Digital Marketing and Consumer Nutritional Behavior

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ABSTRACT: Digital marketing involves promoting and selling products and services online and it is becoming extremely critical for retailers to gain new customers. Digital marketing uses online platforms, e-mail communications and messaging services, advertisements, and multi-modal online techniques. Digital marketing techniques can be used in parallel with machine learning and artificial intelligence to provide more effective results in analyzing customer behavior. Artificial intelligence (AI) has become an important and popular tool in the 21st century, affecting almost every sector, including engineering, science, medicine, business, finance, and marketing. However, AI's dominance in every field of life, especially in digital marketing, may cause some ethical concerns related to consumers. In addition to these moral concerns, digital marketing creates doubts about its negative impact on human health. For this reason, understanding consumer behavior and providing products according to consumer needs has become indispensable for companies today. Digital marketing is everywhere in our daily lives and is also frequently used in the food industry. Through digital marketing, food industries promote the consumption of foods that are particularly high in energy and poor in nutrients. Consequently, individuals exposed to digital marketing in the food industry may be prone to obesity-related problems. This study analyzes the relationship between digital marketing, AI, and consumer behavior specifically on eating habits along with references from the literature.

KEYWORDS: Digital marketing; artificial intelligence; nutritional behavior

1. Introduction

Digital marketing encompasses any communication sent by an application in the digital environment to influence consumer behavior. Digital marketing includes online platforms, e-mail communications and messaging services, advertisements, and multimodal digital marketing [1]. Additionally, digital marketing strategies also make use of artificial intelligence. Artificial intelligence is an effective method in digital marketing. Along with its wide usage in industry, the popularity of artificial intelligence has been increasing in digital marketing [2] Digital marketing is growing in importance for the food business, as it does for all industries as new tactics and approaches are introduced. The widespread use of digital marketing in the food and beverage industries has led to concerns about the health of children and adolescents

[3] Consequently, the relationship between digital marketing, artificial intelligence, and human health creates concerns about the proper and ethical usage of digital marketing, especially in the food industry. This study gives information on this relationship with related references and points out some research directions on this issue.
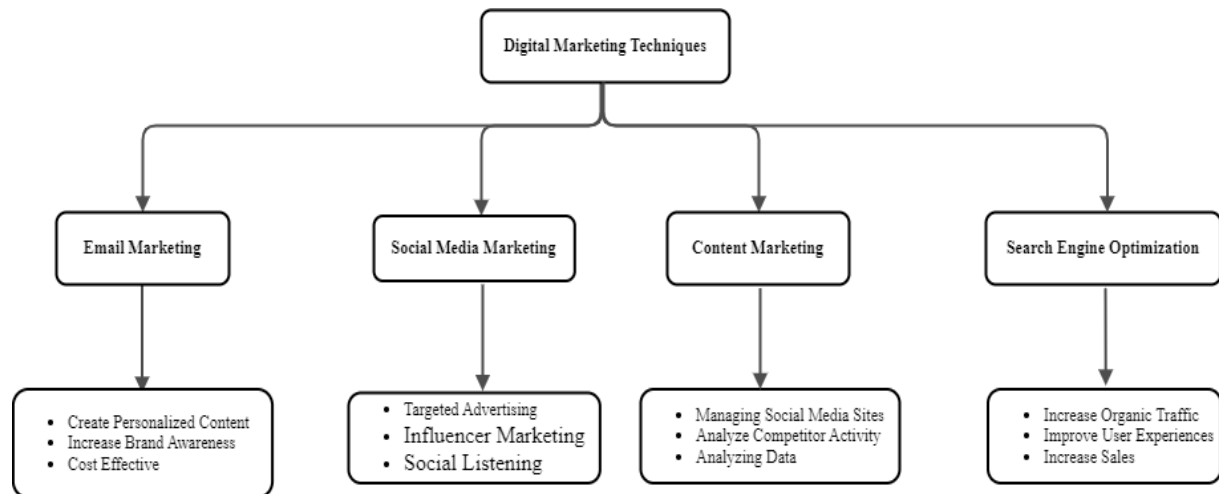
2. Digital Marketing

Digital marketing is the concept of promoting and selling products and services online. It harnesses the power of e-commerce to market and sell goods. Any online marketplace is called electronic commerce. The increase in internet usage has led to the rise in popularity of digital marketing. Text-only websites providing product information are said to be the earliest examples of digital marketing, which was launched in early 1990 [4]. The fact that all processes today are carried out electronically has led to the use of digital marketing and the control of digital marketing systems by marketing companies. As a result, marketing companies started to use digital marketing along with offline marketing. Digital marketing helps industries to gain new customers. The need to increase the number of customers and revenue requires marketing firms to make the best out of digital marketing [5]. Online shopping has become increasingly important for consumers in recent years. There are several reasons why consumers choose online shopping. Among these reasons, the most important ones are saving time compared to physical shopping and the belief of being able to find the best price and the best product. In addition, long queues in traditional shopping and the absence of store crowds are some other reasons why online shopping is preferred [6]. The changes in the behavior of consumers during online shopping affect the marketing strategies of online shopping companies. The increasing effect of digital marketing on consumers causes companies to use digital marketing to achieve their goals [7].

2.1. Digital marketing techniques.

In digital marketing, different techniques such as social media, search engine optimization, email marketing, and content marketing have been used to identify customers' requests and dynamically. Social media is currently considered to be the most effective way to achieve marketing goals and strategies, especially in the areas of communication, customer relationship management, and customer engagement [8, 9]. Using social media data, organizations can manage customer interactions and make business decisions. Advertisers can achieve a range of marketing objectives through the use of social media, including improving customer experience, brand awareness, brand perception, purchase intention, and direct purchase [10]. Another digital marketing technique, search engine optimization, is used to ensure that a website ranks high in search engine results, which in turn attracts more people to the website. If a website ranks higher in the results pages, it is likely to get more visitors to visit it [11]. Email marketing is the practice of using email to deliver a commercial message to a list of recipients. Email marketing can be broadly defined as any email sent to a potential or existing customer [12]. The last technique of digital marketing, content marketing, is one of the most effective and widely practiced strategies that mostly involves the creation and dissemination of valuable content. It encourages participation, mentioning, and sharing on a range of social media platforms [13]. Techniques used in digital marketing can give more effective results using machine learning and artificial intelligence. One of the purposes of using artificial intelligence in digital marketing is the analysis of customer behavior. Large data sets are easier

to analyze with artificial intelligence (AI), which helps businesses identify patterns and trends in consumer behavior. Thanks to machine learning algorithms, marketers can now deliver personalized experiences, and better content, and predict customer preferences [14].

Figure 1. Digital marketing techniques.

2.2.Digital marketing and artificial intelligence.

Artificial intelligence (AI) has gained importance in the twenty-first century as a subject of study affecting almost every field including engineering, science, medicine, education, business, finance, marketing, economics, stock market, and law [15]. Artificial intelligence, which is frequently used especially in health-related issues, has an important role in nutrition science. Artificial intelligence can be used in every field of nutrition science considering the fact that artificial intelligence can be an effective tool especially in processes where human reasoning power is needed Artificial intelligence has been used to expand human intelligence in science and engineering, and since 2010, it has become widespread in food science. Technology and equipment used in artificial intelligence contribute to the advancement of food science [16]. A wide range of AI-supported solutions such as chatbots, virtual assistants, sentiment analysis and predictive modeling can be used to engage consumers and identify their needs [17]. In video advertising, a technique of digital marketing, convolutional neural networks with deep learning capabilities can be developed that use facial cues to identify human genders and solve optimization problems using heuristic algorithms by creating an optimization framework through object-level analysis [18]. In content production, natural language processing can be applied to understand consumers' questions and demands, and logos and music scripts are automatically generated in sync, making technical progress faster and more efficient [19]. To create a personalized marketing strategy, the company can create customized emails by conducting sentiment analysis and using classification algorithms such as support vector machines to predict future trends based on subscribers' previous interactions with the brand [20].

Table 1. AI Application in digital marketing.

AI Applications in Digital Marketing

Chatbots	It leverages conversational automation to achieve common marketing goals such as lead generation, qualification, conversion, customer engagement. Chatbots in marketing can be deployed on the web,on messaging apps like Facebook Messenger or WhatsApp, or as part of native brand apps.
Predictive Modeling	AI predictive analytics empowers marketers with data-driven insights to help make informed decisions, personalize marketing efforts, and improve overall campaign effectiveness.
NLP	Natural Language Processing is invaluable as it helps them access the best of their audience's data, preferences, interests, and habits. Digital Marketers would like to retain positive long customer relations with the help of NLP, where the machine learns and updates itself via real-time interactions with consumers.
Video Advertising	By analyzing user demographics, interests, and behavior patterns, AI algorithms can identify the most relevant video content for each individual. This personalized approach allows marketers to deliver video ads that are tailored to the specific needs and preferences of their target audience.

The development of food industries, the marketing of products to consumers, the increase in global marketing, the increase in consumers' knowledge about foods and easy access to the desired product, and the increase in the nutritional sensitivity of consumers have led to differences as well as similarities among individuals consuming products [21]. The increasing application of artificial intelligence in digital marketing is another factor contributing to shifts in customer perception of food in the digital market. The fact that artificial intelligence is so involved in life has originated discussions among people from all fields. Especially the concept of artificial intelligence and ethics has been the focus of these discussions [22]. The ability of machines to make decisions, feel emotions, and comprehend morality and ethics creates insecurity, and the use of different algorithms of artificial intelligence while performing these operations may cause ethical concerns for consumers. Therefore, ethical concerns should be taken into account when using artificial intelligence for marketing purposes considering the fact that current laws may not be sufficient enough for the ethical use of artificial intelligence [23]. One of the reasons why industries use AI in digital marketing is the significant growth in AI spending. The expectation of growth in the marketing industry also increases the use of digital marketing. AI also improves advertising campaigns by determining the most efficient ad locations, targeting settings, and messaging methods in real time. Businesses can use AI to increase efficiency, relevance and effectiveness in digital marketing campaigns as the technology further develops, which can ultimately increase consumer engagement and the return on investment [24].

Figure 2. Growth of AI.

2.3.Digital market and nutrition behavior.

Today, customers are more worried about their health because of the changing conditions. As consumers try to pay more attention to their diet and healthy lifestyles, product markets are also taking action on this issue [25]. While the need to understand the behavior of consumers was not given enough importance in the early stages of the development of product industries, this is no longer valid. Understanding the behavior of consumers and following consumer behavior has become indispensable for companies today. Consumer behavior analysis is done to satisfy the needs and the expectations of the consumers [26]. Precise determination of consumer behaviors is possible by determining consumer needs correctly and analyzing consumer behavior correctly [27]. With the use of digital marketing, consumers' previous data are utilized and consumer needs can be determined and appropriate products can be recommended to them [28]. However, especially in the food industry, digital marketing can also create a desire for consumers to consume unhealthy foods. With the techniques used in digital marketing, consumers may develop impulsive behavior to buy these products online [29]. Especially in recent years, it is seen that the food market has grown significantly with online food delivery services. In the upcoming years, it is anticipated that online meal orders would generate more revenue globally. One of the reasons for this is that many restaurants and customers have switched to online orders to reduce the risk of personal contact and exposure to the virus during the COVID-19 pandemic outbreak left behind in recent [30]. Turkey, according to the data published by the Turkish Statistical Institute in 2022, the rate of buying or ordering goods and services online is 49.5%. For these online sales, 47.6% of deliveries are from restaurants, fast food chains, and catering companies whereas 37.1% of deliveries are food products [31]. It is also well known that the food industry encourages people to eat high-energy, low-nutrient foods in addition to providing for their nutritional demands through digital marketing. Individuals exposed to digital marketing from the food industry are likely to have obesity problems. It is also known that children and adolescents may have a particular interest in foods sold through digital marketing, especially in some countries [32]. Children and adolescents spend most of their time at home and school. However, it is thought that children and adolescents are more vulnerable to the stimuli used in digital marketing when they are not at home or school. Therefore, they are more likely to consume foods used in digital marketing [33]. Individuals' dietary behavior is influenced by factors such as family attitudes, taste and appearance of food, presentation of food, past dietary behaviors, and ease of access to food [34]. The prevention of obesity, a serious public health problem, lies in determining the factors affecting dietary behavior. It is known that emotional hunger other than physiological hunger, such as that caused by digital marketing, is a factor that causes obesity. When emotional hunger occurs, it is possible crave for foods that are stimulated by digital marketing [35].

3. Discussion

Along with advancements in science, we are able to solve most of our existing problems. On the other hand, new problems emerge in the dynamic environment of our daily lives shaped by technological changes. Artificial intelligence and digital marketing are two interrelated

advancements in science that ease our lives yet create new problems. Digital marketing and artificial intelligence have several benefits on the consumers' side such as reaching a variety of products, comparing different products, finding the most convenient and cheapest product, etc. On the seller's side, using digital marketing and artificial intelligence helps marketers to reach the target customer segment easily and to increase revenue. Although there are benefits of digital marketing and artificial intelligence for both consumers and sellers, it seems like there are also problems on the consumer side. The main problems on the consumer side are usually ethical concerns about its use, health concerns about the consumption of unhealthy food products advertised through digital marketing, potential cognitive health problems caused by exposure to too much digital marketing, and increased unnecessary purchasing behavior along with unnecessary expenses. The above problems provide fruitful research directions for several scientific disciplines to analyze consumer behavior and increase consumer awareness during online shopping.

4.Conclusion

Artificial intelligence, which has become widespread in almost every field, is important in digital marketing. It is inevitable that artificial intelligence, which has different algorithms, is faced with ethical concerns by individuals. However, artificial intelligence is a tool that enables digital marketing industries to reach consumers easier and faster. In addition to industries in different fields, food industries also provide faster and easier access to consumers through digital marketing. Food industries can reach consumers through digital marketing and lead them to have unhealthy feeding behavior. This can lead to obesity, which is a public health problem. Increasing the awareness of consumers about healthy nutrition may lead producers to offer healthier alternatives. Furthermore, increased consumer awareness results in the elimination of potential problems that may develop during online shopping. Therefore, there is a need for further studies on this subject.

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Author Contribution and Competing İnterest

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References

[1]. DeWilde, C. (2024). Social media and digital marketing for veterinary practices. *Veterinary Clinics of North America: Small Animal Practice*, *54*, 381–394. https://doi.org/10.1016/j.cvsm.2023.10.006.

[2]. Keegan, B.J.; Dennehy, D.; Naudé, P. (2022). Implementing artificial intelligence in traditional B2B marketing practices: An activity theory perspective. *Information Systems Frontiers*, *26,* 1025–1039. https://doi.org/10.1007/s10796-022-10294-1.

[3]. Boyland, E.; Thivel, D.; Mazur, A.; Ring-Dimitriou, S.; Frelut, M.L.; Weghuber, D. (2020). Digital food marketing to young people: A substantial public health challenge. *Annals of Nutrition & Metabolism*, *76,* 6–9. https://doi.org/10.1159/000506413.

[4]. Bala, M.; Verma, D. (2018). A critical review of digital marketing. *International Journal of Management, IT & Engineering*, *8*, 321–339.

[5]. Tuzcu, N. (2023). Pazarlamada dijital dönüşüm: Dijital pazarlama stratejilerinin değerlendirilmesi. *Güncel Gelişmelerle Pazarlama Konular ve Araştırmalar-I*, 189.

[6]. İşler, D.B.; Yarangümelioğlu, D.; Gümülü, E. (2014). Online tüketici satın alma davranışlarını etkileyen faktörlere yönelik bir durum değerlendirmesi: Isparta ilinde bir uygulama. *Uluslararası Alanya İşletme Fakültesi Dergisi, 6,* 3.

[7]. Koçarslan, H.; Kılınç, H. (2019). Dijital pazarlamada tüketici algısı, internette alışveriş üzerine bir araştırma. *Avrupa Bilim ve Teknoloji Dergisi*, *17*, 1263–1273.

[8]. Arıca, Ş.Ç.; Güreş, N.; Arslan, S. (2016). Tüketicilerin sağlıklı beslenmeye yönelik tutumlarının incelenmesine yönelik bir araştırma. *Çukurova Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *20*, 99–110.

[9]. Oscarius, Y.A.W.; Sulistiyani, S.; Pudjowati, J.; Kartikawati, T.S.; Kurniasih, N.; Purwanto, A. (2021). The role of social media marketing, entertainment, customization, trendiness, interaction and word-of-mouth on purchase intention: An empirical study from Indonesian smartphone consumers. *International Journal of Data and Network Science*, *5*, 231–238. http://doi.org/10.5267/j.ijdns.2021.6.011.

[10]. Alalwan, A.A.; Rana, N.P.; Dwivedi, Y.K.; Algharabat, R. (2017). Social media in marketing: A review and analysis of the existing literature. *Telematics and Informatics*, *34*, 1177–1190. https://doi.org/10.1016/j.tele.2017.05.008.

[11]. Search engine optimization: A survey of current best practices. (accessed on 15 May 2024) Available online: https://scholarworks.gvsu.edu/cistechlib/151/.

[12]. Pavlov, O.V.; Melville, N.; Plice, R.K. (2008). Toward a sustainable email marketing infrastructure. *Journal of Business Research*, *61*, 1191–1199. http://doi.org/10.1016/j.jbusres.2007.11.010.

[13]. Bubphapant, J.; Brandão, A. (2024). Content marketing research: A review and research agenda. *International Journal of Consumer Studies*, *48*, e12984. https://doi.org/10.1111/ijcs.12984.

[14]. Sung, E.C.; Bae, S.; Han, D.I.D.; Kwon, O. (2021). Consumer engagement via interactive artificial intelligence and mixed reality. *International Journal of Information Management*, 60, 102382. https://doi.org/10.1016/j.ijinfomgt.2021.102382.

[15]. Oke, S.A. (2008). A literature review on artificial intelligence. *International Journal of Information and Management Sciences*, *19*, 535–570.

[16]. Zhu, J.; Wang, G. (2023). Artificial intelligence technology for food nutrition. *Nutrients*, *15,* 4562. https://doi.org/10.3390/nu15214562.

[17]. Artificial intelligence customer experience: What is it, pros, cons, and best tools. (accessed on 16 December 2023). Available online: https://www.questionpro.com/blog/ai-customer-experience/.

[18]. Zhang, H.; Cao, X.; Ho, J.K.; Chow, T.W. (2016). Object-level video advertising: An optimization framework. *IEEE Transactions on Industrial Informatics*, *13*, 520–531. https://doi.org/10.1109/TII.2016.2605629.

[19]. Rust, R.T. (2020). The future of marketing. *International Journal of Research in Marketing*, *37,* 15–26. https://doi.org/10.1016/j.ijresmar.2019.08.002.

[20]. Okay, S. (2023). Dijital pazarlamada yapay zeka ve makine öğrenimi kullanımı. *Elektronik Sosyal Bilimler Dergisi*, *22*, 135–142.

[21]. Öztürk, E.; Tekeli, S. (2021). Tüketicilerin besin seçim güdüleri: Y ve Z kuşaklarının karşılaştırılması. *Pazarlama ve Pazarlama Araştırmaları Dergisi*, *14*, 147–182.

[22]. Mao, Y.; Shi-Kupfer, K. (2023). Online public discourse on artificial intelligence and ethics in China: Context, content, and implications. *AI & Society*, *38*, 373–389. https://doi.org/10.1007/s00146-021-01309-7.

[23]. Othman, K. (2021). Public acceptance and perception of autonomous vehicles: A comprehensive review. *AI Ethics*, *1,* 355–387. http://doi.org/10.1007/s43681-021-00041-8.

[24]. Bhuvaneswari, L.; Subadra, S.; Sreekala, S.; Natarajan, S.; Shajahan, U.S.; Vijai, C. (2024). The impact of artificial intelligence (AI) on digital marketing. *Migration Letters*, *21,* 1132–1142.

[25]. Bozyiğit, S.; Kilinç, G. (2019). Tüketicilerin sağlıklı gıda algıları ve tüketim davranışları keşifsel bir çalışma. *Yüzüncü Yıl Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *45,* 201–229.

[26]. Arıcan Kaygusuz, N. (2023). Nöropazarlama ve yapay zekâ ilişkisinin tüketici davranışları üzerindeki etkisine yönelik kavramsal bir model önerisi. *Jass Studies-The Journal of Academic Social Science Studies*, *16*, 527–547. http://doi.org/10.29228/JASSS.67916.

[27]. Yılmaz, E.; Oraman, Y.; İnan, İ.H. (2009). Gıda ürünlerine ilişkin tüketici davranışı dinamiklerinin belirlenmesi: Trakya örneği. *Tekirdağ Ziraat Fakültesi Dergisi*.

[28]. André, Q.; Carmon, Z.; Wertenbroch, K.; Crum, A.; Frank, D.; Goldstein, W.; Yang, H. (2018). Consumer choice and autonomy in the age of artificial intelligence and big data. *Consumer Needs and Solution, 5*, 28–37. https://doi.org/10.1007/s40547-017-0085-8.

[29]. Ali-Alsaadi, A.A.; Cabeza-Ramírez, L.J.; Sántos-Roldán, L.; Loor-Zambrano, H.Y. (2023). Digital marketing and fast-food intake in the UAE: The role of firm-generated content among adult consumers. *Foods*, *12*, 4089. https://doi.org/10.3390/foods12224089.

[30]. Yaiprasert, C.; Hidayanto, A.N. (2023). AI-driven ensemble: Three machine learning to enhance digital marketing strategies in the food delivery business. *Intelligent Systems with Applications*, *18*, 200235. https://doi.org/10.1016/j.iswa.2023.200235.

[31]. Hanehalkı Bilişim Teknolojileri (BT) Kullanım Araştırması, 2023. (accessed on 15 May 2024) Available online: https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilisim-Teknolojileri-(BT)-Kullanim-Arastirmasi-2023-49407.

[32]. Maksi, S.J.; Keller, K.L.; Dardis, F.; Vecchi, M.; Freeman, J.; Evans, R.K.; Boyland, E.; Masterson, T.D. (2024). The food and beverage cues in digital marketing model: Special considerations of social media, gaming, and livestreaming environments for food marketing and eating behavior research. *Frontiers in Nutrition*, *10*, 1325265. https://doi.org/10.3389/fnut.2023.1325265.

[33]. Shaw, S.; Barrett, M.; Shand, C.; Cooper, C.; Crozier, S.; Smith, D.; Barker, M.; Vogel, C. (2024). Influences of the community and consumer nutrition environment on the food purchases and dietary behaviors of adolescents: A systematic review. *Obesity Reviews*, *24*, e13569. https://doi.org/10.1111/obr.13569.

[34]. Hardcastle, S.J.; Thøgersen-Ntoumani, C.; Chatzisarantis, N.L. (2015). Food choice and nutrition: A social psychological perspective. *Nutrients*, *7*, 8712–8715. https://doi.org/10.3390/nu7105424.

[35]. Kheirollahpour, M.M.; Danaee, M.M.; Merican, A.F.A.; Shariff, A.A.A. (2020). Prediction of the influential factors on eating behaviors: A hybrid model of structural equation modelling-artificial neural networks. *Scientific World Journal*, *18*, 4194293 https://doi.org/10.1155/2020/4194293.