromaticum tree are used to make the essential oil known as clove oil. The phenyl propanoids carvacol, thymol, eugenol, and cinnaldehyde are the essential oil's primary components. Rats have been used to study the radio protective impact of clove oil on certain biochemical parameters against ionizing radiation. Clove oil's ability to inhibit lipid peroxidation, high reducing power, and superoxide radical scavenging activity due to the presence of the polyphenol and trace element concentrations have all been shown to have radio protective benefits.

N. Cumini Syzygium

Syzigium cumini, commonly known as Eugenia cumini or Syzigium jambolanum, is a member of the Myrtaceae family. It is cultivated all throughout Asia, Africa, and America, as well as in Florida and Hawaii. Acetyl oleanolic acid, triterpenoids, ellagic acid, isoquercitin, quercetin, kaempferol, and myricetin have all been shown to be present in the plant in varying amounts. Human cells in culture were used to study the radio protective properties, and it was shown that treatment with S. cumin leaf extract before radiation exposure significantly reduced the production of micronuclei.

Mice were used to study the radio protective properties of S. cumin seed and leaf extracts, and it was discovered that pretreatment shielded the mice from radiation-induced illness and death. Histopathological studies revealed that the use of S. cumin leaf extract enhanced villus height and number of crypts while decreasing goblet and dead cells before radiation exposure. Aromatic plants exhibit tremendous potential and provide a special advantage for usage as radio protectors due to their availability, cheap cost, and safety. According to their chemical composition, these plants' varying antioxidant capabilities closely correspond with their varying radio protective characteristics.

Carotenoids have been shown to provide radiation protection, however a large dosage of a single carotenoid entity may have fatal consequences. Since age, sex, and species must be taken into consideration while doing preclinical assessment tests, quality control investigations must be focused on the appropriate explication of the specific effects of the medicine employed. The availability of comprehensive investigations for each plant product limits the use of medications produced from plants.

Therefore, prior to their potential usage, research has to be focused on learning about the safe use of plant-based medications. However, research on pharmacokinetics and pharmacodynamics characteristics, such as toxicity, is necessary. It is difficult to extend the validity of the majority of published investigations since they were carried out on cell

or animal models, which is a significant barrier. The combined impacts of so many various ingredients that are responsible for its activity may explain why crude extract has been shown to be superior to the separated fractions. The chemical or extract must be effective outside of the laboratory. Plant material should be accurately standardized, characterized, and processed before it is used to make a particular chemical or collection of compounds.

III. CONCLUSION

Natural goods of plant origin are now being used in both developed and developing nations due to the increased side effects of synthetic medications and antibiotics. The current study investigated the radiation resistance of around thirty aromatic plant extracts or chemicals derived from plants. For the evaluation of radiation-induced damage, the majority of aromatic plant extracts or plant products have shown considerable radioprotection in several model systems, including in vivo, ex vivo, and/or in vitro. Aromatic plant extracts have been tested in several radiation insult models for their radical scavenging and antioxidant activities, which include a decrease in radiation-induced lipid peroxidation. The majority of research have shown that radiation protection may significantly improve the survival rates of small animals exposed to radiation while also shielding against radiation's negative effects. The findings of these research suggest that they may be used in radiotherapy as well as in the care of those who have suffered from nuclear plant accidents, leaks, or radiation terrorism. In recent years, the use of aromatic plants and products has spread around the globe with several uses in the herbal medicinal sector. Wastelands and woods are examples of natural resources that might act as a reservoir for the same. The introduction of crops via cropping systems, on the other hand, might greatly assist with a check on activities including chemical composition given the growing strain on natural resources. Additionally, the scientific community has to be urged to concentrate investigations on screening an increasing number of aromatic compounds derived from plants for their various bioactivities, including radioprotection, and to investigate the underlying molecular processes for the same.

REFERENCES

[1] F. Bentos and F. Sosa, “Aplicación del Código de Barras vegetales de interés industrial,” Rev. DEL Lab. Tecnológico Del Uruguay, 2020.
[2] N. Mehrotra, “Medicinal plants, aromatic herbs and spices as potent immunity defenders: Antiviral (COVID-19) perspectives,” Ann. Phytomedicine An Int. J., 2020, doi: 10.21276/ap.2020.9.2.4.
[3] L. Jelenkovic, P. Jelenkovic, and L. Pejanovic, “The economic possibilities and perspectives of aromatic and medicinal herbs (Satureja kitaibelii),” Ekon. Poljopr., 2016, doi: 10.5937/ekopolj1602375j.
[4] E. M. Zahran, U. R. Abdelmohsen, H. E. Khalil, S. Y. Desoukey, M. A. Fouad, and M. S. Kamel, “Diversity, phytochemical and medicinal potential of the genus Ocimum L. (Lamiaceae),” Phytochemistry Reviews. 2020. doi: 10.1007/s11101-020-09690-9.
[5] I. N. Pasias, D. D. Ntakoulas, K. Raptopoulou, C. Gardeli, and C. Proestos, “Chemical composition of essential oils of aromatic and medicinal herbs cultivated in Greece—Benefits and drawbacks,” Foods, 2021, doi: 10.3390/foods10102354.
[6] L. Santos, S. Marín, V. Sanchis, and A. J. Ramos, “Mycotoxin in medicinal/aromatic herbs- A review,” Boletin Latinoamericano y del Caribe de Plantas Medicinales y Aromaticas. 2013.
[7] F. F. M. Yusof et al., “Shading effects on leaf gas exchange, leaf pigments and secondary metabolites of polygonum minus huds., an aromatic medicinal herb,” Plants, 2021, doi: 10.3390/plants10030608.
[8] M. N. Boukhatem and W. N. Setzer, “Aromatic herbs, medicinal plant-derived essential oils, and phytochemical extracts as potential therapies for coronaviruses: Future perspectives,” Plants. 2020. doi: 10.3390/PLANTS9060800.
[9] M. Kehie, P. Kehie, and N. L. Pfoze, “Phytochemical and ethnopharmacological overview of endangered Homalomena aromatica schott: An aromatic medicinal herb of Northeast India,” Indian J. Nat. Prod. Resour., 2017.
[10] M. Vinceković, S. Jurić, M. Marijan, M. Viskić, K. Vlahoviček-Kahlina, and L. Maslov Bandić, “Encapsulation of herb extracts (Aromatic and medicinal herbs),” in Aromatic Herbs in Food: Bioactive Compounds, Processing, and Applications, 2021. doi: 10.1016/B978-0-12-822716-9.00008-1.

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Headspace Trapping Extraction and Solid Phase Micro-Extraction

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Abstract*— A method used in the quantitative measurement of analytes in aqueous and gaseous phases is solid phase micro-extraction. With this cutting-edge technology, flower petals and other parts of the plant are not in contact with the scent molecules being captured. In several fields of application, such as forensics, toxicology, and the investigation of flavors, perfumes, and environmental and biological matrices, SPME has come to be widely accepted as the method of choice. It is best to use SPME for field monitoring. There are three fundamental ways to accomplish SPME sampling: direct extraction, headspace trapping, and extraction with membrane protection. Essentially a gas extraction method, headspace trapping enables the direct study of volatile chemicals found in a non-volatile matrix. The smells of live plant materials vary from those of the extracted oil, necessitating the employment of this technology. Headspace trapping enables a deeper encounter with the live plant's natural perfume and provides a greater understanding of the distinctions between the volatile components of the living plant and the extracted phase. Headspace trapping comes in two flavors: static and dynamic, sometimes known as the purge-and-trap approach. This research presents a few instances of headspace trapping of well-known aromatic flowers, fruits, and leaves in comparison to examinations of the extracted oil. Additionally, certain traditional scents are described.

***Index Terms*— Headspace Trapping, Molecules, Micro-Extraction, Solid Phase.**

I. INTRODUCTION

Professor J. Pawliszyn created solid phase micro-extraction in the 1990s as a rapid and solvent-free method for isolating analytes from a sample matrix. The standard techniques used to extract the relevant analytes are often labor- and time-intensive and entail many steps, which might lower sensitivity. Solvent usage may also be harmful to the environment and to the health of the users. The solid phase extraction method (SPME) was created from it, but since the sorbing substance is firmly bonded to the fiber, the extracting phase may be used again. To separate and concentrate analytes from the sample matrix, SPME employs a tiny amount of sorbent, typically spread on the surface of small fibers. Analytes are either absorbed or adsorbed by the fiber phase after coming into contact with the sample. After the extraction stage, the fibers are transported to the analytical equipment for separation and quantification of the analytes using a syringe-like handling mechanism. This method of on-site monitoring is straightforward and incorporates sampling, extraction, and sample introduction. This method may be used for on-site and in-lab tests, environmental monitoring, and fragrance drug analysis [1].

As a method of sample preparation devoid of solvents, SPME was first presented in 1990. The fundamental idea behind this strategy is to only employ a tiny fraction of the extraction phase typically less than 1 microliter. When the item under investigation is sampled directly, such as the air in a room, sample volumes might be rather substantial. The extracting phase may be either a solid sorbent, often with a high porosity to enhance the surface area available for adsorption, or a high molecular weight polymeric liquid, similar in nature to stationary phases in chromatography. A tiny fused silica fiber that is often coated in a polymeric phase makes up the SPME structure. The fiber is attached in a syringe-like device for protection. Up until the system reaches equilibrium, the analytes are either adsorbed or absorbed by the fiber phase. The magnitude of the analyte's partition coefficient between the sample matrix and the coating material determines the volume of an analyte extracted by the coating at equilibrium.

Analytes are often not quantitatively removed from the matrix in SPME. In order to distinguish target analytes from interferences, equilibrium techniques fully use the difference between extraction phase and matrix distribution constants. As a result, they are more selective. In SPME, exhaustive extraction is possible, and for the majority of chemicals, this is possible by using an internally chilled fiber. Selectivity is sacrificed during exhaustive extraction in order to achieve a quantitative transfer of the target analytes to the extracting phase. Field monitoring works best with SPME. Since the extracted sample's volume does not need to be calculated, the studied material may be exposed directly to the SPME device for the purpose of quantifying desired analytes. Additionally, by only inserting the fiber into the desorption unit, extracted analytes are supplied into the apparatus. Sharp injection bands and quick separations come as a consequence of this easy, solvent-free method [2].

A. The SPME Mechanism

The SPME commercial gadget made by Supelco. The fiber is put on a unique holder after being bonded into a piece of stainless-steel tube. The device's needle may be controlled repeatedly to determine how far it enters the sample container or injector thanks to the holder's adjustable depth gauge. This

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is crucial because the fiber may break if it runs into a barrier. A tiny screw that slides in the device's z-shaped groove restricts the movement of the plunger. The fiber is pulled into the needle of the device with the screw in the topmost position for protection during storage or septum piercing. The fiber is made visible during extraction or desorption by depressing the plunger. Only while replacing the fiber assembly is the plunger lowered to the lowest point. The hub of each kind of fiber is a distinct color.

If the sample is in a vial, the needle is used to breach the septum of the vial before lowering the plunger to expose the fiber to the sample. The fiber is drawn back to the needle after the analytes have been given a certain amount of time to partition into the coating. After that, the gadget is moved to the SPME instrument. The fiber is placed into a hot injector, where thermal desorption of the trapped analyte occurs, when gas chromatography is utilized for analyte separation and quantification. The fiber is exposed to a sample matrix for spot sampling until a partitioning equilibrium between the sample matrix and the coating substance is obtained. On the other hand, the fiber is left in the needle throughout exposure of the SPME device to the sample in the time average technique. Integral concentration over time measurements are produced as a consequence of the coating acting as a trap for analytes that diffuse into the needle [3]. Direct extraction involves inserting the coated fiber into the sample, which allows the analytes to be transferred directly from the matrix of the sample to the extracting phase. To enable quick extraction, some agitation is needed to move the analytes from the sample's center to the area around the fiber. Natural airflow is often sufficient for gaseous samples to enable quick equilibrium for volatile analytes.

The analytes are removed from the gas phase that has equilibrated with the sample in headspace mode. This modification was made primarily to safeguard the fiber against the damaging effects of non-volatile, high molecular weight compounds found in the sample matrix. As a result, as long as the volumes of the two phases are the same in both sampling modes, headspace trapping has the same sensitivity as direct sampling in this situation. The amount of an analyte extracted by the fiber coating does not depend on whether the fiber is in the liquid or gas phase. Only for extremely volatile analytes may there be a considerable sensitivity differential between direct and headspace trapping when no headspace is employed in direct extraction.

The selection of sample mode, however, significantly affects the kinetics of extraction. When the fiber is in the headspace, the analytes are taken out of the headspace first, and then the matrix is indirectly extracted. Due to the fact that a significant portion of the analytes are already present in the headspace before the extraction process even begins, a significant interface typically exists between the sample matrix and the headspace, and the diffusion coefficients in the gas phase are typically four orders of magnitude higher than in the liquid phase, the equilibration times for volatile compounds are typically shorter for headspace SPME than for direct extraction under similar agitation conditions. At room temperature, there is a low concentration of semi volatile chemicals in the gaseous phase, and their headspace extraction rates are much lower. They may be enhanced by using efficient agitation or by raising the temperature of the extraction.

In the third mode, a selective membrane is used to divide the fiber from the sample, allowing the analytes to pass through while inhibiting the interferences. When filthy samples are studied, the membrane barrier's primary function is to shield the fiber from harmful effects brought on by high molecular weight chemicals. While mem-brane protection allows for the identification of less volatile substances, headspace trapping does the same thing. Shorter extraction periods are achieved by using thin membranes and raising the temperature of the extraction solution [4].

Choosing a Fiber Coating

The kind of coating that is utilized depends on the chemical makeup of the target analyte. For liquid coatings, the fundamental principle "like dissolves like" works quite well. The polarity and volatility of the analyte have a major role in the coating choice. The poly coating is the most practical and ought to come first. It can tolerate 300° C or higher injector temperatures and is tough. Due to the non-polar nature of PDMS, non-polar analytes are extremely effectively extracted with a large linear dynamic range. However, by enhancing extraction conditions, it may also be used to effectively treat highly polar molecules. The sensitivity of the procedure and the length of the extraction process are both determined by the coating thickness and the distribution constant. Although thick coatings improve sensitivity, they take significantly longer to equilibrate. Generally speaking, the thinnest covering with the necessary sensitivity should be chosen to expedite the sample procedure. Choosing an extraction mode

The sample matrix composition, analyte volatility, and its affinity to the matrix are taken into consideration while choosing the extraction strategy. The headspace or fiber-protection mode has to be chosen for soiled samples. Both direct and headspace trapping may be employed for clean matrices. The latter is appropriate to medium- to high-volatility analytes. For volatile analytes, headspace trapping is always preferred since it has faster equilibration periods than direct extraction. When the first two modes cannot be utilized, fiber protection should only be used on soiled samples.

B. Choosing an Agitation Technique

The sole factor that often affects the short equilibration periods in gaseous samples is the rate of analyte diffusion in the coating. Most of the analytes are in the headspace when the aqueous and gaseous phases are in equilibrium before the sampling procedure starts. As a consequence, even without agitation, the extraction times are brief. However, agitation is

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often needed for aqueous samples to enable mass movement between the bulk of the aqueous sample and the fiber. The most typical usage of magnetic stirring is in manual SPME experiments. When using this method, care must be given to maintain the stirring bar's consistent rotating speed and prevent temperature changes in the base plate. Typically, this means the usage of premium digital stirrers. For stirrers that are less expensive, it is preferable to thermally isolate the base plate from the vial holding the sample to prevent temperature fluctuations during extraction. When rapid rotating rates are used, magnetic stir rings perform well.

C. Technique Selection for Separation or Detection

However, other separation methods, such as high-performance liquid chromatography, capillary electrophoresis, and supercritical fluid chromatography, may be employed in combination with this technology. The majority of SPME applications have been developed for gas chromatography. The appropriate quantitative tool is chosen based on how complicated the extraction mixture is. With the exception of the most complicated samples, which need the use of mass spectrometry, most samples can often be detected with standard chromatographic and CE detectors [5].

D. Enhancing Desorption Conditions

Standard gas chromatographic injectors include high-capacity inserts to hold the solvent vapors delivered during liquid injections, such as the well-liked split-split less ones. As a consequence, in split less mode, such injectors' linear carrier gas flow rates are quite low, and the volatilized analytes take a long time to travel to the front of the GC column. Since no solvent is used during SPME injection, the substantial insert volume is not required. It is not practicable to open the split line during SPME injection since it lowers sensitivity. High linear flow rates of the carrier gas around the coating are necessary for effective desorption and quick transport of the analytes from the injector to the column. This may be achieved by lowering the injector insert's internal diameter and bringing it as near as feasible to the coated fibers outside diameter.

E. Improvement of Sample Volume

The estimated distribution constant should be used to determine the sample volume. Using published values for the analyte or a similar chemical, with the coating chosen, one may approximate the distribution constant. By balancing the sample with the fiber and calculating or experimentally determining how much analyte is removed by the coating, one may also establish the distribution constant.

F. Time Calculation for the Extraction

The period after which the quantity of analyte extracted stays constant and corresponds, within the range of experimental error, to the amount extracted after infinite time is defined as the equilibration time. When calculating the equilibration period, caution should be used since, in certain cases, a significant decline in the slope of the curve can be mistakenly interpreted as the moment at which equilibrium is attained. Calculating the distribution constants is made possible by determining the quantity extracted at equilibrium. Shorter extraction periods may be employed when equilibrium times are too lengthy. To provide adequate accuracy, it is necessary under these circumstances to tightly regulate the extraction duration and mass transfer conditions. At equilibrium, little differences in the extraction period have no impact on how much analyte the fiber is able to extract.

However, towards the steeper section of the curve, even little changes in extraction time may have a significant impact on the quantity of material removed. The relative inaccuracy increases as the extraction time decreases. Even if equilibrium is not attained in the system, auto samplers can measure time accurately and determine analytes with excellent accuracy. However, this necessitates that the temperature and mass transport parameters be constant during all tests[6].

G. Extraction Conditions Optimization

The extraction rate rises as the temperature for the extraction rises, while the distribution constants fall at the same time. In general, the greatest temperature that still affords acceptable sensitivity should be employed if the extraction rate is a key issue. A change in the sample's pH may increase the method's sensitivity to basic and acidic analytes. This is connected to the fact that SPME can only extract neutral species from water without the usage of ion exchange coatings. Weak acids and bases may be converted into their neutral forms by appropriately altering pH such that the SPME fiber can remove them.

H. Calculating the Method's Linear Dynamic Range

The sensitivity and the equilibration time are both impacted by changing the extraction conditions. Therefore, it is wise to double-check the previously calculated extraction time before moving on to the calculation of the linear dynamic range. If there are significant changes in sensitivity throughout the optimization process, then this step is necessary. Polymeric liquids with a large linear range by definition, such PDMS, are included in SPME coating. Due to the smaller number of sorption sites on the surface of solid sorbents as Carbowax/DVB or PDMS/DVB, the linear range is nevertheless capable of spanning many orders of magnitude for common analytes in pure matrices. Saturation may happen at low analyte concentrations in very uncommon circumstances when the analyte has a very high affinity for the surface. In these circumstances, the linear range may be increased by speeding up the extraction process.

I. Choosing a Calibration Method

SPME may be utilized with common calibration techniques like external calibration. To make sure neither the fiber nor the equipment interferes with the determination, the fiber blank should first be examined. Prior to the first usage,

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the fiber should be condition ed by desorption in a GC injector or in a specifically crafted conditioning device. This procedure guarantees that the fiber coating won't cause interference on its own. Since samples containing significant quantities of high molecular weight chemicals may need longer desorption periods than the target analytes, fiber conditioning may need to be repeated after analysis. For more complicated samples, a unique calibration technique should be utilized, such as isotopic dilution or standard addition. With these techniques, it is presumable that the target analytes will behave like spikes while being extracted. When evaluating homogenous samples, this is often a reasonable assumption.

The investigation of flavor and aroma compounds is ideally suited for SPME. The fibers can readily extract the normally tiny, volatile chemicals, and the method's simplicity makes it simple to couple to analytical tools. Headspace trapping may lessen the likelihood of interference peaks and keep the needle and the instrument from being contaminated. In comparison to traditional approaches, loss of these volatile chemicals during sample preparation procedures is minimized or avoided, and the method is suitable for field sampling and analysis. Even though they first seemed more difficult, SPME has been proved to be helpful for semi volatile compounds. These may also benefit from headspace trapping provided the matrix is modified appropriately. Significant convenience for field and air analysis is provided by SPME. Even in the presence of fluctuating air temperature, quantification is quite simple. Finally, the ability to easily track flavor and scent concentrations over time is made possible by the use of SPME for time-weighted average sampling.

J. Analysis using GC-FID and headspace trapping

Using a syringe-like SPME device with a 75 m Carboxen-PDMS fiber, orange juice volatiles were collected from the juice headspace. Juice samples were added in aliquots to 40-ml glass vials with plastic screw tops and septa coated with Teflon, warmed to 40° C, and then gently swirled to cover the walls of the vial. Juices were kept at 40° C for the whole 35-min extraction time after being allowed to equilibrate for at least 15 min before to fiber insertion. The volatile chemicals were then thermally desorbed from the fiber after it was taken out of the headspace and placed into the heated GC injector. A 30 m x 2 mm i.e. HP 5890 GC instrument was used to separate the flavor extract. Capillary column for DB5. After a 3-min hold at a starting temperature of 32° C for the column, the temperature was raised to 200° C at a rate of 6° C/min. The linear velocity of the helium carrier gas was 29 cm/s. To enhance peak form and chromatographic efficiency, a customized thin boar injector liner was utilized; the whole separation was carried out in split less mode [7].

II. Background of Headspace

A. Traditional Fragrances

The foundation of almost all popular traditional fragrances is floral aromas. They were made by perfumers using natural flower oils like rose and jasmine. Only a small percentage of people are aware that fruit and flower oils prepared by extracting chosen material have distinct scents from those of live things. Classical scents like Amarige, Joy, White Linen, Aura, Anais, and Beautiful are examples of scents based on floral fragrances. The following are the compositional differences between the oil and the aura of Amarige:

B. Need for Mental Room

We notice a nice aroma when we visit a rose field full of blooming roses and anticipate the same scent when we use bottled perfume or 100% pure essential oil produced from the same flowers. This is untrue, however. Because of the following factors, the scent we smell in the field is entirely different from bottled perfume or essential oils:

The low volatile chemicals may sometimes not be recovered when a flower or plant is handled to extract the essential oils and often evaporate. The scent benefits from these low volatile compounds. Numerous chemical processes, including saponification, transesterification, and polymerization, and condensation, take happen when a plant is processed. These processes alter the oil's characteristics, making the final product have a changed composition and a scent that no longer closely matches the original plant. Due to their extreme volatility, many stereo terpenes cannot be removed and remain in the plants. These stereo terpenes don't directly contribute to the odor but work synergistically with other compounds to improve the overall odor quality.

C. Headspace Trapping Types

Headspace trapping, often known as the purge-and-trap approach, may be static or dynamic. Gas extraction is completed in a single step or a small number of stages in static headspace trapping. The purge-and-trap procedure, on the other hand, entails two or three distinct processes, the first of which is continuous gas extraction.

D. Trapping Static Headspace

By thermosetting the sample for a certain amount of time at a predetermined temperature, equilibrium is achieved between the sample phase and the gas phase of the sample vial. This is a one-step gas extraction process. The carrier gas flow is then used to transport a single aliquot of the headspace to the column, where the volatile chemicals are subsequently separated as normal. A partition coefficient, which reflects the ratio of the analyte's concentration in the sample phase to that in the gas phase, characterizes the equilibrium of the two phases in the sample vial.

E. Trapping Dynamic Headspace

This method involves constantly purging the sample with an inert gas until all volatile chemicals have been eliminated.

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The gas effluent exiting the sample vessel is passed through a trap at this stage that has either been cooled to a low temperature or contains an adsorbent. The volatile analytes removed from the sample are delayed by this trap. When all of the gas has been extracted, the condensed or adsorbed analytes are now purged with the carrier gas by rapidly heating the trap [8].

The desorbed analytes are carried straight into the gas chromatograph in Figure 4. Because thermal desorption from an adsorbent does not occur instantly, a sample's "slug" may be excessively protracted, producing wide peaks and tailing. This is especially true when the gas chromatograph employs a capillary column. For this reason, between the main trap and the column, a second, smaller trap that has been cooled to a low temperature is often installed. After desorption is complete, this tiny trap is quickly heated, allowing a sharp band of analytes to enter the column. Since Zlatkis and his team at the University of Houston introduced Tenax as a universal adsorbent for dynamic headspace GC in 1973, this method has been increasingly widely employed. They showed the repeatability of the purge-and-trap approach by applying the methodology to the study of biological fluids.

F. Static Headspace-GC System Principles

With a gas-tight syringe, gas from the headspace of a closed vessel may be easily measured. It is difficult to duplicate all the circumstances required for a good quantitative study using such a manual technique, however. As a result, automated equipment are now almost entirely used for headspace-gas chromatography, with the whole process of thermosetting, aliquoting, and injecting the headspace into the gas chromatograph being totally automated. The necessary precision, accuracy, and dependability are guaranteed in this manner and when employing the correct calibration techniques.

There are two kinds of HS-GC equipment available now. The sample is first injected into the gas chromatograph's injection port after an automatic syringe has collected an aliquot of the headspace. In essence, these systems resemble the GC auto samplers. In the second instance, the aliquot is not pulled from the vial's headspace by suction as it would be with a syringe; rather, when equilibrium is attained, the carrier gas presses the vial. There are two options available upon pressurization. By adjusting the duration of transfer and the pressure, it is possible to precisely regulate the transferred volume of headspace while temporarily interrupting the carrier gas flow to enable the pressured gas in the vial to expand onto the column. A pressured headspace gas may be used to fill the sample loop of the valve in the second option, which involves introducing a gas between the sample vial and the column. Commercially available automated instruments built on these concepts are available now [9].

G. HS-GC Trace Analysis

Low concentrations of analytes may be determined using HS-GC in both dynamic and static variants. The dynamic technique is often thought to be more sensitive, however this isn't always the case. For instance, static HS-GC may rather quickly identify trace contaminants in a water sample at the parts-per-billion level.

III. Techniques for Trapping Headspace

A. Trapping Static Headspace

A food sample is often put in a heated vessel that is sealed gas-tight by a septum when using the static technique. The food sample is kept within the container for a certain amount of time to allow the volatile chemicals to evaporate to a predetermined equilibrium or concentration in the atmosphere. The smell of the headspace may be tested by sniffing the vessel in order to establish the ideal circumstances for the experiment. Then, with or sometimes without previous concentration, a specific volume is withdrawn from the vessel using a gas-tight syringe and injected straight onto a gas chromatographic column. This method's benefit is that it precisely determines the make-up of the odorants. This method's application, known as GC olfactometry of static headspace samples, has been extensively utilized to pinpoint the highly volatile substances responsible for the first olfactory perception of meals.

Static headspace samples, on the other hand, are often too tiny to quantify odorants that are only present in trace amounts in the vapor phase. In other words, they may be smelled, but in many instances, a mass spectrometer cannot produce a signal.

B. Trapping Dynamic Headspace

Dynamic headspace trapping may be utilized to get around the drawbacks of the headspace trapping approach. Once again, the food sample is put in a heated tank, but when the chemicals evaporate, a stream of inert gas continuously sweeps them into a trap that contains a porous polymer that essentially adsorbs the organic components. The quantity of trapped volatiles produced by this approach is substantially larger, making it easier to generate an MS signal following desorption. The heavy reliance on odorant production, carrier gas velocity, and the selectivity of the adsorption and desorption processes for various chemicals is the procedure's drawback, however. These characteristics are very difficult to manage accurately, hence the outcomes of such quantitative measures may not be accurate.

C. Using Thermal or Liquid Solvent Desorption to Recover the Adsorbed Volatiles

Numerous research have documented desorption techniques using organic solvents. Solvent selectivity, solvent contaminants, and loss of volatile chemicals during removal of extra solvent before GC analysis are all disadvantages of using solvent desorption.

In conjunction with thermal desorption and desorption in the interior of a GC injector, we have developed a sensitive and very repeatable dynamic headspace procedure. The fresh

tomato flavor chemicals were characterized using this DHS-style methodology, and the results were compared to published data obtained using a static headspace approach [10].

D. Temperature Desorption

Adsorbed volatile substances were retrieved directly within the GC injector from the trap. The temperature and desorption time were previously established. In order to cryogenically trap the desorbed volatiles, a loop of the analytical column at the injector end was submerged in a liquid nitrogen-filled Dewar flask. The trap was then used to desorb volatiles in lieu of the injector glass lining. The split vent and septum purge were closed throughout the 5-minute thermal desorption process.

E. Hedychium Coronium Headspace

Although Hedychium coronium flower has a light, pleasant scent, both the essential oil and the concrete produced by conventional processes often lose this scent. The H's mindset follows. The flow of coronium was analyzed. The fragrance of H. Coronium fumes had a scent like that of H after being absorbed by XAD-4 resin, eluted by organic solvent, and concentrated. Flowering coronariums.

F. White Hyacinth Volatiles Are Isolated by Dynamic Headspace Trapping

By using GC and GC-MS, more than 70 components of white hyacinths may be identified. Benzyl acetate and --farnesene are the main components. In addition to these, it was possible to identify compounds of sensory significance such indole, oct-1-en-3-ol, and phenyl acetaldehyde. By using GC-sniffing, very small amounts of three substituted pyrazines were found. The benefits of utilizing several adsorbing agents simultaneously while using a simultaneous closed-loop stripping approach were shown. This technique allows for the determination of artifact creation and component differentiation [11].

G. Testing of Medical Materials Using Headspace Trapping, GC, and MS

With the use of cutting-edge technology like the HS-40 Trap and a sensitive detection technique like GC-MS, it is now possible to examine volatile organic compounds in medical sutures at very low concentrations. The mass spectrum data collected may be searched in the NIST database to identify specific chemicals found in the sutures after they have been examined by GC-MS.

The inventive headspace trapping method employed in this application, which is still in the patent-pending stage, provides sensitivity above and above that of conventional static headspace. The assessment of materials used in medical applications as well as other forms of material testing, such as evaluating pharmaceutical formulations and food-packaging materials, now has a higher degree of detection capabilities.

IV. CONCLUSION

The study of flavor and aroma components is particularly suited for cutting-edge technologies like SPME and headspace trapping extraction. It is simple to extract the normally tiny, volatile molecules. The method's simplicity makes it simple to couple to analytical tools. Compared to traditional approaches, loss of volatile chemicals during sample preparation procedures is decreased or avoided. Even if semi volatile chemicals were more difficult in the beginning, similar strategies are still helpful for them now. This analytical approach, which offers great ease for field and air studies, may be used with the proper matrix modification.

REFERENCES

[1] L. Dormont, J. M. Bessiere, D. McKey, and A. Cohuet, “New methods for field collection of human skin volatiles and perspectives for their application in the chemical ecology of human-pathogen-vector interactions,” J. Exp. Biol., 2013, doi: 10.1242/jeb.085936.

[2] E. Jongedijk, K. Cankar, J. Ranzijn, S. van der Krol, H. Bouwmeester, and J. Beekwilder, “Capturing of the monoterpene olefin limonene produced in Saccharomyces cerevisiae,” Yeast, 2015, doi: 10.1002/yea.3038.

[3] S. Y. Oh, “Rapid Monitoring of Pharmacological Volatiles of Night-Flowering Evening-Primrose According to Flower Opening or Closing by Fast Gas Chromatography/Surface Acoustic Wave Sensor (Electronic zNose),” Phytochem. Anal., 2018, doi: 10.1002/pca.2740.

[4] A. Kanavouras and R. J. Hernandez, “The analysis of volatiles from thermally oxidized virgin olive oil using dynamic sorption-thermal desorption and solid phase micro-extraction techniques,” Int. J. Food Sci. Technol., 2006, doi: 10.1111/j.1365-2621.2005.01019.x.

[5] B. D. Fitz, B. C. Mannion, K. To, T. Hoac, and R. E. Synovec, “Evaluation of injection methods for fast, high peak capacity separations with low thermal mass gas chromatography,” J. Chromatogr. A, 2015, doi: 10.1016/j.chroma.2015.03.009.

[6] D. J. Harvey et al., “Use of novel attraction compounds increases monitoring success of a rare beetle, Elater ferrugineus,” Insect Conserv. Divers., 2017, doi: 10.1111/icad.12214.

[7] J. P. Shu, D. B. Sun, and S. S. Liu, “Comparative performance of different methods used to collect tomato plant volatiles,” Allelopath. J., 2010.

[8] H. H. M. Fadel and A. Farouk, “Caramelization of maltose solution in presence of alanine,” Amino Acids, 2002, doi: 10.1007/s007260200008.

[9] M. Poliak, M. Kochman, A. Gordin, and A. Amirav, “A comparison of SnifProbe and SPME for aroma sampling,” Chromatographia, 2006, doi: 10.1365/s10337-006-0051-3.

[10] F. Mothes, N. Reiche, P. Fiedler, M. Moeder, and H. Borsdorf, “Capability of headspace based sample preparation methods for the determination of methyl tert-butyl ether and benzene in reed (phragmites australis) from constructed wetlands,” Chemosphere, 2010, doi: 10.1016/j.chemosphere.2010.04.024.

[11] F. Araniti, S. Pantò, A. Lupini, F. Sunseri, and M. R. Abenavoli, “Chemical characterization of volatile organic compounds (VOCs) through headspace solid phase micro extraction (SPME),” in Advances in Plant Ecophysiology Techniques, 2018. doi: 10.1007/978-3-319-93233-0_24.

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Sources of Natural Essential Oils

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Abstract*— A wide variety of extremely scented plant oils make up essential oils. They are mostly present in plant fruits, peels, seeds, flowers, buds, leaves, twigs, bark, wood, roots, rhizomes, and resin. Some of them are made by microbes or are derived from animal sources. All around the planet, there exist oil deposits. But some have generated more oil than others. Saudi Arabia, Russia, the US, Iran, and China are the leading oil-producing nations. The cosmetic business relies heavily on essential oils since they not only provide goods nice smells but also function as preservatives and active ingredients while also providing the skin with a number of health advantages. Additionally, the revitalizing market for natural components has greatly boosted interest in plant derivatives, particularly essential oils, in the beauty and wellness sectors.

Index Terms*— Aromatic Plant, Essential Oils, Hydro distillation, Medicinal Plants, Menstruum, Phytonics Soxhlet Extraction.

I. INTRODUCTION

Natural essential oils found in plant organs often come from one or more of the following plant parts: flowers, leaves, leaves and stems, bark, wood, roots, seeds, fruits, rhizomes, gums, or oleoresin exudations. It is well knowledge that geranium leaves release an odor when gently touched since the oil glands on the long stalks are delicate. Similar to this, lightly pressing a peppermint leaf can cause the oil gland to burst and discharge oil. Contrarily, only when the leaf's epidermis is torn can pine needles and eucalyptus leaves release their oils. As a result, the sorts of structures in which oil is held vary based on the type of plant and are unique to each plant family. Unfortunately, there is still not enough information available regarding these oil secretary arrangements to properly classify them. They may be divided into superficial and subcutaneous oils practically speaking. Assuming that the oils of the Labiatae, Verbenaceae, and Geraniaceae families are the only recognized superficial oils, the others are regarded as subcutaneous oils based on the knowledge that is presently available. While being handled, some flowers retain their perfume while others rapidly lose it. Additionally, flowers gathered at various periods may have varying fragrance qualities. In regards to the rose, flowers that are just partially open and have full anthers produce more oil than those that are completely open but have shriveled anthers. Surface temperature, wind, rain, and humidity all have a major impact on oil output. The amount and quality of the oil are both impacted by the harvesting schedule [1].

A. Elements of essential oils

It is evident that the majority of essential oils are composed of terpenes, esters, lactones, phenols, aldehydes, acids, alcohols, and esters in addition to hydrocarbons. The oxygenated chemicals constitute the main odor-producing group of these. Compared to other components, they are more resistant to oxidizing and resinifying impacts. Unsaturated components, such as monoterpenes and sesquiterpenes, on the other hand, have a propensity to oxidize or resinify in the presence of air and light. In order to build technology for oxygenated compounds, it is crucial to understand each constituent's physical properties, such as boiling point, thermal stability, and vapor pressure-temperature connection.

B. Techniques for Making Essential Oils

Techniques for extracting essential oils from plant matter. The essential oil business has created nomenclature to differentiate between the three methods of hydro distillation: water distillation, water and steam distillation, and direct steam distillation. These words were first used by Von Rechenberg and are now widely used in the essential oil sector. The same theoretical issues surrounding the distillation of two-phase systems apply to all three techniques. The primary distinctions relate to how the material is handled.

Some volatile oils can't be distilled without decomposing, therefore they must instead be acquired mechanically or by expression. on certain nations, rolling the fruit over a trough lined with pointed projections long enough to break the skin and pierce the oil glands situated on the outer part of the peel is the standard procedure for getting citrus oil. The juice is extracted via a central tube after the fruit is cored by pressing on it to remove the oil from the glands and a single water spray removes the oil from the crushed peel. Centrifugation is used to separate the resultant oil-water emulsion. Before the oil is extracted, the fruit's skin may be removed as an alternative method. Frequently, the volatile oil content of fresh plant parts is so low that using the aforementioned techniques to remove the oil is not economically possible. In such cases, a thin coating of odorless, bland, fixed oil or fat is applied on glass plates.

After the flower petals have been on the fat for a few hours, the petals are continuously taken from the oil and a fresh covering of petals is added. The oil may be extracted with alcohol after the fat has absorbed as much scent as possible. In the past, the making of fragrances and pomades made great use of the enfleurage method. The majority of essential oil manufacturing nowadays in the perfume business is done by

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extraction utilizing flammable solvents like petroleum ether and hexane. The fundamental benefit of extraction over distillation is the ability to keep a consistent temperature throughout the process.

As a consequence, extracted oils have a more natural scent than distilled oils, which may have experienced chemical changes as a result of the high temperature. While the established distillation technique is more affordable than the extraction procedure, this aspect is very significant to the perfume business [2].

Distilling volatile oil in the absence of air is referred to as destructive distillation. When Pinaceae or Cupressaceae wood or resin is burned without the presence of air, breakdown occurs and a variety of volatile chemicals are pushed out. Charcoal makes up the remaining bulk. According to the kind of wood employed, the condensed volatile matter often separates into two layers: an aqueous layer made up of wood naptha and pyroligneous acid, and a tarry liquid made up of pine tar, juniper tar, or other tars. If the wood is chopped or coarsely powdered and the heat is delivered quickly, this dry distillation is often carried out in retorts, and the output frequently equals roughly 10% of the wood weight utilized.

C. Hydro Distillation

By packing the aromatic plant material in a still and adding enough water to bring it to a boil, essential oils may be extracted by hydro distillation. Alternatively, living steam can be introduced into the plant charge. The essential oil is released from the oil glands in the plant tissue under the influence of hot water and steam. Water is indirectly used to chill the water and oil vapor combination in order to condense it. Distillate flows into a separator from the condenser, where oil and water are automatically separated.

D. Procedure for Distillation

The primary physicochemical processes involved in hydro distilling plant material are as follows:

i) Hydro diffusion
ii) Hydrolysis
iii) Heat-induced decomposition

1. Hydro Diffusion

Hydro diffusion is the process of hot water and essential oils diffusing through plant membranes. The dry cell membranes are not really penetrated by the steam during steam distillation. Therefore, dry plant material can only be exhausted with dry steam after all the volatile oil has been thoroughly ground up and released from the oil-bearing cells. The interchange of vapors inside the tissue, however, depends on the permeability of the tissue when it is expanded when the plant material is submerged in water. Plant cell mem-branes are almost impervious to volatile oils. Therefore, during the actual process, a portion of the volatile oil dissolves in the water present in the glands at a temperature equivalent to boiling water. This oil-water solution then passes through the inflated membranes through osmosis and ultimately reaches the exterior surface, where the oil is vaporized by passing steam. Another feature of hydro diffusion is that the degree of solubility of the oil components in water, rather than their volatility, determines how quickly the oil vaporizes. The high-boiling but more water-soluble components of the oil in plant tissue, therefore, distill before the low-boiling but less water-soluble components. Uncomminuted material requires more time to distill than comminuted material because hydro diffusion rates are slower [3].

2. Hydrolysis

In this context, hydrolysis is defined as a chemical reaction between water and certain essential oil ingredients. Esters are components of essential oils, and when they come into contact with water, particularly when the temperature is high, they often react to create acids and alcohols. The relationship between the molal concentrations of different constituents at equilibrium is written as: Therefore, if the amount of water is large, the amount of alcohol and acid will also be large, resulting in a decreased yield of essential oil. However, the reactions are not complete in either direction. Additionally, since this is a time-dependent process, the length of time that the oil and water are in contact will determine how much hydrolysis occurs. One of the drawbacks of water distillation is this.

3. Heat's Effect

At high temperatures, almost all of the components in essential oils become unstable. Distillation must be carried out at low temperatures to produce oil of the highest quality. While the operating pressure in water distillation and water and steam distillation is often ambient, the temperature in steam distillation is solely governed by the operating pressure. The three effects hydro diffusion, hydrolysis, and heat decomposition that were previously discussed all take place at the same time and interact with one another. Temperatures often cause an increase in both the rate of diffusion and the solubility of essential oils in water. The pace and degree of hydrolysis both follow the same pattern. However, lowering the temperature, using as little water as feasible when employing steam distillation, completely comminuting the plant material, and packing it evenly prior to distillation are all ways to improve oil production and quality.

E. Three Hydro distillation Methods

Three different hydro distillation techniques are available for extracting essential oils from plant materials:

1. Distillation of water
2. Distillation of steam and water
3. Using just steam directly

Distillation of Water

This procedure involves submerging the material entirely in water that has been heated using direct flame, steam jacket,

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closed steam jacket, closed steam coil, or open steam coil. This technique' primary feature is the direct contact between boiling water and plant matter. Adequate safety measures are required when the still is heated directly by fire in order to prevent the charge from overheating. There is less risk of overheating when a steam jacket or closed steam coil is utilized; this risk is removed with open steam coils. But with open steam, it's important to take precautions to avoid a buildup of condensed water within the still. As a result, the still has to be well-insulated. In order to prevent thick material clumps from settling on the bottom and degrading thermally, the plant material in the still must be stirred while the water boils.

Mucilage-rich plant materials like cinnamon bark must be powdered in order for the charge to distribute easily in the water; otherwise, when the water's temperature rises, the mucilage will be leached from the ground cinnamon. The water-charge mixture's viscosity is consequently significantly increased, enabling it to char. Therefore, a small-scale water distillation in glassware should be done before any field distillation is carried out in order to see whether any changes occur throughout the distillation process. The production of oil from a known weight of plant material may be calculated using this laboratory experiment. The Clevenger system is the ideal laboratory equipment for test distillations [4].

Boiling water must keep the whole plant charge in motion throughout the water distillation process; this is only achievable if the distillation material is charged loosely and stays loose in the boiling water. Water distillation only has one clear benefit, and that is the ability to treat finely powdered materials or plant parts that, when in touch with live steam, would ordinarily form lumps that the steam cannot pass through. The fundamental drawback of water distillation is the impossibility of full extraction. Additionally, sensitive compounds like aldehydes have a tendency to polymerize and certain esters are partially hydrolyzed. More stills, more room, and more fuel are needed for water distillation. It requires a great deal of expertise and procedure knowledge. The components of the oil, which have a high boiling point and are slightly water soluble, cannot be totally vaporized or do so only with a little amount of steam. The procedure thus becomes unprofitable. Due to these factors, water distillation is only used when either water and steam distillation or straight steam distillation cannot be utilized to treat the plant material.

II. DISCUSSION

A. Traditional Hydro distillation Process for Making Attar

The distillates produced by hydro distilling flowers in sandalwood oil or other base materials like paraffin are known as floral attars. Because the flowers must be treated right after gathering, attar production takes occur in isolated locations. The tools and machinery used to make attar are rather efficient, light, flexible, and simple to repair. Taking these factors into consideration, the traditional "deg and bhapka" procedure has been practiced for many years and is being utilized today using the following traditional tools.

B. Distillation of Water Drawbacks

Esters, for example, are hydrolysis-sensitive whereas aldehydes and acyclic monoterpene hydrocarbons are polymerization-sensitive. It is impossible to completely remove oxygenated substances by distillation since they prefer to dissolve in still water, such phenols. Because water distillation is often a modest operation and it takes a while to gather much oil, excellent grade oil and low quality oil are frequently blended. Local distillers seldom attempt to maximize both oil quantity and quality since they see distillation as an art. Compared to straight steam distillation or water and steam distillation, water distillation is a slower process [5].

C. Distillation of Steam and Water

While separated from the plant material, the steam may be produced in the still or a satellite boiler when using water and steam distillation. Water and steam distillation are both extensively utilized in rural regions, similar to water distillation. Additionally, it doesn't cost much more upfront than water distillation. A perforated grid supports the plant material above the boiling water, although the apparatus employed is often identical to that used in water distillation. In fact, it is typical for those who execute water distillation to go on to steam and water distillation. Therefore, after producing a few batches of oil via water distillation, rural distillers come to the conclusion that the oil's quality isn't very excellent due to its still overtones. Consequently, various adjustments are performed. The plant material is lifted above the water using the same still and a perforated grid or plate. Although the still's capacity is reduced, the oil is of higher quality as a result. If there is not enough water to enable for the completion of distillation, a cohobation tube is connected, and condensate water is manually fed back into the still to make sure there is always enough water to utilize as the steam source. The re-used condensate water will enable it to become saturated with dissolved components, at which point additional oil will dissolve in it. This is thought to help reduce the loss of dissolved oxygenated compounds in the condensate water to some degree.

D. Cohobation

Only during water distillation or water and steam distillation may cohobation be employed. It employs the procedure of re-boiling the distillate water after the oil has been removed from it in the still. The idea behind it is to reduce oxygenated component losses, especially phenols, which partially dissolve in distillate water. For the majority of oils, the quantity of oil lost by solution in water is less than%, but the amount of oil dissolved in the distillate water for phenol-rich oils is%-%. Any dissolved oxygenation

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elements will encourage hydrolysis and deterioration of themselves or other oil contents since this material is continually being re-vaporized, condensed, and re-vaporized again. Similar to this, the likelihood of deterioration is increased if an oxygenated component is often brought into touch with a direct heat source or the side of a still that is much hotter than 100° C. As a consequence, cohobation is not advised unless the oxygenated elements in the distillate are subjected to temperatures no greater than 100° C. However, because the still's walls are good heat conductors, still notes can also be obtained from the thermal degradation reactions of plant material that is touching the sides of the still. In the steam and water distillation process, the plant material cannot be in direct contact with the fire source underneath the still. The fact that the steam used in the steam and water distillation process is moist makes the plant material very wet, which is a significant disadvantage. As a result, distillation takes longer because more water must be vaporized by the steam before it can condense higher up the still. Using a baffle to stop the water from boiling too fiercely and coming into touch with the lower plant material lying on the grid is one technique to avoid it from getting soggy. Water and steam distillation has advantages over water distillation.

E. Increased Oil Yield

Hydrolysis and polymerization are less likely to affect volatile oil components. If refluxing is managed, the loss of polar compounds is reduced. Steam and water distillation provide more consistent oil quality. Steam and water distillation uses less energy and is quicker than water distillation. Steam and water distillation is being used to generate several oils; for instance, lemongrass is produced in Bhutan using a rural steam and water distillation system[6].

Water and Steam Distillation's Drawbacks

High-boiling-range oils need more steam to vaporize due to the low pressure of rising steam, which results in longer distillation times. The distillation process is slowed down when the plant material gets moist because steam must evaporate the water in order for it to condense higher up the still. A baffle is intended to stop the water from boiling too fiercely and coming into direct touch with the lower plant material lying on the grid, preventing it from becoming soggy.

F. Distillation of Steam Directly

Direct steam distillation, as the name indicates, is the process of distilling plant material using steam produced outside the still in a satellite steam generator, sometimes known as a boiler. The plant material is supported on a perforated grid above the steam input, much as in water and steam distillation. The ability to easily manage the steam output is a significant benefit of satellite steam generating. Because steam is produced in a satellite boiler, the plant material is only heated to a temperature of 100° C, preventing thermal damage. The method most often used for the industrial manufacturing of essential oils is steam distillation. It is common practice in the taste and fragrance supply industry. Steam distillation has the apparent disadvantage of requiring a significantly greater capital investment to construct a plant. In other instances, such as the large-scale production of inexpensive oils, the global market values of the oils are only high enough to support their production using steam distillation without depreciating the capital expense necessary to construct the plant over a period of at least ten years.

G. Hydrolytic Maceration Distillation for the Extraction of Essential Oils

Since certain plant materials' volatile constituents are glycosidically bound, they must be macerated in warm water before they release their essential oils. For instance, the enzyme prime verosidase and the precursor gaultherin are both present in the leaves of wintergreen, and when the leaves are macerated in warm water, the enzyme reacts with the precursor gaultherin to release free methyl salicylate and primeverose. Brown mustard, bitter almonds, and garlic are some more examples that are comparable.

H. Extraction of Essential Oil via Expression

Citrus oils are the sole products produced via expression, or cold pressing. Expression is a general phrase for any physical procedure that involves breaking or crushing the essential oil glands in the peel to release the oil. One technique that was used in the past, particularly in Sicily, included first splitting the citrus fruit and then removing the pulp with a pointed spoon-knife. Either pressing the peel against a hard piece of baked clay put under a large natural sponge or bending the peel into the sponge were used to extract the oil from the fruit. Squeezing it into the concolina or another container eliminated the oil emulsion that the sponge had absorbed. It is said that compared to oil made using other methods, oil made this manner has a stronger fruity aroma.

A shallow copper bowl with a hollow center tube is used in the equaling method, which is a second technique. This instrument resembles a shallow funnel in design. The whole citrus fruit is rolled over the blunt-ended brass points in the bowl using moderate pressure until all of the oil glands have ruptured. The oil and aqueous cell contents are allowed to drip into a container at the bottom of the hollow tube, where the oil is then decanted out. manual pressing is obviously impracticable since it is such a laborious operation; for example, a single person employing one of these manual processes can often only produce 2-4 lbs of oil each day. As a consequence, several devices have been created throughout time to either crush a citrus fruit's skin or smash the whole fruit and then separate the juice from the oil [7].

I. Pelatrice Method

Citrus fruits are fed into the machine's abrasive shell in the pelatrice process through a hopper. A slowly rotating

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Archimedian screw rotates the fruits against the abrasive shell, forcing some of the vital oil cavities on the peel to break and release their oil-water emulsion. This screw then moves the fruit into a hopper, where abrasive spike-covered rollers puncture any residual oil voids. A fine water spray removes the oil and water emulsion off the fruit. The emulsion next goes through a separator to remove any particulates, and then it goes through two centrifugal separators that operate in succession to produce pure oil. This method is used to generate bergamot oil and some lemon oil in Italy.

J. Sfumatrice Method

The sfumatrice apparatus consists of two horizontal, ribbed rollers that pull a metallic chain. During the conveyance process via these rollers, the peels are twisted and compressed to release their oil. Similar to pelatrice, fine water sprays are used to wipe the oil off of the submatrices rollers. Through generate purified oil, the oil is once again put via a separator before being transferred through two centrifuges in series. In Italy, the submatrices technique was formerly the most often used method for isolating citrus oil; however, the pelatrice method now seems to be more widely used.

K. Cold-Fat Essential Oil Extraction

Despite the development of the contemporary method of extraction using volatile solvents, the traditional technique of enfleurage, which has been handed down from father to son and developed over many centuries, continues to be crucial. Except for a few rare cases in India where the technique has remained rudimentary, enfleurage is only now used on a significant scale in the Grasse area of France.

Enfleurage operates on basic principles. Even after being harvested, certain flowers continue to undergo physiological processes that result in fragrance development and release. In a sense, each jasmine and tuberose blossom resembles a miniature factory that is constantly releasing minuscule amounts of scent. Fat has a high absorption capacity and is able to quickly absorb aroma when in touch with fragrant flowers. Enfleurage is the deliberate mass use of this idea. Throughout the harvest season, which lasts for eight to ten weeks, batches of recently gathered flowers are scattered over the top of a specially made fat foundation, let to sit there, and then changed out with new flowers. The fat, which is not regenerated during the process, is soaked with floral oil at the conclusion of the harvest. The oil is then isolated after being separated from the fat using alcohol.

The quality of the fat base used has a significant impact on the outcome of enfleurage. The corps must be prepared with the utmost care. It must have the right consistency and be almost odorless. If the corps is too stiff, the blooms won't make enough contact with the fat, which will reduce its capacity for absorption and lead to a below-average output of floral oil. On the other hand, if it is excessively soft, it will have a tendency to envelop the flowers, causing the fatigued ones to stick. When the flowers are removed, they will still have any fat that was adhered, which causes significant shrinkage and loss of tissue. Therefore, the corps' consistency must be such that it provides a semi-hard surface from which the dried-out flowers may be readily removed. Every producer must prepare the corps in accordance with the ambient temperature in the cellars throughout the months of the flower harvest since the enfleurage procedure is done in cool cellars [8].

Years of practice have shown that a combination of two parts lard and one part highly refined tallow is excellently appropriate for enfleurage. This combination ensures that the corps has the proper uniformity and great absorption power. The resulting fat corps is almost odorless, white, smooth, completely homogeneous in consistency, and devoid of water. When producing the corps, some producers additionally include tiny amounts of orange flower or rose water. It seems that this is being done for convention's sake. These ingredients offer a faint orange blossom or rose fragrance, which helps to mask the completed product's smell.

L. Affluence and Defluency

Thousands of so-called chassis, which act as vehicles for holding the fat corps throughout the process, are installed in every enfleurage structure. A wooden frame that is rectangular makes up a chassis. At the start of the enfleurage procedure, the fat corps is applied using a spatula to both sides of a glass plate that is supported by the frame. The chassis create airtight chambers when they are stacked one on top of the other, and each glass plate contains a layer of fat on its upper and bottom surface. Freshly gathered flowers arrive each morning during the harvest and are manually scattered on top of the fat layer of each glass dish after being cleansed of contaminants like leaves and stems. Never use blossoms that have been exposed to mist or rain since even a little amount of moisture may cause the corps to go bad. Depending on the variety of flowers, the chassis are then heaped up and kept in the basements for 24 hours or more. The latter rest in close proximity to one fat layer, which serves as a direct solvent, while the other fat layer just absorbs the flower's volatile fragrance. After 24 hours, the flowers have released the majority of their oil and are beginning to wither, emitting an unpleasant stench. The next step is to remove them from the corps, which still requires manual work despite attempts to install labor-saving technologies. The individual doing this procedure must be competent and skillful since carefully removing the flower is nearly more crucial than replenishing the corps on the chassis with new flowers. When the chassis is softly tapped on the work surface, the majority of the tired flowers will fall from the fat layer on the glass chassis plate, but since it is crucial to extract each and every bloom and flower ppaper, tweezers are used for this delicate task. Fresh flowers are added to the chassis every 24 hours, immediately after defleurage. The chassis are flipped over for this reason, and flowers are now

charged directly onto the fat layer, which during the previous operation served as the top of the little chamber. The full enfleurage procedure for jasmine takes roughly 70 days; each day, spent flowers are plucked and the chassis is replenished with new ones.

The fat on the chassis is scraped over with metal combs at the start of the harvest and numerous times during to modify and enhance the surface of absorption. When the harvest is complete, the fat is comparatively saturated with floral oil and has the familiar scent. The next step is to remove the scented fat from the glass plates separating the chassis. It is carefully melted and bulked in sealed containers after being gently scraped off for this use using a spatula. The finished product is called pomade. The most heavily saturated pomade is pomade no. 36, since the corps on the chassis have been treated with fresh flowers 36 times throughout the full process of enfleurage. Every chassis is charged with 720 g total, or around 360 g of fat corps, on either side of the glass plate at the start of the harvest. For the duration of enfleurage, which lasts between 8 and 10 weeks, every kilogram of fat corps should come into touch with around kg of jasmine flowers. For various flowers, the amounts vary a little. At the conclusion of enfleurage, the fat corps has lost around 10% of its weight due of the different manipulations [9].

M. Warm Maceration Method

Depending on the kind of plant, petals are submerged in molten fat heated to 45°–60° C for 1–2 hours to shorten the lengthy enfleurage process. Each time the petals are submerged, the fat is filtered out and separated. The fat is extracted from discarded flowers and water after 10 to 20 immersions. A technique of extraction and concentration at lower pressure is then used to create absolute of maceration from fat containing oil. It is generally utilized for very fragile flowers whose physiological functions are lost soon after their harvest, such as lily of valley.

N. Modern Methods of Extraction of Essential Oils

These traditional techniques are the ones that are most often employed on a commercial basis and have been explored in relation to essential oil extraction. To make expensive essential oils in their natural state without affecting their thermosensitive components or to extract essential oils for micro-analysis, new techniques have been developed with the advancement of technology. These techniques may not be widely used for the commercial production of essential oils, but they are valuable in certain situations [10], [11].

III. CONCLUSION

There are several significant obstacles to the sustainable industrial exploitation of medicinal and aromatic plants in South East Asian nations, including poor agricultural methods for MAPs, haphazard and indiscriminate wild gathering methods, subpar post-harvest and post-gathering procedures that result in subpar raw materials, a lack of research into the creation of high-yielding MAP varieties, subpar propagation techniques, and inefficient manufacturing processes. To create MAPs for long-term economic exploitation, this necessitates collaboration and coordination across a number of regional institutions and organizations. How well we add value to MAP bio resources depends on the extraction procedure for MAPs. When it comes to essential oils, the extraction procedure changes both the external and interior makeup. Even though the analytical findings are within permissible limits, external appearance might sometimes lead to the batch being rejected. Additionally, skilled perfumers evaluate essential oils on a global scale for their olfactory attributes, which are more important than analytical data. Using non-standard extraction techniques may lead to variations in the chemical components of therapeutic plant extracts. Make an effort to create batches that are as consistently high-quality as you can.

REFERENCES

[1] S. Chen, B. Mulgrew, and P. M. Grant, “A clustering technique for digital communications channel equalization using radial basis function networks,” IEEE Trans. on Neural Networks, vol. 4, pp. 570-578, July 1993.
[2] J. U. Duncombe, “Infrared navigation—Part I: An assessment of feasibility,” IEEE Trans. Electron Devices, vol. ED-11, pp. 34-39, Jan. 1959.
[3] C. Y. Lin, M. Wu, J. A. Bloom, I. J. Cox, and M. Miller, “Rotation, scale, and translation resilient public watermarking for images,” IEEE Trans. Image Process., vol. 10, no. 5, pp. 767-782, May 2001.

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Process Simulation's Role in the Extraction of Medicinal and Aromatic Plants

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Abstract*— The relevance of process simulation in the area of extraction techniques for medicinal and aromatic plants is shown in this research. The chapter begins with a succinct overview of the basics of process simulation and its current place in the business world. It outlines the steps to take in simulating a process as well as its advantages. The second section of the study lists the phytochemical processes that have been modelled at ICS-UNIDO, then presents two case studies to demonstrate the applicability of the technique suggested: batch distillation of turpentine oil and crystallization of menthe oil to obtain menthol. At the conclusion, suggestions are made to support the value of process simulation for developing nations.

Index Terms*— Aromatic Plants, Distillation, medicinal, phytochemical.

I. INTRODUCTION

Despite the abundance of medicinal and aromatic plants in developing nations, it is challenging to add value to this abundant bio resource owing to the lack of easy access to effective extraction technology. The majority of the time, and especially in extremely poor nations, the technologies employed are inefficient and expensive. The main issue is with the product's quality since outdated extraction methods do not always provide consistent, high-quality products, and in other situations, using the wrong methods and technology may lead to the production of subpar products with poor market value.

Dissemination of information about current extraction processes and the most recent advancements in these technologies is crucial to helping developing nations accomplish the goal of harnessing abundant MAP resource for generating value-added goods. Commercial process simulation software is an effective tool for controlling phytochemical processes and improving process parameters since it can be used to simulate actual plants on a computer.

Particularly for developing and emerging nations, process simulation may help optimize a sophisticated process as opposed to managing a simple process that should be replaced by more effective and standardized methods. In this instance, the emphasis is mainly on practical issues like the caliber of the materials and the water that will be utilized for extraction. The majority of the time, developing nations struggle with issues related to the kind of vessel, water quality, and product stability throughout processing. This paper explains how to extract and purify essential oils at both pilot and commercial sizes using process modeling software. In developing and growing nations, such procedures have been established and are in use. In order to improve the extraction process' efficiency in terms of energy usage, raw material consumption, and environmental effect, the procedure for doing so will be shown in this paper [1].

A. Goals and Definitions for Process Simulation

Simulation is the process of simulating some characteristics of the actual world using manipulable numbers or symbols to make them easier to understand. Process optimization, automated calculations, material and energy balances, physical property predictions, design or rating calculations, and other duties are all carried out using process simulators, which are engineering tools. A process engineer is always required to evaluate the issue and the result of a process simulator since a process simulator is not a process engineer. By using computer code, a process simulator can resolve material and energy balances.

In theory, a process simulator for the investigation of a chemical process. One creates the process model, or system of equations, starting with the problem's definition. In addition, based on the system of equations, one gathers the required extra data and solves the model using a suitable approach. The process engineer then evaluates the findings and could start from scratch to create a more accurate model. Optimization, dynamic simulation, and steady-state simulation all share the same solution framework; only the process model and approach are different. The system of material and energy balance equations is difficult to calculate because it takes into account several components, intricate thermos physical models for calculations of phase equilibrium, numerous subsystems, relatively complicated equipment, recycling streams, and control loops. A typical process simulation design, including the key components and their relationships. It is obvious that a process simulator also incorporates cost estimates and economic analysis. The graphic illustrates the significance of the database as a crucial information source for various items in the structure. Process simulation techniques include the following:

Steady state simulation, which takes a moment in time into account. Dynamic simulation, which takes into account how the process' characterizing equations change over time. An integrated simulation of steady-state dynamics, which

combines the first two methods. When it comes to process simulation, these three methods may be used in a variety of ways. Process analysis is one option. In this method, an existing process is examined, and alternative circumstances as well as dynamic behavior are looked at to determine how successful the design is. The second method is called process synthesis, and it compares various process setups to determine which units and linkages work best. The third option is process design and simulation, which seeks to identify the ideal circumstances under which a particular process should operate [2].

All of these scenarios have widespread effects on industry rather than ones that are isolated to certain stages of the process development. The use of technical knowledge in processes has been significantly impacted by process simulation. Designing flowsheets and specifying important equipment characteristics, such the stages and column diameter of a distillation column, were the major goals of the conventional use of process simulation. Today's engineers are focused on a more thorough application of process simulation throughout the entire "life" of the plant, including control strategy design, process parameter optimization, process time evolution study for startup and shutdown procedures, risk analysis, operator training, and procedure definition to lessen non-steady-state operations.

The primary advantages of using process simulation in this way are the partial or complete replacement of pilot plants, the shortened time to market for the development of new processes, and the quick screening of process alternatives to determine which is the best option in terms of cost, environmental impact, energy use, and flexibility. Chemical processes are quite complicated, thus in order to reap their advantages, one must significantly simplify the process and use process simulation methods across the whole life cycle of a process. Steady-state simulators, which are used for designing processes, assessing process modifications, and examining what-if scenarios, are regarded as the basic products of process simulation. Dynamic simulation, process synthesis using pinch technology, thorough equipment design, off-line and on-line equation-based optimization, and application technologies for vertical markets are often undertaken after steady-state simulation. The construction of an appropriate thermodynamic model, the need to define dummy operations, and the identification of tear streams to enable quick convergence are the issues that arise throughout a process simulation run.

The following is the logical order in which a simulation should be run. The first step is to specify every component, both standard and unconventional, that will be utilized in the simulation. The choice of physicochemical parameters to be employed in the calculations is the next and most crucial phase in the definition of the simulation. After doing this, one moves on to define the feed conditions and flowsheet connection. The internal definitions of the unit operation come next. At this point, a base case may be executed to see whether the system is converging. In order to refine the simulation and provide results that are accurate to reality, control parameters, process specification definitions, and equipment hold-up definitions are subsequently included. A simulation run yields a range of alternative outcomes. The verification of the process operating conditions, knowledge of intermediate streams and enthalpy balance, verification of plant specifications, and influence of operative parameters on process specifications are the most crucial. These are followed by the validation of phase equilibria models for the real system to be used in similar conditions [3].

All of this information is helpful for creating process management methods, for de-bottlenecking the whole process or a specific step of it, and for fine-tuning the instruments. This is significant because it enables the verification of how security systems behave under various process settings. Applications for dynamic simulation include continuous processes, concurrent process and control design, assessment of various control techniques, resolving process operability issues, and process safety verification. The capital avoidance and lower operating costs that result from better engineering decisions, the improvements in throughput, product quality, safety, and the environment that result from better process understanding, and the increased productivity that results from better integrating engineering work processes are the most significant advantages of dynamic modeling. The effort being done to simulate significant biotechnological and phytochemical processes is summarized in this section.

II. DISCUSSION

A. Short Description of Biotechnological Processes

The approach aims to simulate ethanol generation from biomass fermentation in a constant condition. The procedure is broken down into two steps: separation using a distillation column that concentrates the ethanol and biomass fermentation that creates a combination of ethanol, water, and other ingredients. Continuous stirred tank reactors in series or parallel make up the simulated reactors.

B. Refining soybean oil and Handling Waste

This project aims to model the refinement of soybean oil. This intricate biotechnological procedure treats solids and includes several reactions. Degumming and neutralization, bleaching, and deodorization are the three divisions of the procedure. The simulation's primary goal is to use pinch technology to minimize the amount of steam that is used. In order to heat the oil, steam is used in heat exchangers, bleacher equipment, and deodorizers. This simulation is challenging since there are so many unknown components that need to be described in order to provide a trustworthy simulation. Additionally, extraction with ethanol is being investigated as a different method of decreasing the free acids. The accomplishment of the requisite product quality while reducing capital and operational expenses are key

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elements.

C. Utilizing Biomass to Produce Synthetic Hydrocarbon Fuels

Gasification may create a syngas with the right composition starting with natural gas, coal, or wood. The syngas may then be processed using the water-gas shift reaction, Fischertropsch synthesis, and hydrocracking to produce a mixture of liquid hydrocarbons that can be utilized as synthetic fuel. By ignoring the kinetics of the various chemical processes, this complicated process may be made simpler. This research aims to measure carbon dioxide emissions as well as energy and mass consumption. The use of a thermodynamic model to provide a realistic simulation, the integration of heat into various process steps to reduce the environmental effect of recovering and recycling the entrainer, and the decrease of energy requirements are key characteristics [4], [5].

D. Corn-based Bioethanol Production

Ethanol is readily made by fermenting sugar cane, maize, or wheat. The solid by-product is dried after being put through the following steps: liquefaction, cooking, fermentation, distillation, dehydration, evaporation, and distillation. The requirement for water and energy may be reduced and the usage of fossil fuels can be avoided by carefully simulating the procedures involved. The energy balance beginning with the biomass content of the feedstock and water conservation are important elements. By precisely replicating the distillation and dehydration steps of this process, which have the largest energy requirements, a second issue may be solved. The utilization of pressure as an operational variable is a crucial component.

E. Phytochemical Processes in Brief

The creation of citral is the aim of this method. To get an oxygenated product, lemon peel oil is fractionated using a conventional technique of separation. A distillation simulation model aids in determining the ideal conditions for operation. This simulation's goal is to distinguish terpenes from oxygenated chemicals.

F. Menthol Recovery via Mentha Oil Crystallization

Menthol, a significant commercial product, is present in mentha oil. Due to differences in melting temperatures, menthol is distinguished from the other components. Due to its capacity to produce high purity separations, crystallization from solution is a crucial unit operation for the industrial sector. Before methodically developing a crystallizer and calculating the best operations and control methods, the crystal growth and nucleation kinetic parameters must be empirically established [6].

G. Recovery of Carvone from Spearmint Oil

The primary constituent of spearmint oil, carvone, has to be isolated from the other constituents. Continuous distillation is used to separate carvone, and the procedure is adjusted once the relevant parameters are identified and determined via sensitivity analysis. The goal of this simulation is to produce carvone that is at least 95% pure.

Steam Distillation for the Extraction of Peppermint Oil

The peppermint leaves are put at the bottom of a distillation flask and steam is percolated through to distill the peppermint. The peppermint oil evaporates, and the vaporized water and oil that results pass into a coil that typically has flowing water to cool it, where the steam condenses. Decantation or, in rare circumstances, centrifugation is used to gather and separate the condensed water and essential oil combination.

H. Multiple-effect Milk serum evaporation

For the recovery of valuable compounds from diluted aqueous mixes, such milk serum, evaporation is a commonly utilized procedure. In this situation, a four-effect process aids in reducing energy usage and enhances the process's economic appeal. The impact of pressure and heat transfer coefficients on the apparatus's overall performance is one of its key characteristics.

I. Case Analysis Distillation of Batch Turpentine Oil

The primary uses of turpentine oil derived from Pinus species are in the paint and soap sectors, while its usage in the medicinal business is restricted to balms and oil bases. Fractional distillation is the process used to create semifluid resin mixes since the resins are still dispersed in the volatile oil. The development of the process simulation base case, comprehension of how to accomplish full fractionation of the oil, optimization of the composition of pinene, carene, and longifolene in the product streams, and optimization of the time and energy consumption of the process are the goals of the process simulation. The top of the distillation column shows the pinene, carene, and longifolene fractional composition profiles against time [7].

J. Time-based energy usage for the whole fractionation case

These simulations demonstrate that a significant proportion of pinene is collected by the distillate accumulator in the basic scenario with a reflux ratio of 15 and a high energy usage. Pinene has a composition of around 90% and can be produced in about 12 hours with a reflux ratio of 5, saving both time and energy if a PID controller is used to keep the concentration constant. At the conclusion of the procedure, we may recover 93% of pinene, 88% of carene, and% of the waste products in the event of full fracture.

K. Menthol Recovery via Mentha Oil Crystallization

Because it can provide high-purity separations, crystallization from solution is a crucial industrial process. The method for crystallizing menthol using menthe oil is a straightforward cascade crystallization. The simulation's goal is to make the menthol crystallization process as efficient as possible. The oil is put into the first crystallizer, which is set at 35° F, and contains 75% menthol in addition to menthyl

acetate, limonene, and menthone. By decantation, the menthol crystals generated here are separated. The liquid that has been decanted is then transferred to the second crystallizer, where the crystals produced in the subsequent step are likewise separated from the liquid by decantation. Therefore, it is assumed that limonene is present in all fractions and that the separation of the solid from the liquid is complete. Additionally, the database of the program contains information on the thermos physical characteristics of menthone and menthylacetate. The use of process simulation in phytochemical processes of industrial significance has two significant advantages. Improving process knowledge comes first.

This is accomplished by "in silico" confirming the operational parameters and data estimations for intermediate streams, which are challenging to measure. Enthalpy balance information, plant specifications verification, the impact of operational parameters on process specifications, validation of phase equilibrium models for the real system to be used in similar conditions, and process de-bottlenecking for each section are additional components of process knowledge. The second significant advantage is process optimization, including identification of process management techniques, clarification of security system behavior when process circumstances change, and consumption of energy and raw materials [8], [9]. The following prerequisites must be met in order to run process simulation software: availability of thermodynamic properties for all involved components; definition of an accurate thermodynamic model for binary and multi-component mixtures; availability of all required interaction parameters; availability of all required unit operation modules; and identification of tear streams to achieve rapid convergence in the event of recycles. Furthermore, user models and user thermodynamic models must sometimes be defined and developed.

It is crucial to emphasize a few key ideas. First, the program serves as a tool for computations and decision-making; the process engineer must guarantee that it is "fit for purpose" and that it is accountable for both the output it produces and any use to which it is put. Second, the process engineer must apply caution and sound judgment in accordance with professional, ethical, and legal obligations. In its most basic form, process simulation is a program. Process simulation is crucial for the design of new and existing processes, for the analysis of existing plants in terms of environmental impact, and because it is a straightforward tool for handling real cases. Nevertheless, process simulation is important because it: has high accuracy; enables one to focus on the interpretation of the results rather than on the methods for obtaining the results; allows a global vision of the process by assembling theories and models. The petrochemical industry has been using process simulation for ten years, and it is a well-known technology in the chemical sector. In addition to the petrochemical and fine chemical industries, process simulation is increasingly useful in many other fields. Biotechnological and phytochemical processes are of special importance in this regard [10], [11].

III. CONCLUSION

In conclusion, process simulation may be crucial to the optimization of phytochemical processes; as a result, its implementation may help create cutting-edge procedures. This study demonstrated that both energy reduction and product yield maximization are feasible goals. Since they should focus on achieving a steady product quality rather than an optimization of energy consumption and environmental difficulties, process simulation may not be a viable tool for nations utilizing primitive technology. Additionally, they should concentrate on real-world issues like the caliber of the components and the extraction water.

REFERENCES

[1] A. Munir, O. Hensel, W. Scheffler, H. Hoedt, W. Amjad, and A. Ghafoor, “Design, development and experimental results of a solar distillery for the essential oils extraction from medicinal and aromatic plants,” Sol. Energy, 2014, doi: 10.1016/j.solener.2014.07. 028.

[2] K. K. Chandrakant, D. J. Pravin, H. S. Bharat, K. Sachin, and K. P. Amol, “" A Overview O Supercritical Fluid Extractio For Herbal Drugs ",” Pharmacologyonline, 2011.

[3] N. Manousi, I. Sarakatsianos, and V. Samanidou, “Extraction Techniques of Phenolic Compounds and Other Bioactive Compounds From Medicinal and Aromatic Plants,” in Engineering Tools in the Beverage Industry: Volume 3: The Science of Beverages, 2019. doi: 10.1016/B978-0-12-815258-4.00010-X.

[4] K. K. Chandrakant, D. J. Pravin, H. S. Bharat, K. Sachin, and K. P. Amol, “An Overview On Supercritical Fluid Extraction for Herbal Drugs,” Pharmacologyonline, 2011.

[5] A. Oreopoulou, D. Tsimogiannis, and V. Oreopoulou, “Extraction of Polyphenols From Aromatic and Medicinal Plants: An Overview of the Methods and the Effect of Extraction Parameters,” in Polyphenols in Plants, 2019. doi: 10.1016/b978-0-12-813768-0.00025-6.

[6] I. Maleš et al., “The medicinal and aromatic plants as ingredients in functional beverage production,” Journal of Functional Foods. 2022. doi: 10.1016/j.jff.2022.105210.

[7] N. J. Sadgrove, “Southern Africa as a ‘cradle of incense’ in wider African aromatherapy,” Scientific African. 2020. doi: 10.1016/j.sciaf.2020.e00502.

[8] A. Saha and B. B. Basak, “Scope of value addition and utilization of residual biomass from medicinal and aromatic plants,” Industrial Crops and Products. 2020. doi: 10.1016/j.indcrop.2019.111979.

[9] D. Arslan, M. Aydın, and S. Türker, “Extraction Methods of Medicinal and Aromatic Plants, Its Use in Foods and Evaluation in Food Supplement Field,” Turkish J. Agric. - Food Sci. Technol., 2021.

[10] S. S. Handa, “An Overview of Extraction Techniques for Medicinal and Aromatic Plants,” in Extraction Technologies for Medicinal and Aromatic Plants., 2008.

[11] N. M. Boukhatem, A. Ferhat, And A. Kameli, “Méthodes D’Extraction Et De Distillation Des Huiles Essentielles :

Revue De Littérature," BOUKHATEM al. Rev. Agrobiol., 2019.

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Techniques for the Maceration, Percolation, and Infusion of Medicinal and Aromatic Plants

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Abstract— Galenicals and tinctures made from medicinal and aromatic herbs have historically been created using methods of maceration, percolation, and infusion. In addition to discussing the different changes made for the small- and large-scale extraction of MAPs, the variables impacting the extraction process, and the quality of the extracts produced, this paper examines the underlying concepts and processes of these extraction procedures. There was little advancement in plant material extraction techniques prior to the eighteenth century. However, for a very long time, simple expression and extraction procedures were popular for the creation of the numerous classes of preparations used in both conventional medicine and in complementary and alternative medicine, which are both widely practiced across the globe.

Index Terms— Aromatic Plants, Maceration, Medicinal, Percolation.

I. INTRODUCTION

Expression, aqueous extraction, and evaporation were the only procedures available; subsequently, the usage of extraction processes was expanded by employing alcohol as a solvent. These methods were quite effective in the field of phyto chemistry, and as a result, single, pure molecules were separated for use in both industrial and medical applications. Rapid advancements in extraction techniques achieved after the eighteenth century allowed for the separation and identification of several groups of plant metabolites with therapeutic value, including both individual chemical ingredients and standardized extracts of unprocessed medicines. Simple traditional methods and cutting-edge technologies are used in the production of different classes of medicinal plant preparations, including decoctions, infusions, fluid extracts, tinctures, semisolid extracts, and powdered extracts, commonly referred to as galenicals, while adhering to the official procedures and specifications outlined in various pharmacopoeias and codices around the world.

The common methods for extracting medicinal plants are maceration, percolation, and infusion, which are usually employed for galenical medicines. Such elementary extraction techniques serve just to retrieve the therapeutically useful component and remove the inert material by treatment with menstruum, a selective solvent. The qualitative and quantitative assessment of the extracts is greatly influenced by these procedures. The thusly produced standardized extracts undergo further processing before being added to various solid and semisolid herbal dosage forms. For different dosage forms of contemporary pharmaceuticals, these extracts serve as sources of chemical components that are therapeutically effective. Galenical preparations were utilized far more often in the past than they are now. However, these extraction techniques are still important and are covered in both official and unofficial monographs regarding medication preparations owing to the global increase in interest in herbal treatments [1]. Because they quickly form a deposit owing to the coagulation of inert colloidal paper and easily enable microbiological growth due to the lack of preservatives, the preparations incorporating these processes are mainly designed for extemporaneous dispensing and must be freshly prepared. In addition to describing the alterations made to these processes for small-scale, official, and large-scale extraction, this page also discusses the main extraction techniques using maceration, percolation, and infusion.

The selection of the extraction technique, quality control, and variables influencing the extraction methods are also covered in the study. General Rules and Mechanisms for Maceration, Percolation, and Infusion Crude Drug Extraction The main concepts and methods used in maceration, percolation, and infusion for the extraction of crude pharmaceuticals are the same as those used in leaching, which is the process of extracting soluble elements from solid materials using a solvent. Leaching procedures might entail a straightforward physical dissolving or solution. The rate of solvent transport into the mass, the rate at which the solvent solubilizes the soluble elements, and the pace at which the solution is transported out of the insoluble material, all have an impact on the extraction processes. Increasing the material's surface area and reducing the radial distances between the paper are the two main factors that support the extraction of crude medicines.

According to mass transfer theory, size reductions that result in the breakdown of material into individual cells provide surfaces with the greatest surface area. In many instances, however, using vegetable material, this is not feasible nor desired. It has been shown that even 200 mesh paper contain hundreds of whole, undamaged cells. In order to obtain an extract with a high degree of purity and to give the solvent enough time to diffuse through the cell wall, dissolve the desired solute, and reach the cell wall's surface, it

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is important to carry out extraction on intact cells.

A. Factors Affecting the Extraction Process of Choice

A lot of variables affect the decision about the extraction method to be employed for a medicine. The type and properties of the crude pharmaceuticals to be extracted essentially determine whether to utilize maceration or percolation. For the optimum outcome, it is thus crucial to be aware of the many types of tissues and organs found in plant materials [2].

B. Continuity of the Raw Drug

When a drug's ingredients are thermos labile, continuous heat extraction techniques should be avoided. When using a costly crude medication, full extraction is preferred. Percolation should thus be employed from an economic standpoint. Despite its reduced efficacy, maceration is acceptable for low-priced medications because of its cheaper cost. The choice of solvent is influenced by how easily the unwanted components of the substance may be dissolved. Continuous extraction should be employed if the components need a different solvent than a pure boiling solvent or an azeotrope.

C. Concentration of the Finished Good

By maceration or percolation, diluted items like tinctures may be created. The more effective percolation method is employed for semi-concentrated formulations. By percolating, concentrated preparations like liquid or dry extracts are created. To protect thermos labile ingredients, solvent recovery is preferred at decreased pressure.

The Extraction Process and Solvent for Quality Assurance

The kind of extraction technique also has a significant impact on the extract's qualitative and quantitative makeup. Important considerations for the extracts' quality include the following: The yield of the active ingredients in herbal medicines improves with more thorough extraction. The added stirring and shearing forces may result in greater extraction if maceration is aided by stirring and the usage of comminuted material. Time, temperature, and solvent volume of the extraction process are additional parameters affecting the quality of the extracts. Some medications extract so slowly that only percolation or multistage motion extraction may result in exhaustive extraction. In many instances, increasing the temperature may significantly enhance the transfer of quality-relevant elements from the herbal medications to the extract. At higher temperatures and for longer extraction durations, hypericin, pseudohypericin, and biapigenin extract more effectively. The ratio of herbal medication to solvent also affects the quality of the extracts and the range of ingredients produced by maceration or digesting. With an increase in extraction solvent volume, more material is extracted. The whole spectrum of compounds produced with percolation, for instance, may be obtained with a drug solvent ratio of 1:20 when Salvia officinalis flowers are macerated. This method provides practically comprehensive extraction. The kind, concentration, and elution strength of the solvent all affect how a herbal extract is made up. Depending on whether the solvent is hydrophilic or lipophilic, the range of components might vary greatly.

D. Maceration Methods

E. Normative Practice

On a modest scale, the usual procedure for maceration is adding the chosen solvent, known as menstruum, to the appropriately crushed plant material or a relatively coarse powder formed from it in a closed vessel. Seven days are given for the system to stand, sometimes shaking. The remaining solid, known as marc, is then crushed to recover as much of the occluded solution as possible after the liquid has been strained off. The resulting strained and expressed liquid is blended and clarified via filtration. It is never necessary to employ plant material in fine powder form since doing so makes it difficult to clarify the extract later on. Vegetable medications are given enough time to diffuse through the cell wall so that the menstruum may solubilize the contents within the cells and for the resultant solution to diffuse outside. The system is static, with the exception of sporadic shaking, therefore the extraction process relies on molecular diffusion, which is a very slow process. A little shaking every now and then helps diffusion and ensures that the concentrated solution that has built up on the surface of the paper is dispersed, bringing new menstrual fluid to the ppaper surface for more extraction. The menstruum is kept from evaporating throughout the extraction process by using a closed vessel, which eliminates batch-to-batch variance. When equilibrium has been attained during the maceration process, the solution is filtered through a cloth, and the marc may be pressed via a special press. The strained and expressed liquids, also known as miscella, have the same amounts of active ingredients and may thus be mixed. It is crucial to provide enough time for coagulation and settling since the extracted liquid could be turbid with colloidal and tiny paper. The settled matter is filtered using a filter press or another piece of tools that is appropriate. Process of Maceration for Crude Drugs, both Organized and Unorganized. Unorganized medications lack cellular structure, while structured drugs have a definite cellular structure. While gum and resin are instances of unstructured crude medicines, bark and roots are examples of organized crude drugs. Drugs that are structured and disorganized go through somewhat different maceration procedures [3].

The marc is squeezed during the maceration of illicit substances because a significant amount of the liquid sticks to it and cannot be separated in any other way. Furthermore, the volume is not changed since the marc still contains a variable quantity of liquid containing soluble materials. If the volume is changed, the product will become weak. Regardless of the effectiveness with which the marc is pressed in a hand press, screw press, or hydraulic press, the volume of liquid

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expressed affects the product yield and the percentage of soluble matter, excluding correction; the strength of the product is unaffected. The preparations produced by this technique include tinctures of orange, capsicum, gentian, lemon, and squill as well as vinegar of oxymel of squill. The desired material is mainly dissolved and the leftover marc is viscous and slimy after the maceration of unstructured medicines, therefore it is not pressed. Therefore, pressing it is not practical nor essential. Additionally, the volume is changed according to how readily filtration can separate the clear top layer from the lower layer. The majority of the drug's soluble components are present in the solution; the minor portion that is adhering to the gummy substance is recovered when the marc is cleaned with menstrual fluid in the filter. As a result, volume adjustment produces homogeneity. This method is used to create preparations such compound tinctures of benzoin, myrrh, and tolu [4].

F. Changes to the General Maceration Processes

Because a significant portion of the active principle may be lost during the initial pressing of the marc, repeated maceration may be more effective than a single maceration procedure, as previously explained. When the active ingredients are very valuable and/or when the concentrated infusions include volatile oil, double maceration is utilized. When pressing the marc is not possible, triple maceration may be used. The amount of solvent required overall is substantial, however, and the second and third macerates are often combined and evaporated before being added to the first macerate.

G. Procedures for large-scale extraction

Modifications are necessary for industrial, large-scale extraction. Occasional shaking is not a concern when the extraction jar contains a tiny volume of solvent. Shaking the containers is challenging in industrial settings when there is a lot of solvent and big vessels are involved. Of course, there are other agitation techniques that are as effective and much easier to use. The importance of economics is also rising, and one of the most significant goals is to increase extraction efficiency so that less solvent is used and the amount of evaporation needed for concentrated products. Another benefit of lowering evaporation costs is that thermos labile components are less likely to be damaged by heat. The next paragraphs provide descriptions of a few of the modified maceration techniques utilized for extensive extraction.

H. Extraction via Circulation

The solvent to be continually cycled through the medication may increase the effectiveness of extraction in a maceration process. Spray nozzles apply the solvent to the drug's surface once it is pumped from the bottom of the vessel. The uniform distribution diminishes local concentration in a shorter amount of time while the mobility of the solvent minimizes border layers.

I. Complex Extraction

Since mass transfer stops when equilibrium is attained, the regular maceration procedure leaves extraction unfinished. A multistep procedure may be used to solve this issue. A container for the raw medication, a circulating pump, spray distributors, and a number of tanks to hold the extracted solution are required for this procedure. Any of the tanks may be linked to the extractor for the transfer of the solution since the extractor and tanks are connected by pipes and valves. Each batch of medication is treated with solvent numerous times, and after each cycle, the receivers are filled with the solution, with the strongest solution being in receiver 1 and the weakest in receiver 3.

II. DISCUSSION

There are as many extractions of the raw medication as there are receivers. It is only essential to have more receivers if more extraction processes are needed. The medication receives a new solvent as its last treatment before being released, ensuring optimum extraction. The new medicine is in touch with the solution before it is removed for evaporation, producing the greatest concentration achievable.

A. Procedure

Put crude drug in the extractor, then circulate while adding solvent. Move quickly to receiver 1. Circulate after adding more solvent to the extractor. Run to receiver number two. Circulate after adding more solvent to the extractor. Move quickly to receiver 3. Drug extractor should be taken out and recharged. Return the extractor with the solution from receiver 1. For evaporation, remove. Circulate the solution from receiver 2 back into the extractor. Move quickly to receiver 1. Circulate the solution from receiver 3 back into the extractor. Run to receiver number two. Circulate a new solvent in the extractor. Move quickly to receiver 3. Drug extractor should be taken out and recharged. Recurring cycle [5].

B. Removal Battery

The percolate is a relatively diluted solution during a typical percolation process, while the highest concentration is desired. When handling vast quantities of a single substance, continuous extraction machines of the battery kind are utilized. It is possible to create these devices by thinking about percolation as a multistage process. An extraction battery procedure employs a number of vessels for semi continuous extraction.

C. Equipment

A collection of containers with internal pipes make up an extraction battery. The arrangement of the vessels makes it possible to add solvent and remove product from any vessel. Therefore, any of these boats might serve as the first of a series made up of these vessels. The easiest way to assemble three containers is by using an extraction battery.

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D. Percolation

General Percolation Process

In this procedure, a percolator is filled with an organized vegetable medicine in a suitable powdered form, and the solvent is allowed to percolate through it. Even though certain ingredients may be placed dry straight into the percolator, this might interfere with other medications. The dry substance expands when a solvent is added, and this swelling grows as the solvent's watery nature increases. This swelling significantly impairs the extraction process by reducing or obstructing the flow of the solvent. Additionally, if the dry powder is packed, small paper might wash down the column and collect at the lower levels, severely decreasing porosity, obstructing the column, and altering its uniformity. Even the smaller papers could wash out of the column. In order to avoid these issues, the raw material must first be uniformly moistened with menstrual fluid for a period of four hours in a separate, closed vessel. This procedure is known as imbibition. The raw drug is allowed to swell as much as possible during this time. Therefore, more menstruum is required during imbibition when aqueous solvents are employed for extraction. Additionally, the solvent's vapor replaces the medication powder's blocked air, allowing the substance to be packed more evenly and the menstrual flow to be more consistent. Inefficient extraction results from uneven packing, which allows more solvent to flow via channels with less resistance to the solvent's flow.

The medication is equally packed into the percolator after imbibition. A loose plug of tow or another appropriate material is wet with the solvent first, then the medication is placed over it. Layering the material and compressing it evenly using an appropriate tool might result in uniform packing. The amount of pressure used to compress the material will vary depending on its nature and permeability. In order to prevent the top layer of the medication from being disturbed when solvent is added for extraction, a piece of filter paper is put on the surface once packing is complete, and followed by a layer of clean sand.

Now, enough menstruum is carefully and evenly poured over the medication to completely saturate it while maintaining an open tap at the bottom to enable the trapped gases between the paper to escape. Never pour menstrual fluid when the tap is closed since the air will escape from the top and disturb the bed. When menstrual fluid starts to drop through the tap, it is shut; then, enough fluid is poured to keep a thin layer over the medication, and it is left to stand for 24 hours. The layer of menstruum above the bed's top surface keeps the top layer from drying out, which might cause cracks to appear there. During the 24-hour maceration period, the solvent may permeate through the medication, solubilize the component parts, and leach off the material that is soluble. In comparison to percolation without the maceration phase, the extraction is more effective in this approach [6].

Following the maceration, the outlet is opened and a regulated amount of new solvent is continuously added while the solvent percolates. The kind of finished product determines how much percolate is collected. Typically, around 75% of the completed product's volume is collected, the marc is pressed, and the expressed liquid is added to the percolate, providing the ultimate volume between 80% and 90%. Following testing, the volume is corrected using determined amounts of fresh menstrual blood. If there isn't an assay available, the volume is modified after adding any additional ingredients. In percolation, pressing the marc only serves to recover the valuable solvent; the ex-pressed liquid is devoid of active ingredients since they have already been removed during the percolation process. This is in contrast to maceration, which involves pressing the marc.

Changes to the General Percolation Process

The following issues may occur during the general percolation process, especially when producing concentrated preparations like liquid extracts: Large amounts of diluted percolate may evaporate, perhaps losing some of the active ingredients if the components are thermos labile. Alcohol vaporizes preferentially during evaporation in alcohol-water combinations, leaving behind an almost entirely aqueous concentration. The chemicals may precipitate since this may not be able to keep the extracted content in solution. In certain circumstances, the standard percolation procedure is altered as detailed in the following paragraphs.

Reserved Percolation

In this instance, extraction is carried out using the standard percolation method. When all the water has been evaporated, the process is finished by applying lowered pressure in machinery like a climbing evaporator to produce a soft extract. The evaporated fraction is then readily dissolved in the very alcoholic reserved portion without any danger of precipitation.

E. Method of Cover and Run Down

This method combines the percolation and maceration processes. Materials with volatile components or those that alter during the evaporation step cannot be processed using this method. This process is useful since industrial methylated spirit rather than the pricy rectified spirit may be utilized for extraction. The specific steps are listed below. The material is packed in a percolator after the imbibition step and macerated for a few hours with a sufficiently diluted industrial methylated spirit. Then the liquid is drained, and more menstrual fluid covers the bed. The second volume of the extract is gathered after the same amount of maceration as previously. A new batch of the medicine is extracted using the later, weaker extracts from this procedure, which is done numerous times. To get rid of the harmful methanol, more concentrated fractions are evaporated at less pressure. The concentrate is diluted with water and ethanol to achieve the proper concentration of alcohol and active principle after being tested for the active principle or the total solids content. For both small- and large-scale extraction, many percolator types are used [7].

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F. Laboratory- or small-scale Extraction

Maceration and percolations, which are used to make concentrated preparations, entail solvent extraction followed by evaporation. A continuous extraction technique combines the two activities. The next paragraphs outline the typical methods and equipment used for small- or laboratory-scale extraction.

G. Soxhlet Device

The Soxhlet device is utilized on a lab scale. A flask, a Soxhlet extractor, and a reflux condenser make up this apparatus. The raw material is typically put in a filter paper thimble and pushed into the extractor's large central tube. Alternatively, the medication may be placed in the extractor after being ingested with menstrual fluid, taking care to avoid blocking the bottom extract exit. The fluid is filled with solvent and heated to boiling. Its vapors go from the extractor's top section via the bigger right-hand tube into the condenser, where they condense and fall back onto the drug. The soluble components are removed at this time. The full volume of extract syphons over into the flask when the level reaches the top of the syphon tube. The procedure is repeated until all of the medication has been removed. The flask's extract is subsequently processed. Thus, this process consists of a number of quick macerations.

H. Authorized extractor

An authorized extractor as defined in the authorized monographs. The extraction method used in this instance is continuous percolation. In this system, the drug container is passed through the extraction chamber while vapors rise through it. The vapor then condenses in the reflux condenser and returns through the drug, carrying any soluble components to the flask. Because the extraction is carried out at a high temperature and the extract in the flask is also kept in the hot state until the procedure is complete, it is not beneficial when the raw material includes thermos labile active components. Only pure solvents or solvent mixes that produce azeotropes may be utilized with it. The composition of the vapor will vary from the composition of the liquid if an ordinary binary mixture is employed as the menstruum. Large-scale manufacturing may make use of comparable techniques. An example of a standard industrial extraction setup. The operating concept is similar to that of laboratory equipment.

I. Massive Extractor

The medication is resting on a perforated metal plate that is wrapped in sacking or straw. The percolator includes a detachable cover with portholes for introducing the solvent and monitoring the solvent flow. The percolator's output is equipped with a tap and pipeline. By performing the extraction in a counter-current way, this outlet enables the evacuation of the percolate for further processing or for use as a menstruum in a second percolator connected in series. Percolators constructed of glass or stainless steel have mainly replaced the small-scale copper percolators that were formerly utilized. A slightly conical percolator is preferable to a cylindrical one since the latter prevents the solvent from permeating the material located close to the edges at the bottom and allows for the eventual expansion of the bed [8].

J. General considerations for infusion

Dilutions of solutions that include the easily soluble components of crude pharmaceuticals are known as infusions. Previously, fresh infusions were utilized and reduced to eight volumes by briefly macerating the medicine with cold or boiling water, but nowadays, infusions are often made by diluting one volume of a concentrated infusion to ten volumes using water. An altered percolation or maceration technique is used to create concentrated infusions. Concentrated infusions mimic the matching fresh infusion in intensity and scent after being diluted with water. Because infusions are susceptible to bacterial and fungal development, it is important to use them within 12 hours after preparation.

K. Typical Procedure for Making Fresh Infusions

The coarsely powdered crude medication is wet with 50 cc of cold water and let to stand for 15 minutes in a suitable jar with a lid. 900 ml of boiling water is then added, and the vessel is securely covered and let to stand for 30 minutes. After the mixture is filtered, 1000 ml of water is added to the infusion. Some medications are provided in muslin bags for making particular volumes of infusion, and as such, they are used to prepare infusions. Cold water should be used if the heat of the boiling water is affecting the infusion's action. Fresh infusions should only be prepared on the spot and in tiny amounts as needed since they do not store well [9].

L. Concentrated Infusions Preparation

The official monographs also acknowledge certain "concentrated infusions," where 25% alcohol is added before, during, or after the infusion procedure and is diluted in accordance with pharma copoeial requirements. When the active and desired drug components are equally soluble in water and the menstruum utilized for both concentrates and infusions, concentrated infusions are particularly made.

M. Evaporation

The evaporation of the eluate from the soft extract is one characteristic that is important to quality. The most recent advancement is careful vacuum evaporation, which limits evaporation temperatures to 55 °C. If the extract contains volatile or thermos labile constituents, the temperature in relation to the evaporation time is especially significant for the quality of this step.

III. CONCLUSION

When compared to exhaustive extraction, steady-state extraction yields a different spectrum of components. One may produce a spectrum of elements using maceration that is

comparable to percolations. The study of several manufacturing batches that confirms the compliance with standards and the observance of essential quality criteria allow different extraction techniques to be considered equal.

REFERENCES

[1] J. Singh, "Maceration, Percolation and Infusion Techniques for the Extraction of Medicinal and Aromatic Plants," in Extraction Technologies for Medicinal and Aromatic Plants, 2008.
[2] E. El Maaiden et al., "A Comparative Study between Conventional and Advanced Extraction Techniques: Pharmaceutical and Cosmetic Properties of Plant Extracts," Molecules, 2022, doi: 10.3390/molecules27072074.
[3] N. Manousi, I. Sarakatsianos, and V. Samanidou, "Extraction Techniques of Phenolic Compounds and Other Bioactive Compounds From Medicinal and Aromatic Plants," in Engineering Tools in the Beverage Industry: Volume 3: The Science of Beverages, 2019. doi: 10.1016/B978-0-12-815258-4.00010-X.
[4] T. Balakrishna, S. Vidyadhara, R. Sashidhar, B. Ruchitha, and E. Venkata Prathyusha, "A review on extraction techniques," Indo Am. J. Pharm. Sci., 2016.
[5] T. Ahmad, S. B. Singh, and S. Pandey, "Phytochemical Screening and Physicochemical Parameters of Crude Drugs: A Brief Review," Int. J. Pharma Res. Rev. IJPRR, 2013.
[6] P. K. Mukherjee, "Extraction and Other Downstream Procedures for Evaluation of Herbal Drugs," in Quality Control and Evaluation of Herbal Drugs, 2019. doi: 10.1016/b978-0-12-813374-3.00006-5.
[7] R. Rodríguez-Solana et al., "Influence of elaboration process on chemical, biological, and sensory characteristics of European pennyroyal liqueurs," J. Sci. Food Agric., 2021, doi: 10.1002/jsfa.11043.
[8] M. Zougagh et al., "Adaptive immune response-modifying and antimicrobial properties of Andrographis paniculata and andrographolide," J. Chromatogr. A, 2012.
[9] N. I. Azahar et al., "Master Seminar (Psi-Sem-M)," Trends Food Sci. Technol., 2019.

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Expression, Hydrolytic Maceration and Cold Fat Extraction

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Abstract— It is crucial to include bioactive compounds into meals, flavors, medications, insecticides, and cosmetic goods without sacrificing their effectiveness. In order to maintain bioactivity, it is crucial and vital to extract the active ingredients from the raw materials. There are several extraction techniques that may be used, and they are chosen such that the phyto constituents' activity is preserved. The methods of hydrolytic maceration, expression, and cold fat extraction are covered in this chapter.

Index Terms— Aromatic Plant, Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermo labile

I. INTRODUCTION

One of the most important processes in the creation of natural goods for commercial use is the extraction of active components from plants. The process of extracting caffeine and tannins from coffee beans in hot water is perhaps the simplest example of extraction. All living things have intricate chemical combinations, which are often housed inside the cellular structural material. Some of these chemical mixtures are wanted, while others are not. Extraction is the process of separating the desired component from the whole crude medication, and it is carried out in solvents where the components change phases [1]. The stability and physicochemical characteristics of the desired phyto constituents determine which of the several extraction techniques should be used. The easiest techniques for extracting essential oils include hydro distillation and steam distillation. Cold fat extraction, expression, maceration, and solvent extraction are also used. Modern extraction methods employ more sophisticated techniques including supercritical fluid extraction, solid phase micro-extraction, and phytonic extraction. The current paper discusses cold fat extraction, expression, and hydrolytic maceration of extracts [2].

A. Water-Light Maceration

The Latin term maceratus, which meaning to soften, is the root of the English word maceration. Maceration is the process of creating a solution by soaking plant material in water or vegetable oil for medicinal and aromatic plants. Percolation techniques rely on the flow of solvent through the powdered drug, while maceration methods depend on the immersion of crude drug in bulk solvent. The following factors affect the rate of extraction: the speed at which the solvent is absorbed by the bulk that will be leached. The speed at which soluble components dissolve in a solvent. The speed at which solute is transported from an insoluble substance's interior and from its surface into a solution [3].

The powered solid substance is introduced to the selected solvent in a closed vessel throughout the maceration process. It is permitted to stand for extended periods of time while shaking occasionally. The menstruum is given enough time to diffuse through the cell wall, solubilize the constituents within the cells, and diffuse out the resultant solution. Only molecular diffusion is used in the process. When the necessary amount of time has passed, the liquid is strained off, and the remaining solid is compressed to extract as much solvent as possible. To stop microbial development when the menstruum is water and the maceration time is prolonged, a tiny amount of alcohol may be added [4].

Before fermentation begins, crushed grapes are cold-macerated at room temperature. In order to get greater aqueous extraction without the impact of ethanol on grape cells, the skin and seeds are allowed to soak for one to two days before to the start of fermentation in this method. Before maceration, such as the maceration of wine, hydrolysis may sometimes be carried out with the use of an appropriate agent. Wine quality is assessed based on its appearance, color, fragrance, flavor, and taste. Precursors of grape-derived fragrance and taste may be found in non-volatile, sugar-bound glycoside form [5]. Hydrolysis alters sensory characteristics and may improve wine quality. After hydrolysis, flavored aglycones may have an impact on the wine's quality. Enzymes that break down cell walls aid in the release of grape fragrance during cold maceration before fermentation.

B. Essential oil extraction via expression

Steam distillation or hydro distillation is the method used to separate the majority of essential oils from the corresponding plant components. Some essential oils, like those found in citrus fruit peels, may be produced and are mostly obtained by pressing, producing a higher-quality end product. Some thermos labile substances are impacted by the prolonged heating action of boiling water, which may lead to their decomposition by hydrolysis, polymerization, and resini fication. As a result, the essential oil produced during distillation does not accurately reflect the natural oil as it was when the plant material was first growing. Essential oil is

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derived from such plant materials using the expression or solvent extraction technique.

It is crucial to understand the anatomy of a citrus peel before discussing the expression process in citrus oil. Numerous oval, balloon-shaped oil sacs, glands, and vesicles may be seen on orange peels. These ductless glands are unevenly distributed and may be found in the outer colored region of the peel of ripening and mature fruit, in the outer mesocarp above the inner mesocarp and under the epicarp and hypoderm, respectively. Albedo is composed of substances such as cellulose, hemicellulose, lignin, pectin, sugars, and glycosides. Albedo cells undergo elongation and branching throughout maturity, and the wide intracellular voids they have provide the spongy feel of the ripe peel. Although the spongy layer is crucial to oil expression, it also presents some mechanical challenges during oil extraction since it readily absorbs the oil expelled from the sacs. The oil that comes out of the peel depends on the freshness and maturity stage [6]. The oil content of the peel is%-%, and its overall weight is almost half that of the fruit. Salt in aqueous solution may be found inside the cells that surround the oil sac. When a cell comes into touch with water, the greater osmotic pressure causes water to diffuse into the cell, raising turgor pressure and stressing the oil sac from both sides [7]. The spongy tissue will absorb the oil as the sacs are ruptured and tenaciously retain it if it is not filled with water. As a result, the pressure applied first produces watery fluid and then oil.

In Sicily, peels undergo a "sponge" procedure after being submerged in water for a number of hours. To stop loss by spurting, salt is dissolved in water and used as a carrier. The end result of expression is not just an oil and water combination but rather a thin emulsion that is allowed to stand; over time, a supernatant layer develops. The colloidal ppaper is absorbed during filtration using a sponge, leaving just the oil and water combination.

C. Hand-based Expression Process

The recently collected fruits are split in half transversely during this operation. Using a spoon with a sharp edge known as a rastrello, the pulp is removed. The peel is then submerged in water for a number of hours before being manually squeezed. The worker pushes the peel on the upper sponge while holding either one big or two smaller flat sponges in the left hand and the upper sponge in the right hand. From the inside, thinner peels may be squeezed [8]. The sponge soaks up the emulsion that was expelled from the oil sacs and maintains solids while absorbing colloidal materials. Oil is eventually decanted and sucked out by periodically squeezing the sponge's contents. The labor-intensive procedure yields between 50% and 70% of the total oil available in the peel. Oil produced by hand pressing is almost of the same caliber as fruit peel. The whole Italian production of lemon and orange oil used to be handled by a sizable number of tiny units in Sicily and Calabria, but the method is no longer in use.

D. Ecuelle Method

In the south of France, this procedure was commonplace. Ecuelle is made of a hollow central tube and a shallow bowl of copper that resembles a funnel. The fruit is rolled manually under pressure on the huge, blunt-ended brass nails in the basin until the fruit's whole surface releases its oil. In the middle tube, the oil and aqueous cell contents are separated by decantation. Only 20% of the total oil in the peel is yielded. With the development of technology, machines have been created to do these labor-intensive processes. Today, centrifugal force is used to extract oil from rinds.

E. Manual Device

For expressiveness, the peel is put within a hollow sponge that is fastened to a plate that is moved by a lever and connected to the base below with more sponges. Oil and other liquids are channeled down the funnel on the sponge and into the receiving vessel. Brass or bronze is used for the component that comes into touch with the oil. This is a specifically made roller machine where each peel is twisted to release the most oil possible. Other cell contents are not expelled with significant force. Oil and water are produced by collecting the emulsion and filtering it through wool or sponges. Several sfumatrici have been created and have been used in several nations [9].

Using sfumatrici, two methods are used for expression. The first method involves splitting the fruit, removing the flesh, and then expressing the peel since only the peel is treated. In the second method, the oil is extracted by either removing a superficial layer of peel to expose the oil glands or puncturing the peel glands; this is followed by washing the oil away with a water spray.

The entire fruit is crushed during whole fruit extraction using a rasping machine, and the oil is then separated from the aqueous phase. Citrus peel oil is produced as a byproduct of the citrus juice business; hence, both the oil and juice must be extracted separately, for example, using a rotatory juice extractor or a Pipkin peel oil press [10]. The fruit is mechanically cleaned here, sorted by size, and then sliced in half. The fruit is cut in half and moved between two cylinders where moderate pressing is used to extract just the juice, leaving the oil glands on the surface alone. Essential oil is produced from the leftover, half peels. For instance, the Pipkin peel oil press uses two closely spaced stainless steel cylinders with capillary grooves running around the outside to press oil. There is no need to spray water since the expressed oil immediately exits the grooves.

II. DISCUSSION

A. Today's technology

Complete automation has been accomplished now, and equipment for processing entire fruits have been created. These devices both smash the whole fruit and then separate the oil from the liquid phases using centrifugation or distillation, or they express the oil without coming into touch

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with the juice. The essential oil is released from entire citrus fruits using the oil extractor created by Brown International, located in California. The fruit is softly pounded with more than three million razor-sharp stainless steel needles arranged in the shape of spinning rollers to remove oil. The amount of pressure put on the fruit is controlled by a speed difference between adjacent rolls. Whole fruits roll through the brown oil extractor, which is comprised of toothed rollers partly placed in a flowing bed of water. As the fruit rolls across the machine, the peel is punctured, releasing the oil from the glands [11]. The oil-water combination travels through centrifugation and into the oil recovery chamber while the fruit moves on to the extractor.

Two interlocking jaws of the FMC juice extractor enclose the fruit and crush it in the space between them. Juice is separated from the peel, pith, and seeds as it leaves the fruit through a mesh screen that pierces the center of the fruit. The flavado's surface glands that contain oil may be forced to release their contents by this crushing action. The oil-water emulsion is centrifuged while water is sprayed over the fruit's surface by the FMC machine. By maintaining a low temperature, waxy substance and traces of water are kept apart. This technology is used in about a quarter of the citrus oil industry. Cold-pressed oil has a natural scent that is comparable to the oil found in fruit.

B. Extraction of Cold Fat

Jasmine, tuberose, and gardenia are a few high-quality odor-producing flowers that produce a little amount of oil but cannot be hydro distilled. Furthermore, since the oil components are thermos labile, these blooms continue to release a little amount of perfume even after being picked. Enfleurage, or cold fat extraction, is the method used to extract the oil from certain kinds of flowers. Fat has a strong ability to absorb volatile oils, and when in touch with fragrant flowers, it also absorbs the aroma. Enfleurage is the deliberate large-scale use of this technique. For the quality of the floral oil, the fat base's quality is crucial. It must have the right consistency and be odorless. The quality and output will be subpar if the crops are too hard and do not allow the flowers enough time to come into touch with them. If the crops are loose, they may swallow the flowers, making it harder to remove tired ones and causing removed flowers to retain clinging fat. The crops must be of a consistency that will result in a semi-hard surface that will allow dried-out blooms to be removed with ease.

Pomade is a saturated, aromatic fat extract. Bulgaria, Egypt, Algeria, Sicily, and Grasse all use the enfleurage procedure of cold extraction. The primary source of the highly sought-after "natural flower oil" is still France. Natural flower oil exclusively refers to floral oils derived by enfleurage, maceration, or solvent extraction and excludes the distilled essential oil. The entire process takes place in cellars with a cold climate. Enfleurage is best performed with a combination of one part highly refined tallow and two parts lard.

Crops have been prepared using a variety of bases. For instance, vegetable fat, mineral oil, esters of polyhydric aliphatic alcohol, and fatty acids with high molecular weight have all been used, but the traditional combination of lard and tallow produced the greatest results. Tallow must first be cleansed, washed, and stripped of its blood and muscles before being melted, to which benzoin and alum are then added. While alum causes impurities to coagulate when heated, benzoin acts as a preservative. Warm fat that has melted is passed through fabric and allowed to cool.

A unique "chassis" has been created to contain the fat crops throughout the procedure. These are wooden rectangles holding a glass plate. At the start of enfleurage, the fat crops are placed with a spatula to both sides of the glass: 360 g crops are needed on each side. The chassis create an airtight chamber with a layer of fat on the upper and bottom edges of each glass when they are stacked one on top of the other. Freshly picked flowers are cleaned every morning by removing the leaves and stalks and wiping away any dew or rainwater. On top of the fat layer of each glass plate, the flowers are manually scattered. Crops will get rancid if there are any traces of moisture, thus care must be exercised.

When chassis are stacked on top of one another, flowers stay in touch with the bottom fat layer, which serves as a direct solvent, while the higher fat layer just absorbs the flower's volatile aroma. The flowers are taken from the chassis after 24 hours. However, the nature of the blooms will determine when they are removed. Defleurage is the process of removing blossoms from crops. Fresh flowers are added to the chassis just after defleurage to replenish them. The chassis is flipped over for this reason, allowing the fat layer that accumulated on top of the tiny chamber during the previous procedure to be immediately charged with new flowers. A spatula is used to remove the fat crops from the chassis after they are fully soaked with scent. In a procedure known as extrait, the pomades are extracted using just 100% alcohol. The fat on the chassis is changed and increased in surface area accessible for optimal absorption by being scraped over with a metal comb at the beginning and numerous times during the harvest.

The crop on the chassis has been treated with fresh flowers 36 times over the whole enfleurage process, making the number 36 the most intensely saturated. In the case of jasmine, each kilo of fat carries a charge of 3 kg flowers throughout the course of the whole duration. Extrait No. 36 is the name given to the alcohol-washed version of Pomade No. 36, which successfully mimics genuine floral oil to an impressive degree. Occasionally, the extrait has a fatty note that may be eliminated by freezing and filtering the alcoholic washes.

Pomades are made throughout the winter in chilly, stirrer-equipped copper caves known as batteuses. The batteuses are placed in a serial fashion. In the second, third, and first washings of succeeding batteuses, the alcohol extracted from one batteuse is spilled. The last washing is

done with brand-new alcohol. The odorless fat from the process of evaporation is utilized to make soap. To completely remove the alcohol, extrait is concentrated under vacuum and at a low temperature, yielding absolute of enfleurage, which is semisolid in nature. In order to extract the flowers from the chassis, solvents are used. The concentrated residue is then dissolved in pure alcohol. Freezing is used to eliminate the fat. The absolute of chassis is the name of this preparation. Since each reflects a portion of the total oil contained in the flowers, absolute of enfleurage and absolute of chassis naturally complement one another. However, they are maintained apart owing to price differences.

III. CONCLUSION

Despite recent advancements in extraction technology, some kinds of raw materials will always need hydrolytic maceration, expression, and cold fat extraction techniques. There are currently no alternatives for these components, however citrus and floral oils, as well as other materials used in perfumery, may be extracted using hydro distillation or solvents. However, only expression and cold fat extraction can really replicate essential oils or the genuine natural smells found in these materials. The only technical advancements that won't change the fundamentals of these processes are those that make extraction simpler.

REFERENCES

[1] U. Wittstock, K. Meier, F. Dörr, and B. M. Ravindran, "NSP-dependent simple nitrile formation dominates upon breakdown of major aliphatic glucosinolates in roots, seeds, and seedlings of Arabidopsis thaliana Columbia-0," Front. Plant Sci., 2016, doi: 10.3389/fpls.2016.01821.

[2] C. C. JENKINS and K. SUBERKROPP, "The influence of water chemistry on the enzymatic degradation of leaves in streams," Freshw. Biol., 1995, doi: 10.1111/j.1365-2427.1995.tb01165.x.

[3] I. Cruz-Lachica, I. Márquez-Zequera, R. Allende-Molar, J. León-Félix, J. A. Sañudo-Barajas, and R. S. García-Estrada, "Expression analysis of the NEP-1 and cell-wall degrading genes of Gilbertella persicaria during pathogenesis in papaya (Carica papaya L.) fruits," Physiol. Mol. Plant Pathol., 2021, doi: 10.1016/j.pmpp.2021.101676.

[4] Z. Guadalupe, A. Palacios, and B. Ayestarán, "Maceration enzymes and mannoproteins: A possible strategy to increase colloidal stability and color extraction in red wines," J. Agric. Food Chem., 2007, doi: 10.1021/jf063585a.

[5] "Enhancing the Removal of Phenolic Compounds from Palm Oil Mill Effluent by Enzymatic Pre-treatment and Microwave-Assisted Extraction," Chem. Sci. Trans., 2014, doi: 10.7598/cst2014.797.

[6] A. Osete-Alcaraz et al., "The impact of carbohydrate-active enzymes on mediating cell wall polysaccharide-tannin interactions in a wine-like matrix," Food Res. Int., 2020, doi: 10.1016/j.foodres.2019.108889.

[7] M. J. Ruiz-Moreno et al., "The influence of pre-fermentative maceration and ageing factors on ester profile and marker determination of Pedro Ximenez sparkling wines," Food Chem., 2017, doi: 10.1016/j.foodchem.2017.03.048.

[8] W. Wei et al., "A fungal extracellular effector inactivates plant polygalacturonase-inhibiting protein," Nat. Commun., 2022, doi: 10.1038/s41467-022-29788-2.

[9] A. K. Singh, "Hydrolytic Maceration, Expression and Cold Fat Extraction," in Extraction Technologies for Medicinal and Aromatic Plants, 2008.

[10] P. K. Mukherjee, "Extraction and Other Downstream Procedures for Evaluation of Herbal Drugs," in Quality Control and Evaluation of Herbal Drugs, 2019. doi: 10.1016/b978-0-12-813374-3.00006-5.

[11] T. Ahmad, S. B. Singh, and S. Pandey, "Phytochemical Screening and Physicochemical Parameters of Crude Drugs: A Brief Review," Int. J. Pharma Res. Rev. IJPRR, 2013.

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Techniques for Hot Continuous Extraction and Decoction

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Abstract*— Natural goods are crucial sources for the creation of new medications. In natural therapies, the concentrations of bioactive natural compounds are almost never very high. The development of efficient and focused extraction and separation processes for such bioactive natural compounds is now of utmost importance. This essay aims to provide a thorough analysis of the many techniques used in the extraction and separation of natural products. The methods, factors, and equipment used for hot continuous extraction and decoction plant extraction are discussed in the study. Rapid solvent extraction and conventional solvent extraction principles, operations, advantages, and disadvantages are also explored.

Index Terms*— Aromatic Plant, Decoction, Medicinal, Plant Material.

I. INTRODUCTION

Decoction is one of the most extensively recorded traditional procedures for extracting medicinal plant material for an aqueous extract. A water-based preparation known as decoction is used to extract active ingredients from medicinal plant sources. In this procedure, the plant material and water are boiled to create the liquid preparation. Infusion is different from decoction in that it is not actively cooked. When dealing with stiff, fibrous plants, barks, and roots, as well as plants that contain compounds that are water soluble, decoction is the preferred procedure. Typically, the plant material is either powdered or broken up into tiny bits. The creation of decoctions may be done in a variety of ways.

The yanakuna, a crude medicine, is put in earthen pots or tinned copper containers with clay on the exterior in the Ayurvedic technique known as kwatha. The pot is filled with water and cooked over a fire. For every one part of the medicine, four parts of water should be used if the material is soft, eight times water should be used if the material is somewhat hard; and sixteen times water should be used if the material is very hard. In the case of easy medications, the mixture is next cooked on low heat until it is reduced to one-fourth of the beginning volume, and to one-eighth in the case of moderately or very hard drugs. After cooling and straining the extract, the filtrate is collected in sanitized containers [1], [2].

A. Process of Solid-Liquid Extraction

One of the most often utilized unit operations in the business of medicinal and aromatic plants is solid-liquid extraction. Solvent extraction of herbs is one instance of solid-liquid extraction. Leaching is another name for this separation method, which is often used to take a solute out of a solid mixture with the aid of a solvent. The insoluble solid may be massive and permeable, but it is more often particulate, and the paper may be surface-activated, cellular with selectively permeable cell walls, or freely porous. The underflow is the term for both the solids stream that is being leached and the accompanying liquid. Marc refers to the stream's robust substance. The overflow is the flow of liquid that the leached solute is present in.

B. Process Variables That Affect the Extraction of Solid-Liquid

The rate of solid-liquid extraction is often influenced by the following factors:

1. Processing after harvesting.
2. Features of the matrix.
3. Solvent selection.
4. Contact technique.
5. Extraction temperature.
6. Amount of washings.
7. Extractible condition

1. Processing after harvesting

Most herbs cannot be preserved without being dried since they have a moisture content of 60% to 80% after being harvested. Important compounds may decompose or the material may get contaminated if this doesn't happen. It is often suggested to dry the herbs in a thin layer in the shade. If exposed to direct sunlight for a prolonged length of time, certain medicinal plants, such as pyrethrum, lose their active ingredients. In a hot air drying oven, material may be put on several trays that are piled on top of one another to dry vast amounts of plant material. In order to prevent the medicinal plant's active ingredients from being harmed, the oven temperature must be maintained at a safe level [3].

2. Characteristics of a matrix

It's crucial to understand the carrier solid's matrix

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properties in order to decide if it has to be treated beforehand to make the solute more associable with the solvent. Plant material is ground when it is mechanically reduced from big, course pieces to fine powder. This may happen with leaves, roots, seeds, or other plant components. The inert solids may include solute in a number of ways, including:

On the solid's exterior, within the cells, surrounded by a matrix of inert material, or chemically combined. Solvent can easily remove any substance that is stuck to a solid surface. The solvent must permeate into the core of the solid to bind the solute when it is present in pores surrounded by a matrix of inert material. Ball mills and fluid mills are often used in the industry to grind medicinal plants, and the ideal ppaper size is determined before large-scale extraction.

3. Selection of Solvent

When choosing a solvent for commercial usage, the following elements must to be taken into account:

Solvent strength. High selectivity is necessary because only the active, desirable elements should be removed from the plant material. To make it easier to remove the solvent from the product, the solvent's boiling point is as low as practicable. Reactivity: The extract shouldn't chemically react with the solvent or quickly disintegrate. Reduced solvent viscosity results in reduced pressure drop, excellent heat transmission, and efficient mass transfer. Safety: The solvent should not be hazardous or caustic, should not be combustible, and its disposal shouldn't endanger the environment. Cost. The solvent should be reasonably priced and easily accessible. Vapor pressure: At working temperature, a low vapor pressure is necessary to avoid solvent loss due to evaporation. Recovery: To create an extract devoid of solvent, the solvent must be readily removed from the extract [4].

4. Prerequisites for Extraction

Inability to pack solids for extraction properly due to too-fine ppaper size may impede solvent from freely flowing through the solid bed. In this situation, extraction is more challenging, particularly when treated with finely separated sol-ids in a non-agitated condition. Contact between the solid and the solvent is made easier by agitating the paper in a liquid solvent.

While providing effective extraction, agitation may also result in the suspension of fin paper in an overflowing solution. Solid-liquid extraction technique: Single-stage systems, multistage counter-current systems, and multistage co-current systems are the three main flow types employed in leaching systems.

The single-stage system reflects the whole process of coming into touch with the fresh solvent and solid feed. Due to the limited solute recovery attained and the somewhat diluted solution generated, this is seldom seen in industrial practice. By splitting the solvent into many smaller sections and performing several subsequent extractions as opposed to only one contact of the full quantity of solvent with the solid, extraction efficiency is considerably increased.

The underflow and overflow streams in the continuous counter-current multistage system flow in the opposite directions. The concentrated solution departs the system after coming into touch with the fresh solid in this system, allowing for a high solute recovery with a highly concentrated product.

Hot and Decoction Techniques for Continuous Extraction

Continuous Extraction: Percolation and immersion are employed for continuous extraction.

C. Percolation

The solvent removes the soluble active components from the solid substance by passing through the immobile solid material. Because it does not need to move in the percolator as the product travels through the solution, this approach has the benefit of requiring minimum mechanical processing of the solid material. Additionally, since self-filtration occurs, the extract has a low amount of single solid paper [5].

D. Immersion

During this procedure, the solid substance entirely submerges itself in the sol-vent and is combined with it. Therefore, the solid material does not need any specific percolation qualities. The drawback is that the extract solution does not filter itself. As a result, a filtering step must be included.

E. Equipment for Continuous Extraction

The solid substance is put in baskets and percolates into touch with the solvent. Contrary to the movement of solid material, the solvent moves through the extractor.

1. Extractor Hildebrandt

The immersion technique is used to remove the solid substance. The extractor has screw conveyors attached to move the solid material. Once again, the solvent flows through the extractor in the opposite direction as the solid solids.

2. Extractor Bonotto

According to the immersion technique, the Bonotto extractor is utilized for counter-current extraction. The mixer moves the solid material on a tray until it reaches the open area, where it falls onto the next tray. The extracted solid material is withdrawn by the screw conveyor at the output, which also stops the solution from running out of the extractor.

3. Extractor Bollman

To ensure that this component functions against current, the new solvent is injected when the baskets are raised. In order for this portion of the extractor to work in a co-current manner, the preloaded solution is removed from the extractor's bottom and enters the downward-moving baskets. The miscella is removed in its entirety from the extractor's bottom. The miscella undergoes self-filtration in the baskets,

negating the need for further purification prior to distillation.

4. Kennedy Extractor

Paddles are used to move the solid material from one chamber to the next against the flow of the solvent. The miscella extraction chamber serves as a filtering equipment to separate the fused paper from the extract solution.

F. Traditional Solvent Extraction Mechanisms and Principles

The choice of solvent along with the application of heat or agitation is the foundation of traditional approaches for the solvent extraction of active constituents from medicinal plant matrices. Soxhlet, hydro distillation, and maceration with an alcohol-water combination or other organic solvents are currently utilized traditional methods to extract active components from plants. Soxhlet extraction is a widely used and well-proven technology that outperforms other traditional extraction methods with the exception of the extraction of thermos labile chemicals in a small number of applications [6].

The plant material is put in a thimble-holder that is filled with condensed new solvent from a distillation flask in a traditional Soxhlet method. A siphon aspirates the thimble-holder solution when the liquid reaches the overflow level and dumps it back into the distillation flask, bringing the extracted solutes into the bulk liquid. Fresh solvent returns to the plant solid bed while the original solvent stays in the flask. Up till full extraction is accomplished, the procedure is repeated.

G. The benefits and drawbacks of soxhlet extraction

Benefits: Displacement of transfer equilibrium by frequent interaction of new solvent with solid matrix. Using the heat from the distillation flask to maintain a reasonably high extraction temperature. The extract doesn't need to be filtered.

Advantages: The Soxhlet gadget does not allow for agitation. Given that extraction often takes place near the solvent's boiling point for a considerable amount of time, the risk of thermal breakdown of the target compounds cannot be overlooked. Globally, the majority of solvent extraction machines use the Soxhlet principle and solvent recycling. A drug holder-extractor, a solvent storage vessel, a reboiler kettle, a condenser, a breather system, and supporting structures including a boiler, a refrigerated chilling unit, and a vacuum unit make up the basic equipment for a solvent extraction unit. Extraction of Solvents Quickly Mechanisms and Principles [7].

A solid-liquid extraction procedure known as accelerated solvent extraction is carried out at high pressures and temperatures, typically between 10 and 15 MPa and 50 and 200 C, respectively. Consequently, pressured solvent extraction is a subset of rapid solvent extraction. A safe and quick extraction is achieved by accelerating the kinetics of extraction at higher temperatures while maintaining the solvent's liquid state at higher pressures. High pressure also makes it possible to fill the extraction cell more quickly and forces liquid into the solid matrix. Depicts a typical rapid solvent extraction system. Although pressurized hot water may be utilized, organic solvents are often employed in ASE. Pressurized hot water extraction or sub-critical water extraction are the terms used in these situations [7].

H. Accelerated Solvent Extraction: Benefits and Drawbacks

ASE offers a significant decrease in solvent consumption and extraction time when compared to conventional Soxhlet extraction. A special focus should be placed on ASE procedures carried out at high temperatures, which might result in the destruction of chemicals that are thermos labile. Designing a Solvent Extraction Plant for Medicinal Plants: Key Considerations High extraction efficiency, little solvent loss, cold and hot extraction facilities, agitated extraction, multiple solvent extraction systems, multiple fraction collecting systems, and an online filtering unit. Brine circulation unit; fractionating column for separating solvent mixtures; vent lines with breather to reduce solvent loss and maximize safety [8].

II. CONCLUSION

One of the most popular traditional methods for extracting active components from a medicinal plant is decoction, a water-based preparation. Typically, it involves boiling the plant component for a certain amount of time. One of the most used extraction methods for processing medicinal plants is hot continuous extraction, often known as solvent extraction. The solvent extraction approach is straightforward, dependable, and affordable. For optimal yield, it is important to optimize variables that might influence extraction effectiveness, such as post-harvest processing, solid properties, solvent selection, contact technique, and temperature. Selectivity, polarity, boiling point, chemical and thermal stability, safety, flammability, and prices are just a few of the numerous variables that influence the choice of solvent, particularly for commercial plants and high efficiency. Despite the financial benefits of solvent extraction, the processing of medicinal plants using volatile organic solvents like hexane, acetone, and methanol has been restricted owing to environmental concerns. The technique of choice for high efficiency, affordable extraction, and with minimum capital investment will always be hot continuous extraction technology.

REFERENCES

[1] S. Tandon and S. Rane, “Decoction and Hot Continuous Extraction Techniques,” Extr. Technol. Med. Aromat. Plants, 2008

[2] G. L. P. Ramya, P. M. Vasanth, P. V Prasad, and V. Sarath Babu, “Qualitative Phytochemical Screening Tests of Alpinia,” World J. Pharm. Res. www.wjpr.net, 2019.

[3] T. Ahmad, S. B. Singh, and S. Pandey, "Phytochemical Screening and Physicochemical Parameters of Crude Drugs: A Brief Review," Int. J. Pharma Res. Rev. IJPRR, 2013.

[4] M. Gahlot, P. Bhatt, J. Joshi, S. R. Fellow, and T. Pantnagar, "Study on Yield of Plant Extracts Using Different Solvents and Methods," 2018.

[5] Research Trends in Medicinal Plant Sciences. 2019. doi: 10.22271/ed.book.415.

[6] B. Umrethia, B. Kalsariya, and P. P. U. Vaishnav, "Classical and modern drug extraction techniques: facts and figures," J. Ayurveda Integr. Med. Sci., 2017, doi: 10.21760/jaims.v2i4.9367.

[7] Milan Hait, Extraction Techniques of Herbal Drugs. 2019. doi: 10.22271/ed.book.415.

[8] U. Chiranjeevi, K. Kamarajan, and P. K. Manna, "Investigation of in-vitro anthelmintic activity of Lindernia madayiparense," Res. J. Pharm. Technol., 2018, doi: 10.5958/0974-360X.2018.00034.3.

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Fermentation-based Aqueous Alcoholic Extraction of Medicinal and Aromatic Plants

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Abstract*— Pharmaceutical dose forms have a long history that dates back to the Vedic period. It sheds light on the inventions made in the past, when unprocessed herbs were first utilized as powder and eventually transformed into decoctions, self-fermented goods, paste, tablets, and other sophisticated dosage forms. In the process of developing new drugs, pharmacophores must be found that are fresh and innovative. Combinatorial chemistry and the reductionist approach are unable to provide a satisfying solution to the issue. Ayurvedic product Asava arishta, which is fermented, is an excellent source of fresh pharmacophores for developing new medicines.

Index Terms*— Aromatic Plant, Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermo labile.

I. INTRODUCTION

The Charka Samhita, the earliest comprehensive record of Ayurveda, may be used to track the history of the creation of pharmacological dose forms. Ayurveda has prescribed a thorough Materia Medical that includes therapeutic plants, minerals, metals, products of animal and marine origin, and more. Herbal remedies, however, have been prioritized. Since ancient times, medicinal plants have been used for therapeutic reasons. These were first utilized as fresh or dry powder, which resulted in issues with high dosage, large volume, and short shelf life. The invention of extraction techniques resulted from this.

Because the required dosage was lower, the volume was less, and the shelf life was longer, extracts were shown to be more beneficial. Initially, either water, alcohol, or a combination of the two were utilized as extraction solvents.

Even now, different polarity solvents are being tested, and extraction techniques have advanced from simple water decoction of ages past to supercritical extraction. While this is true for certain product streams, Ayurveda diverged from the pack and created a unique method of innovation [1], [2].

A. Swarasa's Ayurvedic Dosage Forms

The ingestion of freshly extracted plant juices paved the way for the development of liquid orals. Green herbs are crushed to acquire fresh juices, which are then extracted by squeezing the crushed material. The thing in question is called swarasa. This approach administers the freshly crushed plant material as is, without expressing the fluids.

B. Kwatha

Depending on the kind of plant material being used, one part of finely powdered herb is cooked with 16 times its weight in water in an earthen pot over a gentle fire until the liquid is reduced to one-fourth or one-eighth of the original volume [3].

Hima: The plant matter has been dried and pulverized roughly. The powder is steeped in plain water for the designated amount of time as needed. The combined filtrate is then utilized once it is fi ltered and the marc is strained.

Phanta: The phanta technique was chosen as a further development of hima. This technique makes use of heated water to produce a hot infusion.

II. DISCUSSION

A. Preservability of Dosage Forms

The shelf life of different dose forms was provided by the Sarngadhara Samhita. Ayurvedic doctors used to make the recipes for their patients in the past. Ayurvedic doctors used to make their own recipes for patients, but in the fourteenth century AD, they learned about the issue of the botanicals' short shelf lives in various dosage forms, such as powder and decoction. As a result, new dosage forms known as asava and arishtas, which are self-fermented concoctions with 10%–12% alcohol, were discovered. These resemble medicinal wines. Unprocessed plant material is utilized for cold infusion to make asava, whilst decoction of the plant material is used for fermentation to make arishta [4].

B. Asava and Arishta: Products of Self-fermentation

The Ayurvedic system of medicine claims that this novel dosage form has an illimitable shelf life and that the older the medication, the better. According to current thinking, this phrase is more significant since this dosage form naturally produces continuous hydro-alcoholic extraction and likely natural counterparts of the chemical components found in medicinal plants. A few of the main Ayurvedic remedies that are self-fermented. In Ayurveda, the process of making asava arishtas is called as sandhana kalpana. In order to start fermentation, Wood fordia fruticose flowers are introduced as an inoculum along with a defined quantity of jaggery to a decoction or cold infusion of numerous herbs. To achieve a certain amount of self-generated alcohol, it is stored for roughly four weeks to ferment anaerobically. After then, the product is stored for a while to mature. As flavoring agents, spices like cardamom and cinnamon are used. An overview

of how to prepare asava arishta in short. To determine if fermentation has taken place, a rudimentary match-box test is used. The process's emission of carbon dioxide is essential to this strategy. Wood fordia fruticose, which is utilized as an inoculum for fermentation but seems to have other functions, plays a significant part in this dosage form [5]–[7].

C. Benefits of the Method

The following advantages of fermented herbal products are taken directly from Prahst's remarks:

The majority of the unwanted carbohydrates in plant matter are removed during fermentation, which also increases product bioavailability and gets rid of adverse effects like gas and bloating. Since the menstruum moves through a gradient of increasing alcohol levels, fermentation extracts a larger spectrum of active compounds from the plant than any other extraction process. Heavy metals and pesticide residues are naturally bound by yeast cell walls, which makes them a powerful natural purification mechanism. In addition to eliminating pollutants, fermentation may lessen the toxicity of some of the harmful elements found in plants. Bacteria contain enzymes that break down cell walls to further aid in the leaching process. Fermentation aggressively ruptures the herb's cells, exposing it to the menstruum. The active transport system that fermenting also produces transports the dissolved components from the herbal material to the menstruum [8].

D. Utilizing Asava Arishta Technology to Discover New Drugs

In terms of asava arishtas, the ayurvedic maxim "older is better" has to be put to the test. According to appearances, the method of making asava arishtas includes: crude plant material floating in the liquid is slowly extracted with ethanol at room temperature. Because of the bigger surface area and smaller ppaper size of the plant material floating in the liquid, extraction may be more successful. If the product is stored for a long time throughout the process, there is a strong likelihood that analogues of some of the plant material's pure chemical components may arise. Starting with 2- to 3-year-old self-fermented preparations rather than solvent extracts is indicated to increase the success rate of isolating pure "druggable" components from medicinal plants. This method may have a high likelihood of isolating medicinal molecules that work, thus this possibility has to be considered [9]–[11].

III. CONCLUSION

In order to extend the shelf life and improve the effectiveness profile of asavaarishtas, a multi herbal preparation, fermentation was used in Ayurveda hundreds of years ago. The search for novel compounds is becoming more and more competitive, and at the same time, the absence of such pharmacophores is a significant barrier that slows down the development of new drugs. Even though the isolated compounds may not be specifically "druggable," nature continues to be a source of pharmacophores. Derivation is required, mostly to increase their efficacy. The self-fermented products in asavaarishtas might go through ongoing chemical changes that go beyond hydro-alcoholic extraction of the suspended material. This might lead to the development of new natural compounds with improved medicinal efficacy.

REFERENCES

[1] Permenkes, “Peraturan Menteri Kesehatan Republik Indonesia Nomor 18 Tahun 2020,” Molecules, 2020.
[2] Kemenkes Ri, “Keputusan Menteri Kesehatan Republik Indonesia Nomor : Hk.01.07/Menkes/312/2020 Tentang Standar Profesi Perekam Medis Dan Informasi Kesehatan.,” Molecules, 2020.
[3] Renstra Kemenkes, “Peraturan Menteri Kesehatan Repblik Indonesia No 21 Tahun 2020 Tentang Rencana Strategis Kemenentrian Kesehatan 2020-2024,” Kemenkes, 2020.
[4] Kemenkes Ri, “Peraturan Menteri Kesehatan Republik Indonesia Nomor 12 Tahun 2020 Tentang Akreditasi Rumah Sakit,” Molecules, 2020.
[5] S. Nuryatin, “Adaptasi Metode Pembelajaran Melalui E-Learning Untuk Menghadapi Era New Normal,” Osf Prepr., 2020.
[6] Menteri Kesehatan Republik Indonesia, “Permenkes Ri Nomor 2 Tahun 2020 Tentang Standar Antropometri Anak,” Molecules. 2020.
[7] Kemenkes Ri 2020, “Standar Profesi Perekam Medis Dan Informasi Kesehatan,” Molecules. 2020.
[8] A. Fahriyah And R. Yoseph, “Keunggulan Kompetitif Spesial Sebagai Strategi Keberlanjutan Ukm Di Era New Normal,” Semin. Stiamieminar Stiami, 2020.
[9] Agis Dwi Prakoso, “Penggunaan Aplikasi Tik Tok Dan Efeknya Terhadap Perilaku Keagamaan Remaja Islam Di Kelurahan Waydadi Baru Kecamatan Sukarame Skripsi,” Molecules, 2020.
[10] Sugiarti, “Analisis Dampak Covid-19 Terhadap Penerbangan Di Indonesia,” Molecules, 2020.
[11] D. Mustomi, A. Puspasari, A. Ayu;, And W. Diah, “Analisis Belanja Online Di Kalangan Mahasiswa Pada Masa Pandemi Covid 19,” J. Akrab Juara, 2020.

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Technology for Essential Oil Distillation

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***Abstract*— The method used to extract essential oils from aromatic plants is archaic and out-of-date in many developing nations. Low yield and poor quality of essential oils are the outcome of this. Therefore, developing suitable technical capabilities in the field of processing essential oil plants is very necessary. This paper discusses several distillation methods, distillation principles, and significant processing and design considerations that have an impact on the quantity and quality of essential oils.**

***Index Terms*— Aromatic Plant, Essential Oils, Medicinal Plants, Soxhlet Extraction, Menstruum, Phytonics, Thermo labile**

I. INTRODUCTION

The most well-liked, generally used, and economical way of creating essential oils globally is distillation. The process of distilling aromatic plants simply entails vaporizing or liberating the oils from the plant's cell membranes while they are moist, then cooling the vapor mixture to separate the oil from the water based on the essential oil's immiscibility and density with respect to water [1].

A. Distillation Principles

The following factors are often taken into account when choosing an extraction method for essential oils: the oil's sensitivity to the effects of heat and water.

1. Essential oil's volatility
2. Essential oil's water solubility

It is not possible to steam distill essential oils that are very soluble in water or that are vulnerable to heat destruction. Additionally, for steam distillation to be practical, the oil has to be steam volatile. The majority of commercially available essential oils are steam volatile, somewhat heat stable, and essentially insoluble in water, making them ideal for processing by steam distillation. Monoterpenes, sesquiterpenes, and their oxygenated derivatives, which have a boiling point between 150° and 300° C, are the main components of essential oils. These oils are released from the plant when the plant material is heated while being moistened by steam. In order for the oil to transition from the liquid to the vapor phase, it needs latent heat, which can only come from condensing steam within the tank.

Because there must be a temperature gradient to absorb the latent heat from the condensing steam to vaporize the oil droplet, the temperature of the steam inside the still must be higher than the temperature at which the oil boils in the presence of water on the surface of the plant material. Thus, the oil is transformed into a vapor by the latent heat of vaporization, which is energy from the steam in the form of heat. However, due to the fact that oil has a greater boiling point than water, steam is used to vaporize the substance due to their different relative vapor pressures [2].

It is critical to remember that a liquid always boils when its vapor pressure reaches the same level as the ambient or surrounding pressure. The total vapor pressure of a combination of any two immiscible liquids is always equal to the sum of their partial pressures. The concentration of each component multiplied by its corresponding partial pressure yields the composition of the combination in the vapor phase. If, for instance, a sample of an essential oil made of component A and water is heated until its vapors are saturated, the temperature will eventually fall to 9° C, which is the temperature at which the combined vapor pressure of the two components equals 760 mmHg. In other words, when combined with water, the oil produces an azeotropic combination. Any essential oil with a high boiling point may thus be evaporated with steam in a ratio such that their combined vapor pressures are equivalent to air pressure; the essential oil can then be recovered from the plant using the wet distillation method [3].

B. Hydro Distillation

The simplest and most traditional method for extracting essential oils from plants is hydro distillation. The fundamental way that hydro distillation varies from steam distillation is that the plant material in the still, which is situated atop a furnace, is nearly completely covered with water. The amount of water in the tank must always be sufficient to last throughout the distillation process in order to avoid the risk of the plant material overheating and charring. In this procedure, the essential oil is transferred to the condenser with the produced steam after the water is brought to a boil. Oil made using other processes lacks the powerful still notes and somewhat deeper hue of water-distilled oil. Small-scale manufacturers of essential oils often use stills based on this theory because of their simple construction. Powdered herbs should be handled carefully while distilling them since they have a tendency to collect on the bottom of the still and deteriorate thermally. Additionally, there is a higher risk of charring for plant material that tends to produce mucilage and raise the viscosity of the water. Water distillation is the ideal technique of oil separation for plant material that has a propensity to aggregate or agglutinate into an impenetrable mass when steam is passed through.

Water distillation is also the foundation of the archaic,

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ancient Indian bhapka technique of essential oil distillation. In this procedure, a copper distillation still called as a deg is used to completely cover the plant material with water. A brick furnace is used to heat this degree. To act as a condenser, another copper vessel with a long neck is positioned in a water tank or natural pond. The vapor connection is a bamboo pipe, and the numerous connections are sealed with mud. The oil is separated after the water is boiled, when the oil vapors and steam are condensed in the copper vessel. A batch of one deg can hold around 40 kg. In Kannauj, Uttar Pradesh, and the Ganjam area of Orissa, India, these kinds of equipment are still used to make rooh and attars of gulab, kewda, khus, rajnigandha, and bela. Although these devices are portable, they are not appropriate for the large-scale distillation of fragrant plants like grasses and mints [4].

C. Distillation of Steam and Water

Some adjustments were made to the distillation machines to reduce some of the problems of water distillation. In order to support the plant material and prevent it from coming into direct touch with the hot furnace bottom, a perforated grid was added to the still. The essential oil is distilled by the rising steam from the boiling water while the water level is maintained below the grid. Water and steam distillation is the overall name for this kind of distillation. The idea of water and steam distillation is used to build the field distillation unit, sometimes referred to as a directly fired-type distillation unit. The FDU is attached directly to a brick furnace and consists of a still or tank made of mild stainless steel with a perforated grid. A chimney is attached to the furnace to reduce workplace pollution and to promote optimal fi ring and draft. The tank's perforated grid is loaded with plant material, and water is poured into the space underneath it. A vapor line connects the condenser and the tank. When water is boiled, steam is released, passing through the herbs and vaporizing the oil before condensing, often in a coil condenser with ice-cold water. The oil separator then separates the condensate.

These devices may be put in a farmer's field and are easy to construct. FDUs are quite common among essential oil producers in poor nations because of their simple design, cheap price, and ease of use. Always using firewood or straw that is readily accessible in the area, the furnace. Because of this, the device may be used in distant locations where raw materials are accessible. This aids in lowering the price of transportation used in the manufacture of essential oils. FDUs are now being used in the distillation of several oils, including citronella oil in Taiwan, fragrant grass and mint oil in India, and patchouli oil in Indonesia. In order to distill mint oils, Indian farmers in the countryside presently employ a regional FDU. These field devices typically have a capacity of 100–2000 kg for plant material. With these machines, distillation takes a total of around 6 to 8 hours [5].

D. Enhancements to Field Distillation Units

The rate of steam generation in the FDU is always insufficient because of the little amount of accessible heating surface. Longer distillation durations and sometimes reduced oil yields are the outcome of this. Due to insufficient steam rate, refluxing of oil back into the still may result in breakdown reactions and lower oil quality. Experimental research at the Central Institute of Medicinal and Aromatic Plants in India has shown that the amount of firewood used in a traditional field still may be up to ten times more than the amount used in a contemporary steam distillation system powered by an external boiler. Where fuel sources are affordable and plentiful, this issue may not be as important, but in many developing nations, fuel supplies are becoming expensive and limited, and poor thermal efficiency can have a direct impact on production costs.

Given the aforementioned drawbacks of FDUs, designs of practical and upgraded units with batch sizes of 500–2000 kg are presently favored. High-quality mild stainless steel is used to construct the units while taking into account the plant materials that will be removed. The upgraded distillation unit consists of a cylindrical distillation tank mounted atop a square built-in boiler with smoke pipes that shorten the water's heating period, generating a lot of steam at once while using less fuel. The smoke tubes are used to direct hot flue gasses from the furnace into the water, where they heat it and create further steam. For optimal management of the flame and airflow, the tank is mounted on a specially built furnace with a fire grate, fluorescent ducts, and a fire door. To optimize the air draft and reduce smoke pollution in the workplace, the furnace is linked to a chimney that is the ideal height. The vapors are cooled using a tube-type condenser with a greater condensation capacity and a stainless steel shell of a similar design. It prevents oil from being lost as a result of poor condensation. The condensed oil-water combination is then let to run through a stainless steel oil separator that has been specifically made. The separator features a built-in baffle to extend the mixture's retention duration, preventing any oil loss with the water that exits the separator. The unit also contains a chain pulley hoist system with a support structure that speeds up the process of removing the distillation waste material from the tank and makes work simpler. These enhanced units have been created, manufactured, and given to business owners and farmers in various regions of India by CIMAP.

E. Distillation of Steam Directly

In direct steam distillation, plant material is distilled using steam produced in a steam generator or boiler located outside the tank. The plant material is supported on a perforated grid above the steam input, much as in water and steam distillation. Since the steam in an FDU is at atmospheric pressure and has a maximum temperature of 100° C, as was previously mentioned. However, the temperature of steam in a contemporary pressure boiler running, say, at 50 psi

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pressure would be proportionately greater. Furthermore, when an external boiler is utilized as a source of steam, there are no restrictions on the amount of steam that may be produced. Modern steam distillation equipment make it possible to distill essential oils considerably more quickly and completely thanks to the use of high-pressure steam [6].

When many units are to be installed and a large area is being farmed, steam distillation is suggested. Additionally, steam distillation is more effective for the distillation of high boiling oils and tough materials like roots and woods like sandalwood, cedar, and nagarmotha. Oil extraction takes less time with steam distillation as well. In a steam distillation still, a charge of Java citronella may be processed in two to three hours as opposed to up to five hours in an FDU. Steam is produced separately in a steam boiler and then fed through the distillation tank via a steam coil in this technique of distillation. Above the perforated grid, there is a densely packed layer of plant material. In a tube condenser, steam that contains oil vapor is condensed before being separated in the oil receiver. Due to the improved thermal efficiency at which the majority of the boilers run, fuel costs are often lower in contemporary steam distillation plants. Since such units have a greater capital cost, only larger manufacturers can afford to possess them. Plant material still batch capabilities vary from 1 to 3 tonnes.

F. Boiler-operated Unit and Directly Fired Type Comparison

A single steam boiler may power a sizable number of distillation machines. Therefore, a boiler system is perfect for producing essential oils on a big scale. Small and medium-sized farmers are better suited for an FDU. A well-constructed FDU may extract essential oils with an efficiency comparable to that of a boiler unit. However, with a badly built FDU, oil recovery might be limited and fuel waste could be significant, along with smoke pollution. A boiler-operated unit's steam injection rate can be easily modified, while an FDU's steam production rate is limited by the unit's heat transfer area. Low oil output in an FDU may be caused by insufficient steam production. An FDU may be operated by relatively unskilled people, unlike boiler-run units that need a qualified boiler man to operate them [7].

G. Cohobation during Distillation

The process of cohobation may be used to either water or water and steam distillation. It employs the procedure of re-boiling the distillate water after the oil has been removed from it in the still. For oils that have a partial solubility in water, this is essentially an adapted approach of the directly fired type steam and water distillation machines. Some essential oils, such as those of rose, lavender, and geranium, have considerably greater solubilities in water, despite the fact that most essential oils have limited solubilities in water. Such extractions may result in shockingly significant oil loss when distillation water is released into the atmosphere. The cohobation process, which involves returning the separator's condensate water to the still, may fix this issue. It is clear that steam distillation cannot do this since the continual steam injection causes the water level in the still to keep rising.

In an even better variation, a packed column is installed on top of the column to provide mass transfer to the oil-water vapors, boosting the concentration of the ejected condensate and coalescing the oil droplets in the oil separator. The condenser is positioned above the column to allow gravity to recycle the condensate water from the separator back into the still. A closed steam coil submerged in the tank bottom may provide more heat if necessary. Condensed water from the separator may flow by gravity to the distillation still thanks to the relocation of the condenser above the still. In this closed-cycle process, it is feasible to boost the yields of more water-soluble essential oils by reducing the total amount of water used. It is important to note that the different contaminants and products of plant breakdown might accumulate in the system due to the extended recirculation of the distillation water. The quality of the oil may sometimes be impacted by this. When selecting a cohobation distillation system for any purpose, one must constantly bear this in mind [8].

H. Hydro Diffusion

1983 saw the first description of this system. Hydro diffusion, in contrast to conventional steam distillation, relies on the diffusion principle, which entails letting steam enter the top of the plant charge and let it move through the charge via gravity. Oil from the oil glands is diffused via the osmotic pressure mechanism. The system is linked to a steam supply, and a boiler is used to feed low pressure steam into the plant's material. The still's tube-style condenser is located immediately underneath the basket. In a standard oil separator, the water and oil are collected below the condenser. In terms of the procedures for loading and unloading the plant material, hydro diffusion is an effective and simple technique. Due to less steam being used, shorter distillation times, and no hydrolysis since the raw material is not in contact with boiling water, the oil yield is greater and the process is favorable. The co-extraction of additional non-volatile chemicals and polar components complicates the process due to the downward flow of steam and condensate. The reality remains that commercial initiatives based on hydro diffusion have not been able to take off effectively, despite the perception that it is a superior alternative to traditional distillation procedures.

II. DISCUSSION

The many process variables have an impact on the production and quality of the essential oil produced by steam distillation. The best course of action is to keep these in mind while creating such systems. The following is a list of some of the crucial parameters [9].

A. Approach to Distillation

The boiling point of the essential oil and the features of the

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herb should be taken into account when selecting the distillation method since steam temperature and heat content might change the distillation properties. Boiler-operated steam distillation should be used to extract oil from sources with high boiling points, such as woody oils and roots. A change in steam pressure may vary the characteristics of distillation since the heat content and temperature of steam are dependent on its pressure. In order to distill over high-boiling essential oil ingredients, high-pressure steam is often used. Since flowers tend to clump and form lumps that cannot be distilled using water and steam distillation or straight steam distillation, the material is often submerged in water during the hydro distillation process for rose oil and other floral oils.

B. Proper Equipment Design

The wrong tank, condenser, or separator designs might result in oil loss and expensive capital expenditures. The fi ring and heat management of the distillation rates depend on the furnace and chimney architecture. The ratio of tank height to diameter is crucial. Similar to this, inappropriate condensation and oil loss will result from using a condenser with an unsuitable design and without accounting for the heat transfer regions based on the steam generating areas[10].

C. Equipment fabrication materials

Corrosive essential oils should ideally be distilled in stainless steel, aluminum, or copper stills due to their resistance to corrosion. The condenser and separator may be built of a durable material like stainless steel, but the tank can still be made of a less expensive metal like mild steel or galvanized iron. Rust and other corrosion-related byproducts may not get into the oil since there is still simply vapor in the tank. As a consequence, the equipment's capital cost may be significantly reduced. It is best to distill pricey, valuable essential oils like rose, agarwood, kewda, sandalwood, and lavender in stainless steel equipment. Despite being the most popular material for distillation still construction since antiquity, copper is becoming less and less frequent due to the competition from better alloys like stainless steel.

D. The state of the raw materials

Because certain materials, such roots and seeds, would not readily generate essential oil if distilled in their original form, the condition of the raw material is crucial. To reveal their oil cells, these materials must be broken, pulverized, or submerged in water. Plants that have been chopped will alter the material's packing density when it is put in the distillation still. Once certain fragrant herbs like mint have been chopped, one may fit up to 50% more plant material in the same still. Prior to distillation, the herb should be air dried and wilted, which has a significant impact on distillation. If necessary, the herbs should be dried before distillation in shady places, and the dried material shouldn't be stored in piles. Distillation time

Various essential oil components are distilled in the order of their boiling points. Therefore, when typically very little oil is distilling, the highest boiling fractions will be the last to come over. The high-boiling ingredients will be lost if the distillation is stopped too soon. These high-boiling fractions of several aromatic plants, including vetiver, patchouli, chamomile, sandalwood, and agarwood, are significant because of the quality of their scents. Therefore, it is important to choose the distillation time carefully [11].

E. Raw Material Loading and Steam Distribution

The herb may not be loaded properly, which might lead to steam channeling and insufficient distillation. Without any vacancies, the herb should be placed into the tank equally and equitably. Additionally, excessive plant material removal may result in the creation of "rat holes," which might let steam escape without vaporizing the oil. To stop plant matter from dropping into the tank base when using powdered herbs, a good stainless steel wire mesh or muslin fabric should be placed at the fake bottom.

F. Operating Conditions

In boiler-operated machines, proper management of injection rates and pressure is required to optimize the temperature of extraction for maximum yield. In general, distilling essential oils with high-pressure steam is not recommended. The condensate shouldn't be too hot since it might cause oil to evaporate and be lost. The fi ring of the furnace in directly fired-type FDUs has to be carefully managed since it might lead to excessive flow rates and high condensate temperatures.

G. Tank and Equipment Condition

The equipment, including the tank, shouldn't be rusty. The tank should be cleaned using diluted caustic solutions if it is corroded. The plant material shouldn't be able to settle to the bottom of the tank and release a burned smell if the perforated grids are rusted or have wide gaps. Prior to distillation for multiple crop distillation, the distillation tanks should be thoroughly steamed. Cleansing of Unrefined Essential Oils

Crude essential oil is what is obtained from the oil separator. It could contain noticeable moisture content and suspended contaminants. It may possibly include some undesirable ingredients that decrease the taste quality. Moisture and impurities have a negative impact on the oil's ability to retain, because they speed up polymerization and other undesired events. The oil may be dried out and made free of suspended contaminants by adding a drying agent such anhydrous sodium sulphate, letting it rest for an overnight period, and then filtering it. It is usual practice to use high-speed centrifugation to clarify the essential oils. To get rid of undesirable components, essential oils are usually rectified or redistilled. Re-distillation is done under vacuum or with the aid of steam distillation, which helps to maintain the temperature within acceptable ranges [12].

H. Distillation of Steam Continuously

Plant material for steam distillation units is manually charged and discharged from a tank still. These processes take a lot of time and need a lot of work. Continuous steam distillation facilities were created in the Soviet Union and have been in use for a few decades as a solution to these issues. Lavender is being distilled using these devices, which need very little physical handling. Two tonnes per hour capacities are very typical. After being first chopped using specialized ensilage cutters, incoming plant material is then transported to the top of a tall distillation column using a belt conveyor. Gravity or specialized helical screw conveyors may transport material inside the column. Two columns may be used in series at times to completely remove oil. The column receives numerous injections of steam. Special screw conveyors with a vapor lock that prevents steam escape continually discharge used material from the bottom of the distillation column.

III. CONCLUSION

The most used technique for extracting essential oils is distillation. The quality and production of an essential oil are greatly influenced by the proper distillation procedure selection, equipment design and material, and processing parameters. Continuous distillation columns are difficult to construct and run, and outside of the former Soviet Union, they have not yet been widely accepted and used. Additionally, Mentha piperita and lavender are being distilled in select areas of the United States using containerized distillation. This method involves attaching large capacity containers with wheels to a harvester that directly loads plant material into the containers from the fields. The containers are then taken to the distillation area, where steam is directly connected to the coils, the top is closed, and the connections to the condenser and oil separator are made through a vapor line.

REFERENCES

[1] Z. Hussain, A. Munir, J. Liu, and M. Sultan, “Experimental Study On Solar Distillation System For Oil Extraction From Eucalyptus Plant Leaves,” Therm. Sci., 2022, Doi: 10.2298/TSCI210905340H.

[2] B. A. Ngcangatha-Maqhude, H. A. Seepe, Z. Mkile, And D. M. Katwire, “The Effect Of Distillation Methods On The Chemical Composition Of The Essential Oil From Pelargonium Graveolens L’ Heritier Cultivated In Selected Locations Of Amathole District,Eastern Cape Province,” J. Essent. Oil-Bearing Plants, 2022, Doi: 10.1080/0972060X.2022.2145915.

[3] J. Moncada, J. A. Tamayo, And C. A. Cardona, “Techno-Economic And Environmental Assessment Of Essential Oil Extraction From Oregano (Origanum Vulgare) And Rosemary (Rosmarinus Officinalis) In Colombia,” J. Clean. Prod., 2016, Doi: 10.1016/J.Jclepro.2015.09.067.

[4] X. M. Li, S. L. Tian, Z. C. Pang, J. Y. Shi, Z. S. Feng, And Y. M. Zhang, “Extraction Of Cuminum Cyminum Essential Oil By Combination Technology Of Organic Solvent With Low Boiling Point And Steam Distillation,” Food Chem., 2009, Doi: 10.1016/J.Foodchem.2008.12.091.

[5] C. Park, S. M. Garland, And D. C. Close, “Yield And Profile Of Essential Oil Of Kunzea Ambigua: Prediction Using Solvent Extraction And Effects Of Distillation Time,” J. Essent. Oil-Bearing Plants, 2022, Doi: 10.1080/0972060X.2022.2058329.

[6] S. Hilali Et Al., “Green Extraction Of Essential Oils, Polyphenols, And Pectins From Orange Peel Employing Solar Energy: Toward A Zero-Waste Biorefinery,” ACS Sustain. Chem. Eng., 2019, Doi: 10.1021/Acssuschemeng.9b02281.

[7] R. Kumar, S. Sharma, M. Kaundal, S. Sood, And V. K. Agnihotri, “Variation In Essential Oil Content And Composition Of Damask Rose (Rosa Damascena Mill) Flowers By Salt Application Under Mid Hills Of The Western Himalayas,” J. Essent. Oil-Bearing Plants, 2016, Doi: 10.1080/0972060X.2016.1153985.

[8] M. Pateiro Et Al., “Essential Oils As Natural Additives To Prevent Oxidation Reactions In Meat And Meat Products: A Review,” Food Res. Int., 2018, Doi: 10.1016/J.Foodres.2018.07.014.

[9] M. Gavahian And Y. H. Chu, “Ohmic Accelerated Steam Distillation Of Essential Oil From Lavender In Comparison With Conventional Steam Distillation,” Innov. Food Sci. Emerg. Technol., 2018, Doi: 10.1016/J.Ifset.2018.10.006.

[10] J. Moncada, J. A. Tamayo, And C. A. Cardona, “Techno-Economic And Environmental Assessment Of Essential Oil Extraction From Citronella (Cymbopogon Winteriana) And Lemongrass (Cymbopogon Citrus): A Colombian Case To Evaluate Different Extraction Technologies,” Ind. Crops Prod., 2014, Doi: 10.1016/J.Indcrop.2014.01.035.

[11] Y. Xiao, Z. Liu, H. Gu, F. Yang, L. Zhang, And L. Yang, “Improved Method To Obtain Essential Oil, Asarinin And Sesamin From Asarum Heterotropoides Var. Mandshuricum Using Microwave-Assisted Steam Distillation Followed By Solvent Extraction And Antifungal Activity Of Essential Oil Against Fusarium Spp,” Ind. Crops Prod., 2021, Doi: 10.1016/J.Indcrop.2021.113295.

[12] N. Patel, A. Kalnbalkite, And D. Blumberga, “An Analysis Of The Extraction Technologies: Fruit Peel Waste,” Environmental And Climate Technologies. 2021. Doi: 10.2478/Rtuect-2021-0050.