



Marketing Experts' Perspectives on the Role of Digital Marketing in Enhancing Sustainability in Saudi Arabia's Petrochemical Industry Field Studying

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السنة الجامعية: 2024-2025

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Abstract

This study investigates the central role that digital marketing (DM) technologies have in facilitating sustainability in Saudi Arabia's petrochemical sector, which is one of the nation's major contributors to greenhouse gas (GHG) emissions. Because petrochemicals account for about 9.05% of carbon emissions throughout the Kingdom, and because the sector faces increasing global and domestic pressure to adopt cleaner technology such as everyone else, this research examines the various DM approaches, i.e., web site design, SM advertising, SEO, e-marketing, and affiliate marketing, as aids towards environmental stewardship and sectoral sustainable transformation. The study is based on descriptive research method, addressing marketing professionals from petrochemical companies across the Kingdom in an effort to derive representative and assorted opinions.

The findings showed statistically significant positive impacts of all five DM tools on sustainability outcomes, confirming their collective value in promoting green behavior. Website design, SM marketing, SEO, email marketing, and affiliate marketing all played significant roles, with R values ranging between 0.588 and 0.652, indicating their ability to impact awareness, engagement, and sustainable behavior. According to these results, the research recommends the use of DM to disseminate educational materials, carry out awareness campaigns, and establish strategic alliances, along with carrying out further studies in the integration of sophisticated digital technologies and awareness of sustainability into the Kingdom's industrial setting.

Keywords: Social Media Marketing, Digital Marketing, Internet of Things, Email Marketing, Sustainability, Sustainable Development

Research Background

The consumption levels of the petrochemical industry pertain to the extraction of petrol and gas, manufacturing of chemical products and raw materials, manufacturing of plastic products and rubber, nuclear fuel processing, coking, petroleum processing, and fiber production (Peng et al., 2023). Moreover, petrochemical industry is among the industries that contribute significantly to carbon emissions (Ahsan et al., 2024). Additionally, in its capacity the petrochemical business, as a conventional industrial sector, is characterized by significant energy use, elevated emissions, and reliance on resources (Cui & Wu, 2024). According to Behbahani (2024) project management firms working in the marketing sector for the oil and petrochemical industries should be aware of how DM strategies can be used to restructure customer data and help with customer segmentation and targeting for relevant marketing messages via a variety of marketing channels, including Facebook, and others.

Accordingly, digital marketing (DM) is the practice of promoting any good or service online. Accordingly, DM and the internet have grown to be crucial elements of business since technological adoption has become urgently necessary (Jadhav et al., 2023). Moreover, DM is an unconventional form of marketing that utilizes internet-based media such as websites, search engines, emails, SM, and mobile applications for the purpose of advertising. It has become increasingly popular because of cultural, technological, and societal changes. It increases customer awareness, informs companies about consumer behavior, and accelerates buying processes, thus becoming a marketer's revolution (Bharti & Kumar, 2020).

Additionally, according to Rumangkit and Hadi (2023); Soe (2024); Kale et al. (2022); Atar et al. (2022) DM encompasses several dimensions such as: (a) Search Engine Optimization (SEO), (b) email marketing, (c) SM (SM) marketing, (d) website design, (e) affiliate marketing, and (f) influencer marketing. Consequently, it is worth noting that this form of marketing is not exclusive to the internet, DM encompasses internet marketing. For instance, internet marketing includes channels that are exclusively available to people online, such as webinars, contextual advertising, and website SEO. Conversely, DM includes advertising and promotion on all digital platforms that are not connected to the internet, in addition to internet marketing. To put it another way, DM refers to both online and offline digital communication Oklander (2023).

In addition, compared to traditional marketing techniques, DM tactics offer various benefits including (a) they can reach a larger target market, (b) they can increase sales figures, and (c) they are more efficient. Along with having excellent DM abilities, they also possess an easy-to-learn style. Initially, digital-marketing strategies include push-DM is a strategy that sells goods to clients in secret so they may get buy outcomes fast, and pull-DM which offer an opposite notion to the push-based strategy (Agvi & Taurus, 2024).

Additionally, DM has played an important role in customer buying behavior in the era of globalization. It provides customers with new information about companies, engages them in various activities, and provides explicit information on products or services. Companies use DM to promote their products, allowing customers to compare time and price among suppliers. Customers can buy products online on a daily basis, forward product or service content, and get frequent price changes or promotions. Online marketing has also enabled customers to make it easy to locate the respective physical outlets in which to buy the product or service, without customers having to go to physical outlets (Verma & Vemuri, 2022)

Furthermore, the performance of marketing, e-commerce, and DM are all positively and significantly correlated. Additionally, DM is positively and significantly correlated with the sustainability of businesses. For example, e-commerce and the sustainability of SMEs' businesses are positively and significantly correlated (Udayana et al., 2023). As a result, every aspect of human existence, including the economy, the environment, and social problems, are all impacted by the theme of sustainability, which is a worldwide discourse (Battour et al., 2021). In addition, DM markedly enhanced sales performance and the company's sustainability over time. DM encompasses various aspects, including SEO, SM, websites, and other online platforms (Guru & Asifulla, 2023).

Sustainability, as United Nations (2024) defines it, means a structure covering strategic long-term problems in environmental, social, and economic settings to fulfill the demands of current generations without compromising the capacity of future generations to fulfill their own demands.

Also, sustainability can be analyzed based on many various parameters or pillars of sustainability. Sustainability pillars of three have to be adopted at every juncture for obtaining strong sustainable development performance at both industry and society level. Economic, social, and environmental are covered in pillars of sustainability, typically addressed as profit, people, and the earth. It can be referred to as the Triple Bottom Line (TBL) at the corporate sector (Hashim et al., 2023).

Moreover, environmental sustainability denotes the judicious and equitable stewardship of natural resources and ecosystems to guarantee their enduring vitality and robustness while fulfilling the requirements of present and future generations. It includes initiatives to mitigate environmental deterioration, decrease resource consumption, and advocate for conservation and restoration methods. Attaining environmental sustainability is essential for addressing climate change, safeguarding biodiversity, and preserving the integrity of ecosystems and natural resources (James, 2024).

In addition, corporate practices that allow for long-term financial growth and the establishment of long-term goals in order to create a more appropriate economy are what are referred to as economic sustainability principles (Olaleye et al., 2024). Furthermore, social sustainability denotes a company's dedication to conducting

business in a socially responsible fashion by prioritizing stakeholder welfare, tackling social challenges, and making a constructive impact on society. It includes measures such as fostering diversity and inclusion, aiding local communities, upholding human rights, and guaranteeing equitable work standards (Udo, 2023).

Additionally, project management firms in the oil and petrochemical industry's marketing sector must comprehend the application of DM strategies to restructure customer data and facilitate the segmentation and targeting of clients for suitable marketing communications via diverse channels, including Facebook and SMS (Behbahani, 2024). Moreover, businesses have commenced the strong promotion of their products via DM and advertising. This transformation is achieving substantial environmental and sustainability advantages by decreasing energy usage and carbon dioxide (CO₂) emissions (Thangam & Chavadi, 2023).

Therefore, the aim of this research is to analyze the perception of marketing professionals about the contribution of DM to achieving the sustainability of the petrochemical sector in the Kingdom of Saudi Arabia (KSA). As the petrochemical industry has high energy requirements, carbon footprints, and resource dependencies, the integration of DM tools can lead to improved efficiency, consumer interactions, and sustainable operations. Through techniques like data-driven marketing, SM, and search engine optimization, firms can increase consumer awareness, improve resource utilization, and promote environmentally and socially sustainable measures. The study will discuss how online marketing promotes sustainable business growth for the petrochemical sector in alignment with economic, social, and environmental sustainability parameters.

Problem Statement:

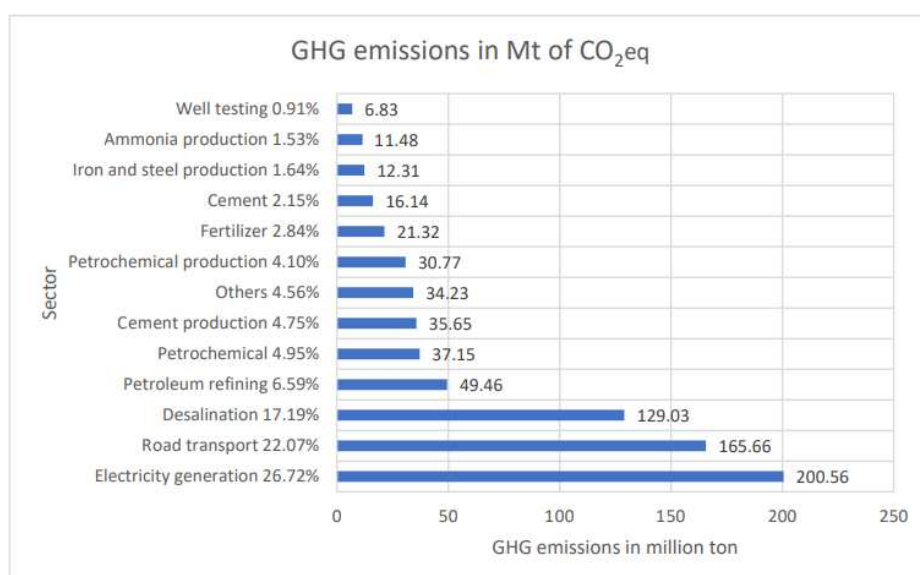
Bauer et al. (2022) state that petrochemical industry's direct greenhouse gas emissions in 2020 were 1.8 GtCO₂eq, or 4% of world GHG emissions. Another 3.8 GtCO₂eq came from indirect GHG emissions from operations in other businesses that provide inputs to the petrochemical sector. Thus, 5.6GtCO₂eq of GHG emissions, or around 10% of world emissions, are linked to the petrochemical sector. In addition, Usman (2023) indicated that the primary contributor to the rise in greenhouse gas emissions is the petrochemical and oil and gas industries. Approximately 89% of carbon dioxide emissions originate from fossil fuel utilization, particularly in electricity and heat generation, transportation, and manufacturing and consuming activities.

Furthermore, without accounting for energy consumption, Industrial Process and Product Use's (IPPU) 2020 emissions totaled 78 million tons of CO₂ equivalent (CO₂eq), with the cement sector leading the pack at 35.5%, followed by the petrochemical (32.3%) and iron and steel (16.8%) sectors (Rahman et al., 2022). Additionally, in 2019, KSA's per capita greenhouse gas (GHG) emissions exceeded the global average by more than three times (Rahman et al., 2022).

Also, according to Alshammari (2021) almost 21% of carbon emissions worldwide are attributed to the industrial sector. Also, UNFCCC (2022) highlights that the

petrochemical industry contributed 4.10% of the overall emissions, while the CO₂ emissions produced as a result of fuel combustion in KSA's petrochemical sector contributed 4.95%. The overall contribution of the petrochemical sector to the emission of carbon dioxide was correspondingly around 9.05%. Additionally, there existed a distinguishable rise observed in the Saudi Arabian Oil Company's emission of greenhouse gases as well. The enhanced GHG emission by the petroleum refining sector of these emerging economies was stimulated via the installation of high-level big-size refineries and local increasing demand for products refined (Ma et al., 2023).

Figure No.1 shows GHG emissions by sector in KSA, including the share of the petrochemical sector. Petrochemical production released 30.77 Mt of CO₂eq (4.10% of total emissions) and fuel combustion in the petrochemical sector released 37.15 Mt of CO₂eq (4.95%). The combined emission from these two sources totaled 67.92 Mt of CO₂eq, rendering petrochemicals a major contributor to industrial emissions. While less than electricity generation (26.72%) and road transport (22.07%), these emissions indicate the industry's requirement for greener measures and cleaner technologies to reduce the industry's effect on the environment (Al-Sinan et al., 2023).



"Figure 1-1 shows GHG emissions in KSA, Source (Al-Sinan et al., 2023)"

Therefore, in light of the substantial environmental repercussions of the petrochemical industry, there is an increasing demand for cleaner technologies and more sustainable methods. DM is essential for promoting sustainability by improving transparency, supporting eco-friendly efforts, and involving stakeholders. Nevertheless, its influence on sustainability initiatives inside KSA's petrochemical sector remains inadequately examined. This research analyzes marketing experts' perspectives on utilizing DM to enhance environmental accountability and promote industry-wide sustainable change.

Research Questions

This research aims to answer the main research question: What is the role of DM in enhancing sustainability within petrochemical companies in Saudi Arabia?

From this main question, the study seeks to address the following sub-questions:

1. What is the impact of website design on sustainability improvements?
2. How does SM marketing contribute to sustainability improvements?
3. What role does SEO play in enhancing sustainability?
4. How does email marketing support sustainability efforts?
5. What is the impact of affiliate marketing on sustainability in petrochemical companies?

Literature Review

History of DM in Organizations:

The term "DM" was first used in the 1990s. Its initial goal was to replicate traditional marketing techniques and tools online. However, offline marketing strategies are now unimaginable due to the new channels, formats, and languages created by the digital world. Customization and mass distribution are now combined in DM to accomplish marketing objectives. New perspectives on online marketing have been made possible by technological convergence and device proliferation, which are pushing the envelope in the direction of a user-centred, quantifiable, pervasive, and interactive idea of DM (Obitovich, 2022).

Small businesses were not able to reach the farthest corners of the globe. Now, with DM on our ever-growing earth, it is achievable. Channel Erestvious Soft Ad Group was the first that described the term "DM," and it employed digital advertisements. This brought about a number of promotional activities with digitalized forms. Later, IBM invented the very first personal computer, and this motivated all other companies, businesses, and households to start using computers. "DM" was widely utilized in the years that followed from 1990 (Dsouza & Panakaje, 2023).

Evolution of Sustainability in Organizations:

The industrial revolution of the 18th century marked the beginning of modern business. Although the corporate business model originated in Italy in the eleventh century, legally registered, shareholder-owned corporations did not become prominent until the early twentieth century. Since then, they have become widespread. However, the concept of sustainability has remained vague and even controversial.

Sustainability issues affect both commercial and non-commercial entities and include challenges such as labour exploitation, environmental degradation, resource depletion, and broader concerns about quality of life. Today, a growing number of organizations are emerging as leaders in promoting "external sustainability." Their efforts to achieve internal and external sustainability are based on intertwined social and economic incentives (Chang, 2016).

Sustainability has been led by organizations, with some concentrating on the organization and others on organizational contributions to society, for example, by working on the Sustainable Development Goals (SDGs). There has been little embedding of the SDGs into organizational systems, even though organizations have been attempting to address them. Through an integrated approach, SD and sustainability have become terms to help deal with the social, economic, and environmental effects of past generations on the present and future generations. The 17 SDGs are one of the latest efforts for SD. The SDGs were created by and for governments, and they are interconnected (Lozano & Gen, 2022).

Overview of the Saudi Petrochemical Industry:

One of the main objectives of Saudi Vision 2030 is economic diversification, and this entails exports (SV2030). As it forms a large percentage of non-oil exports, the petrochemical industry can contribute to the diversification strategy of the Kingdom. Production and export diversification in the non-oil sector can be greatly aided by the growth of the petrochemical industry and its exports. The Saudi government intends to continue its substantial support for the sector's growth in the upcoming years following SV2030, which includes investment and energy incentives. Additionally, the sector is developing in a favorable environment concerning production inputs like inexpensive energy and feedstock (Hasanov et al., 2023).

The petrochemical industry is less explicitly highlighted in Vision 2030 and associated strategic programs because it is more established than other developing industries like mining or the production of basic metals. Nonetheless, the industry is positioned as a cornerstone of non-oil economic diversification due to its dominance in the Kingdom's export portfolio. The Kingdom's Vision 2030 has two main goals: increasing non-oil exports and making Saudi Arabia a global centre for logistics. The Kingdom's petrochemical sector will play a significant role in achieving both goals. Furthermore, a large number of targeted industries, including plastics, automotive, agri-nutrients, and biomedicine, rely on various petrochemical raw materials (Alwazir & Dichter, 2022).

Saudi Arabia attaches great value and importance to the petrochemical sector. The petrochemical sector, which is largely government-owned with a few joint venture firms, is still the Kingdom's primary foreign exchange earner. It is based primarily on crude oil exports and is regarded as an upstream business, where gas and crude are extracted from natural reservoirs (Aljohani, 2021). From a local industry to one of the pillars of the Saudi economy, the petrochemical industry has grown at a rapid pace,

forming some of the world's largest and most lucrative companies. Given how quickly this change happened, the rise of the Saudi petrochemical industry is all the more impressive (Mohammed et al., 2021).

Definition of DM:

DM is the sale of goods and services utilizing digital technology, primarily the Internet but also mobile phones, display ads, and other digital media. The arrival of DM in the 1990s and 2000s transformed the manner in which companies and brands utilize technology as a means of marketing. Online marketing campaigns continue to gain popularity and effectiveness since digital platforms are being integrated into marketing and day-to-day living, and because customers shop on digital devices rather than physically in stores (Desai, 2019).

Işoraitè (2020) confirmed that internet marketing is a process of marketing where web-based technologies are used in attempting to achieve business objectives. Internet marketing can also be referred to as e-marketing or online marketing. DM allows companies to market their products at an exceptionally lower cost than other types of advertisement while providing an extremely effective method of reaching their audience. SM, content marketing, and email are used to market DM. The need for DM increases day by day. DM does not just mean DM channels but also means and methods to reach the consumer through a product or service.

Current Trends in DM in Organizations:

Marketing is an innovative concept that stays in tune with contemporary market fashion. Customer experience and satisfaction rank among the key marketing imperatives. Interactive website is one of the latest marketing trends, a website that utilizes various software to provide users with an enhanced interactive experience; it enables them to interact with the site. Another trend in marketing is content creation, where consumers create and share text, voice, image, and video content associated with a product on the internet. While 360-degree video has been trending since long ago, marketers have recently picked up this interactive technology to enhance brand interaction (Sharma, 2022).

The use of artificial intelligence (AI) is one of the most prominent DM trends. AI technologies, such as chatbots and machine learning algorithms, are radically changing the ways businesses engage with customers and interpret data. AI enables marketers to predict customer behavior, optimize marketing campaigns in real time, and deliver personalized experiences at scale. Another key trend is the focus on personalized content. Consumers now demand experiences that are tailored to their individual needs and interests. Personalization can help increase brand loyalty, conversion, and customer engagement. With mobile devices now the primary access point to the internet, mobile marketing continues to dominate the DM landscape (Baranikumar et al., 2024).

Challenges of DM in Organizations:

One of the biggest challenges with DM is keeping up with the ever-evolving algorithms that big platforms use. These algorithms directly affect a brand's visibility and engagement by dictating how content is ranked and presented to users. In the current DM environment, protecting data privacy and regulatory compliance is a major challenge. Businesses need to be careful about how they gather, store, and use customer data because of stricter regulations and growing consumer awareness. Maintaining trust and compliance requires a strategic approach that strikes a delicate balance between protecting consumer privacy and using data for personalized marketing (Baranikumar et al., 2024).

Additionally, other difficulties facing DM include developing consistent branding. The company becomes just another nameless title in a sea of advertisements if its branding is inconsistent. As more important platforms become available, generating site visitors and leads appears to become more difficult, or easier. In addition to a wide range of returns, many business owners dedicate their entire time to SM, sharing dozens of posts every week. It is particularly annoying when it seems to work for other brands. Additionally, finding decent people to join their team is a major issue for many business owners and marketing managers. However, it is frequently not possible to hire advertising authorities on a full-time basis. Thus, choose to rent the less costly option (Poorani et al., 2021).

Dimensions of DM:

Website Design: Web design marketing serves as a strategic approach to promoting a company's products and services. DM efforts are built around available online tools and platforms. This approach not only reduces costs but also provides distinct advantages that traditional marketing methods typically cannot offer. Consumers turn to websites for comprehensive information about products and services. The website design should not be purely based on copying others or drawing solely from past influences. Yet in reality, common design practices tend to swing between unstructured creative ideas and the reuse of familiar templates. Within many recognized frameworks, design is generally seen as an act of creativity and personal expression. Therefore, it is assumed that a good website should be visually striking and serve as an inspiration for a creative webmaster (Vasiliu, 2020).

SM Marketing: SM marketing is a tool that enables users to promote their websites, products, or services, as well as engage and reach a much wider audience than traditional advertising channels. Most importantly, SM focuses on the group, not the individual. People connect online and form communities of varying sizes. SM marketers must leverage these communities to engage with group members around specific product and service offerings. As a business representative, SM marketing also entails interacting with the groups and listening to their opinions (Ravi & Kumar, 2021). According to Dwivedi et al., (2021), SM marketing experiences both

opportunities and challenges as new SM platforms are launched, gain traction, and attract new followers.

Search Engine Optimization (SEO): Search engine optimization is the process of making your website "rank" higher in search engine results pages, which will increase the amount of free or organic traffic it receives. SEO is beneficial for websites, blogs, and infographics, among other channels (Desai, 2019). Search engine optimization includes technical website optimization, user experience enhancement, and the creation of unique, high-quality content in addition to selecting the appropriate keywords and constructing backlinks. With the use of sophisticated analytics tools, businesses can track their SEO performance in real time, comprehend visitor behaviour, and modify their marketing strategies to get better outcomes. As a result, SEO has developed from a simple marketing tactic to a crucial component of an all-encompassing business plan that promotes not only more traffic but also conversions and client retention (Usmany et al., 2024).

Email Marketing: Email marketing is a widely used method taken up by companies to connect with customers. Marketing products and services via emails is referred to as email marketing. It enables building relationships with customers and prospective customers. Email marketing is a part of Internet marketing. A firm can communicate a business message to the public using email marketing, which is sending and receiving messages through regular practice, but marketing professionalism demands the use of new software for carrying out marketing campaigns using electronic mail (Sabbagh, 2021). Email marketing is an essential part of marketing communication. Firms can make customers receive marketing emails to trigger one-time purchase or relationship emails to enable customer relationship management (CRM) and brand building purposes. Furthermore, when clients have opted for alert and notification, emails are sent (Thomas et al., 2022).

Affiliate marketing: Every e-commerce company employs astute marketing techniques to boost users' interest in making purchases on its platform, like hosting affiliate programs that are currently popular. This tactic also seeks to increase traffic to e-commerce websites, boosting the company's revenue with each new sale. DM helps businesses and online marketers leverage SM platforms, a popular sales promotion tool. Affiliate marketers' involvement in the buying and selling process has been shown to have a significant impact on the continuity of online sales. If the review has the potential to impact consumer purchasing decisions, drive more traffic to the website or marketplace, and result in purchases, the affiliate may receive a commission (Erislan, 2024). Affiliate marketing is a well-known, modern form of performance-based online advertising in which a company pays affiliates for each customer they bring in via their marketing. The method of acquiring customers that are expanding the fastest right now is affiliate marketing. The affiliate marketing sector is still in its infancy despite this expansion. It gives affiliates and merchants lots of chances to grow their clientele and generate additional income for their companies (TANWAR & SAHU, 2024). One popular, modern form of performance-

based Internet marketing is affiliate marketing, in which a company pays affiliates for each customer they bring in via their marketing efforts (Dwivedi, 2017).

Concept of Sustainability

Sustainability is a feature of an ideal economic system where social justice and environmental preservation are balanced with purely economic considerations to drive economic growth. The concept first emerged in the 1960s. Sustainability policies are designed to reshape national and regional economies by incorporating environmental and social considerations, elements often overlooked in core decision-making processes. In many Western countries, the terms "economic growth" and "economic development" have become almost synonymous in policy discussions. This is exactly what the current idea of sustainability seeks to alter: it seeks to integrate social and environmental factors into the system so that they are taken into account alongside financial and monetary factors in economic theory (Gonçalves & Machado, 2023).

From its inception in the 1980s, the concept of sustainable development has made significant global strides. This idea, which has been heralded as the most promising ideology of the twenty-first century, effectively tackles the intricacy of the institution environment's rapid decline. Early theories of enterprise and regional or national development ignored the effects of enterprise operations on the environment and society in favour of concentrating mainly on economic growth. The evolution of sustainability shows a change from short-term interests to long-term sustainability, from domestic development to international cooperation, and from singular to diversified development (Shulhina & Dong, 2024).

Nature of Sustainability in Organizations:

In the past, most businesses focused on environmental preservation and sustainability mainly to meet legal requirements. The "command and control" strategy worked, and businesses followed the rules to stay out of trouble. But over the past few decades, things have gradually changed. People are now more conscious of corporate conduct and environmental issues, particularly in developed nations. This knowledge motivates companies to put in a lot of effort to improve their reputation (Zhihkova, 2022). Sustainability refers to an organization's ability to survive and thrive in a demanding, competitive, and dynamic business environment. The environment is changing, and SMEs must adapt and take steps to mitigate its impact. In the long term, SMEs must reduce pollution and resource degradation to balance three dimensions (Jayasundara et al., 2019).

Impact of DM on Sustainability Improvements:

Digitalization has been a way of life in the modern world and a necessity for organizations that desire to be sustainable and competitive. To thrive, organizations must make DM a part of their strategic plans, going beyond the traditional methods and embracing the unique requirements of digital media. This requires not only a shift

in attitude but also earnest effort in developing a well-drafted framework that is aligned with their vision. Success in DM depends on the acquisition of the right knowledge of both technology and operational tools and an in-depth knowledge of consumer behaviour. Organizations can practically use digital strategies to enhance sustainability, focusing on the necessity of combining digital tools with sustainable methods (Baroutis, 2022).

In today's business climate, with sustainability as a pre-eminent concern, developing a brand sustainability strategy is essential in a bid to secure long-term success. There is a significant role of marketing management and SM marketing in constructing sustainable brand images and advancing responsible business practices. SM is an efficient tool for transmitting sustainability communications, engaging customers, and making people aware of ethical business standards. Marketing management also acts as a driving engine for incorporating sustainability into every form of marketing effort. Employee activation and cross-departmental integration are also determined to be equally important for carrying out a well-rounded brand approach to sustainability successfully (Aripin et al., 2023). The use of blue on a company website, especially on a product category landing page, has significant impacts on purchase intention and consumer perception of sustainability and affects the most variables. An eco-claim or a specific color has no substantial effect on trust level. Therefore, the use of blue on a company website has substantial effects on the look of a website and products as sustainable (Flaschka, 2020).

To companies looking to tackle the needs of contemporary conscious consumers, a competitive advantage is claimed for the ability to embed sustainability messages within marketing messages. Content marketing research for use in communication of sustainability is one of the essential areas of focus with potential prospects. Developing quality sustainability content is an important step to engage stakeholders' participation mechanisms on the net. It may be a useful instrument in the hands of the marketers to enable web users to be in a position to attain sustainable development in their decision-making (Confetto & Covucci, 2021).

Empirical Literature Review:

Alsuhaibany's (2025) study investigated how digital innovation and circular economy principles boost sustainability operations within the Saudi Arabian OGS. The study sample included 348 executives from oil and gas companies in Saudi Arabia. The author employed a quantitative research design by using an online questionnaire survey. The research found that digital innovation leads to both cost reduction and operational efficiency improvements which boost the sustainable operations of the oil and gas industry. Through the adoption of digital innovation and the application of circular economy principles, the OGS industry can successfully address its sustainability challenges and compete in the market.

Ali, et al. (2024) study evaluated the environmental sustainability efforts of Middle East national oil companies. The study focused on how the companies are

contributing towards mitigating the effects of climate change through sustainable development and social marketing efforts. The researcher analyzed the qualitative data that were collected through electronic interviews with experts and quotes based on the relevant conferences and events. The study discovered that national oil companies in the Middle East region have launched sustainability programs that are committed to cutting down greenhouse gas emissions and enhancing environmental sustainability. Remarkably, Saudi Aramco and ADNOC have undertaken considerable efforts such as carbon capture and storage, renewable energy investments, and climate change promotion campaigns. However, the study also revealed that the extent of dedication and success of sustainability integration differs among them.

Al-Lami, et al. (2024) examined digital transformation in the oil and gas industry in terms of the transition to renewable energy sources, specifically the transition to renewable energy, and the innovative technology role. It explored how operational strategies are transformed by digital technology and the data use, brand awareness, and ethical data behaviour role in this transformation. The authors used a qualitative methodology through interviews with experts and industry decision-makers. The research results confirmed digital transformation is essential for oil and gas companies because it produces efficiency improvements with reduced expenses and enhanced decision capabilities. It also relies on good use of data, strong brand awareness, and responsible use of data. The adoption of successful digital transformation by oil and gas companies provides them with both market flexibility and innovative capabilities along with achieving sustainability goals.

Egbumokei, et al. (2024) study aimed to understand how digitalization and technological innovation can address the environmental and operational challenges of the oil and gas sector. Through reviews, the researchers examined how digital technology including AI, IoT, and data analytics assist in reducing environmental effects. The Research findings demonstrated that digital transformation has irreplaceable value for sustainable oil and gas industry development through operation enhancement emission reduction and innovation promotion. The combination of artificial intelligence and machine learning enables the detection of upcoming equipment breakdowns which together with energy optimization cuts down both operational stoppages and energy usage. Also, the IoT provides complete monitoring systems through real-time data which serves both operational efficiency needs and regulatory requirements.

Riak's (2024) study utilized a combination of empirical literature reviews and case studies to investigate global and DM strategies through analysis of marketing strategies, brand creation, and customer interaction in oil and gas companies to explore the importance of global and DM strategies in the sector of oil and gas. The researcher concluded that global marketing strategies are important in the process of buying and selling international oil and gas products to companies. DM strategies are crucial to improve brand awareness, sales, and online presence, i.e., email marketing, mobile marketing, SEO, PPC, and social websites.

Barahona, et al. (2024) study identified the barriers that face sustainable supply chain management (SSCM) practice adoption within Saudi Arabian petrochemical organizations. The study included eight experts who worked in Saudi Arabian petrochemical organizations. The study depended on an analytical case study based on Multi-Criteria Decision-Making (MCDM) and nonparametric statistics linked with bootstrapping to implement the Analytic Hierarchy Process (AHP) to analyse the data related to the obstacles of the oil sector in Saudi Arabia. The study concluded that the most significant barriers to sustainable supply chain management are consumer resistance to adopting sustainable practices and communication gaps. It emphasized that managers must consider the reverse relationship between barriers while developing implementation strategies, suggesting that the biggest hurdles are communicative and cultural and not financial or technological.

Farradia, et al. (2019) study analyzed the components of green marketing, such as (green product, green price, green distribution, and green promotion) impact sustainability outcomes (economic environmental, and social) within Indonesian petrochemical firms. The study sample involved (255) olefin petrochemical manufacturers established in Banten Province through purposive random sampling procedures. The researchers used a quantitative method to examine green marketing and sustainability within petrochemical firms through a structured questionnaire. The researchers concluded that green marketing components have positive impacts on economic, environmental and social sustainability evaluation. The research validated all three tested relationships between green marketing mix elements and sustainability dimensions thus confirming its business strategic value in commodity markets such as petrochemicals.

Setkute's (2018) study investigated DM communications (DMC) usage within British business-to-business oil and gas small and medium enterprises based in Aberdeen. The research used a qualitative case study and collected data from observations and interviews with marketing professionals and managers in B2B. The research concluded that DM communications (DMC) play an important role for B2B SMEs, however, traditional face-to-face communications and personal networks remain highly vital for these businesses due to the lack of sources and traditional mindsets in the oil and gas sector.

Research Gap:

The Saudi Arabia petrochemical industry's sustainability targets benefit from DM practices but existing research lacks understanding about this relationship despite its extensive exploration of sustainability along with digital transformation in the oil and gas sector. Alsuhaibany (2025) and Egbumokei et al. (2024) explored digital innovation together with technological tools for operational enhancement and emission reduction but failed to analyze DM strategies or stakeholder engagement through digital platforms. Ali et al. (2024) and Al-lami et al. (2024) provided insights about corporate sustainability and digital transformation although they did not explain DM strategies that shape public opinions or influence consumer conduct and

sustainability branding. DM strategies receive substantial recognition from Riak (2024) for their influence on branding and customer engagement in the oil and gas industry but don't specify applications related to environmental or sustainability improvements, especially at Saudi Arabia's petrochemical facilities. Barahona et al. (2024) outlined the obstacles facing SSCM yet failed to present DM instruments as resolving these obstacles despite indicating the necessity of proficient digital communication frameworks. Farradia et al. (2019) and Setkute (2018) have published research on green marketing and digital communication in other nations (Indonesia and the UK), with an emphasis on their positive impacts. There is limited localized research in Saudi Arabia's petrochemical sector, especially concerning how DM plays a role in sustainability awareness, consumer engagement, or green reputation. Marketing experts have not received attention in existing research about how DM affects sustainability practices within Saudi Arabia's petrochemical industry. The absence of research in this area provides an excellent chance to analyze how DM strategies should be used to overcome sustainability barriers along with promoting green initiatives while engaging stakeholders better.

Research Methodology

The research employs the use of descriptive research methodology in investigating the contribution of DM to sustainability within Saudi Arabian petrochemical companies. The population will be inclusive of marketing experts will be considered the practitioners who will be approached from across the country form the study sample from which a simple random sample will be drawn to ensure varied and representative data.

Study population and sample:

The study population was DM experts in the Kingdom of Saudi Arabia. Because the study population is very large, the researcher had to rely on the sample to conduct the study. The sample size was (315) people, and they were selected by a simple random method. Statistical analysis will be done using SPSS program. SPSS, which stands for Statistical Package for the Social Sciences, is a powerful computer program that is widely used to examine data in research. Data management features of SPSS enable investigators to organize, scrub, and manipulate data sets effectively.

Findings and Discussion

Show the results of the hypothesis that states: “ There is a statistically significant effect at an indicative level (0.05) of website design on sustainability within petrochemical companies ”

To verify the validity of the hypothesis, a regression analysis test was used, and its results are shown in the following table:

"Table (4-1) results of the “regression analysis” of the impact on website design on sustainability within petrochemical companies"

Sig.T	T.value	R2	R	Beta	B	Independent variable
.000	13.481	.367	.606 _a	.606	.526	website design
1.952						Fixed coefficient
.365						Adj R2
181.739						F value
.000 ^b Moral model						Mr F

The results of the previous table show the presence of a positive, statistically significant impact of website design on sustainability within petrochemical companies, where the value of (R) was (.606a) with a significance level of (.000b). Thus, the validity of the hypothesis was verified and accepted, and the answer to the question that stated “What is the impact of website design on sustainability improvements?” The researcher attributes this to the fact that site design plays a pivotal role in facilitating users’ access to sustainability information in a clear and organized manner by providing simple user interfaces that enable users to quickly access the information that interests them, which enhances their understanding of the sustainable practices adopted by companies. In addition, designing the site in a way that is visually attractive to users contributes to attracting their attention and invites them to learn about more content, which makes the site more attractive. Not only that, but organizing the site content in an orderly manner makes it easier for users to move easily between pages. And find what they need more efficiently and effectively.

Verification of Research Hypotheses:

“ There is a statistically significant effect at an indicative level (0.05) of SM marketing in enhancing sustainability ”

To verify the validity of the hypothesis, a regression analysis test was used, and its results are shown in the following table:

"Table (4-2) results of the “regression analysis” of the impact on SM marketing in enhancing sustainability"

Sig.T	T.value	R2	R	Beta	B	Independent variable
.000	15.229	.426	.652 ^a	.652	.580	SM marketing
1.784						Fixed coefficient
.424						Adj R2
231.928						F value
.000 ^b Moral model						Mr F

The result of the above table shows statistically significant positive influence of SM advertising towards making it grow more sustainable, as evidenced by an R value of (.652a) and a significance level of (.000b). The hypothesis was therefore confirmed and accepted " **How does SM marketing contribute to sustainability improvements?"**

SM is a powerful tool in promoting awareness about sustainability in the petrochemical industry. These platforms provide companies with the opportunity to effectively communicate with users through targeted marketing campaigns, which helps companies reach the appropriate audience, which enhances the ability of these companies to positively influence users. In addition, SM helps in employing more effective strategies to increase the number of those interested in sustainability issues, which contributes to the formation of a community supportive of sustainability initiatives. SM also works to promote the sustainability of the petrochemical industry and its importance, which enhances the image of companies and increases confidence between them and the public.

“ There is a statistically significant effect at an indicative level (0.05) of SEO to sustainability improvements ”

To verify the validity of the hypothesis, a regression analysis test was used, and its results are shown in the following table:

"Table No. (4-3) Results of the “regression analysis” of the impact on SEO to sustainability improvements"

Sig.T	T.value	R2	R	Beta	B	Independent variable
.000	14.717	.409	.640 ^a	.640	.571	THIS
						Fixed coefficient
.407						Adj R2
216.593						F value
.000 ^b Moral model						Mr F

The results of the previous table show a statistically significant positive effect of SEO to sustainability improvements Where the value of (R) came (.640^a(level of significance).000^bThus, the hypothesis was verified and accepted, and the question was answered, which stated: **What role does SEO play in enhancing sustainability?"**

The researcher attributes this to: By improving companies' search engines, it contributes to enhancing sustainability in the petrochemical industry. Good search engines contribute to ensuring that content related to sustainability appears more frequently in search results, which makes it easier for users to access relevant information, and enhances the ability of companies to reach the largest audience interested in environmental issues. Improving websites also helps in enhancing effective communication with users, and companies become more able to answer user inquiries, meet their needs, and provide the information they are looking for, which enhances confidence and encourages them to Supporting sustainable initiatives. It is also worth noting that targeting keywords related to sustainability gives companies the opportunity to attract the right audience and establish long-term relationships with customers interested in sustainability.

“ There is a statistically significant effect at an indicative level (0.05) of the effectiveness of email marketing in supporting sustainability efforts. ”

To verify the validity of the hypothesis, a regression analysis test was used, and its results are shown in the following table:

"Table No. (4-4): Results of the “regression analysis” of the impact on email marketing in supporting sustainability efforts"

Sig.T	T.value	R2	R	Beta	B	Independent variable
.000	12.877	.346	.588 ^a	.588	.568	email marketing
1.740						Fixed coefficient
.344						Adj R2
165.825						F value
.000 ^b	Moral model					Mr F

The results of the previous table show a statistically significant positive effect effectiveness of email marketing in supporting sustainability efforts Where the value of (R) came (.588^a(level of significance).000^bThus, the hypothesis was verified and accepted, and the question was answered, which stated: **How does email marketing support sustainability efforts?"**

The researcher attributes this to the fact that e-mail marketing supports sustainability efforts by providing effective means of communicating with the

audience and providing customized content that meets their needs. By customizing e-mail content, companies can send messages related to sustainable practices that are compatible with users' interests, which enhances the effectiveness of campaigns and increases positive interaction. This requires providing attractive and eye-catching e-mail addresses; These titles encourage users to read the content and raise awareness about sustainability issues and environmental initiatives. In addition, it requires setting clear goals for each email marketing campaign, to direct messages correctly and achieve tangible results.

“ There is a statistically significant effect at an indicative level (0.05) of the role of affiliate marketing in fostering sustainability within the petrochemical sector. ”

To verify the validity of the hypothesis, a regression analysis test was used, and its results are shown in the following table:

"Table No. (4-5): Results of the “regression analysis” of the impact on affiliate marketing in fostering sustainability within the petrochemical sector"

Sig.T	T.value	R2	R	Beta	B	Independent variable
.000	14.117	.389	.624 ^a	.624	.554	affiliate marketing
1.892						Fixed coefficient
.387						Adj R2
199.283						F value
.000 ^b Moral model						Mr F

The results of the previous table show a statistically significant positive effect affiliate marketing in fostering sustainability within the petrochemical sector Where the value of (R) came (.624^a(level of significance).000^bThus, the hypothesis was verified and accepted, and the question stipulated was answered" **What is the impact of affiliate marketing on sustainability in petrochemical companies ?"**

The researcher attributes this to the fact that affiliate marketing reflects positively on sustainability in petrochemical companies. By contributing to expanding access to a new audience, it increases awareness of the sustainability practices adopted by the company, and communicates with diverse categories of users, to enhance understanding of the importance of sustainability in this sector. In addition, affiliate marketing reduces the costs of traditional advertising, allowing companies to direct available resources to sustainability initiatives, and saving these costs contributes to increasing investment in developing more environmentally friendly technologies or improving production processes. Marketing also A commission enables companies to cooperate with a variety of partners from different industries and fields, which increases opportunities for innovation, exchange of knowledge

about sustainability practices, and development of new solutions that enhance sustainability.

Conclusion

This chapter encapsulates the overall conclusions from previous chapters, by subsequently crucial recommendations and propositions for further research based on the study findings. The research aimed at exploring the impact of various DM factors on petrochemical companies' sustainability, and findings confirmed that there are significant positive impacts in all hypotheses under test.

The first hypothesis covered the significance of website design and sustainability in petrochemical firms. The outcome showed a positive statistically significant effect with an R value of (.606a) and significance level of (.000b), validating that proper website design has a bearing on enhanced sustainability practices. The same applies to the second hypothesis, which tested for the impact of SM marketing on sustainability. It also exercised a statistically significant positive effect, and its R value was (.652a) and its significance was (.000b), signifying the considerable part played by SM websites to guarantee sustainable practices.

The third hypothesis was used in investigating the contribution of SEO towards sustainability increases. The tests revealed a statistically significant positive contribution with an R value of (.640a) and significance level of (.000b), to support the hypothesis that effective SEO strategies can channel more awareness and support towards activities for sustainability. The fourth hypothesis examined the role of email marketing in favoring sustainability efforts. The results indicated a statistically significant positive effect, R value (.588a) and significance level (.000b), which meant that affiliate marketing campaigns are useful tools for promoting sustainability.

The fifth and final hypothesis tested the influence of affiliate marketing on enhancing sustainability in the petrochemical sector. The research established a statistically significant positive contribution with an R value of (.624a) and a significance level of (.000b). The consistent results across all the DM instruments validate their common role towards sustainability in the sector. Based on these results, several recommendations are provided: developing educational material on sustainability, using DM channels, offering real-case studies, holding training workshops, obtaining the government's support, forming strategic alliances, and launching awareness campaigns through SM.

Apart from these recommendations, the study indicates further research towards advancing knowledge in this field. Suggested future studies include researching "the role of DM in raising awareness of sustainability within the Kingdom of Saudi Arabia petrochemical industry sector" and researching "the role of current technology in the development of innovative solutions to environmental challenges in the Kingdom of Saudi Arabia." Such researches have the potential to provide more

elucidations of processes and actions driving sustainable development within the region

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