International Journal of Innovative Research and Scientific Studies, 8(3) 2025, pages: 2377-2384

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Implementing digital marketing using artificial intelligence

Dhia Qasim[1*], Amin Khalifeh[2]

[1,2]*Faculty of Business, Al-Zaytoonah University of Jordan. Amman, Jordan.*

Corresponding author: Dhia Qasim (*Email: d.qasim@zuj.edu.jo*)

Abstract

This paper aims to discuss the application of AI in digital marketing, its role in enhancing decision-making, personalization, and campaign performance along the customer's journey. This study employs a qualitative research approach to investigate the strategic application of AI in digital marketing, drawing on recent academic literature, industry reports, and case studies. Thematic coding was applied to identify key patterns and emerging themes such as predictive analytics, customer personalization, and performance optimization. The key applications are big data analytics, content personalization, omnichannel integration, automated content generation, and dynamic customer interaction. The evidence suggests that the strategic use of AI not only enhances customer satisfaction and conversion rates but also improves operating efficiency and fosters long-term brand loyalty. As digital ecosystems continue to evolve, AI emerges as a key driver of innovation and digital marketing competitiveness. The study leverages existing academic and practical knowledge to describe how AI equips organizations with the capacity to manage enormous datasets, automate marketing functions, and deliver hyper-personalized experiences.

Keywords: Artificial intelligence (AI), digital marketing, machine learning, marketing automation, marketing strategy, omnichannel marketing.

DOI: 10.53894/ijirss.v8i3.6993
Funding: This study received no specific financial support.
History: Received: 1 April 2025 / **Revised:** 7 May 2025 / **Accepted:** 9 May 2025 / **Published:** 13 May 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: Both authors contributed equally to the conception and design of the study. Both authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Publisher: Innovative Research Publishing

1. Introduction

The evolution of digital marketing has tracked technological advancement over the past century. Since its inception in 1988, the concept of digital marketing has undergone a dramatic transformation, extending across the business landscape from small-scale enterprises to multinationals. Key areas such as digital promotion, advertising, distribution, and customer experience have significantly altered the manner in which companies engage their customers [1, 2]. Remarkably, the

integration of AI, computational analysis, and data mining has changed digital marketing processes from traditional data-based models to more sophisticated knowledge-based decision support systems [3, 4].

Current marketing strategies are increasingly dependent on the analysis of data and user insights, with data storage and meticulous analysis at the core of successful campaigns [5, 6]. With more intensive investigation into market direction and customer behaviour becoming feasible via AI, marketing managers can now better identify determinants of market share and profitability than ever before. Sophistication in marketing choices, however, outgrows computational ability. Effective marketing solutions require domain knowledge, experiential insight, and adaptive wisdom in the context of dynamic and multidimensional environments. The presence of vast amounts of data provides the potential for the development of intelligent, AI-based decision-support systems incorporating both quantitative data and qualitative information [7].

Digitalisation has also influenced consumer behaviour, especially among younger, digitally-native generations. Generation Y, Z, and Alpha, who have grown up with advancing technological development and constant internet access, show a strong inclination towards innovative digital solutions in everyday life [8-12]. This has prompted companies to concentrate on digital communication and adopt technology-based marketing initiatives to stay competitive [13-16].

Consequently, organizations today focus on developing and implementing marketing strategies that generate meaningful user engagement and long-term relationships. Increasing dependence on digital media has caused a migration of social interactions from the offline to the online sphere, transforming the nature of customer-company interactions [17]. Social networks, the key digital marketing tools, continuously evolve in terms of form and user engagement. Rebranding by major platforms, Facebook to Meta in 2021 and Twitter to X in 2023, show the industry's rapid adoption of new trends and user needs [18].

Digital marketing and AI alignment are also supported by the advancements in real-time data analytics and the widespread adoption of cloud-based services [19]. Automated data collection techniques, such as web parsing and big data analytics, provide companies with real-time data that enhances marketing effectiveness and risk management [20]. Cloud infrastructure now supports large-scale data processing, and thus it is possible to implement AI algorithms that disclose hidden patterns in consumer behavior [21]. As AI keeps evolving, its adaptability to internal and external adjustments makes it a useful tool in digital marketing [13, 22-24]. Operating in an online market where competition is fierce, modern companies are compelled to apply innovative strategies in order to maintain customers and achieve optimum conversion rates [9]. Application of advanced mathematical formulas and evidence-based methodologies in analysing types of data allows companies to optimise resource allocation [25]. Furthermore, advances in server technology have enabled the application of efficient machine learning algorithms that allow real-time processing of big data and achieve timely adjustment of marketing initiatives.

This paper discusses the application of AI in digital marketing and explores how businesses can harness these technologies to enhance decision-making, user experiences, and guarantee a competitive advantage.

2. Methodology

This study adopts a qualitative research approach to examine the strategic application of AI in digital marketing. A careful examination of recent academic articles, industry reports, and case studies was conducted to examine current trends, tools, and practices. Sources were selected based on relevance and reliability to obtain up-to-date findings [26, 27].

Data were coded thematically to identify recurring patterns and prominent themes regarding AI application in marketing, including predictive analytics, customer personalization, and performance optimization.

While this paper is primarily conceptual in focus, it lays the groundwork for future empirical research by proposing the potential effects of AI technology on marketing policy and consumer participation. The research approach promises to undertake an exhaustive integration of learning that is both theoretically and practically relevant.

3. Findings

3.1. Recent Contribution

Recent scholarly studies underscore increasing AI deployment in online marketing strategies. Dumitriu and Popescu [28] identified digitisation as among the key causes of world innovation and economic development, offering a four-step model that uses AI to drive a company's website presence. This strategy includes the use of machine learning to optimize search engine strategy and automate picking high-frequency words, allowing for more effective communication with the target audience on the basis of their digital behavior and hobbies. In aid of this, Shahbaznezhad et al. [29] highlighted the use of content in social media marketing, optimal content picking and well-set plans of content liable to significantly improve levels of user engagement and conversion rates.

Besides this perspective, Banerjee [30] examined the role of AI in content curation, particularly the way it could detect misinformation and propel original content, thereby building users' trust. Balaji et al. [31] further highlighted the importance of social media as a prime source of digital interaction, especially by younger, tech-literate consumers. They also highlighted that continuous digital engagement generates big data sets, which, by being processed through machine learning-based algorithms, can provide actionable intelligence on how to customize marketing approaches. Such AI-powered tools assist organizations in recognizing shifts in consumer behavior, reacting to changing needs, and maximizing online visibility and brand awareness through data-driven, intelligent decision-making.

3.2. Artificial Intelligence (AI)

AI is a research field that seeks to develop computational methods capable of achieving tasks that typically require humans. Such tasks usually are communication and learning tasks grounded on mental abilities like analysis, synthesis, decision-making, reasoning, judgement, organisation, hypothesis generation, and interpretation [32].

AI systems draw on building blocks like knowledge representation, search mechanisms, perception, and inference. For these systems to produce right outputs, they must be capable of defining, interpreting, and representing information in a processing-friendly form. Such a success depends on advanced search mechanisms to identify optimal solutions, and then the use of inference to evaluate and respond to different scenarios [32-34].

AI-driven decision-making comes before the selection of relevant data, which goes through transformation and pre-processing. At the centre of the process is data mining, whereby relations and patterns essential to come up with correct conclusions are made explicit. They are then analyzed in order to influence intelligent and intelligent decisions [35, 36].

3.3. Digital Marketing

Digital marketing means the application of digital media, technology, and methods to promote products or services, reach target audiences, and create business opportunities online. Digital marketing revolutionized the way businesses interact with consumers through the adoption of new ways of making their markets visible and generating sales online [37]. The digital age has given people the power to form opinions, shape brand image, and make intelligent decisions [38].

In turn, businesses now have greater opportunities to interact dynamically with their audiences, offer personalised content, and extend their market reach. This shift has enhanced the value that digital marketing brings to both consumers and organisations. Brands prioritise building trust and positive customer relationships. Through tailored messaging, digital marketers can produce human-centred and user-friendly content. User-generated content, including comments and reviews, plays a vital role in influencing public perception. Key factors such as content timing, platform interface, feedback speed, and visual elements all contribute to the quality of engagement. When brands establish a warm and customer-focused digital environment, users tend to respond favourably. As a result, businesses benefit from stronger consumer connections, improved service quality, and increased revenue [39].

To guide these efforts, organisations assess their market position and set digital objectives based on internal strengths and weaknesses, as well as external opportunities and threats. They also use the RACE framework, which stands for Plan, Reach, Act, Convert, and Engage [40-42].

Reach: This stage initiates the customer journey by attracting new customers and creating brand awareness. SEMRush tools enable this objective by offering search engine optimization (SEO) tools to support businesses in developing high-quality content and improving search rankings. Alexa provides reports on performance and monitors technical issues to ensure that sites meet search engine specifications. Google Ads enhances visibility even further by producing traffic-driven and engagement-increasing ads. These generally include important information like products and links, and campaigns only conclude after exhausting their respective budgets.

Act: At this point, businesses aim to increase user interaction through compelling content and experiences. The goal is to guide visitors toward further engagement, often measured through website visits or social media interactions, commonly referred to as lead generation.

Convert: Conversion involves encouraging users to take specific actions, whether purchasing a product, registering, or subscribing to a service. This process is driven by optimisation strategies that support measurable changes in user behaviour.

Engage: Once users have converted, the focus shifts to nurturing relationships post-sale. Continued engagement through personalised communication, social media interaction, and feedback helps build loyalty, trust, and repeat business.

3.4. Digital Marketing and AI

The vast amount of data produced by internet users estimated at 2.5 quintillion bytes per day has created significant challenges for marketers, particularly in capturing consumer attention amid a flood of digital content and advertisements [43]. In response, businesses are increasingly turning to AI and related technologies to personalise customer experiences, target audiences more precisely, and ultimately enhance conversion rates and profitability [44].

By leveraging tools such as data mining, machine learning, and predictive modelling, companies can refine digital marketing strategies across channels, evaluate campaign performance, and respond to evolving customer needs more effectively [45]. These technologies support marketers in identifying business strengths, weaknesses, and market opportunities, thereby boosting customer satisfaction and return on investment [46, 47]. AI utilises data from websites, analytics, sales reports, and social media to produce accurate, optimised, and predictive outcomes [46, 48].

Numerous AI-powered platforms are now supporting different stages of digital marketing. For example, in the ‘Reach’ stage, Google’s RankBrain helps to process and sort search results [49, 50] while Apple’s Siri responds to voice commands with tailored actions [51]. Tools such as Gupshup automate campaign messaging, lead qualification, and scheduling [52] and Meetcortex and Atomic Reach assist in creating audience-optimised multimedia content [53, 54].

For the ‘Act’ phase, SAS provides automated predictive analytics, while Phrasee generates human-like marketing language [55, 56]. Evergage engages visitors through personalised website interactions that convert leads into customers [57]. In the ‘Convert’ stage, SentientAscend improves conversion rates via smart website testing and personalisation [58]. Messenger Chatbots, meanwhile, support customer acquisition and transaction processes through interactive automation [59]. Finally, during the ‘Engage’ phase, Seventh Sense enhances customer retention by delivering marketing emails at optimal times, increasing the likelihood of engagement and response [60, 61]. While AI has become a prominent term in digital marketing discourse, many marketers struggle to distinguish it from related concepts like machine learning and predictive modelling, often using these terms interchangeably [47, 62].

4. Applications of AI in Digital Marketing

AI has become an indispensable asset in modern digital marketing, transforming how businesses engage with customers, create content, manage operations, and ensure data security. Through a variety of applications (Table 1), AI enhances marketing strategies by offering deeper insights, greater personalisation, improved efficiency, and heightened customer satisfaction.

4.1. Big Data Analytics and Predictive Modelling

Machine learning (ML) algorithms allow organisations to process and manage enormous volumes of structured and unstructured data, revealing hidden patterns among product offerings, consumer trends, and market movements [63]. By digitising multimedia content such as images, videos, and audio and applying cause-and-effect models, businesses can forecast future actions and construct dynamic real-time predictive models. AI also facilitates advanced predictive analytics through techniques. For instance, time-series analysis and deep learning to make better decisions related to inventory, marketing campaigns, and workforce planning [64-66].

4.2. Content Personalization and Omnichannel Integration

AI significantly improves the ability to provide hyper-personalised content across customer touchpoints [60]. Clustering and classification techniques enable businesses to segment users into distinct groups based on behavioural data, making the development of personalised communication plans easier [63]. Artificial intelligence systems build a unified customer profile across websites, mobile applications, and in-store points, facilitating personalised, intuitive, and context-aware interactions [67-69]. For example, marketing messages can be customised based on a customer's purchasing history or web-surfing behaviour, making them more loyal and involved [70, 71].

4.3. Automated Content Generation

AI-driven tools (i.e., ChatGPT and DALL·E 3) have revolutionised content creation by generating relevant textual and visual content based on prompts. Such technologies enable marketers to create social media posts, website content, and advertisement scripts efficiently and at scale [72]. This automation ensures firms maintain a continuous online presence and engage in timely interactions with customers. The rest of the tools, such as Microsoft's Copilot, Google's Gemini, Amazon's Bedrock, and Meta's Llama 2, also aid social media marketing by making it more interactive and customer-responsive [73].

4.4. Customer Service and Interaction

AI-powered chatbots and voice assistants offer 24/7 customer service, handling routine queries with human-like responsiveness. These systems identify user intent through Natural Language Processing (NLP), allowing personalized and precise responses that improve customer experience [74]. Virtual assistants not only conserve response time but also free up human agents to handle more complex issues, improving service efficiency in general [75].

4.5. Sentiment Analysis and Emotional Intelligence

AI also comes in handy while capturing consumer sentiments, beyond simplistic ones like click-through rates. NLP technology helps companies monitor sentiment through readings such as opinions in the form of reviews, emoticons, and social media replies and thus identify satisfaction as well as dissatisfaction beforehand [76, 77]. It helps businesses shift their approach in line, be it managing unfavorable complaints or capitalizing on a good mood. Real-time sentiment monitoring can even trigger real-time actions, such as apologies or discounts, to retain clients [78, 79].

4.6. Marketing and Operational Automation

AI has a significant function in marketing automation since it does, independently, tasks like trend detection, personalized content generation, and campaign optimization. Algorithms are capable of doing A/B testing, SEO content optimization, and scheduling posting by maximum reach for all, depending on real-time performance metrics [80]. Automation is used in customer care to handle ticketing, customer database management, and automatic responding. AI also improves back-end processes like inventory management, staff scheduling, and demand forecasting, increasing productivity and reducing costs [81-83].

4.7. Enhancing Resource Efficiency

AI optimises resource use by enabling real-time visibility of inventories, product demand, and staffing needs. Predictive analytics and ML-based systems forecast the need for replenishment, identify slow-moving items, and schedule staff based on customer footfall trends [84]. This reduces waste and optimizes human capital use, enhancing customer satisfaction and business efficiency.

4.8. Security and Privacy Considerations

In the context of deepened digital communication, AI forms an essential component in strengthening security by enabling immediate fraud detection, transaction verification, and identity checks via biometric and behavioural patterns [85-87]. All these are particularly crucial in risky environments such as banking and electronic commerce [88, 89]. Increasing use of AI, however, raises concerns around the privacy of information. Organisations must implement good consent policies, data minimisation, and users' rights policies, and follow regulatory guidelines and apply data anonymisation techniques to protect consumer data [88, 90].

4.9. Supporting Technologies and Platforms

The real-world application of AI in online marketing is facilitated by a wide range of tools and platforms [69]. Python, along with libraries such as Pandas and Matplotlib, is widely utilized for data management. Machine learning libraries such as TensorFlow and PyTorch, and big data libraries such as Hadoop and Spark, are used primarily for data processing and analytics. Cloud computing platforms AWS, Google Cloud, and Microsoft Azure offer scalable ecosystems to implement AI. Concurrently, BI technologies such as Tableau and SAS facilitate exploration and visualization of actionable information [91].

Table 1.
Applications of Artificial Intelligence in Digital Marketing.

Application Area	Description	Key References
Big Data Analytics and Predictive Modelling	Uses ML to process vast data, detect patterns, and forecast outcomes. Supports decisions in inventory, campaigns, and staffing through time-series and deep learning techniques.	Ando, et al. [64]; Bose [65]; Mazorchuk, et al. [63] and Montgomery, et al. [66]
Content Personalisation and Omnichannel Integration	Segment customers via clustering/classification for tailored content across web, mobile, and physical stores. Enhances loyalty through personalised messages.	Kunal [70]; Mazorchuk, et al. [63]; Martini, et al. [71]; Núñez [67] and Puntoni, et al. [68]
Automated Content Generation	AI tools like ChatGPT and DALL·E 3 automate the creation of text and visuals. Enables quick, consistent content for social media and ads. Platforms like Copilot, Gemini, Bedrock, and LlaMA 2 support engaging marketing output.	Gamoura, et al. [72]
Customer Service and Interaction	NLP-enabled chatbots and virtual assistants offer 24/7 support. Improve service with quick, contextual, and scalable responses while freeing human agents for complex issues.	Camilleri and Troise [74] and Roslan and Ahmad [75]
Sentiment Analysis and Emotional Intelligence	Analyses customer emotions via reviews, emoticons, and replies. Enables proactive responses such as discounts or apologies to improve retention.	Ahmed, et al. [78]; Bharadiya [76]; Erikson and Lam [79] and Babu and Kanaga [77]
Marketing and Operational Automation	Automates A/B testing, SEO, content scheduling, ticketing, and campaign optimisation. Enhances backend tasks like inventory, staff scheduling, and demand forecasting.	Akter, et al. [81]; Campbell, et al. [80]; Duan, et al. [82] and Khan and Ahmed [83]
Enhancing Resource Efficiency	Real-time forecasting of inventory, demand, and staffing via ML improves efficiency and minimizes waste. Staff scheduling is optimised based on footfall data.	Kwon, et al. [84]
Security and Privacy Considerations	AI improves fraud detection, biometric ID checks, and transaction security. Raising privacy concerns necessitate data minimisation, anonymisation, and compliance with regulations.	Odeyemi, et al. [86]; Villegas-Ch and García-Ortiz [90] and Wechsler [87]
Supporting Technologies and Platforms	Includes tools like Python, Pandas, TensorFlow, Hadoop, and platforms such as AWS and Azure. BI tools like Tableau enable data visualisation and insight extraction for marketers.	Hatcher and Yu [91]

5. Conclusion

Using AI in internet marketing is a revolution in companies' strategies for interacting with people, adapting to modern market conditions, and achieving performance outcomes. Real-time analytical capabilities, autonomous content delivery, and predictive forecasting enable marketers to become proactive rather than reactive. RACE is a good framework for mapping AI technologies to significant points on the customer journey with greater effectiveness in reach, interaction, conversion, and engagement after the sale. The ability of AI to efficiently handle high volumes of data enables new levels of personalization and evidence-based decision-making. This not only increases marketing efficiency but also customer satisfaction and retention. Despite concerns over data quality, ethics, and the need for human judgment, the strategic use of AI solutions offers enormous opportunities for innovation, efficiency, and sustainable competitive advantage. As increasingly sophisticated digital ecosystems develop and consumer needs become increasingly fluid, AI will remain at the center of digital marketing's future.

References

[1] K. S. Al-Omoush, S. G. Yaseen, and I. A. E. Qirem, "The impact of the covid 19 shock on intention to adopt social commerce in digital economy, business analytics, and big data analytics applications." Cham: Springer International Publishing, 2022, pp. 87-100.

[2] C. Sismeiro and R. E. Bucklin, "Modeling purchase behavior at an e-commerce web site: A task-completion approach," *Journal of Marketing Research*, vol. 41, no. 3, pp. 306-323, 2004. https://doi.org/10.1509/jmkr.41.3.306.35985

[3] A. Al-Okaily, M. Al-Okaily, and A. P. Teoh, "Evaluating ERP systems success: Evidence from Jordanian firms in the age of the digital business," *VINE Journal of Information and Knowledge Management Systems*, vol. 53, no. 6, pp. 1025-1040, 2021.

[4] J. Casillas and F. Martínez López, "Marketing intelligence systems, STUDFUZZ," *Springer-Verlag Berlin Heidelberg*, vol. 258, pp. 1–8, 2010.

[5] F. Hasan, M. Al-Okaily, T. Choudhury, and U. Kayani, "A comparative analysis between FinTech and traditional stock markets: using Russia and Ukraine war data," *Electronic Commerce Research*, vol. 24, no. 1, pp. 629-654, 2024. https://doi.org/10.1007/s10660-023-09734-0

[6] D. Qasim, Q., A. Bataineh, and W. Abu-Dawwas, "The impact of information management strategies on decision-making effectiveness in Jordanian private hospitals," *Problems and Perspectives in Management*, vol. 23, no. 1, pp. 685–702, 2025. https://doi.org/10.21511/ppm.23(1).2025.51

[7] A. B. Mohammed, M. Maqableh, D. Qasim, and F. AlJawazneh, "Exploring the factors influencing academic learning performance using online learning systems," *Heliyon*, vol. 10, no. 11, 2024. https://doi.org/10.1016/j.heliyon.2024.e32584

[8] A. Khalifeh *et al.*, "Influence of students' self-control and smartphone E-Learning readiness on Smartphone-Cyberloafing," *Journal of Information Technology Education: Research*, vol. 23, p. 016, 2024.

[9] D. Qasim, A. Shuhaiber, and Z. Rawshdeh, "Driving innovation performance: Exploring the mediating role of knowledge sharing in telecommunication companies," *Journal of International Entrepreneurship*, pp. 1-27, 2025. https://doi.org/10.1007/s10843-025-00383-y

[10] A. B. Mohammed, R. Al-Rafaia, D. Qasim, M. Al-Okaily, and A. Al-Sartawi, "Exploring the impact of predictive analytics on decision making and efficiency in the banking industry," Springer, 2024, pp. 61-79.

[11] S. Azimi, Y. Andonova, and C. Schewe, "Closer together or further apart? Values of hero generations Y and Z during crisis," *Young Consumers*, vol. 23, no. 2, pp. 179-196, 2022. https://doi.org/10.1108/ YC-03-2021-1300

[12] H. Wahshat, A. Khalifeh, A. Taha, F. Wahsheh, K. Amayreh, and M. Matalka, "Individual, technological, organizational, and environmental factors impact of the internet of things on e-learning adoption in higher education institutions in Jordan," *International Journal of Data and Network Science*, vol. 8, no. 3, pp. 1451-1462, 2024.

[13] M. S. Alhur, S. Alshamari, J. Oláh, and H. Aldreabi, "Unsupervised machine learning to identify positive and negative themes in Jordanian mhealth apps," *International Journal of E-Services and Mobile Applications*, vol. 14, no. 1, pp. 1-21, 2022. https://doi.org/10.4018/IJESMA.313950

[14] B. Mathani *et al.*, "Identifying variables influencing the adoption of artificial intelligence big data analytics among SMEs in Jordan," *International Journal of Data and Network Science*, vol. 8, no. 4, pp. 2615-2626, 2024.

[15] O. Morgulets and T. M. Derkach, "Information and communication technologies managing the quality of educational activities of a university," *Information Technologies and Learning Tools*, vol. 71, pp. 295–304, 2019.

[16] Y. Li, J. Dai, and L. Cui, "The impact of digital technologies on economic and environmental performance in the context of industry 4.0: A moderated mediation model," *International Journal of Production Economics*, vol. 229, p. 107777, 2020. https://doi.org/10.1016/j.ijpe.2020.107777

[17] M. Al-Okaily, A. A. Alsmadi, N. Alrawashdeh, A. Al-Okaily, Y. Oroud, and A. S. Al-Gasaymeh, "The role of digital accounting transformation in the banking industry sector: an integrated model," *Journal of Financial Reporting and Accounting*, vol. 22, no. 2, pp. 308-326, 2023.

[18] P. Fernandez, "Facebook, meta, the metaverse and libraries," *Library Hi Tech News*, vol. 39, no. 4, pp. 1-3, 2022. https://doi.org/10.1108/LHTN-03-2022-0037

[19] D. Dajani, S. G. Yaseen, I. El Qirem, and H. Sa'd, "Predictors of intention to use a sustainable cloud-based quality management system among academics in Jordan," *Sustainability*, vol. 14, no. 21, p. 14253, 2022.

[20] M. Y. S. Bak *et al.*, "The use of automated data collection in applied behavior analytic research: A systematic review," *Behavior Analysis: Research and Practice*, vol. 21, no. 4, p. 376, 2021.

[21] V. P. Oleksiuk and O. R. Oleksiuk, "The practice of developing the academic cloud using the Proxmox VE platform," *Educational Technology Quarterly*, vol. 2021, no. 4, pp. 605-616, 2021. https://doi.org/10.55056/etq.36

[22] L. O. Fadieieva, "Enhancing adaptive learning with Moodle's machine learning," *Educational Dimension*, vol. 5, pp. 1-7, 2021.

[23] O. V. Klochko, V. M. Fedorets, and V. I. Klochko, "Empirical comparison of clustering and classification methods for detecting Internet addiction," 2024: CTE Workshop Proceedings. https://doi.org/10.55056/cte.664.

[24] I. A. Pilkevych, D. L. Fedorchuk, M. P. Romanchuk, and O. M. Naumchak, "Approach to the fake news detection using the graph neural networks," *Journal of Edge Computing*, vol. 2, no. 1, pp. 24-36, 2023.

[25] M. Alhur, J. Caamaño-Alegre, and F. Reyes-Santias, "A public value-based model to understand patients' adoption of eHealth: Theoretical underpinnings and empirical application," *Digital Health*, vol. 10, p. 20552076241272567, 2024. https://doi.org/10.1177/20552076241272567

[26] A. Khalifeh *et al.*, "Can transformational leadership influence job satisfaction? An empirical study with the mediating role of knowledge sharing," Emerald Publishing Limited, 2025, pp. 41-77.

[27] D. Qasim, A. Bany-Mohammed, and F. Liñán, "The theoretical basis of relevant e-entrepreneurship results: a systematic literature review," *International Journal of Entrepreneurship and Small Business*, vol. 50, no. 4, pp. 550-579, 2023. https://doi.org/10.1504/IJESB.2023.134691

[28] D. Dumitriu and M. A.-M. Popescu, "Artificial intelligence solutions for digital marketing," *Procedia Manufacturing*, vol. 46, pp. 630-636, 2020. https://doi.org/10.1016/j.promfg.2020.03.090

[29] H. Shahbaznezhad, R. Dolan, and M. Rashidirad, "The role of social media content format and platform in users' engagement behavior," *Journal of Interactive Marketing*, vol. 53, no. 1, pp. 47-65, 2021. https://doi.org/10.1016/j.intmar.2020.05.001

[30] T. Banerjee, "A system of content analysis of social media using AI and NLP," *International Journal of Research in Engineering, Science and Management*, vol. 4, no. 6, pp. 132-136, 2021.

[31] T. Balaji, C. Annavarapu, and A. Bablani, "Machine learning algorithms for social media analysis: A survey," *Computer Science Review*, vol. 40, p. 100395, 2021. https://doi.org/10.1016/j.cosrev

[32] S. Tanimoto, *The elements of artificial intelligence: An introduction using lisp*. New York: Computer Science Press, 1987.

[33] H. Aldreabi, N. K. S. Dahdoul, M. Alhur, N. Alzboun, and N. R. Alsalhi, "Determinants of student adoption of generative ai in higher education," *Electronic Journal of e-Learning*, vol. 23, no. 1, pp. 15-33, 2025. https://doi.org/10.34190/ejel.23.1.3599

[34] A. Khalifeh, A. S. Al-Adwan, M. K. Alrousan, H. Yaseen, B. Mathani, and F. R. Wahsheh, "Exploring the nexus of sustainability and project success: A proposed framework for the software sector," *Sustainability*, vol. 15, no. 22, p. 15957, 2023.

[35] Encyclopaedia Britannica, "Artificial intelligence," Retrieved: https://www.britannica.com/technology/artificial-intelligence, n.d.

[36] J. Han, M. Kamber, and J. Pei, *Data mining: Concepts and techniques*. Burlington: Morgan Kaufmann, 2011.

[37] M. Al-Okaily, M. Al-Kofahi, F. S. Shiyyab, and A. Al-Okaily, "Determinants of user satisfaction with financial information systems in the digital transformation era: Insights from emerging markets," *Global Knowledge, Memory and Communication*, no. ahead-of-print, 2023. https://doi.org/10.1108/GKMC-12-2022-0285

[38] A. P. Teoh, M. Al-Okaily, M. Iranmanesh, and M. A. Al-Betar, "The efficiency measurement of business intelligence systems in the big data-driven economy: A multidimensional model," *Information Discovery and Delivery*, vol. 51, no. 4, pp. 404-416, 2023. https://doi.org/10.1108/IDD-01-2022-0008

[39] Smart Insights, "RACE framework and customer lifecycle," Retrieved: https://www.smartinsights.com/digital-marketing-strategy/racea-practical-framework-to-improve-your-digital-marketing, 2025.

[40] Alexa, "Alexa website ranking and analytics," Retrieved: https://www.alexa.com, 2025.

[41] Google Ads, "Google ads help," Retrieved: https://support.google.com/google-ads/answer/6319?hl=en, 2025.

[42] SEMRush, "SEO tools," Retrieved: https://www.semrush.com, 2025.

[43] Marketing Profs, "The incredible amount of data generated online every minute," Retrieved: https://www.marketingprofs.com/charts/2017/32531/the-incredibleamount-of-data-generated-online-every-minute-infographic, 2025.

[44] Datorama, "How AI is transforming marketing," Retrieved: https://cdn2.hubspot.net/hubfs/2635477/How%20AI%20is%20Transforming%20Marketing_Datorama.pdf, 2025.

[45] A. Bataineh, D. Qasim, and M. Alhur, "The impact of digital banking channels and organizational culture on operational excellence in Jordanian banking," *Banks Bank Syst*, vol. 19, no. 4, pp. 163-176, 2024. https://doi.org/10.21511/bbs.19(4).2024.13

[46] Smart Insights, "Artificial intelligence for marketing," Retrieved: https://www.smartinsights.com/tag/artificial-intelligence-ai-for-marketing, 2025.

[47] The Financial Brand, "AI, machine learning, and analytics in marketing," Retrieved: https://thefinancialbrand.com/71350/ai-machine-learning-analyticsmarketing-banking-trends, 2025.

[48] A. F. Srouji, M. E. Hamdallah, R. Al-Hamadeen, M. Al-Okaily, and A. A. Elamer, "The impact of green innovation on sustainability and financial performance: Evidence from the Jordanian financial sector," *Business Strategy & Development*, vol. 6, no. 4, pp. 1037-1052, 2023.

[49] Backlinko, "Google rankBrain SEO," Retrieved: https://backlinko.com/google-rankbrain-seo, 2025.

[50] Top Rank Marketing, "How artificial intelligence is transforming marketing," Retrieved: http://www.toprankblog.com/2018/02/artificial-intelligencetransforming-marketing, 2025.

[51] Apple Siri, "Siri," Retrieved: https://www.apple.com/ios/siri, 2025.

[52] Gupshup, "Developer overview," Retrieved: https://www.gupshup.io/developer/overview, 2025.

[53] Atomic Reach, "Platform overview," Retrieved: https://www.atomicreach.com/platform, 2025.

[54] Meetcortex, "Platform overview," Retrieved: https://www.meetcortex.com, 2025.

[55] Phrasee, "AI-powered copywriting," Retrieved: https://phrasee.co, 2025.

[56] SAS, "SAS solutions," Retrieved: https://www.sas.com, 2025.

[57] Evergage, "Evergage personalization," Retrieved: https://www.evergage.com, 2025.

[58] SentientAscend, "Ascend AI conversion tools," Retrieved: https://www.ascend.ai, 2025.

[59] Facebook Messenger, "Messenger for business," Retrieved: https://messenger.fb.com, 2025.

[60] S. F. Eletter, T. Yasmin, G. A. Elrefae, A. Qasem, and S. G. Yaseen, "The impact of ai and the internet of things on healthcare delivery in conference on sustainability and cutting-edge business technologies." Cham: Springer Nature Switzerland, 2023, pp. 396-402.

[61] Seventh Sense, "Email marketing intelligence," Retrieved: https://www.theseventhsense.com, 2025.

[62] eMarketer, "Why marketers struggle to define artificial intelligence," Retrieved: https://www.emarketer.com/content/why-marketers-struggle-to-defineartificial-intelligence, 2025.

[63] M. S. Mazorchuk, T. S. Vakulenko, A. O. Bychko, O. H. Kuzminska, and O. V. Prokhorov, "Cloud technologies and learning analytics: web application for PISA results analysis and visualization," in *CTE Workshop Proceedings*, 2021, vol. 8, pp. 484-494, doi: https://doi.org/10.55056/cte.302

[64] R. K. Ando, T. Zhang, and P. Bartlett, "A framework for learning predictive structures from multiple tasks and unlabeled data," *Journal of Machine Learning Research*, vol. 6, no. 11, pp. 1817–1853, 2005.

[65] R. Bose, "Advanced analytics: Opportunities and challenges," *Industrial Management & Data Systems*, vol. 109, no. 2, pp. 155-172, 2009.

[66] D. Montgomery, C. Jennings, and M. Kulahci, *Introduction to time series analysis and forecasting*. John Wiley & Sons, 2025.

[67] M. T. Núñez, *The implementation of AI in marketing*. Comillas Pontifical University, 2021.

[68] S. Puntoni, R. W. Reczek, M. Giesler, and S. Botti, "Consumers and artificial intelligence: An experiential perspective," *Journal of marketing*, vol. 85, no. 1, pp. 131-151, 2021.

[69] S. G. Yaseen and S. Zayed, "Exploring determinants in deploying mobile commerce technology: Amman stock exchange," presented at the International Conference on Information Society (pp. 612-620), 2010.

[70] K. Kunal, "Impact of AI in customer services retention: A behavioural perspective of Indian mobile market," *Global Journal of Business and Integral Security*, 2016.

[71] B. G. Martini, G. A. Helfer, J. L. V. Barbosa, R. C. E. Modolo, M. R. da Silva, and R. M. de Figueiredo, "Prediction and context awareness in agriculture: a systematic mapping," *AGRIS on-line Papers in Economics and Informatics*, vol. 12, no. 3, pp. 45-58, 2020.

[72] S. C. Gamoura, H. İ. Koruca, and K. B. Urgancı, "Exploring the transition from "contextual AI" to "generative AI" in management: Cases of ChatGPT and DALL-E 2," in *International Symposium on Intelligent Manufacturing and Service Systems*, 2023, pp. 368-381.

[73] F. Aljawazneh and D. Qasim, "A proposed model of gender differences in metaverse usage intentions in education: an innovation resistance theory perspective in achieving sustainable business through ai, technology education and computer science: volume 2: teaching technology and business sustainability." Cham: Springer Nature Switzerland, 2024, pp. 87-96.

[74] M. A. Camilleri and C. Troise, "Live support by chatbots with artificial intelligence: A future research agenda," *Service Business*, vol. 17, no. 1, pp. 61-80, 2023. https://doi.org/10.1007/s11628-022-00513-9

[75] F. Roslan and N. B. Ahmad, "The rise of AI-powered voice assistants: Analyzing their transformative impact on modern customer service paradigms and consumer expectations," *Quarterly Journal of Emerging Technologies and Innovations*, vol. 8, no. 3, pp. 33-64, 2023.

[76] J. P. Bharadiya, "The role of machine learning in transforming business intelligence," *International Journal of Computing and Artificial Intelligence*, vol. 4, no. 1, pp. 16-24, 2023.

[77] N. V. Babu and E. G. M. Kanaga, "Sentiment analysis in social media data for depression detection using artificial intelligence: a review," *SN computer science*, vol. 3, no. 1, p. 74, 2022. https://doi.org/10.1007/s42979-021-00958-1

[78] A. A. A. Ahmed, S. Agarwal, I. G. A. Kurniawan, S. P. Anantadjaya, and C. Krishnan, "Business boosting through sentiment analysis using Artificial Intelligence approach," *International Journal of System Assurance Engineering and Management*, vol. 13, no. Suppl 1, pp. 699-709, 2022.

[79] S. Erikson and W. Lam, "Sentiment analysis in digital marketing: evaluating success dimensions of sentiment analysis and its role in digital marketing," 2024.

[80] C. Campbell, S. Sands, C. Ferraro, H.-Y. J. Tsao, and A. Mavrommatis, "From data to action: How marketers can leverage AI," *Business horizons*, vol. 63, no. 2, pp. 227-243, 2020.

[81] S. Akter, K. Michael, M. R. Uddin, G. McCarthy, and M. Rahman, "Transforming business using digital innovations: The application of AI, blockchain, cloud and data analytics," *Annals of Operations Research*, pp. 1-33, 2022.

[82] Y. Duan, J. S. Edwards, and Y. K. Dwivedi, "Artificial intelligence for decision making in the era of Big Data–evolution, challenges and research agenda," *International Journal of Information Management*, vol. 48, pp. 63-71, 2019.

[83] A. Khan and A. Ahmed, "Optimizing retail operations, inventory management and sales forecasting with big dataand AI in China," *Emerging Trends in Machine Intelligence and Big Data*, vol. 16, no. 1, pp. 18-37, 2024.

[84] C. Kwon, A. Raman, and J. Tamayo, "Human-computer interactions in demand forecasting and labour scheduling decisions ", Retrieved: https://ssrn.com/abstract=4154452. [Accessed 2022.

[85] M. F. Mdanat, M. Al Hur, O. M. Bwaliez, G. A. Samawi, and R. Khasawneh, "Drivers of port competitiveness among low-, upper-, and high-income countries," *Sustainability*, vol. 16, no. 24, p. 11198, 2024. https://doi.org/10.3390/su162411198

[86] O. Odeyemi, C. C. Okoye, O. C. Ofodile, O. B. Adeoye, W. A. Addy, and A. O. Ajayi-Nifise, "Integrating AI with blockchain for enhanced financial services security," *Finance & Accounting Research Journal*, vol. 6, no. 3, pp. 271-287, 2024.

[87] H. Wechsler, "Biometric security and privacy using smart identity management and interoperability: Validation and vulnerabilities of various techniques," *Review of Policy Research*, vol. 29, no. 1, pp. 63-89, 2012.

[88] M. F. Anabtawi, M. Alhur, R. A. Ghaboush, Y. AlDaaja, and S. E. A. Hammour, "The impact of social stigma and interaction anxiety during crises on healthcare workers' job satisfaction: Evidence from the COVID-19 pandemic," *International Journal of Innovative Research and Scientific Studies*, vol. 8, no. 1, pp. 1267–1279, 2025. https://doi.org/10.53894/ijirss.v8i1.4578

[89] S. F. Eletter and S. G. Yaseen, "Loan decision models for the Jordanian commercial banks," *Global Business and Economics Review*, vol. 19, no. 3, pp. 323-338, 2017.

[90] W. Villegas-Ch and J. García-Ortiz, "Toward a comprehensive framework for ensuring security and privacy in artificial intelligence," *Electronics*, vol. 12, no. 18, p. 3786, 2023.

[91] W. G. Hatcher and W. Yu, "A survey of deep learning: Platforms, applications and emerging research trends," *IEEE access*, vol. 6, pp. 24411-24432, 2018.