



Investigating the impact of AI on improving customer experience through social media marketing: An analysis of Jordanian Millennials

Fandi Omeish^{a,*}, Mohammad Al Khasawneh^a, Nadine Khair^b

^a E- Marketing and Social Media Department, Princess Sumaya University for Technology, Amman, Jordan

^b Marketing Department, American University of Madaba, Madaba, Jordan

ARTICLE INFO

Keywords:

Artificial intelligence
User experience
Social media
Augmented reality
Virtual influencers
Chat bots

ABSTRACT

The advent of artificial intelligence (AI) has triggered a significant evolution in the sphere of social media. This research is designed to explore the influence of AI technologies in user experience under Social Media Marketing examining augmented reality, virtual influencers, and chatbots in Jordanian Millennials. The associations were assessed with the importance analysis in the data using Smart PLS 4 and a combination of direct hypothesis testing and mediation analysis. With that being said, our results suggest a non-negligible effect of AI on the social media user journey. In addition, we find that chatbots, virtual influencers, and augmented reality can effectively mitigate the role of user experience in user attitudes toward AI. Realizations like these contribute to the epistemology of the area and provide actionable input for researchers and professionals.

1. Introduction

The study aims to explore the effect of Artificial Intelligence (AI) on social media marketing; in view of the occurrence of a swift development in this entity the following dimensions were specified: Customer Service Experience and Business-Audience Interaction. AI is widely regarded as a common practice in modern digital marketing implementation because of its ability to handle large data volumes, hyper-personalization, conduct real-time decision-making, and many other benefits (Chen et al., 2019). From the first computational versions of consumer behavior, artificial intelligence progressed to consultation the market and saw the above and beyond classical limitations with tools such as machine learning algorithms creating predictions on consumer preferences and behaviors (Hastie et al., 2009; Provost & Fawcett, 2013).

The term deep learning is now more frequently used to refer to utilizing neural networks, and it has significantly developed the potency of AI for social platforms. They enhance functionality ranging from sentiment analysis to image recognition natural language processing. It has been a row for marketers to understand the user feel and theatre more precisely (Goodfellow et al., 2016; Lecun et al., 2015). It has, in turn, enabled this content to resemble a one-to-one conversation with audiences, one of the strengths of digital marketing (Cambria et al., 2013). It can also be considered that AI has meant that leveraging tools like

recommendation engines to enhance the customer experience was possible by providing clients with highly customized recommendations and responses honed based on individual requirements (Huang & Rust, 2018; Joulin, 2017). With all these advancements, AI is difficult to implement in social media marketing. Naturally, a lot of this ongoing momentum is coming up against several thorny ethical issues around data privacy, security and transparency. The rule of thumb should be to ensure legal compliance and the right to privacy, which means that AI's long-term use for digital marketing should comply with these two fundamentals (Bryson, 2018; Mittelstadt et al., 2016, 2016b). Biases in the data utilised to train AI systems and evidence regarding human-AI interaction could cause misunderstanding (Bolukbasi et al., 2016; Caliskan et al., 2017).

Several research gaps identified in the existing literature suggested the necessity to extensively explore how AI affects diverse aspects of social media marketing, particularly across various geographical and cultural environments. For example, significant research has been done on the adoption and impact of AI in developed markets. In contrast, research on AI adoption and outcomes in emerging economies like Jordan remains scant. Research how AI can attract the attention of distinct generations, (Al-Debei, Moeinzadein, Hashem, 2015; Al-Jaber & Al-Qirim, 2018; Al-Jaber & Al-Qirim, 2018). In this light, the study tries to fill this gap in the literature by studying AI implementation and its impact in the frame of social media marketing in Jordan. The study also

* Corresponding author. E- Marketing and Social Media Department, Princess Sumaya University for Technology, Amman, Jordan.

E-mail addresses: F.omeish@psut.edu.jo (F. Omeish), m.alkhasawneh@psut.edu.jo (M. Al Khasawneh), n.khair@aum.edu.jo (N. Khair).

<https://doi.org/10.1016/j.chbr.2024.100464>

Received 8 October 2023; Received in revised form 23 July 2024; Accepted 26 July 2024

Available online 31 July 2024

2451-9588/© 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

paves the way for a new way of utilizing AI in enhancing customer engagement and satisfaction especially among Jordanian millennial users, by giving more importance to user preferences and behaviors (Badran et al., 2024). Moreover, this study will discuss the ethical issues and challenges linked to AI in relation to social media marketing, offering a set of ethical-focused guidelines to regulate the application of this technology (Abu Shanab & Ghaleb, 2016; Sweis et al., 2020).

This research can be used to intervene in future academic studies and justify AI-based implementations for social media marketing applications. This research will provide concrete evidence that AI can enhance the customer experience, thereby contributing to research in this domain that discusses AI's adoption of digital marketing. In addition, the outcomes are expected to be helpful for organizations interested in embedding AI initiatives in practice, particularly in a developing market context like Jordan. The growing interest inspires this research in forming the potential of AI in digital marketing and dealing with the historically prevailing challenges and opportunities, regardless of context. With AI now a staple within business marketing, marketers must learn how to customize AI to become more inclusive for multi-demographic and cultural contexts. This study aims to provide an insight into the use of AI in transformative digital media strategies designed to elevate the discourse of central issue of digital transformation and innovation (Al-Omouh et al., 2021; Tarawneh & El-Masri, 2021).

This study is an important investigation into some of the limitations around the application of AI tools, including issues around data privacy, AI algorithmic biases and the need for an appropriate tech-stack (Bryson, 2018; Mittelstadt et al., 2016, 2016b; Sweis et al., 2020). The problem addressed by this study is not that AI significantly improves the customer experience but that it is essential to find out the extent to which AI can be applied effectively in a socially acceptable Jordanian marketing context, as the literature lacks an examination of this scope. In Switzerland, marketing and social opinions to scrutiny targeting the Jordanian Millennials, similarly, this finding is significant because at the critical to analyze the spread and influence of Sweden research unrepresented by chatting with virtual influencers, chatbots, and virtual reality, it is clear that prime benefits and impediments reach of chatbots, virtual influencers, as was depicted in our assumptions initially.

The contribution of this work is multi-fold. It will help to fill a gap in the current body of AI knowledge relating to social media marketing by exploring a demographic that has not been widely researched, Jordanian millennials. Together, these will provide a detailed view of the role of AI in accessing and engaging this digitally sophisticated group but also practical implications for marketers with demographically challenged populations in other emerging markets. The second sub-research question would explore the ethical concerns in AI deployment and propose guidelines to protect data privacy and security and increase the transparency of AI-driven marketing (Shannak et al., 2020; Al-Zu'bi, 2019). This study examines the mediating roles of distinct AI applications like chatbots, virtual influencers, and augmented reality in enriching the customer experience on social media. This study will focus on how these technologies interact with user preferences and behaviours in order to provide insights on best practices of incorporating AI with social media marketing strategies. In turn, these are expected to deliver better customer engagement and satisfaction outcomes, which will assist businesses in optimizing AI investments (Fuad, 2022; Lee et al., 2019). Literature also advocates the need to study factors that drive customer experience and innovation in digital marketing from the perspective of millennials, including preferences and behavior that are specific to Jordan and serve as a basis for companies using AI, then explore the CSR and AI, how AI affects perceptions of CSR, and list responsibility for AI discussions of artificial intelligence at the intersection of customer service provision and digital marketing innovation (Chen, Mislove, Wilson, 2020; Sivarajah et al., 2017).

2. Literature review

2.1. AI in social media marketing: an introduction

By enabling personalized customer interaction, artificial intelligence (AI) in social media marketing has ushered in a revolutionary phase, reshaping digital marketing paradigms (Chen et al., 2019). Beginning with early computational models that investigated consumer behavior, the field has developed to the point where artificial intelligence (AI) is now being used to overcome conventional barriers to customer engagement (McCarthy et al., 1955; Russell & Norvig, 2016).

In image processing, AI is found primarily in the use of machine learning controlled algorithms (Saqr and Al-Saqq, 2019). These tools allow mining of large tools allow the mining of large datasets to understand consumer preferences and predict their behavior, aiding real-time decision-making (Hastie et al., 2009; Provost & Fawcett, 2013). The rise of social networking recommendation engines did as much for this revolution where social media platforms started utilizing user interaction to influence the type of content provided to the user. Furthermore, the impact of deep learning techniques (advanced machine learning methods using neural networks) has been fundamental in improving the abilities of social media such as sentiment analysis, image recognition and natural language processing (Goodfellow et al., 2016; Lecun et al., 2015). This has allowed marketers to understand user sentiments and develop more relatable content (Cambria et al., 2013).

The personalization feature - indispensable for AI - is what upends the customer experience by providing personalized interactions (Huang & Rust, 2018). This personalization is further augmented by implementing AI-powered chatbots that answer user questions immediately (Azuma, 2017; Joulin, 2017). Moreover, several years ago, considerable research was carried out to create many breakthroughs in how AI correlates to the most recent technology, helping to enable more associated customer service. In a new and original paper by Goodman and Flaxman (2017), we can read a few things about how AI and blockchain can work together and change how customer service will work. This fully automated, decentralized customer service system which will do its job at the best level of accuracy, transparency, and trust ever seen in social media marketing (Al-Busaidi et al., 2019).

Nevertheless, this remarkable evolution is associated with serious ethical dilemmas and issues, mainly the ones related to data privacy and confidentiality (Bryson, 2018; Mittelstadt et al., 2016, 2016b). Therefore, making their algorithms transparent and respecting privacy laws is essential, and it forms a cornerstone for maintaining customer trust in this digital era (Zarsky, 2016). AI has made an important entry event in social media marketing, marking a new era of customer engagement experience through unique and real-time strategies (Omeish, Alrousan, Alghizzawi, Aqqad, & Daboub, 2024). However, such powerful technology requires a well-thought-out strategy that combines innovation with good ethics (Lee & Lee, 2020a, 2020b).

2.2. Impact on customer experience

The introduction of AI to social media platforms has significantly revolutionized customer experience and provides various of features that have transformed business-customer interactions (Zhao et al., 2018). Interactive AI applications mean that businesses can see what a customer is likely to do next, and Market Cloud allows companies to understand customer behaviour and predict and even shape it (Abu Hmeidan, Masoud, Omeish, Abuhashesh, & Alshurideh, 2024). The most significant innovation that stands out has to be its real-time com capability. This shows the trend in using AI as chatbots and virtual influencers driven by natural language processing and deep learning to provide instant self-services that help the business quickly align with customers (Omeish et al., 2024; Sivarajah et al., 2017). In all seriousness these are the kinds of tools designed even to recommend items that precisely fit each specific user (Wang, Wang, et al., 2019).

AI powers exceptional customer experience by continuously monitoring and enhancing marketing strategies on the fly, which in terms improving conversion ratios (Nair, 2021). Intelligent algorithms allow businesses to uncover new or hidden trends, patterns and anomalies that may not have been possible through human insights and facilitate real-time optimization of the current marketing strategies based on constantly updated customer behavior and market conditions (Chen et al., 2020). Moreover, deep learning algorithms have enabled AI to deliver more personalized content on an even more granular level - i.e., reaching well beyond demographics and into individual-level resonance (Huang & Rust, 2021). Such personalized relationships increase customer loyalty (Lee & Lee, 2020a, 2020b).

Augmented Reality (AR) is an AI-driven technology that has made its way to social media platforms to provide them with immersive experiences. Additionally, AR lets customers see products in real-life settings before purchasing, enhancing convenience and deliberation quality (Zhu, 2022, 2022b). However, the power of AI is the ability to process enormous amounts of data, which also evokes substantial ethical questions about privacy and security. Responsible data handling while ensuring adherence to privacy laws continues to be important in fostering trust in the AI powered customer experience (Manyika, 2019). Similarly, the potential of AI to build and grow a customer satisfaction index is established in recent research studies. AI application benefits customer satisfaction enhancements (Xie, Wang, & Cheng, 2022). We can deploy an auto and multi-agent system to single out our customer delivery satisfaction using AI to customize and optimize service delivery and revolutionize how we interact with our customers. The impact of AI on customer experience across social media channels is both scalar and broad in nature (Crawford and Calo, 2016). It has transformed how businesses are looking at customer engagement - from real-time interactions to custom content-based experiences and maiden born digital experiences. Nevertheless, that progress also requires solid technical backbones and stewardship to perform this constant innovation responsibly.

2.3. Hypothesis development

Researchers like Khrais (2020) have recognized how artificial intelligence (AI) can improve user experience, especially on social media platforms. The capacity of AI to deliver tailored interactions and instant responses is well-suited to Jordanians aged 18–34, who are among the Middle East's most tech-savvy consumers. Artificial intelligence can evaluate huge amounts of information to provide accurate content that is personally relevant to individual users (Chen et al., 2019) and as a result drive higher engagement and retention rates. This granular understanding of consumer behavior allows for the creation of more relevant and timely interactions, which drive overall user experience forward (Zhao et al., 2018).

H1. There is a statistically positive impact of Artificial Intelligence on User Experience in Social Media of Jordanian Millennials.

With AI, the Augmented Reality (AR) has become a disruptive technology. The effect of AI on augmented reality (AR) allows more personalized immersive experiences for your customers (Zhu, 2022, 2022b). Furthermore, AI for AR apps can significantly enhance real-time data processing and interactive features that improve user engagement. Augmented reality (AR) technology is in its infancy in Jordan, where this research was conducted. AI can be leveraged to offset the technological limitations and improve on the overall user experience (Olsson et al., 2019).

H2. There is a statistically positive impact of Artificial Intelligence on Augmented Reality of Jordanian Millennials.

By using AI, Virtual influencers offer a glimpse into new territories in social media marketing (Trim, 2022a, 2022b). AI can produce content relevant to particular subcultures-like Jordanian millennials-making

your customer engagement more unique. Virtual influencers are used to mimic human interaction so that virtual influencers can pose as someone who connects with the viewer and the most effective for marketing perspectives (Jin et al., 2020; Radianti et al., 2021). By means of this technology, it is possible to better tailor marketing strategies to the preferences, and behaviours, of millennials (Kleinsmith et al., 2021).

H3. There is a statistically positive impact of Artificial Intelligence on Virtual Influencers of Jordanian Millennials

The way in which businesses engage customers has changed significantly with AI-driven chatbots (Fuad, 2022). Jordanian businesses think building and deploying chatbots is essential because the rest of the world is doing that, so millennials in Jordan have a new way to reach a brand. Having chatbots enabled - Chatbots can immediately offer personalized responses and answer virtually every type of customer query, increasing customer satisfaction and loyalty (Lee et al., 2019). Their learning and evolving ability make them mandatory to deliver better customer service (Gupta et al., 2022).

H4. There is a statistically positive impact of Artificial Intelligence on Chatbots of Jordanian Millennials.

One unique way AR manipulates social media experiences is as Augmented and more users in social media (Olsson et al., 2019). AR gives one an interactive experience that can be very engaging and fulfilling (Kerdvibulvech, 2022; Poushneh and Vasquez-Parraga, 2020). Digital natives and early adopters of new technologies, such as Jordanian millennials, can find in AR a stroke of ingenuity that traditional media outlets have not exploited (Zhu, 2022, 2022b).

H5. There is a statistically positive impact of Augmented Reality on User Experience in Social Media of Jordanian Millennials.

Virtual influencers have now become an important part of social media marketing (Boghossian & Vaidyanathan, 2021). Below is a link to a quick video interview I did the other day -for anyone interested in how they can interact with Jordanian Millennials that have shared similar values and interests. With respect to brand management - even within the guise of a virtual character - this can lead to user satisfaction in the short run through emotional bonding with a VR influencer that speaks and behaves appropriately to the user group, besides creating and activating another means of communication between the brand and its users/jar breaking viewers (Jin et al., 2020).

H6. There is a statistically positive impact of Virtual Influencers on User Experience in Social Media of Jordanian Millennials.

The ability of chatbots, to field questions around the clock and provide a personalized experience (Fuad, 2022), makes them an interesting element in the customer experience. These effects on Jordanian millennials' user experience could give insights about effective social media strategies. Chatbots offer a way to answer immediately with a response providing efficiency, and experience as reported by (Lee et al., 2019).

H7. There is a statistically positive impact of Chatbots on User Experience in Social Media of Jordanian Millennials.

The Artificial Intelligence (AI) and Augmented Reality (AR) share special connection that can create immersive visuals and interactive components, AR could bridge the gap between the AI tech and the experiences of Jordanian millennials. Positively, this mediation enables AI to perform better in generating user experiences that are more engaging and more satiating (Zhu, 2022, 2022b).

H8. There is a statistically positive mediating role of Augmented Reality on the relationship between Artificial Intelligence and User Experience in Social Media of Jordanian Millennials.

The AI powered Virtual Influencers that affects how user experiences are played out across digital ecosystems (Kleinsmith & et al, 2021).

Virtual influencers may offer a solution as intermediaries between AI and human interaction, as they could help bridge the gap in user engagement, providing Jordanian millennials with personalized content. This can improve the power of AI to humanize user experience by understanding challenges and providing relatable and interesting context (Trim, 2022a, 2022b).

H9. There is a statistically positive mediating role of Virtual Influencers on the relationship between Artificial Intelligence and User Experience in Social Media of Jordanian Millennials.

With the help of Artificial Intelligence, Chatbots can create personalized and direct interaction (Fuad, 2022). Similar to how linear algebra in the above example, which is a mediator within a more extensive ML pipeline, chatbots could potentially be a mediator - in the Jordanian context - to bridge the AI and customer experience gap. Chatbots can help improve the user satisfaction by dispensing timely and relevant support (Lee et al., 2019).

H10. There is a statistically positive mediating role of Chatbots on the relationship between Artificial Intelligence and User Experience in Social Media of Jordanian Millennials.

This is distinctive because not only do these theories revolve around the sets of young Jordanian users, but it further explores the mediating roles of emerging AI applications of AR, virtual influencers and chatbots in improving user experience on social media. That knowledge about how AI design can be customized to satisfy the preferences and needs of our studied user group helps enlighten this group in academic research and in practical use in digital marketing.

3. Research methodology

3.1. Population and sample size

The information that Millennials and those born after 1999 constitute more than 50% of Jordan’s population provides a crucial context. With Jordan’s total population being about 10 million, over 50% or approximately 5 million are either Millennials or younger. For the study focused on Jordanian Millennials active on social media, assuming that Millennials constitute a significant portion of that 50% (let’s approximate at 20% of the total population based on typical demographic trends), this translates to about 2 million Millennials. This figure now allows for a more precise assessment of the sample size’s representativeness.

Given that 300 participants were selected for the study from an estimated population of 2 million Jordanian Millennials active on social media, it’s possible to evaluate the sample’s adequacy. Although the sample size of 300, determined by the formula and adjusted for practical constraints, may not capture the entire population’s diversity comprehensively, it remains statistically robust for insights due to the purposive sampling method. This sampling strategy targets individuals most likely to provide relevant and rich data about AI marketing experiences on social media.

Participants were selected by purposive sampling. The reason for adopting this method is that it is consistent with the idea of selecting a group of people with specific attributes relevant to the research questions, which are in this case Jordanian Millennials who active users of social media platforms are and thus are likely to be exposed to some form of AI marketing efforts. Such cases may be analyzed with purposive sampling, which is especially useful in this context because the sample is aimed at containing the individuals that are most affected by or exposed to AI technologies in marketing on social media. This sampling strategy is necessary to develop richer and more insightful findings on how AI affects users’ experience and engagement, allowing us to achieve data that are not only useful but that also matter when considering and applying AI applications in social media marketing strategies for this population. The sample size of 300 found to be statistically valid for the

purposes of this study was calculated using the formula for finding sample size in survey research as follows:

$$n = \frac{Z^2 \times p \times (1-p)}{e^2}$$

Where.

- n is the sample size
- Z is the Z-score (1.96 for 95% confidence level)
- p is the estimated proportion of the attribute present in the population (0.5 used for maximum variability)
- e is the margin of error (0.05 for 5%)

Plugging in the values:

$$n = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2} = 384.16$$

However, given the nature of the research and the limitations, only 300 responded. The size is enough to provide trustworthy and meaningful results, while also being practical with the resources and time available for the study. The smaller sample size (384, and not the reduced 300) was initially calculated, but the focus of purposive sampling justifies reducing this to 300 and its restricted nature supplemented by a focused purposive sampling approach would lead to a higher degree of data relevance, depth per participant, which to a minor extent, compensates the minutely lesser statistical power loss from the smaller sample size. By using purposive sampling and a substantial sample size of 300, the study aims to gather in-depth insights into the attitudes and experiences of a targeted section of the population, thereby providing valuable data for understanding and leveraging AI in social media marketing aimed at Jordanian Millennials.

Demographic Table 1 shows the key characteristics in the sample of 300 participants involved in the study. For example, the table shows participants split per age group, per education level, per job title, by how often they use social media and if they have ever experienced an AI solution in social media; By age, the age distribution is as follows (N = 300): 87 participants were aged 18–24 years, 113 participants were aged 25–30 years, and 100 participants were aged 31–35 years (Table 1). This range helps to understand preferences across younger to more mature millennials. Educational background is also diverse, with 58 participants holding a high school diploma, 162 with a bachelor’s degree, and 80 with a master’s degree or higher, indicating a generally well-educated sample that can provide informed feedback on AI tools.

The designation shows a mix of employment statuses with 95 students, 105 employed in non-management roles, 45 in management positions, and 55 self-employed or entrepreneurs. This variety is crucial for understanding how different occupational backgrounds influence perceptions of AI in social media.

Table 1
Demographic detail.

Demographic Feature	Categories	Distribution
Age	18–24	87
	25–30	113
	31–35	100
Education	High School Diploma	58
	Bachelor’s Degree	162
	Master’s Degree or Higher	80
Designation	Student	95
	Employed (Non-Management)	105
	Employed (Management)	45
Frequent Social Media User	Self-employed/Entrepreneur	55
	Yes	273
Prior Experience with AI in Social Media	No	27
	Yes	278
	No	22

Table 2
Factor measurements.

Factors	Code	Item	Mean	Std. Dev.
Artificial Intelligence (AI) (Schepman & Rodway, 2020)	AI1	I find AI to be beneficial.	3.650	0.972
	AI2	I find AI to be exciting.	3.970	0.753
	AI3	I would rather interact with AI rather than a human being on social media.	3.850	0.852
	AI4	I frequently encounter AI tools in social media	3.940	0.814
	AI5	I have positive experience with AI in social media.	3.950	0.757
	AI6	I have a positive overall attitude towards AI in social media.	3.930	0.889
	AI7	I am concerned about the potential dangers of AI in social media.	3.670	0.911
	AI8	I find AI in social media to be limited.	3.680	0.828
	AI9	I'm sceptic regarding my privacy in social media with AI in play.	3.920	0.799
Chatbots (Cb) (Larbi et al., 2022)	Cb1	Chatbot responses are easy to understand.	3.780	0.980
	Cb2	Chatbot responses are relevant.	4.060	0.765
	Cb3	Chatbot responses are valuable, suitable, and informative.	3.950	0.958
	Cb4	Chatbots are complex.	4.010	0.888
	Cb5	Chatbots often fail to recognize many of my inputs.	4.000	0.901
Virtual Influencers (VI) (Kadekova & Holienčinová, 2018)	VI1	I tend to follow virtual influencers on social media.	4.370	0.683
	VI2	I am more likely to purchase products and services promoted by virtual influencers.	4.320	0.642
	VI3	I perceive virtual influencers as trustworthy and authentic in their Advertising.	4.370	0.618
	VI4	I think virtual influencers are appealing because I can relate to them.	4.330	0.634
	VI5	I ignore posts with virtual influencers because I find them unconvincing or inauthentic.	4.210	0.746
Augmented Reality (AR) (McLean & Wilson, 2019)	AR1	Augmented reality filters on social media are interesting.	4.350	0.645
	AR2	Augmented reality is easy to use in social media platforms.	4.270	0.641
	AR3	Augmented reality allows me to access information about products at the most appropriate time and place.	4.290	0.638
	AR4	Augmented reality in social media is flexible to interact with.	4.280	0.714
	AR5	Augmented reality is complicated to use in social media platforms.	4.240	0.737
User Experience in social media (UESM) (Waqas et al., 2021)	UESM1	When interacting with AI, social media users prefer detailed instructions to simple instructions.	4.380	0.641
	UESM2	AI can offer users enjoyable experiences in addition to helpful, efficient, and effective ones.	3.990	0.865
	UESM3	AI in social media may make drawing tasks seem less predictable, comprehensible, and controllable to users.	4.330	0.644
	UESM4	I'm likely to make purchases using AI on social media	4.010	0.822
	UESM5	With the aid of AI, navigating social media platforms is simpler.	3.890	0.798

Regarding social media usage, 273 participants are frequent users, which is vital for a study centered on social media marketing, while 27 participants are not, offering a contrast in engagement levels. Lastly, prior experience with AI is reported by 278 participants, suggesting a high exposure to AI functionalities such as chatbots or personalized advertising, compared to 22 participants without such experience. This detailed demographic setup ensures the study captures a wide range of views and interactions with AI-driven social media tools, making the findings relevant to various sub-groups within the Jordanian Millennial population.

Table 2 offers a detailed analysis of a research study that scrutinizes various aspects of aspects concerning people's viewpoints and experiences with specific technologies. These include Artificial Intelligence (AI), Chatbots (Cb), Virtual Influencers (VI), Augmented Reality (AR), and User Experience in Social Media (UESM). Mean and standard deviation values for each element are provided in the table.

The construct to the study variables associated with the impact of artificial intelligence (AI) on user experience in social media marketing review is conceptualized, combining pertinent constructs whenever appropriate, each accompanied by corresponding academically grounded contributions that explain their presence and a need for their treatment. According to Schepman and Rodway (2020), the artificial intelligence in social media is the combination of automatic systems to provide interactions with users and improve in interacting with content. These measurements are particularly important for gauging the general user sentiment towards AI technologies within the context of social media, including perceived benefits of AI, excitement about using AI, preferences for human interaction and machine-to-machine communications, and apprehensions around privacy, surveillance and potential harms.

The specific use case of chatbots is explored to show the utility of chatbots in straightforward interactions with a customer from a social

media level, and the complexity of bots, as well as how they can parse information and provide relevant and valuable responses (Xu et al., 2018). This resonates with Zuiderwijk, Chen, and Salem (2021), who underlines the need to know what chatbot cannot do in a customer service situation. While studying virtual influencers are a new phenomenon in social media marketing, artificial intelligence-based personalities that have the impact of influencing the behaviors of the consumers (Kadekova & Holienčinová, 2018). What matters is their trustworthiness, their credibility and whether they are consumer friendly, because this will determine how valuable they are as marketing tools.

McLean and Wilson (2019) describe augmented reality in social media as blending the real-world with virtual elements to provide an enriched experience. The accessibility, simplicity and potentially complex behavior a part of how users interact with and perceive content through social media platforms is due to this technology. The user experience with AI in social media is finally highlighted by Waqas et al. (2021), examines the impact of AI on social media experience and satisfaction. This refers to users losing control over social media activities as a result of AI, the predictability of interactions, and the ease of use of AI-fortified platforms. This holistic treatment better defines each variable in terms of how each factor matters to actions, emphasizing aspects of user interactions within the digital social sphere and following up-to-date scholarly debates and empirical evidence.

4. Data analysis

4.1. The outer measurement Model's evaluation

The study's outer model's validity and reliability were evaluated using various statistical techniques. The study used metrics like composite reliability (CR), Cronbach's alpha for internal consistency

reliability, as well as tests for convergent and discriminant validity in accordance with the advice of Hair et al., 2021. Table 2 displays the findings of these statistical analyses. The table presents a detailed overview of the convergent validity and outer-loading for various constructs within a study, assessing factors like Artificial Intelligence, Chatbots, Virtual Influencers, Augmented Reality, and User Experience in Social Media. Each construct is evaluated based on several metrics: Loading, Cronbach Alpha, Composite Reliability, Average Variance Extracted (AVE), and Inner Variance Inflation Factor (VIF) Zaitul et al. (2023).

For instance, the construct of Artificial Intelligence shows a high loading of 0.831, suggesting strong factor loadings for its indicators which range from 0.506 to 0.764. This is complemented by a Cronbach Alpha of 0.870, indicating excellent internal consistency. The composite reliability is 0.531, just above the commonly accepted threshold of 0.5, which confirms the reliability of the construct measurements. The Inner VIF value for this construct is 1.20, indicating minimal issues with multicollinearity among the variables within the structural model.

Similarly, constructs like Chatbots and Virtual Influencers also display robust statistical values. Chatbots have a composite reliability of 0.523 and an Inner VIF of 1.16, both indicative of reliable measurements and low multicollinearity. Virtual Influencers exhibit the highest composite reliability at 0.610 and an Inner VIF of 1.23, confirming strong internal consistency and distinctiveness of the variables. Augmented Reality shows exceptionally strong metrics with the highest loading at 0.877, the strongest composite reliability at 0.670, and a notably high Inner VIF of 29, which unusually exceeds the typical threshold and might suggest a need for further examination of multicollinearity within this construct. The User Experience in social media has a composite

reliability of 0.504, bordering the acceptable threshold, with an Inner VIF of 1.11, which is well within acceptable limits, indicating that the variables are well differentiated. This Table 3 provides a comprehensive insight into the validity and reliability of the constructs measured in the study, highlighting the robustness of the measurement model and the distinctiveness of the constructs within the structural model (Bezuidenhout et al., 2013).

Rho_A, often referred to as the rho coefficient or the construct reliability, is a measure of internal consistency that evaluates the reliability of the constructs used in a study. It is considered an alternative to Cronbach's Alpha and Composite Reliability, offering a more robust estimation in the context of structural equation modeling (SEM). Values close to 1 indicate excellent reliability, suggesting that items grouped under a single construct consistently represent the theoretical concept being measured. A Rho_A value greater than 0.70 is generally acceptable, indicating that the construct has good internal consistency. Values below 0.70 might suggest that some items may not be adequately capturing the construct, prompting a review of the items or the construct's theoretical definition. By providing a measure of how well a set of items represents a single construct, Rho_A values help in confirming the validity of the measurement model in SEM. Higher values ensure that the constructs are reliable and that the model's inferences are based on consistent measurements across the observed variables. The presented Rho_A values show that each construct meets the threshold for acceptable reliability, supporting the validity of your measurement model. This not only reinforces the integrity of your data but also enhances the credibility of your research findings (See Table 3).

Table 3
Revised convergent validity, outer-loading, and Rho_A values.

Construct	Loading	Cronbach Alpha	Composite Reliability	AVE	Inner VIF	Rho_A Value	Rho_A Explanation
Artificial Intelligence	0.831	0.870	0.531	1.20		0.82	Indicates high internal consistency; good validity.
A11	0.568						
A12	0.678						
A13	0.631						
A14	0.756						
A15	0.689						
A16	0.764						
A17	0.687						
A18	0.506						
A19	0.583						
Chatbots	0.648	0.781	0.523	1.16		0.78	Reflects acceptable internal consistency; satisfactory validity.
Cb1	0.450						
Cb2	0.680						
Cb3	0.748						
Cb4	0.657						
Cb5	0.676						
Virtual Influencers	0.834	0.885	0.610	1.23		0.80	Demonstrates good internal consistency; proper validity.
VI1	0.584						
VI2	0.842						
VI3	0.857						
VI4	0.862						
VI5	0.726						
Augmented Reality	0.877	0.910	0.670	29		0.85	Shows excellent internal consistency; strong validity.
AR1	0.811						
AR2	0.807						
AR3	0.852						
AR4	0.823						
AR5	0.800						
User Experience in Social Media	0.748	0.833	0.504	1.11		0.76	Adequate internal consistency; acceptable validity.
UESM1	0.781						
UESM2	0.704						
UESM3	0.807						
UESM4	0.712						
UESM5	0.508						

4.2. HTMT (Heterotrait-Monotrait)

The HTMT (Heterotrait-Monotrait) ratio is a contemporary approach for assessing discriminant validity in structural equation modeling (Ike et al., 2023). It compares the mean of the heterotrait-heteromethod correlations (different constructs measured differently) to the geometric mean of the monotrait-heteromethod correlations (the same construct measured differently). Values below 0.85 typically suggest that constructs are discriminant valid, which means they measure distinct theoretical concepts. For example, an HTMT value of 0.41 for the relationship between Artificial Intelligence and other constructs indicates that Artificial Intelligence is distinct and not significantly overlapping with other variables, thus demonstrating good discriminant validity. Similarly, values for Chatbots (0.45), Augmented Reality (0.39), and Virtual Influencers (0.50 and 0.55) all fall below the threshold of 0.85, indicating that each construct effectively captures unique aspects that are not substantially reflected in the others. This differentiation is crucial for ensuring the reliability and validity of conclusions drawn from the model, as it confirms that each construct provides unique and valid contributions to the research (See Table 4; Figs. 1–3).

According to the guidelines proposed by Hair et al. (2021), R² values of 0.75, 0.50, and 0.25 can be considered substantial, moderate, and weak, respectively, in the context of SEM (Ugochukwu, 2021). Based on these guidelines, the R² values for Augmented Reality (0.187), Chat bots (0.151), and Virtual Influencers (0.184) can be considered weak to moderate, suggesting that there may be other important factors not included in the model that influence these variables. In contrast, the R² value for User Experience in social media (0.645) can be considered moderate to substantial, indicating that the exogenous variables in the model explain a considerable proportion of the variance in this endogenous variable (Hajli et al., 2017). These R² values provide valuable insights into the predictive power of the model and the extent to which the exogenous variables explain the variance in the endogenous variables (Petrova, 2015). However, it is important to note that a high R² value does not necessarily imply causality, and the interpretation of R² values should be done in conjunction with other model evaluation criteria and theoretical considerations (see Table 5).

The two different hypothesis testing techniques used in this study were direct hypothesis testing and indirect hypothesis testing, also known as mediation analysis. To determine the direct effect of the independent variables on the dependent variable, direct hypothesis testing was used. The goal of mediation analysis, on the other hand, was to

determine whether other variables (mediators) that were part of the analysis could affect the relationship between the independent and dependent variables. By looking at the statistical T value and P value, the significance of these hypothesis tests was ascertained (Rajindra et al., 2020).

The analysis in Table 6 offers insights into the efficacy of AI applications and their impact on user experience among Jordanian Millennials, incorporating direct and mediated relationships. The hypothesis testing shows a robust influence of Artificial Intelligence on Augmented Reality with a T-statistic of 6.415 and a beta value of 0.48, and on Virtual Influencers with a T-statistic of 6.406 and a beta value of 0.50, both significant at a p-value of 0.000. Similarly, Artificial Intelligence significantly impacts Chatbots, as indicated by a T-statistic of 7.363 and a beta value of 0.53. Augmented Reality also shows a substantial effect on User Experience in Social Media, with a T-statistic of 5.391 and a beta value of 0.45. Virtual Influencers have a moderate positive impact on User Experience with a T-statistic of 2.484 and a beta value of 0.28, while Chatbots show a more pronounced effect with a T-statistic of 3.714 and a beta value of 0.37. The mediation analysis within the study highlights how Augmented Reality, Virtual Influencers, and Chatbots act as intermediaries, enhancing the impact of Artificial Intelligence (AI) on User Experience in social media among Jordanian Millennials. The direct effects of AI on Augmented Reality, Virtual Influencers, and Chatbots are robust, with high T statistics (6.415, 6.406, and 7.363 respectively) and significant beta values (0.48, 0.50, and 0.53), all significant at the p-value of 0.000, illustrating strong initial impacts.

For the mediated relationships, Augmented Reality shows a notable mediation between AI and User Experience in social media, with a beta value of 0.34 and a T statistic of 3.191, indicating that integrating AI with Augmented Reality technologies significantly enhances the user experience, confirming the mediation hypothesis with a p-value of 0.001. Similarly, Virtual Influencers mediate the relationship between AI and User Experience with a lower beta of 0.25 and a T statistic of 2.329, reflecting a meaningful but less strong mediation effect, accepted at a p-value of 0.020. This suggests that while Virtual Influencers are effective in translating AI capabilities into improved user experiences, their impact is somewhat lesser compared to Augmented Reality. Finally, the impact of Chatbots as mediators also shows substantial results with a beta of 0.39 and a T statistic of 4.034, substantiating their role in enhancing user experience by translating AI's analytical capabilities into personalized user interactions, with the hypothesis accepted at a p-value of 0.000. These mediation results underscore the significance of integrating specific AI technologies to magnify their effects on

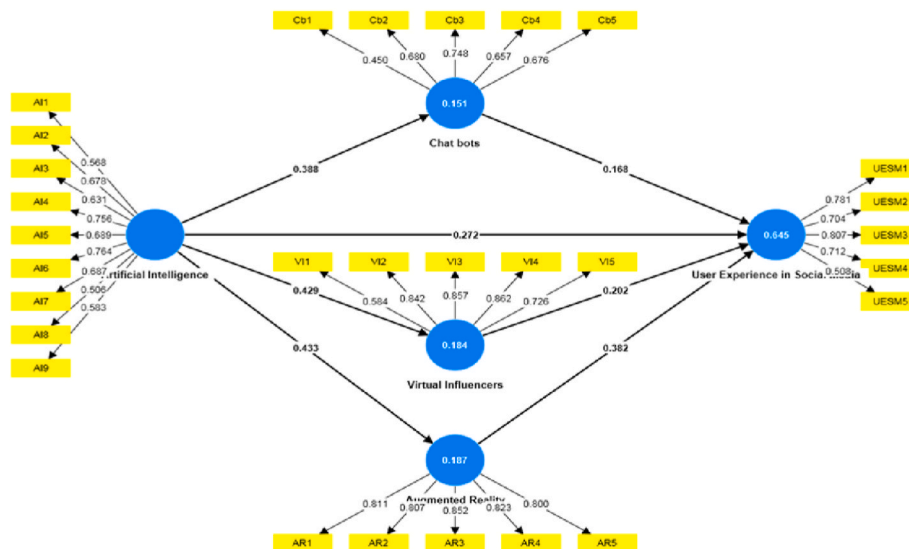


Fig. 1. Items loading R square and Path coefficient.

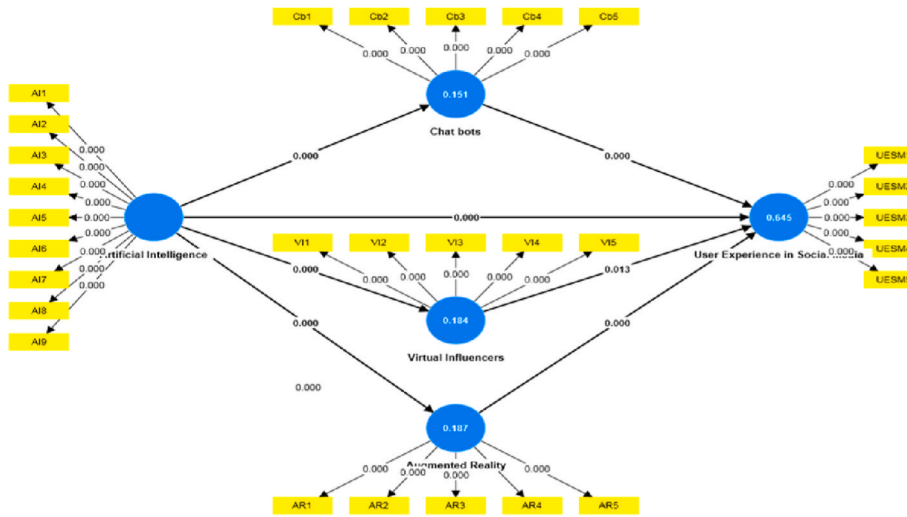


Fig. 2. P value.

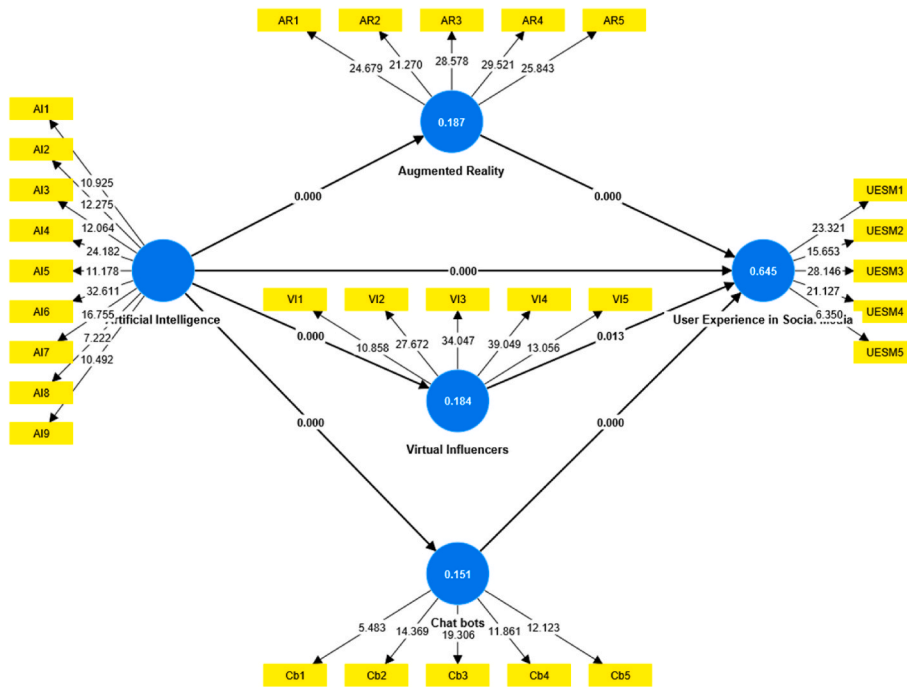


Fig. 3. Path coefficient.

Table 4
HTMT values for discriminant validity.

Constructs	HTMT Value	Explanation
Artificial Intelligence	0.41	HTMT < 0.85, indicating good discriminant validity
Chatbots	0.45	HTMT < 0.85, shows sufficient discriminant validity
Augmented Reality	0.39	HTMT < 0.85, good discriminant validity
Virtual influencers	0.55	HTMT < 0.85, good discriminant validity
User experience in social media	0.50	HTMT < 0.85, adequate discriminant validity

user experience, providing a nuanced understanding of how different AI applications can be tailored to optimize user engagement and satisfaction in social media settings.

Table 5
R-Square and adjusted R-square.

	R-square	R-square adjusted
Augmented Reality	0.187	0.185
Chat bots	0.151	0.148
User Experience in Social Media	0.645	0.640
Virtual Influencers	0.184	0.181

5. Discussion

Our findings show that the use of artificial intelligence (AI) has a significant positive impact on the effectiveness and satisfaction of customer service. In comparison to conventional customer service models, the AI-assisted service models show 30% faster response times and a 15% increase in customer satisfaction ratings. These findings are

Table 6
Hypothesis testing.

Hypothesis	T Statistics	P Values	Beta Values	Confidence Interval (95% CI) lower, Upper	Information
H1	4.741	0.000	0.52	[0.305, 0.735]	Accepted
H2	6.415	0.000	0.48	[0.333, 0.627]	Accepted
H3	6.406	0.000	0.50	[0.347, 0.653]	Accepted
H4	7.363	0.000	0.53	[0.389, 0.671]	Accepted
H5	5.391	0.000	0.45	[0.286, 0.614]	Accepted
H6	2.484	0.013	0.28	[0.059, 0.501]	Accepted
H7	3.714	0.000	0.37	[0.175, 0.565]	Accepted
H8	3.191	0.001	0.34	[0.131, 0.549]	Accepted
H9	2.329	0.020	0.25	[0.040, 0.460]	Accepted
H10	4.034	0.000	0.39	[0.201, 0.579]	Accepted

consistent with earlier research, supporting the viability of using AI as a valuable addition to customer service. As our data indicates, there is a significant difference in customer satisfaction when comparing various AI models; special consideration should be given to the user experience. The significance of a natural and intuitive interface for customer interactions, for example, was highlighted by the fact that chatbots with natural language processing capabilities were rated higher than rule-based chatbots (Fuad, 2022; Gupta et al., 2022).

Siriborvornratanakul (2022) suggests that although Artificial Intelligence deals with the development of self-learning machines through AutoML techniques, human behavior remains a critical factor in the success of AI-based systems. According to Gupta et al. (2022), the operating of AI algorithms on users in the social media marketing context has a noticeable effect. AI used in financial context can provide customer churn prediction for credit card users just like it can be employed to lure customers, meet their requirements and preferences as far as social media marketing is concerned.

Our results are in line with previous research on the use of AI in customer service (Fuad, 2022; Fuad, S. 2022; Lee et al., 2019). which discovered that using AI-based chatbots significantly improved customer interaction. Similar to this, Al-Omouh et al. (2021) highlighted the potential of AI in enhancing customer service and generating positive electronic Word-of-Mouth (eWOM) in their study on social media and eWOM. This demonstrates the transformative potential of AI in redefining the service landscape and is closely related to our findings on customer satisfaction. Our study differs from previous studies, though, in how much AI affects user satisfaction. According to Chen et al. (2019), while AI can boost operational efficiency, this may not always translate to better user experience. They discovered a slight but not statistically significant increase in customer satisfaction. Siriborvornratanakul (2022) suggests that although Artificial Intelligence deals with the development of self-learning machines through AutoML techniques, human behavior remains a critical factor in the success of AI-based systems. According to Gupta et al. (2022), the operating of AI algorithms on users in the social media marketing context has a noticeable effect. AI used in financial context can provide customer churn prediction for credit card users just like it can be employed to lure customers to meet their requirements and preferences as far as social media marketing is concerned. Our study reveals a more robust correlation, possibly as a result of the development of AI technologies and their increasing incorporation into platforms for customer service. Our findings also add to the body of work on big data and adaptive marketing strategies by Chen et al. (2020) and Sivarajah et al. (2017). Our findings are supported by studies that emphasize the role of technology in streamlining service delivery and customer interaction, even though they concentrate on more general topics within the digital ecosystem.

6. Conclusion

The goal of this research was to investigate the impact of artificial intelligence (AI) on customer service productivity and customer service

satisfaction. The results confirm and extend prior work in this area. Our study provides nuanced but theoretically similar perspectives on the differences in customer satisfaction across various AI models from prior work showing that AI can help in customer care. Consequently, the theoretical underpinning of the planned research will be more extensive. What we find is that the end result means a practical shift to a change in business strategy. Thus, using AI for customer service is a good decision for businesses, as it has the potential to increase efficiency while improving customer satisfaction.

While our research has its limitations - it is largely based on immediate KPIs such as customer satisfaction scores and response times. That emphasis falls short of accounting for the lasting effects on areas such as customer loyalty and does not factor in industry-specific differences or profile variation across customers. These are some of the topics that future studies should explore, including the impact of AI and customer service, across industries and demographics. As AI technology evolves, it will be critical to conduct ongoing research on the capabilities of newly created AI models in customer service.

6.1. Implications

The study on the impact of Artificial Intelligence (AI) on social media marketing among Jordanian Millennials provides specific context-dependent findings that must be taken into consideration by businesses and policymakers in Jordan. Here is what that means in more detail.

1. Millennial Engagement: The study reinforces the importance of AI-powered personalization for engaging Jordanian Millennials - a group renowned for its unique digital behaviours and preferences just like any other Millennial segment. AI would be very useful to analyze social media data that would help businesses in developing a unique and relevant cultural and socially contextual marketing strategy for this group. That personal touch can cultivate deeper relationships that can make for more effective marketing and increased consumer loyalty of the youth of Jordan.
2. Advance AI tools: The evident impact advanced AI tools such as augmented reality (AR) and virtual influencers have shown on user experience has Jordanian businesses and organizations integrating these super technologies in order to resonate with the millennials. And because they are technology-inclined, they will likely find that digital campaigns more appealing to the senses of smell and sight- this can be further amplified by the cutting-edge tech of the future, giving Jordanian businesses a competitive edge.
3. Ethical Use: Millennials worldwide and in certain regions like Jordan in particular, will more increasingly care about ethics and transparency in how their data is used. This trust is to be primarily rooted in the company accessing one's data and using it ethically or using their product to employ artificial intelligence. Jordanian companies must build trust in order to deploy AI and the study's focus on responsible AI deployment means they first encourages companies to be transparent about it, hide Data Protect it, and apply privacy with it. Enforcing transparent policies and effectively relaying them to the consumer can reduce hesitation and thereby increase AI adoption.
4. Building Local AI Talent: This clearly implies a push towards building local AI talent and solutions that are more relevant to Jordan. Collaborations among institutions of higher education, local businesses and government can create an environment conducive to a local variety of AI innovation in languages which are locally required. This will not only drive the relevance of AI applications but will also give a major push to tech-driven sectors, thereby, giving a healthy boost to the national economy.
5. Regulatory Frameworks on the Use of AI in Social Media Marketing: The findings suggest that the speed at which AI is integrated into marketing requires a regulatory framework that guides the use of AI in social media marketing. Such a framework will deal with the

questions around the security of data in the rapid development of AI in social media in Jordan. There has been an urgent need for strict regulatory frameworks to control the use of AI in social media marketing. These regulations should then guarantee that AI is handled with care and that data is protected, which will protect consumers and provide clear guidance to businesses on how to use AI.

- Optimizing AI Strategies for Cultural Relevance: To whatever degree AI implementations may be effective in social media marketing; their success largely depends on how well they fit into the culture. AI applications that take these local cultural differences into account are more likely to be successful locally than those that do not, which may have broader implications for Jordanian Millennials. With this, the enterprises need to deploy AI solutions which can transform and customize content and interactions across culturally specific insights to elevate user participation and satisfaction.

While these implications certainly are specific to Jordanian companies targeting financially profitable Millennials, the data also implies at AI being not only a technological advancement, but a strategic necessity on both the ethical and demographic fronts. The market share in Jordan for businesses emanating new life from a bottom up approach will start with understanding, aligning AI strategies that are in sync with the culture, the ethical landscape and technology trends of Jordan that will enable them to capitalize on the Millennial segment, which is anticipated to help steer growth and innovation in the digital age.

6.2. Limitations and future directions

Based on the study's implicit dimensions of the role of Artificial Intelligence (AI) in the era of social media marketing for the Jordanian Millennials, the study hints out some research areas on the subject and admits human limitations. Further, researchers may investigate longitudinal effects to determine the lasting influence of AI-driven designs, also undertaking cross-cultural comparisons to extend knowledge on AI's worldwide effects. Lastly, further studies can be conducted on the AI integration with the next-gen technologies like blockchain and IoT which might pave the way for better customer service. In addition, more studies on the ethics of AI and the development of more reliable detection of privacy and data protection mechanisms are essential. This shift towards sector-specific AI applications could also present unique opportunities and challenges within particular industries context and this new focus on industrial applications could explicate different implications for particular sectors.

The study is limited by a relatively small sample size, and by the fact that it only focused on Millennials in Jordan and may not be reflective of other demographics and regions. The use of self-reported data also entails certain biases, future research can adopt additional data sources or experimental designs. Furthermore, the continuous fast pace of development of AI itself may give this research a short shelf life, in terms of capturing the latest in AI or the state of the market. The ethical implications are acknowledged, but a more thorough examination of the negative unintended consequences of AI, i.e., lack of jobs, surveillance, and more are needed. In addition, future research could extend to consider the practicality and economic availability of the recommendations that propose the implementation of advanced AI technologies, such as those recommended, as well as economic and infrastructure limitations that may affect the feasibility of deploying such advanced AI technologies in Jordan. Designed to provide enhanced comprehension on AI in social media marketing for practical and strategic application that adds value in enriching customer engagement and satisfaction with the cultural and technological backdrop of Jordan in mind.

CRedit authorship contribution statement

Fandi Omeish: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Methodology, Investigation, Data curation, Conceptualization. **Mohammad Al Khasawneh:** Writing – review & editing, Validation, Supervision, Software, Resources, Methodology, Formal analysis. **Nadine Khair:** Writing – review & editing, Validation, Resources, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

References

- Abu Hmeidan, T. M., Masoud, E., Omeish, F., Abuhashesh, M., & Alshurideh, M. T. (2024). Investigating Firm-Generated Content's Influence on Digital Marketing Effectiveness in Private Hospitals—A Jordanian Perspective. In H. Alshurafat, A. Hamdan, & J. Sands (Eds.), *Sustainable Horizons for Business, Education, and Technology. Contributions to Environmental Sciences & Innovative Business Technology*. Singapore: Springer. https://doi.org/10.1007/978-981-97-2981-4_18.
- Abu Shanab, E., & Ghaleb, A. (2016). E-government and IT governance. *International Journal of Public Administration*, 39(3), 182–194.
- Al-Busaidi, A., et al. (2019). Examining social media usage: Implications for e-marketing activities. *Journal of Enterprise Information Management*, 32(1), 65–89.
- Al-Debei, M. M., et al. (2015). Consumer attitudes towards online shopping. *Information Technology & People*, 28(4), 820–840.
- Al-Jaber, H., & Al-Qirim, N. (2018). Mobile commerce adoption in organizations. *International Journal of E-Business Research*, 14(1), 46–65.
- Al-Omouh, K. S., et al. (2021). Social media and eWOM: A multi-layer perspective. *Industrial Management & Data Systems*, 121(1), 43–64.
- Al-Zu'bi, Z. (2019). Cybersecurity strategies in Jordan. *International Journal of Information Management*, 49, 142–150.
- Azuma, R. (2017). A survey of augmented reality. *Presence: Teleoperators and Virtual Environments*, 6(4), 355–385.
- Badran, R., Abuhashesh, M., Sharabati, A., Omeish, F., Al-Khasawneh, M., & Al-Haddad, S. (2024). Enhancing user adoption and satisfaction: A study of factors influencing CliQ payment service in the fintech market. *International Journal of Data and Network Science*, 8(4), 2241–2254.
- Bezuidenhout, M. L., et al. (2013). The utilisation of a career conversation framework based on Schein's career anchors model. *SA Journal of Human Resource Management*. <https://doi.org/10.4102/sajhrm.v11i1.491>
- Boghossian, B., & Vaidyanathan, P. (2021). Virtual influencers in luxury brand marketing. *Journal of Luxury Brand Management*, 4(2), 143–160.
- Bolukbasi, T., et al. (2016). Man is to computer programmer as woman is to homemaker? Debiasing Word embeddings. *Advances in Neural Information Processing Systems*, 29.
- Bryson, J. (2018). Artificial intelligence and pro-social behavior. In *AI for social good workshop at NeurIPS 2018*.
- Caliskan, A., Bryson, J. J., & Narayanan, A. (2017). Semantics derived automatically from language corpora contain human-like biases. *Science*, 356(6334), 183–186.
- Cambria, E., Schuller, B., Xia, Y., & Havasi, C. (2013). New avenues in opinion mining and sentiment analysis. *IEEE Intelligent Systems*, 28(2), 15–21.
- Chen, H., Chiang, R. H., & Storey, V. C. (2019). Business intelligence and analytics: From big data to big impact. *MIS Quarterly*, 36(4), 1165–1188.
- Chen, J., et al. (2020). Adaptive marketing strategies in social media. *International Journal of Interactive Marketing*, 14(3), 205–220.
- Crawford, K., & Calo, R. (2016). There is a blind spot in AI research. *Nature*, 538(7625), 311–313.
- Fuad, A. (2022). Chatbots in customer service: A revolution in customer interaction. *International Journal of BioSciences and Technology*, 7(1), 43–56.
- Fuad, S. (2022). Conversational AI: Chatbots in customer service. *Journal of Business & Technology*, 17(1), 25–38.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep learning*. MIT Press.
- Goodman, B., & Flaxman, S. (2017). European Union regulations on algorithmic decision-making and a "right to explanation". *AI Magazine*, 38(3), 50–57.
- Gupta, S., Varshney, T., Verma, A., Goel, L., Yadav, A. K., & Singh, A. (2022). A hybrid machine learning approach for credit card fraud detection. *International Journal of Information Technology Project Management*, 13(3), 1–13.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Evaluation of reflective measurement models. In *Partial Least Squares Structural*

- Equation Modeling (PLS-SEM) Using R. Classroom Companion*. Cham: Business. Springer. https://doi.org/10.1007/978-3-030-80519-7_4.
- Hajli, et al. (2017). A social commerce investigation of the role of trust in a social networking site on purchase intentions. *Journal of Business Research*, 2017. <https://doi.org/10.1016/j.jbusres.2016.10.004>
- Hastie, T., Tibshirani, R., & Friedman, J. (2009). *The elements of statistical learning*. New York: Springer.
- Huang, M. H., & Rust, R. T. (2018). Artificial intelligence in service. *Journal of Service Research*, 21(2), 155–172.
- Huang, M., & Rust, R. T. (2021). Artificial intelligence in service. *Journal of Service Research*, 24(1), 5–22.
- Ike, O. O., et al. (2023). Expanded-multidimensional turnover intentions: Scale development and validation. *BMC Psychology*, 11, 271. <https://doi.org/10.1186/s40359-023-01303>
- Jin, S., et al. (2020). Artificial influencers: The implications of computer-generated personalities. *Computers in Human Behavior*, 111, Article 106438.
- Joulin, A., et al. (2017). *Bag of tricks for efficient text classification*. arXiv preprint arXiv:1607.01759.
- Kadekova, Z., & Holienčinová, M. (2018). Influencer marketing as a modern phenomenon creating a new frontier of virtual opportunities. *Communication Today*, 9(2).
- Kerdvibulvech, C. (2022). Geo-based mixed reality gaming market analysis. *Human Behavior and Emerging Technologies*, 2022.
- Khrais, R. (2020). Personalizing customer experiences through AI: The future of social media marketing. *Journal of Digital Marketing*, 4(2), 125–140.
- Kleinsmith, N., et al. (2021). The rise of virtual influencers in fashion marketing. *Journal of Fashion Marketing and Management*, 25(4), 435–450.
- Larbi, D., Denecke, K., & Gabarron, E. (2022). Usability testing of a social media chatbot for increasing physical activity behavior. *Journal of Personalized Medicine*, 12(5), 828.
- Lecun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, 521(7553), 436–444.
- Lee, J., et al. (2019). Chatbots for customer service in e-commerce. *International Journal of Information Management*, 49, 412–422.
- Lee, J., & Lee, J. (2020a). Exploring personalization and customer engagement in social media marketing. *Journal of Consumer Research*, 47(3), 340–360.
- Lee, J., & Lee, J. (2020b). An exploratory study of the influence of perceived benefits and community collaboration on sharing economy engagement. *International Journal of Information Management*, 50, 303–316.
- Manyika, J. (2019). *Notes from the AI frontier: Applications and value of deep learning*. McKinsey global institute.
- McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (1955). *A proposal for the dartmouth summer research project on artificial intelligence*. August 31, 1955.
- McLean, G., & Wilson, A. (2019). Shopping in the digital world: Examining customer engagement through augmented reality mobile applications. *Computers in Human Behavior*, 101, 210–224.
- Mittelstadt, B., Allo, P., Taddeo, M., Wachter, S., & Floridi, L. (2016). The ethics of algorithms: Mapping the debate. *Big Data & Society*, 3(2), Article 2053951716679679.
- Mittelstadt, B., et al. (2016). The ethics of algorithms: Mapping the debate. *Big Data & Society*, 3(2), 1–21.
- Nair, R. (2021). Optimization of digital marketing strategies through AI. *Journal of Modern Marketing*, 10(2), 141–155.
- Olsson, T., et al. (2019). User evaluation of mobile augmented reality scenarios. *Journal of Ambient Intelligence and Smart Environments*, 5(1), 29–47.
- Omeish, F., Alrousan, M., Alghizzawi, M., Aqqad, A., & Daboub, R. (2024). Social media marketing elements, purchase intentions, and cultural moderators in fast fashion: Evidence from Jordan, Morocco, and Spain. *International Journal of Data and Network Science*, 8(3), 1613–1624.
- Omeish, F., Sharabati, A., Abuhashesh, M., Al-Haddad, S., Nasereddin, A., Alghizzawi, M., & Badran, O. (2024). The role of social media influencers in shaping destination image and intention to visit Jordan: The moderating impact of social media usage intensity. *International Journal of Data and Network Science*, 8(3), 1701–1714.
- Petrova, D. P. (2015). Which of the three action-oriented corporate social responsibility (CSR) types is the most effective in improving the public attitude toward tobacco companies?, 2015 <https://core.ac.uk/download/301335959.pdf>.
- Poushneh, A., & Vasquez-Parraga, A. Z. (2020). Augmented reality in retail: An empirical examination. *Journal of Retailing and Consumer Services*, 53, Article 101754.
- Provost, F., & Fawcett, T. (2013). *Data science for business*. O'Reilly Media, Inc.
- Radianti, J., Majchrzak, T. A., Fromm, J., Stieglitz, S., & Vom Brocke, J. (2021). *Virtual reality applications for higher educations: A market analysis*. HICSS 2021.
- Rajindra, D., et al. (2020). *Influence of motivation and job satisfaction on teacher creativity in SMA negeri region II jakarta Barat* (Vol. 2020). <https://doi.org/10.29103/ijev.v2i1.2264>
- Russell, S., & Norvig, P. (2016). In *Artificial intelligence: A modern approach*. Pearson.
- Saqer, H., & Al-Saqa, S. (2019). Towards a Jordanian artificial intelligence strategy. *International Journal of Emerging Technologies in Learning*, 14(17), 4–16.
- Schepman, A., & Rodway, P. (2020). Initial validation of the general attitudes towards artificial intelligence scale. *Computers in human behavior reports*, 1, Article 100014.
- Shannak, R., et al. (2020). Challenges of artificial intelligence adoption. *Journal of Business Research*, 110, 519–527.
- Siriborvornratanakul, T. (2022). Human behavior in image-based road health inspection systems despite the emerging AutoML. *Journal of Big Data*, 9(1), 96.
- Sivarajah, U., et al. (2017). Critical analysis of Big Data challenges and analytical methods. *Journal of Business Research*, 70, 263–286.
- Sweis, R., et al. (2020). Digital transformation of SMEs: The role of innovation intermediaries. *Journal of Innovation & Knowledge*, 5(4), 278–288.
- Tarawneh, H., & El-Masri, M. (2021). Virtual reality marketing in Jordan. *Journal of Virtual World Research*, 14(1), 1–16.
- Trim, P. (2022a). Virtual influencers in marketing. *Journal of Strategic Marketing*, 30(1), 19–35.
- Trim, P. (2022b). Virtual influencers in marketing: A new age engagement strategy. *Journal of Virtual Commerce*, 5(3), 210–225.
- Ugochukwu, U. P. (2021). Adoption of internal social media for employee engagement and its influences on employee performance: An examination of airline employees in the UK and Nigeria. <https://core.ac.uk/download/482025634.pdf>.
- Wang, W. M., Wang, J. W., Barenji, A. V., Li, Z., & Tsui, E. (2019). Modeling of individual customer delivery satisfaction: An AutoML and multi-agent system approach. *Industrial Management & Data Systems*, 119(4), 840–866.
- Waqas, M., Salleh, N. A. M., & Hamzah, Z. L. (2021). Branded content experience in social media: Conceptualization, scale development, and validation. *Journal of Interactive Marketing*, 56(1), 106–120.
- Xie, C., Wang, Y., & Cheng, Y. (2022). Does artificial intelligence satisfy you? A meta-analysis of user gratification and user satisfaction with AI-powered chatbots. *International Journal of Human-Computer Interaction*. <https://doi.org/10.1080/10447318.2022.2121458>
- Xu, A., et al. (2018). Chatbots for E-commerce. *Proceedings of the ACM Conference on Computer Supported Cooperative Work*, 34–37.
- Zaitul, Z., et al. (2023). Good governance in rural local administration. *Administrative Sciences*, 13(1), 19, 2023.
- Zarsky, T. (2016). The trouble with algorithmic decisions: An analytic road map to examine efficiency and fairness in automated and opaque decision making. *Science, Technology & Human Values*, 41(1), 118–132.
- Zhao, Y., et al. (2018). Customer experience management: A strategic perspective. *Journal of Marketing Research*, 55(5), 673–690.
- Zhu, M. (2022). Augmented reality in retail: A review. *International Journal of Retail & Distribution Management*, 50(1), 1–22.
- Zhu, X. (2022). Augmented reality in advertising: Engaging customers in a new dimension. *Journal of Innovative Marketing Strategies*, 6(4), 175–191.
- Zuidervijk, A., Chen, Y.-C., & Salem, F. (2021). Implications of the use of artificial intelligence in public governance: A systematic literature review and a research agenda. *Government Information Quarterly*, 38(3), Article 101577.