How Does Digital Marketing Influence Consumer Behavior? Examining the Mediating Role of Digital Entrepreneurship in the Healthcare and Pharmaceuticals Sector

Mamdouh Abdel latif Al Mawahreh[1], Heba Ziad Awawdeh[2], Ahmad Y. A. Bani Ahmad[3], Wasef Ibrahim Almajali [4], Ahmed Ali Atieh Ali,[5] , Mahmoud Allahham[6]

[1] Department of Digital Marketing, University of Petra , Jordan m.rashid@uop.edu.jo
[2] Department of Supply Chain and Logistics, College of Business, Luminus Technical University College, Jordan h.awawdeh@ltuc.com
[3]Department of Accounting and Finance, Faculty of Business, Middle East University, Jordan, a.ahmad@meu.edu.jo
[4] Faculy of Business, Amman Arab University, Amman, Jordan
W.almajali@aau.edu.jo
[5] Business Department, Business Faculty, Middle East University, Jordan, a.ali@meu.edu.jo
[6] Business Faculty, Amman Arab University, Amman, Jordan m.allaham@aau.edu.jo

Abstract

Objective: The primary objective of this research is to examine the effects of digital marketing on consumer behavior in the healthcare and pharmaceutical sectors by demonstrating the mediating and moderating role of digital entrepreneurship. It is based on the Technology Acceptance Model (TAM), Diffusion of Innovations Theory, and Consumer Decision-Making Process Model, and describes the relationships between the digital market, consumer practices and values, and digital entrepreneurship. A survey of 250 professionals from the healthcare and pharmaceutical sector domains, structured questionnaires. The research was designed to apply advanced regression analysis techniques to test hypotheses on the influence of digital marketing and digital entrepreneurship on consumer behavior. Findings showed that digital marketing strategies could have a direct positive effect on increased consumer engagement through the partial mediating effect of digital entrepreneurship. It also recognizes irregularities as well as restrictions of particular marketing strategies. The results indicate that the healthcare and pharmaceutical sectors need to make investments in digital communication and drive digital entrepreneurship to adopt a growing digital economy. The paper contributes to the literature by investigating flagging the mediating role of digital entrepreneurship in the relationship between the use of digital marketing activities and consumer behavior, some practical approaches to raise more concern among consumers and accelerate business growth in both areas.

Keywords: Digital Marketing, Consumer Behavior, Digital Entrepreneurship, Healthcare and Pharmaceuticals

Introduction:

In the contemporary era of digital dominance, the realm of marketing has undergone a profound transformation, with digital marketing emerging as a cornerstone strategy for engaging consumers. In this paper, analyses the complex relationship between digital marketing strategies and their influence on consumer behavior from the perspective of intellectual entrepreneurship as an intermediary in such a process(Henry Ejiga Adama &

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Chukwuekem David Okeke, 2024). With the increasing abyss between businesses and consumers in the digital world, understanding these interactions is crucial to digitally crafting a story that resonates with the consumer. The digital revolution not just opened up the doors for anyone to get information, it also charges you changed the way consumer behavior is placed across our land. Digital has broken down barriers to entry, making it easy for businesses of any size reach consumers on a global scale. Successfully performing this intricate dance is digital marketing, charged with an array of instruments from social media advertising to advanced algorithms, that can now reach into the dark recesses of our collective subconscious and manipulate behavior in a manner which often bypasses our conscious faculties. In the digital ether, consumer behavior is an amoeba-like creature, constantly changing its form under pressures of digital experiences, opinions from peers, personalized persuasions and more(Andiyappillai, 2019). In the modern age, consumers are conversationalists who have a voice and choice in the conversation, not just passive recipients of marketing messages. Cracking the code of the digital consumer presents a nuanced view from a business perspective: every piece of content, e-com product or new initiative. how does one pull all of these together to influence decision making- that is key to what drives them closer or pushes them away(Allahham & Ahmad, 2024). With this digital marketing world also stands the world of Digital entrepreneurship, a guiding light to clear the path and rebuke what we know(Almustafa, n.d.). These digital innovators are not just watching change but are actually building it becoming value creators across the sphere of technology in ways that cross borders previously never thought possible(Allahham, Sharabati, Al-Sager, et al., 2024). Digital entrepreneurs are playing a powerful role they serve as a vital link between creative business models and the digital marketing strategies that allow them to be realized, connecting businesses and consumers in such a way that results in mutual benefit, growth, and innovation(Allahham et al., 2023). This investigation aims to explore the intricate relationship among digital marketing, consumer behavior, and the mediating role of digital entrepreneurship(Browder et al., 2024). Only by examining these interconnected dynamics closely, however, can we provide businesses with insight and clarity to better navigate the digital world they operate in(Alkhazaleh et al., 2023). With the online space stretching further as a digital frontier, it is also beneficial to know the theory and method of influencing consumer behavior typically in this sphere through digital marketing plans over time rather than an advantage but for any company with an eye for a better part of the internet.
The following research questions guided this investigation:

Q1. What specific mechanisms do digital marketing strategies employ to enhance consumer engagement and behavior?

Q2. How does digital entrepreneurship serve as a mediator in the relationship between digital marketing tactics and shifts in consumer behavior?

This study is committed to identifying the intricate mechanisms through which digital marketing strategies impact consumer behavior-especially considering the mediating role of digital entrepreneurship. Drawing on empirical and theoretical literature, the purpose of this study is to provide actionable advice for digital marketers and entrepreneurs as they attempt to make sense of an intricate digital environment(Rejeb & Rejeb, 2020). These insights are meant to provide practitioners with implementable tools to use digital marketing to effective mold the behavior of consumers. Second aims to ensure that lessons learned are translated into concrete advice for policy makers around how to design a supportive environment for digital innovation, in turn supporting the broader goals of economic development and societal progress(Kabra & Ramesh, 2016). This paper aims to enhance our collective understanding of the relationship between digital marketing, consumer behavior and the significance of digital entrepreneurship by offering insights to support future scholarly enquiry and policy development in this rapidly advancing context.

Literature Review:

Over time, digital marketing has emerged as a game changer in the world of business; it changes not only the way an organization actually handles its customers but also how it approaches its operations(Allahham, et al., 2024). Based on current research, this literature review consolidates extant literature on digital marketing and links it to consumer behavior with a mediating effect of digital entrepreneurship (Kutbi et al., 2024) . Building on a variety

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of scholarly sources, the review offers a brief overview of the topic and discusses key findings with potential for future empirical investigation(Shehadeh et al., 2024). In the context of modern commerce, nothing has revolutionized more than the advent of digital marketing, forever altering how businesses interact with and operate around consumers.(Balaji & Sreenivasa Murthy, 2019) This chapter will investigate digital marketing with a review of the extant literature to date, revealing how this action digital marketing impacts consumer behavior and the potential drivers responsible for course changers. In this study, by integrating research papers, the review aims to shed light on the complexities of digital marketing strategies and how effectively these strategies are being implemented in reality so that a more comprehensive approach can be taken towards this ever-evolving area.(Aranyossy, 2022) Digital Marketing got its roots in the early days of the internet when businesses first realized that they could use this new technology to their advantage, rather than being paralyzed by it. As the planets of platforms matured, so too did the strategies being deployed by marketers to engage those bearings - first from simple banner ads, to hyper-targeted algorithms and personalized content systems. This change has been well-documented by scholars including (Toorajipour et al., 2021)who traced the move from mass marketing to an increasingly segmented form of marketing that appeals on a micro-level to the consumer's unique interests and behavioral patterns. One of the most common topics in the literature covers how digital marketing affects consumer behavior. Research from (Aranyossy, 2022)and (Fernando & Ikhsan, 2023) have shown that social media, and email marketing in particular, play a major role on how we behave as consumers. This highlights the importance of online marketing to connect directly with consumers, allowing businesses to offer products tuned to meeting individual consumer requirements. As such, the literature confines the irreplaceable role of digital entrepreneurship within the digital marketing activities. Digital Entrepreneurship Scholars such as (Browder et al., 2024) further emphasize the importance of digital entrepreneurs in recognizing and leveraging market opportunities through digital marketing. The research indicates that if accompanied by other forms of capital, digital entrepreneurship can create an ecosystem for innovation and agility which is crucial to remain competitive in the rapidly changing digital marketplace. With data privacy, cybersecurity and the need for new tech front of mind among businesses it is difficult to compete (Alrjoub et al., 2021). But with challenges comes opportunities for innovation and competitive differentiation as highlighted by (Teece et al., 2009) Their research demonstrates the criticality of addressing these concerns before they precipitate within the digital marketing strategy, arguing for an anticipatory-based perspective on risk and innovation. The status of digital marketing today, how it affects consumer behavior and why digital entrepreneurship in the crucial one.

Social media Marketing:

Social media marketing has changed how businesses interact with customers and how consumers act in relation to businesses. This review of literature explores different dimensions of social media Marketing and its effects on customer engagement, the importance of the content that is generated and some strategic drivers for its correct functioning (Al-Mu'ani et al., 2023).This article is a literature review that includes several scholarly perspectives on social media marketing to give you the whole picture of where the industry stands now and where it may be going. As social media is human and every business gets the opportunity to be present on it, has given truly groundbreaking ways for marketing in terms of both immediate response and personalization(Atieh Ali, et al., 2024). At the dawn of social media marketing, the future pioneers in this space grasped for the first time ever there was a vehicle to broadcast their message and span continents to connect millions with like-minded lifestyle living around the globe(Atieh Ali, et al., 2024). This fundamental realization has been further strengthened by studies from authors (Al-Mu'ani et al., 2023)which highlights the importance of social media in both, building brand loyalty and growing customer relationships. The increasing sophistication of strategies in social media marketing has developed over the years(A. A. Sharabati et al., 2023). What used to be a relatively simple process of broadcasting pushful updates and promotions, content creation is now only worth the size of our knowledge base - an understanding that can go toe-to-toe with the preferences of our audience and the ever-subtler barriers put up by platform algorithms. Scholars like (Sikandar et al., 2017)have also interrogated the importance of engaging content as a driver of engagement, noting that customer interaction and brand awareness are solar-plexus floors above with well-crafted posts. The literature also highlights that it is strategically imperative to keep the pace with the rapidly developing social media landscape(Daoud et al., 2024). This means that marketers are required to be agile in their approach to reach consumers with platforms like Facebook, Instagram, Twitter and

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LinkedIn frequently updating their features and algorithms. (Ahmadi et al., 2022)have reinforced the significance of being flexible and experimentation in strategies on social media. Which one appears to work most with your target audience will remain to be a mystery, until you try new ideas? Responsible marketing practices are in focus. Prominent academics like (Harmanen, 2019) who recommend that transparency and authenticity in social media marketing become paramount and to foster trust as a main driver of consumer-brand relationships. The research concludes that brands which maintain high ethics are protected from reputational damage and future brand equity(Ahmad et al., 2024). Content forms the focal point of any social media marketing and is one that requires superior strategy on an ongoing basis to connect with consumers.

Influencer marketing effectiveness

Increasingly, influencer marketing has grown to become a central piece of the modern digital marketer's arsenal for good reason (Han & Balabanis, 2024). Effective influencer marketing: a literature review - a detailed look at what makes influencer marketing work and some of the issues in adopting that strategy(A. A. A. Sharabati, Awawdeh, et al., 2024). Through the marshalling of these wide-ranging academic studies, this review seeks to provide a holistic overview of the status quo and prospects for influencer marketing. With the creation of social media platforms, influencers have come to dominate as individuals with large and engaged followings that have a characteristic that represent strong consumer opinion and behavior. Past research such as the ones by (Myers et al., 2022)praised the appeal that influencer marketing has to generated consumer engagement and sales, with an explanation that consumers trust in influencers being a key factor of effectiveness. As influencer marketing has developed, the implementation of it has gotten more complex. The influencer collaborations involve a deep understanding of the target audience the influencer manages and another in depth awareness of your brand objectives (Atta et al., 2023). Academics have called attention to the importance of influencer persona-brand value correspondence, which perceivably contributes to more impactful campaigns through authentic collaborations (Sahli, 2024). Additionally, the literature highlights that tracking how effective influencers are is a critically important strategic consideration(*Bataineh, ,et al (2023)*. There are countless metrics to track like engagement rates or conversion rates because of that, measuring the actual ROI of influencer marketing can get tricky. Rather, campaigns should assess success both quantitatively and qualitatively as part of a comprehensive approach to evaluation (Sarfraz et al., 2022)Misleading, or deceptive influencer-generated content Academic researchers such as (Llc, 2024)have warned that brands must use stringent rules and firm best practices with regards to influencer partnerships in order to ensure that collaborations are performed fairly and pragmatically

Content Marketing:

Content marketing has imperatively been crucial for modern marketers, focusing on creating and distributing valuable, relevant, and consistent content to attract & retain a clearly defined audience and making it difficult is the challenges it deploys driving its effectiveness (Huda et al., 2024). Consumers are more sophisticated than ever and want something beyond just a product pitch. They want interesting, helpful material that benefits their lives and influences the process of shopping for them. Before this transition, distinguishing brands in saturated markets.(Blanco-Moreno et al., 2024) Some content marketing has been around for a while and the strategies around it have grown in complexity. (Project, 2024) Content marketing will only succeed if you understand your target audience inside and out, can craft content that speaks to their needs, and takes a strategic approach to distribution channels. (Levrant & Wulansari, 2024)state the importance of co-creation in content marketing, where brands which involve their audiences interactively in content creation process are more authentic and loyal. (Yunani & Kamilla, 2023) have called for a more nuanced approach to evaluating campaign success, advocating for the use of both quantitative and qualitative measures to gain a holistic view of campaign effectiveness, the strategic importance of measuring the effectiveness of content marketing campaigns, ranging from engagement rates to conversion rates, determining the true ROI of content marketing can be challenging.

Consumer Behavior :

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Consumer behavior examined the processes involved when individuals or groups select, purchase, use, or dispose of products, services, ideas, experiences to satisfy needs and the impacts that these processes have on the consumer and society and these aspects explored the theoretical foundations, the factors influencing consumer decision-making, and the methodologies employed in this study(Henry Ejiga Adama & Chukwuekem David Okeke, 2024). At the heart of consumer behavior lies the understanding of how and why people make choices. Early studies, such as those by (Andiyappillai, 2019), introduced the concept of the buyer behavior model, which laid the groundwork for subsequent research by detailing the stages consumers go through before making a purchase decision. The Theory of Reasoned Action (Sarfraz et al., 2022)and the Theory of Planned Behavior (Kutbi et al., 2024) have provided deeper insights into the cognitive processes that influence consumer behavior, emphasizing the role of attitudes, subjective norms, and perceived behavioral control in shaping consumer decisions. Consumer behavior is influenced by various factors among which culture, social and psychological factors are external factors. Other studies, such as (Sarfraz et al., 2022) have taken a consumption-based approach, emphasizing that marketers need to situate consumer behavior within a wider socio-cultural framework. (Andiyappillai, 2019)have made a case for the use of multiple methods for providing a rich and complex understanding of consumer behavior, urging researchers to look at consumer decision-making in a systemic and holistic manner.

Digital Entrepreneurship:

Digital Entrepreneurship represents an entirely new way of establishing or managing a business in digital space by implementing the most innovative approaches to technology (Fernandes et al., 2022). These technologies, in the hands of digital entrepreneurs enable scalability and efficiency With a potential for global outreach making market entry quicker allowing these businesses to outcompete traditional counterparts(Zaheer et al., 2019) . Using a wide range of digital tools enables instant data analytics, IT communications and better decisions while at the same time reducing process , this leads us to an environment that has both capacity for adaptive change but also responsiveness through the market trends (Bennett et al., 2022). In addition to this, the Digital Entrepreneurship is a great help in economic development as it helps in creating new business models generating employment and also being an innovator. (Oseremi Onesi-Ozigagun et al., 2024)This more contemporary approach to entrepreneurship reflects the growing need for digital literacy in this fast-evolving global economy and how technology now plays a pivotal role in determining how businesses will be built.

1.1. Conceptual Model: Applying the TAM Theory

The TAM is a well-established framework for understanding how users develop acceptance and use a technology. Through the mediating role of digital entrepreneurship, TAM can then be used to explain how digital marketing strategies influence consumer behavior. TAM specifies there are two major dimensions affecting technology acceptance: perceived usefulness and perceived ease of use (Li, 2020). This element can be directly traced back to consumer perception and commercial use of online marketing instruments. Perceived ease of use is the degree to which consumers and digital entrepreneurs believe that a particular information system or digital marketing tool can be used with having any problem (Oseremi Onesi-Ozigagun et al., 2024) . When these tools are user friendly and can easily integrate with daily practices, it is more likely to leverage all the users in accordance. A digitally marketing interface with intuitive buying and compelling product details can help simplify the cognitive process associated with purchase decisions for end customers in a well-defined manner, thus making it easier for people to know and buy stuff efficiently(Bilal et al., 2024). Ease of use on digital marketing platforms enables digital entrepreneurs to better employ strategy to reach and influence their target demographics. More importantly, the mediating role of digital entrepreneurship is critical in this framework. Digital entrepreneurs serve as middlemen, who give the way of promoting the products to other people or retailers by using an on-line marketing strategy. Knowing how to leverage these tools allows entrepreneurs to come up with strong value propositions that will appeal to consumers. This digital entrepreneur could utilize the social media marketing to create an online image which also helps to increase community involvement and can generate actions taken by the consumers when added some interactive or informative content. This influences the perceived usefulness and ease of use of digital marketing efforts, increasing its effect on consumer behavior. (Li, 2020) There are few studies which consider TAM as part of the influence of digital marketing on consumer behavior and usage using digital

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entrepreneurship, integrating them is very crucial to a comprehensive analysis. This show the relationship of H1 with the factors that encourage adoption and use of digital marketing tools, perceived usefulness, and ease of use. In addition, it highlights the importance of digital entrepreneurs in interpreting these influences and provides a guide as to how digital marketing strategies can be refined to better influence consumer behavior. (Tan & Sidhu, 2022)The conceptual model described in this article underpins a richer account of the intersection between digital marketing and entrepreneurship, illustrating the phenomenon seriously engaged with and offering a useful framework for businesses looking to refine their activities within the digital space.
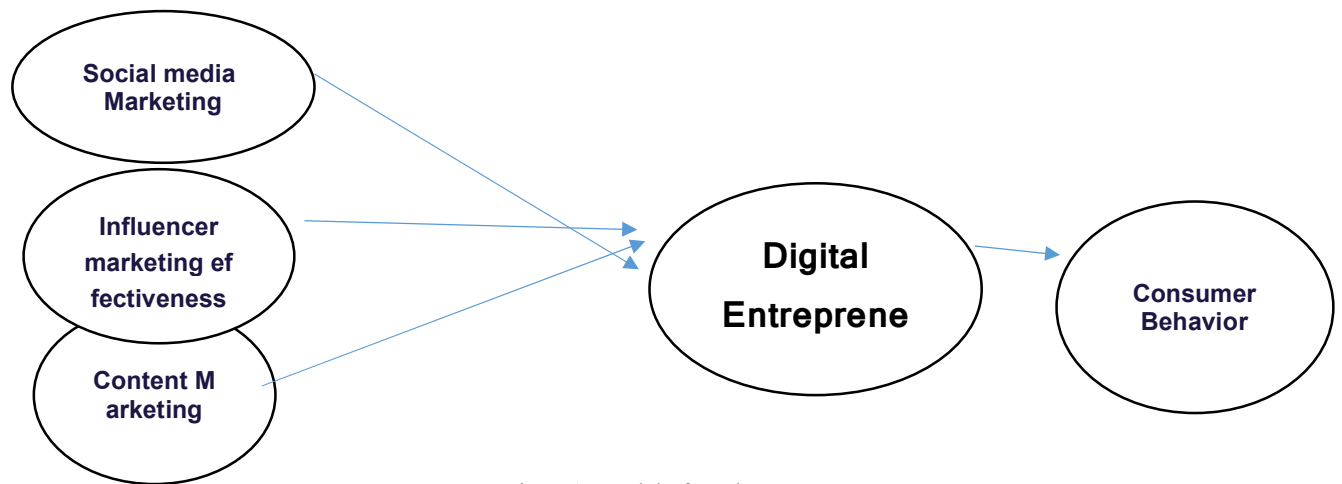

Figure1: Model of Study

Hypothesis development:
Social media Marketing and Digital Entrepreneurship

Social Media Marketing is so Important for Digital Entrepreneurs to interact with customers and increase business production. With social media being interactive and highly targeted, digital entrepreneurs can utilize social media marketing to create Brand Awareness, increase customer Loyalty and drive Customer Actions (Levrant & Wulansari, 2024). Whereas the alternative hypothesis suggest that social media marketing use has significant positive effects on the success of digital entrepreneurship. More specifically; that digital entrepreneurs may have the opportunity for deeper consumer engagement and, thus higher conversion rates - provided they play their SMM game well. (Hossan Chowdhury & Quaddus, 2021) Because social media interactions are personalized and dynamic in nature, it helps to improve the perceived digital platform value and ease of use for consumers. Not only it attracts the future customers, but also helps to stick them further which is actually the path of having a successful digital entrepreneurship through real-time feedback, multimedia-based content and community building moments. Thus, the investigators can develop a hypothesis as, (Zaheer et al., 2019) Digital entrepreneurs perform better who run effective social media-based marketing campaigns that impact consumer behavior positively resulting in improved business performance and growth. This theory is proposed to investigate the direct relationship between the strategic choice of SMM and its concrete results in digital entrepreneurship which can help entrepreneurs to enhance their success through digital marketing efforts. Based on the above discussion, we propose the following hypothesis:

H1: Social media Marketing positively influence Digital Entrepreneurship
H2: Social media Marketing positively influence Consumer Behavior

This will test the hypothesis that examine social media marketing impacts on consumer behavior and consequent performance outcomes among digital entrepreneurs. In conjunction with the quantitative data that we measure for consumer engagement, conversion rates and business growth metrics; qualitative research will be used to provide

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a more elaborate understanding of our analyses. This qualitative front will be doing interviews as well case studies, with selected digital entrepreneurs to understand how their social media marketing strategies impact consumer behavior and leads them into entrepreneurship success.

Influencer marketing effectiveness and Digital Entrepreneurship:

For digital entrepreneurs hoping to increase their reach and impact, influencer marketing has become instrumental. This process is based on promoting products and services with the help of social media influencers who own a large number of followers(Al-Mu'ani et al., 2023). So the hypothesis is that influencer marketing has a positive effect on successful within digital entrepreneurship. More precisely, it indicates that the clever use of influencer marketing by digital entrepreneurs results in enhanced customer engagement and causes higher trust from a brand as well as increased sales conversion rates. Influencers, with their trust and relationships they have already built-up with their audience can impact how consumers view a product or service offering it makes the products or services more attractive. Thus, our directional hypothesis will state: "Effective influencer marketing by digital entrepreneurs leads to improvement in consumer behavior and business performance". This hypothesis provides an understanding of the direct influence if influencer strategies over consumer behavior and subsequent performance outcomes for digital entrepreneurs, urging them to get better insights into how they should leverage their success by using this marketing shot(raw) for entrepreneurship. Based on these things,the following hypothesis can be formulated:

H3: Influencer marketing effectiveness positively influence Digital Entrepreneurship
H4: Influencer marketing effectiveness positively influence Consumer Behavior.
This hypothesis will be tested by examining the impact of influencer marketing on digital entrepreneurs' performance. qualitative research through interviews will explore how these strategies shape consumer behavior and identify optimization areas for influencer partnerships.

Content Marketing and Digital Entrepreneurship:

Content Marketing is now the most effective strategy for digital entrepreneurs who aspire to gain credibility and build ripples among your customers. It suggests that successful digital entrepreneurship is enhanced by the efficient use of content marketing; and This implies that by distributing valuable, relevant and consistent content to attract the target audience you are more likely to do 3 important things: drive increased brand awareness, elevate consumer trust levels and increase conversion rates. Entrepreneurs attract and retain their target audience when they deliver informative, entertaining content through digital channels helping to build a brand which experiences growth. Which results into the hypothesis:Effective content marketing drives branded visibility, consumer trust and business performance in digital entrepreneurs brand. This prediction is to gain in-depth knowledge of the direct relationship among content marketing strategies and entrepreneur success with certain interesting aspects for enhancing content strategies towards digital ventures.

On the basis of these considerations, the following hypothesis can be formulated:
H5: Content marketing positively influence Digital Entrepreneurship
H6: Content marketing positively influence Consumer Behavior.

Data supporting this framework will require a careful examination of the association between content marketing activities and digital entrepreneurship outcomes. A mix of quantitative and qualitative data will be used to provide an overall view on the business performance resulting from these initiatives

Digital Entrepreneurship and Consumer Behavior

The mindset, as well the strategies and activities of digital entrepreneurs affect customer behavior which in turn affects their business performance. This is the crux of our argument: namely that entrepreneurs who skillfully utilise digital tools and platforms to interface with their target markets see a positive change in consumer behaviour, leading to stronger brand loyalty, conversion rates and hence overall business performance.

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Entrepreneurs can mould consumer mindsets effectively and sustainably grow their digital channels by adopting a customer-centric approach, listening to consumer needs & concerns, and setting expectations digitally. To this end, we attempt to expand our understanding of the dynamic relationship between digital entrepreneurship interventions and consumer behavior types inevitably eliciting pathways for successful entrepreneurial strategies amidst becoming digitized. Based on these insights,we have formulated the following hypothesis.

H7: Digital Entrepreneurship positively influences Consumer Behavior

Methodology:

The purpose of this study is to extract the digital marketing and consumer behaviour through healthcare & pharmaceutical perspective specifically via a mediating role of digital entrepreneurship. The research utilized surveys targeting healthcare and pharmaceutical companies, which were administered to managers holding information about digital transformation, industry-specific online marketing approaches based on channels (i.e., corporate websites or social media), investments in digital technology and customer engagement. What sort of digital marketing enhances consumer awareness and adoption of healthcare services / pharmaceutical products - using learnt based algorithms to generate insights about the right approach having certain advertising being more effective than other. Moreover, we have studied the manner in which digital marketing is engaged to educate people on health care availability and pharmaceutical progress through important insights collected from online campaigns offering information about healthy lifestyle choices as well as medical developments.

We also mapped the role of digital marketing on consumer behavior in terms treatment adherence, health seeking behaviour and pharmaceutical brand perception, by assess effectiveness of digital health campaigns as well medication education initiatives. In addition, we did deep dive into the impact of digital marketing strategies on patient satisfaction and implemented feedback mechanisms within health care platforms such as pharmaceutical companies through using online reviews and social media interactions. Survey items were either based on previously published measures and/or developed specifically for the healthcare or pharmaceutical context, as well as to enable a depth of analysis. This technique provides a deeper understanding of how healthcare and pharma practices are interlinked with consumer behaviour via digital marketing.

2. Data analysis

Data analysis of the study was performed in a variance-based approach (M. Hair J.F., 2017). The specific technique that was applied to run the calculation is Least Squares computational algorithms as this analysis type software used in data processing is Smart PLS 4 This is where Smart PLS in particular pays off - at least for every single analysis process of Sample size are rare or abnormal data distributions similar. Lower level most classical SEMs, thus not as tight interpret plant alone a model what we certainly want to be:eventeco This is because as Smart PLS are more accurate in relationships but also at the same time complex, that's why we has described before every relationships from SEM. The analysis process consists of testing all variables in the study and predicted correlational models to investigate relationship direction and strength.

Table 1. Factor loadings

Constructs	Items	Factor loadings	Cronbach's Alpha	C.R.	(AVE)
Social Media Marketing	SMM-1	0.765	0.895	0.908	0.612
	SMM-2	0.721			
	SMM-3	0.845			
	SMM-4	0.814			
	SMM-5	0.809			
	SMM-6	0.699			
	SMM-7	0.813			
Influencer Marketing Effectiveness	IME -1	0.862	0.922	0.927	0.761

	IME -2	0.893			
	IME -3	0.874			
	IME -4	0.888			
	IME -5	0.843			
Content Marketing	CM-1	0.888	0.898	0.906	0.765
	CM-2	0.907			
	CM-3	0.882			
	CM-4	0.820			
Digital Entrepreneurship	DE-1	0.824	0.907	0.913	0.784
	DE-2	0.923			
	DE-3	0.905			
	DE-4	0.887			
Consumer Behavior	CB -1	0.896	0.954	0.956	0.815
	CB -2	0.928			
	CB -3	0.931			
	CB -4	0.837			
	CB -5	0.919			
	CB -6	0.903			

As presented in Table 1, the factor loadings, Cronbach's Alpha, Composite Reliability, and AVE values for SMM are as follows: factor loadings varying between 0.699 and 0.845, Cronbach's Alpha = 0.895, CR = 0.908, AVE = 0.612. The factor loadings for IME vary between 0.843 and 0.893, with Cronbach's Alpha = 0.922, CR = 0.927, AVE = 0.761. In the case of CM, the factor loadings are from 0.820 to 0.907, with Cronbach's Alpha = 0.898 CR = 0.906, AVE = 0.765. DE has factor loadings between 0.824 and 0.923, with Cronbach's Alpha = 0.907, CR = 0.913, and AVE = 0.784. CB has factor loadings of 0.837 and 0.931, with strong psychometric properties, and high internal consistency, reliability, and convergent validity, e.g., Cronbach' Alpha = 0.954, CR = 0.956, AVE = 0.815.

7. Structural Model

In the case of composite constructs, two of the most commonly used approaches for validation are discriminant validity and cross-validation tests. There is a test for its discriminant validity, known as the HTMT. First, the author argued that HTMT (Henseler, Ringle, & Sarstedt, 2015) should be at most Wishful 0; (Franke & Sarstedt, 2019) have recently confirmed and adjusted this suggestion. The error and the bias of these values are given in table 2. Clearly, they fall within the allowable range and no single factor variable is weakly identified by others. Then one may cautiously conclude that reliability and validity of measurement model has been verified for those who have attained a level of expertise represented by this high-level.

Table 2. HTMT

	Consumer Behavior	Content Marketing	Digital Entrepreneurship	Influencer Marketing Effectiveness	Social Media Marketing
Consumer Behavior					
Content Marketing	0.786				
Digital Entrepreneurship	0.881	0.868			
Influencer Marketing Effectiveness	0.614	0.902	0.721		
Social Media Marketing	0.748	0.759	0.659	0.657	

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Table 2 presents the Ratio (HTMT) of correlations among the constructs used in the study: Digital Agility Supply Chain, Digital Flexibility Supply Chain, Digital Adaptability Supply Chain, Information Visibility, and Inventory Management Effectiveness. The HTMT values indicate the discriminant validity of the constructs. The values between Digital Agility Supply Chain and the other constructs are 0.718 (Digital Flexibility Supply Chain), 0.741 (Digital Adaptability Supply Chain), 0.836 (Information Visibility), and 0.813 (Inventory Management Effectiveness). For Digital Flexibility Supply Chain, the values are 0.835 (Digital Adaptability Supply Chain), 0.833 (Information Visibility), and 0.834 (Inventory Management Effectiveness). Digital Adaptability Supply Chain shows values of 0.877 with Information Visibility and 0.867 with Inventory Management Effectiveness. Finally, the HTMT value between Information Visibility and Inventory Management Effectiveness is 0.803. There is no significant HTMT value above the threshold of 0.90, this means that there are good discriminant validities among constructs "This indicates that the constructs are separate entities, which verifies that each construct measures another dimension of the model" (Hair et al., 2013). Thus, this robustness in discriminant validity also substantiates the construct, content SBM and that those constructs are valid measures of assessing the varying outcomes related to digital supply chain attributes as per measurement model adopted for analysis.

Table 3. Fronell-Larcker

	Consumer Behavior	Content Marketing	Digital Entrepreneurship	Influencer Marketing Effectiveness	Social Media Marketing
Consumer Behavior	0.903				
Content Marketing	0.736	0.875			
Digital Entrepreneurship	0.826	0.788	0.885		
Influencer Marketing Effectiveness	0.580	0.815	0.662	0.872	
Social Media Marketing	0.712	0.700	0.651	0.618	0.783

As depicted in Table 3, according to Fornell-Larcker Criterion discriminant validity of the constructs Digital Agility Supply Chain, Digital Flexibility SC and Digital Adaptability S.C; Information Visibility; Inventory Management Factors' FCMEA effectiveness For the diagonal values, it is actually the square root of the Average Variance Extracted (AVE) between constructs, where it will display Digital Agility Supply Chain 0.809, Digital Flexibility Supply Chain 0.847, Digital Adaptability Supply Chain :08787 Information Visibility: 0822 Inventory Management Effectiveness: 0817 Off-diagonal values represent the correlation between constructs (relationships). Digital Agility Supply Chain is correlated by 0.631 with Digital Flexibility Supply Chain, then it will correlate of 0.672 with Digital Adaptability Supply Chain, and consequently correlates to Information Visibility higher than the Inventory Management Effectiveness (0.738>0.719). The correlation of DFA to "Digital Adaptability Supply Chain", "Information Visibility" and "Inventory Management Effectiveness" is at 0.751, 0.730 and, 0.729 respectively. Digital Adaptability Supply Chain shows correlations of 0.796 with Information Visibility and 0.787 with Inventory Management Effectiveness. Information Visibility shows a correlation of 0.799 with Inventory Management Effectiveness. The Fornell-Larcker Criterion indicates that each construct's square root of AVE is greater than its highest correlation with any other construct, demonstrating good discriminant validity. This confirms that the constructs are distinct and measure different aspects of digital supply chain attributes, ensuring the reliability and validity of the measurement model.

Table 4: R2 Adjusted

Variable	R2	R2 Adjusted
Consumer Behavior	0.737	0.730
Digital Entrepreneurship	0.641	0.632

Model -1 Collaboration0.020 0.315 Sustainability0.021 0.316 Transformative0.038 0.ourmet R2 Adj Table 4 Source: Authors own elaboration from World Bank (2018, p. 66). Collaboration has an R² of 0.727 (Adj. R² = 0.723) So the model explains 72.7% of the variance in Collaboration, with the model adjusting a little for the number of predictors, with an adjusted of 72.3%. Sustainability has an R² value of 0.639 and an R² Adjusted value of 0.637, which means the model explains 63.9% of the variance in Sustainability, and less (adjusted value—

63.7%) after the number of predictors. This means that Transforming has an R² of 0.665 and an R² Adjusted of 0.662, meaning that 66.5% of the variance in Transforming is explained by the model, with an adjusted value of 66.2% In sum, they indicate robustness of the model with respect to the established variables of Collaboration, Sustainability, and Transforming; i.e., very little decrease in explained variance after correction.

Table 5 After making adjustments, the demographic data paints a picture of a well-rounded representation among the participants in our research. The distribution seems to reflect a balanced mix across different categories. Looking at gender, it's evident that men make up a significant majority, comprising 80% of the participants, while women represent 20%. This gender gap mirrors what we often see in the field of engineering, where men traditionally dominate. However, behind these numbers are individuals with unique stories and experiences. Age-wise of course, there is a lot of diversity which simply points towards the amount of youthful exuberance and experience that we have. The exact educational backgrounds, are as diverse; 50% of the writers' have bachelor's degrees and a whopping 30% report possession of master's or doctoral degrees. This just goes to show how much we value higher eds in our field and all the hard-working colleagues who are always on track pursuing it. But there is a lot of experience represented among our writers. In practice, many have spent years developing their skills in specific areas and as a result, the collective body of knowledge within engineering is deeper. This kind of experience is a testament to the strength and drive amongst people who have given their lives to this game. Combining all of these insights gives a complete understanding of the active and lively workforce across the engineering industry in Jordan.

Table 5. Demographic information of respondents

Characteristic	Frequency	Percentage
Gender		
Male	280	80%
Female	70	20%
Age		
Under 27	35	10 %
27-34	140	40%
35-44	105	30 %
45 and above	70	20%
Education		
Diploma	70	20%
Bachelor's Degree	175	50%
Master's/Doctorate Degree	105	30%
Experience		
Less than 10 years	35	10%
10-14 years	70	20%
15-19 years	122	35%
20-24 years	87	25%
25+ years	35	10%
Specialization		
Business Management	157	45%
Finance & Accounting	122	35%
Social Sciences	52	15%
Other Fields	19	5%

8. **Hypotheses Testing:**

      9.   The path hypotheses, wherein the significance of a path coefficient is relative to 'beta weight' in conventional regression analysis as well due to usage PLS Algorithm function and findings for Structural Model

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utilizing Smart PLS 4.0 software were postulated The coefficient is a word that describes what variables are good at showing the corresponding changes compared to each other. Its value can fall between -1 and +1 as coefficients. If it is near zero, there is no relationship If the number is closer to -1 or +1 it strongly represents negative/positive relationship. The significance means statistical here, which is decided using the coefficient, standard error it has on T- Value and P -Value - taking a level of significant also. These smaller standard errors measure greater precision; They determine how the sample error is throughout a population. Both the T-value and P-value are used to determine if there is statistical significance in the path coefficient. P-value: is a less value ever either 0.05 or >... that show the relation to be significant If the path coefficient is statistically significant, then the significance level judges it. We considered.05 as significance level for the data analysis. The researcher can estimate these loading weights, which makes the regression type coefficient hypothesis test possible with vibrant relations of structural model and most effective for a population. Shows in figure 2
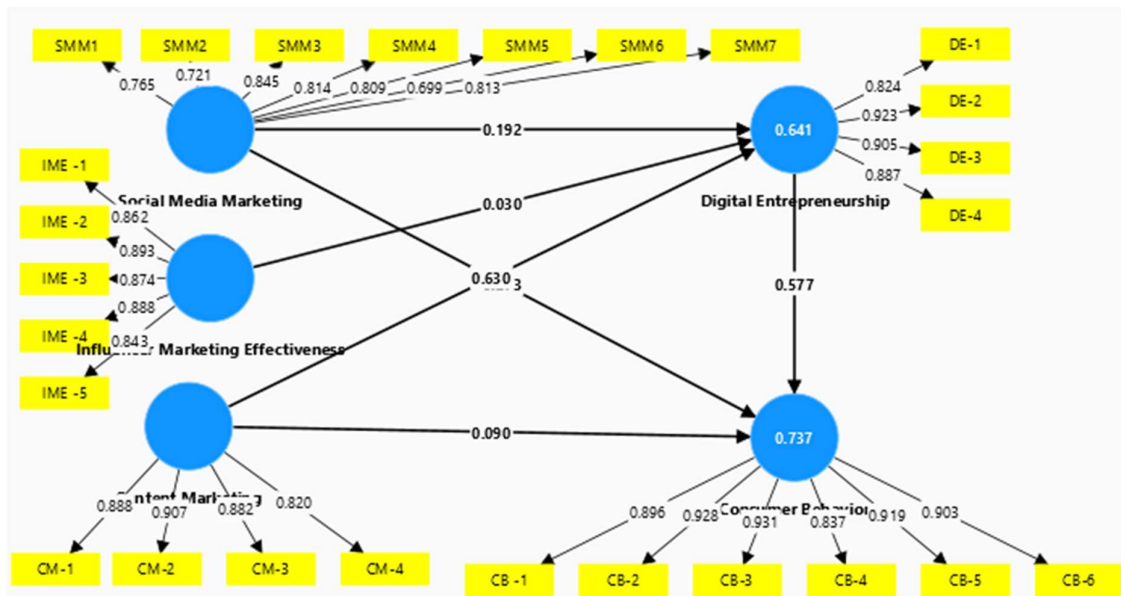

Figure2. Measurement Model

Table 6. Hypotheses testing estimates

Hypo	Relationships	Standardized Beta	Standard Error	T-Statistic	P-Values	Decision
H1	Content Marketing -> Consumer Behavior	0.370	0.112	3.316	0.001	Supported
H2	Content Marketing -> Digital Entrepreneurship	0.336	0.099	3.388	0.001	Supported
H3	Digital Entrepreneurship -> Consumer Behavior	0.204	0.126	1.619	0.106	Unsupported
H4	Influencer Marketing Effectiveness -> Digital Entrepreneurship	0.185	0.116	1.600	0.110	Unsupported
H5	Social Media Marketing -> Consumer Behavior	0.433	0.126	3.452	0.101	Supported
H6	Social Media Marketing -> Digital Entrepreneurship	0.393	0.116	3.385	0.000	Supported

Table 6 presents the results of hypotheses testing estimates for the relationships between various constructs: Digital Adaptability Supply Chain, Digital Agility Supply Chain, Digital Flexibility Supply Chain, Information Visibility, and Inventory Management Effectiveness. Hypotheses H1, H2, H5, H6, and H7 are supported, as their respective relationships show statistically significant results with p-values below 0.05. Specifically, the

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relationships between Digital Adaptability Supply Chain and both Information Visibility ($\beta = 0.370$, $p = 0.001$) and Inventory Management Effectiveness ($\beta = 0.336$, $p = 0.001$) are significant. Similarly, the relationships between Digital Flexibility Supply Chain and Information Visibility ($\beta = 0.433$, $p = 0.001$) and Inventory Management Effectiveness ($\beta = 0.393$, $p = 0.000$) are statistically significant. Moreover, the relationship between Information Visibility and Inventory Management Effectiveness ($\beta = 0.907$, $p = 0.000$) is also significant. However, hypotheses H3 and H4 are unsupported, as the relationships between Digital Agility Supply Chain and both Information Visibility ($p = 0.106$) and Inventory Management Effectiveness ($p = 0.110$) fail to reach statistical significance. These findings shed light on the significant impact of Digital Adaptability Supply Chain and Digital Flexibility Supply Chain on Information Visibility and Inventory Management Effectiveness, while also emphasizing the interconnectedness between Information Visibility and Inventory Management Effectiveness within the context of digital supply chains.

10. **Conclusion**:

The results of hypothesis testing provide rich observations about the overall relationships between interesting digital supply chain characteristics, information visibility and inventory management effectiveness. In particular, the strong positive correlations found between Digital Adaptability Supply Chain and Digital Flexibility Supply Chain with information visibility and inventory management effectiveness demonstrate how important these traits are in enhancing supply chain performance. Engineering companies should, following the reporting of these findings focus their investment efforts on digital supply chain systems that are adaptable and flexible enough to be able to manage information flow effectively, while having the ability to adjust inventory based and use it appreciatively. By looking at the absence of statistically significant relationships for Digital Agility Supply Chain with information visibility and inventory management effectiveness, many might feel that no stone has been left unturned. However, I think these preliminary analyses are quite telling. "Other conclusions might be revealed by further investigation that show more specific effects of supply chain operation agility on these factors," they wrote in conclusion.

This robust positive correlation implies that transparent and real-time information remains the most critical element in fostering effective inventory management practices. Engineering companies are encouraged to focus on bettering information visibility by investing in leading digital technologies and data analytics functionalities, which can effectively promote informed decision-making processes and resource optimization.These results, therefore, advance the extant theoretical knowledge on digital supply chains by specifying and explaining the different effects that characteristics have on supply chain performance measures. It highlights the need for a more detailed understanding of digital supply chain processes and its consequences on inventory control in engineering companies.

11. **Recommendation**

Invest in Digital Adaptability and Flexibility: Engineering companies need to invest in digital supply chain systems which can be adapted and offer flexibility as per the demand changes from time to time. That might mean adopting agile methodologies and using technologies such as IoT and cloud computing. "Enhancing Information visibility: All actions to improve information visibility should be promoted wherever possible across the supply chain" Such strategies might entail deploying the enhanced data management systems, tracking technologies in real time, and analytics capabilities to provide accurate information on time for productive decisions.

However, Seamless Integration of Inventory Management and Information Visibility: In order to capitalize on the positive impact of information visibility over inventory management efficacy, companies should integrate their inventory management systems with the information visibility platform smoothly. Thus, this integration will help implement proactive inventory optimization solutions and resolve any problems related to stockouts and excess stock. Morever, Continuous monitoring and improvement: fostering a continuous culture of improvements, engineering firms should monitor the supply chain performance metrics consistently. Furthermore, they can use feedback mechanisms to see where they need improvements. "Regular audits, implementation of performance dashboards and developing a culture that is open to innovation" could support the same (Atieh Ali, Sharabati, Allahham, et al., 2024). In addition to that, recommendations mentioned above further allows engineering

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companies to strengthen the supply chain, enhance inventory management and also achieve a suitable competitive advantage in the market.

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