

# The Impact of AI Adoption on Digital Marketing Capabilities: An Empirical Study in the Service Sector of El Oued

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## Abstract

This study examines the relationship between the adoption of artificial intelligence (AI) and the development of digital marketing capabilities within the service sector of El Oued. Employing a quantitative methodology, we conducted a survey of service-oriented businesses in the region. The collected data were analyzed using SPSS 29 and Smart PLS 4 to assess the correlation between AI integration and enhanced digital marketing capabilities. Our empirical findings indicate a statistically significant and positive association between AI adoption and digital marketing capabilities. This suggests that the integration of AI technologies within service businesses in El Oued significantly contributes to the improvement of their digital marketing capabilities. Further research is recommended to explore the potential impact of enhanced digital marketing capabilities on firm performance in this context. Future investigations should also incorporate a broader range of variables to gain a more comprehensive understanding of how AI adoption influences various facets of business operations in the service sector.

## 1. Introduction

Digital marketing has fundamentally transformed how businesses interact with consumers, leveraging online platforms, social media, and various digital tools to promote products, services, and brands (Chaffey & Ellis-Chadwick, 2019). For small and medium-sized enterprises (SMEs), digital marketing has become an essential component of their business strategies. It offers a cost-effective approach to reaching a broad audience, competing with larger corporations, and cultivating a loyal customer base (Tiago & Veríssimo, 2014). The ability to analyze consumer behavior, target specific demographics, and measure campaign success in real-time has made digital marketing indispensable for SMEs aiming to enhance their market presence and drive growth (Kumar et al., 2021).

Since 2023, the advent of Artificial Intelligence (AI) has significantly altered business practices, particularly in reshaping digital marketing (Dwivedi et al., 2019). The integration of AI into business processes has become imperative due to the rise of big data and advancements in computing power (Haenlein & Kaplan, 2019). AI enables organizations to gain deeper insights into customer behavior and deliver personalized digital messages more effectively (Mogaji et al., 2020).

Despite the widespread adoption of digital marketing, there is a notable gap in research regarding the impact of AI on digital marketing capabilities. While previous studies have underscored AI's transformative potential in marketing strategies, empirical research examining how AI adoption influences digital marketing capabilities is lacking. Scholars have highlighted the importance of investigating AI's role in enhancing digital marketing. For example, Davenport and

Ronanki (2018) discuss the efficiency and customization that AI brings to consumer interactions, and Lemon and Verhoef (2016) highlight AI's ability to streamline repetitive processes and foster innovation in content creation. However, despite these insights, there is a dearth of empirical evidence on the specific effects of AI on digital marketing capabilities, particularly in SMEs within developing economies like Algeria, where the context has been largely overlooked.

To address these gaps, this study poses the following research question: What is the impact of Artificial Intelligence (AI) adoption on enhancing digital marketing capabilities? This paper aims to fill this gap by presenting a detailed framework that elucidates how AI reshapes SMEs' digital marketing capabilities and its impact on the interactions between digital marketing and customers, with a particular focus on the service sector.

This study holds substantial academic and practical significance. Academically, it contributes to the existing body of knowledge by providing a comprehensive analysis of AI's impact on digital marketing capabilities, especially in the context of Algerian SMEs. Practically, the findings will offer actionable insights for businesses and policymakers. Companies can leverage these insights to strategically implement AI in their marketing initiatives, while policymakers can develop supportive frameworks to foster AI-driven marketing. Additionally, the study underscores the positive societal implications of AI adoption, such as economic development and job creation, highlighting the broader benefits of integrating AI into digital marketing strategies.

## **2. Artificial Intelligence Adoption and Digital Marketing Capabilities**

Digital marketing capabilities (DMCs) are essential skills, knowledge, and processes enabling firms to effectively utilize digital technologies to engage with customers and partners. These capabilities allow businesses to interact with their audience in a targeted, measurable, and integrated manner, creating value without the constraints of time and distance (Wielgos, D.M., Homburg, C., & Kuehn, C., 2021). DMCs encompass various activities, including social media marketing, content marketing, email marketing, and web analytics, among others. They differ from classic marketing capabilities (CMCs) due to their higher degree of scalability, measurability, interconnectivity, and adaptability (Wielgos, D.M., Homburg, C., & Kuehn, C., 2021; Herhausen, D., Miocevic, D., Morgan, R.E., & Kleijnen, M.H.P., 2020).

The integration of digital marketing capabilities (DMCs) and artificial intelligence (AI) presents a substantial prospect for transforming marketing strategies. The potential of artificial intelligence (AI) to improve marketing performance by means of enhanced data analysis, personalization, and automation has been highlighted in research (Basha, 2023; George et al., 2024). This could result in increased efficiency and competitive advantages. However, the incorporation of AI into marketing strategies also presents ethical concerns, specifically regarding the effects it may have on susceptible consumers (Mogaji, Soetan, & Kieu, 2020). It is imperative to maintain a delicate equilibrium between technological advancements and ethical concerns, in addition to incorporating human supervision, in order to avert the worsening of customer susceptibilities.

AI is revolutionizing diverse marketing domains, including content generation and customer support, in addition to enhancing consumer interactions (Durmus Senyapar, 2024). In order to optimize the potential of artificial intelligence (AI) in the realm of strategic marketing decision management, organizations are undergoing structural adjustments (Eriksson, Bigi, & Bonera, 2020). Research has established that the utilization of AI in e-commerce and business-to-business marketing is crucial for fostering innovation and bolstering competitive advantages (Thakur & Kushwaha, 2023; Arslan, 2022). Marketing frameworks that incorporate both artificial intelligence and human intelligence offer significant benefits in terms of optimizing marketing efficacy, specifically within the retail industry (Huang & Rust, 2021). The incorporation of artificial intelligence (AI) into marketing strategies necessitates a flexible approach that takes into account issues related to data privacy, challenges in system integration, and the need for an ethical framework to govern the use of AI.

## **3. Method**

### **Data collection**

This study, conducted in the El Oued province where Arabic is the primary language, employed a structured survey instrument to examine the effects of AI adoption on digital marketing capabilities and firm performance among SMEs. To ensure accuracy and translation integrity, the survey was translated into Arabic and back-translated by bilingual management lecturers, following best practices advocated by Brislin (1970), Douglas & Craig (2007), and Ozolins (2009). This ensured the translated survey remained faithful to the original English version in content and intent while being adapted to the linguistic and cultural nuances of the SME audience in El Oued, thereby facilitating accurate and meaningful responses. The survey included nine tables for comprehensive data collection: the first six captured respondent and firm

demographics, while the final three assessed the extent of AI adoption, digital marketing capabilities enabled by AI, and firm performance.

Targeting 453 SMEs identified by the CNRC in 2024, systematic sampling and oversampling techniques were employed. Following Krejcie and Morgan (1970), a sample size of 209 was deemed statistically significant for a 95% confidence level with a 5% margin of error. To maximize usable responses, the sample size was increased by 50%, resulting in 314 distributed questionnaires. Systematic sampling (Zikmund et al., 2013) ensured a fair and random selection, with every third SME chosen until 314 questionnaires were sent. The study achieved a significant response rate of 30.89%, with 97 completed returns. This success can be attributed to personal visits and thorough follow-up processes, fostering trust and engagement among respondents. The collected data offers valuable insights into the impact of AI adoption within El Oued's SME landscape.

## Measurement

**Digital Marketing Capabilities (DMCs):** are defined as a comprehensive construct encompassing twelve key elements of modern marketing, such as social media marketing, mobile marketing, content marketing, search engine marketing, web analytics, marketing automation, and email marketing (Homburg & Wielgos, 2022). Additionally, strategic uses of digital marketing for information dissemination, customer relationship building, community management, and fostering customer closeness are included (Giantari et al., 2022). These capabilities are assessed using a 5-point Likert scale from 1 ('much worse') to 5 ('much better'), measuring their performance and evolution over time to provide insights into their impact on market engagement and customer relationships.

**Artificial Intelligence Adoption:** in marketing processes is evaluated using items inspired by Chen et al. (2023) and assessed on a 5-point Likert scale from 'strongly disagree' (1) to 'strongly agree' (5). This evaluation covers dimensions such as Comprehensive AI Integration, Extent of AI Implementation, Transformation of Marketing Processes, AI in Social Media Marketing, Mobile Marketing, Content Marketing, Search Engine Marketing, Web Analytics, Marketing Automation, Email Marketing, Decision Making, AI as a Mainstream Technology, Top Management Acceptance, and AI as Core Technology. This approach measures the degree of AI adoption and its impact on marketing strategies and processes.

## 4. Result

To analyze the data, a two-step process for evaluating and reporting Smart PLS SEM results was employed, following the guidelines of Henseler and Sarstedt (2013). According to the recommendations of various researchers, the goodness-of-fit (GoF) index is not appropriate for model validation, as it fails to distinguish between valid and invalid models (Joseph Hair et al., 2012; Henseler & Sarstedt, 2013). This conclusion was supported by a simulated study utilizing PLS path models (Hair Jr., Hult, Ringle, & Sarstedt, 2016). Consequently, this study adopted a two-step approach for evaluating and reporting PLS-SEM path model results, as recommended by Henseler, Ringle, and Sinkovics (2009).

### 4.1. Measurement Model

In evaluating the measurement model, two primary aspects must be tested: convergent validity and discriminant validity. Convergent validity refers to the extent to which measurements accurately represent the intended latent variable and correlate with other measures of the same latent variable (Hair, Black, Babin, Anderson, & Tatham, 2006). This is assessed using factor loadings, composite reliability (CR), and average variance extracted (AVE). Discriminant validity, on the other hand, measures the degree to which a specific latent construct is distinct from other latent constructs (Duarte & Raposo, 2010). To evaluate discriminant validity, researchers utilize the Fornell-Larcker criterion and item cross-loadings (Hair et al., 2016).

#### 4.1.1. Convergent validity and reliability

Table 1.1 presents the reliability metrics, item loadings, Average Variance Extracted (AVE), and composite reliability for the constructs of Artificial Intelligence adoption (AIDOP) and Digital Marketing Capabilities (DMC). All of the items loaded significantly onto their corresponding constructs with factor loadings larger than 0.6. Except two items from IJV innovativeness (AIDOP 14, AIDOP 1, AIDOP 10, AIDOP 8, AIDOP 5, AIDOP 5, AIDOP 7 and I DMC11, DMC12, DMC1, DMC2, DMC 2, DMC 3, DMC 5, DMC 6, and DMC 7) were dropped due to severe cross-loading and it failed to meet the 0.50 minimum threshold value as recommended by Hair et al.

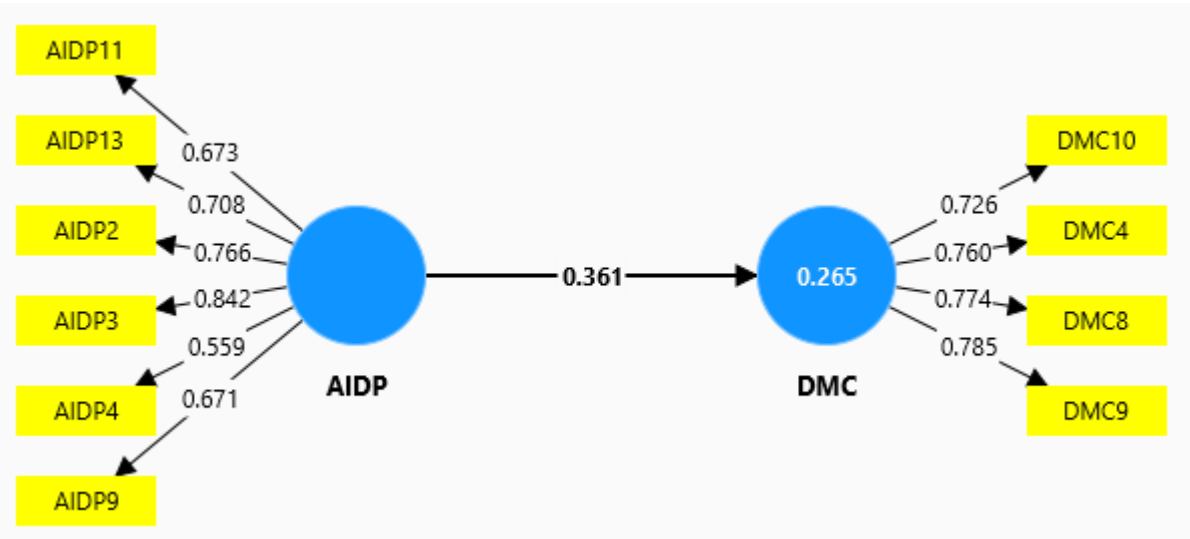
(2016).

For the AIDOP construct, Cronbach's Alpha is 0.802, indicating good internal consistency. The item loadings for AIDOP range from 0.559 to 0.842, with an AVE of 0.502 and a composite reliability of 0.856. These values suggest that the construct has moderate convergent validity and high composite reliability, indicating that the items are well-correlated and consistently represent the construct.

The DMC construct has a Cronbach's Alpha of 0.76, reflecting satisfactory internal consistency. The item loadings for DMC range from 0.726 to 0.785, with an AVE of 0.580 and a composite reliability of 0.847. These values indicate strong convergent validity and high composite reliability, demonstrating that the items are reliable indicators of the digital marketing capabilities construct.

**Table 1: Reliability, Item Loading, AVE, and Composite Reliability**

Construct	Alpha	Items	Loadings	AVE	Composite Reliability
Artificial Intelligence adoption (AIDOP)	0.802	AIDOP 11	0.673	0.502	0.856
		AIDOP 13	0.708		
		AIDOP 2	0.766		
		AIDOP 3	0.842		
		AIDOP 4	0.559		
		AIDOP 9	0.671		
Digital marketing capabilities (DMC)	0.76	DMC 10	0.726	0.580	0.847
		DMC 4	0.760		
		DMC 8	0.774		
		DMC 9	0.785		



**Figure 1: Items loading, f square, and R2 Value**

**4.1.2. Discriminant Validity**

Table 2 presents the discriminant validity metrics for the constructs of Artificial Intelligence adoption (AIDP) and Digital Marketing Capabilities (DMC). Discriminant validity is assessed to ensure that each construct is distinct and measures different concepts.

The diagonal values in the table represent the square root of the Average Variance Extracted (AVE) for each construct. For the AIDP construct, the square root of AVE is 0.709, indicating that the construct explains a significant portion of the

variance in its items. For the DMC construct, the square root of AVE is 0.762, also indicating a substantial portion of variance explained.

The off-diagonal value represents the correlation between the two constructs. The correlation between AIDP and DMC is 0.515, which is lower than the square root of the AVE for both constructs. This demonstrates good discriminant validity, as each construct shares more variance with its own items than with other constructs.

Table 2: Discriminant validity		
	AIDP	DMC
AIDP	0.709	
DMC	0.515	<b>0.762</b>

4.2. Structural Model

4.2.1. R-square, f-square, and Goodness of Fit

Table 3 presents the R-square value for Digital Marketing Capabilities (DMC), which is 0.265. This indicates that approximately 26.5% of the variance in DMC is explained by the predictors in the model, suggesting a moderate level of explanatory power. Table 4 shows the f-square values, which measure the effect size of each predictor construct in explaining the variance of the dependent construct. The f-square value for Artificial Intelligence adoption (AIDP) on DMC is 0.361, indicating a large effect size. This suggests that AIDP has a substantial impact on DMC. There are no f-square values reported for DMC, indicating that DMC is not used as a predictor in the model.

Table 5 presents the Global Criterion of Goodness of Fit (GoF) for the structural model, which combines both the R-square and AVE values to provide an overall measure of the model's fit. The R-square value for DMC is 0.265, while the AVE values are 0.502 for AIDP and 0.580 for DMC. The average R-square value ( $\sum x/n$ ) is 0.265, and the average AVE value ( $\sum x/n$ ) is 0.559. Using these averages, the GoF value is calculated to be 0.378. This GoF value indicates an acceptable fit of the model, demonstrating that the structural model has good explanatory power and captures a significant portion of the variance in the constructs. Overall, the tables indicate that the model has moderate explanatory power, a substantial impact of AIDP on DMC, and a satisfactory overall fit.

Table 3: R-square	
DMC	0.265

Table 4: f-square		
	AIDP	DMC
AIDP		0.361
DMC		

Table 5: Global Criterion of Goodness of Fit (GoF) for Structural Model		
Construct	R Square	AVE
AIDOP		0.502
DMC	0.265	0.580
$\sum x/ n$	<b>0.265</b>	<b>0,559</b>
GOF	<b>0.378</b>	

4.2.2. Path coefficient

The table provides statistical metrics to evaluate the relationship between Artificial Intelligence adoption (AIDP) and Digital Marketing Capabilities (DMC). These metrics include the original sample value, sample mean, standard deviation (STDEV), T statistics, and p values, which are used to test the hypothesis regarding the impact of AIDP on DMC.

The original sample (O) value for the relationship between AIDP and DMC is 0.515. This indicates a strong relationship in the initial sample data. The sample mean (M) value is 0.542, representing the average strength of the relationship across multiple bootstrapped samples, and is slightly higher than the original sample value, suggesting consistency in the relationship. The standard deviation (STDEV) is 0.068, indicating the variability of the relationship strength across the bootstrapped samples. A lower STDEV implies less variability and more stability in the relationship.

The T statistics value, calculated by dividing the original sample value by the standard deviation, is 7.585. This high T value indicates that the relationship between AIDP and DMC is statistically significant. The p value is 0.000, which is below the common significance threshold of 0.05, further indicating that the relationship between AIDP and DMC is statistically significant and highly unlikely to have occurred by chance.

Based on the T statistics and p values, the hypothesis that AIDP significantly impacts DMC is supported. The significant p value confirms the strong relationship between AIDP and DMC. In summary, the table demonstrates that Artificial Intelligence adoption (AIDP) has a significant and positive impact on Digital Marketing Capabilities (DMC), as evidenced by the strong original sample value, high T statistics, and significant p value.

Table 6: Mean, STDEV, T values, p values

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	P values	Hypothesis
AIDP -> DMC	0.515	0.542	0.068	7.585	0.000	Significant

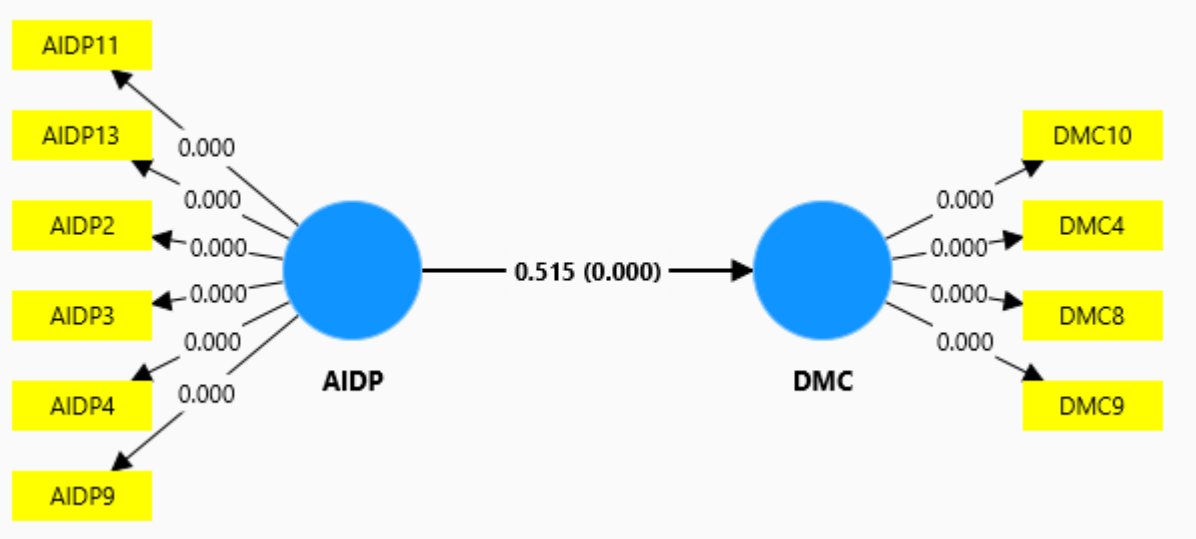


Figure 2: Figure 3.2: PLS Bootstrapping results of the Model

Discussion and Conclusion

The objective of this research is to examine the profound effects that the incorporation of Artificial Intelligence (AI) and digital marketing have on the service sector of small and medium-sized enterprises (SMEs) located in El Oued, Algeria. The utilization of digital tools, social media, and online platforms to advertise and endorse products, services, and brands has brought about a significant transformation in the way businesses engage with consumers. Digital marketing offers small and medium-sized enterprises (SMEs), especially in developing nations like Algeria, an economically viable approach to expand their reach, contend with larger corporations, and foster consumer loyalty. Small and medium-sized enterprises

(SMEs) that wish to expand their market presence and stimulate growth have found digital marketing indispensable due to its capacity to analyze consumer behavior, target particular demographics, and measure campaign success in real-time.

Artificial intelligence (AI) has had a profound impact on digital marketing since 2023. It has empowered businesses to acquire more profound understandings of consumer behavior and to deliver personalized digital messages with greater efficacy. As a result of the proliferation of big data and advancements in computational capacity, the incorporation of AI into business processes has become essential. Notwithstanding the extensive implementation of digital marketing, a significant dearth of empirical research exists concerning the precise ramifications of artificial intelligence (AI) on digital marketing capabilities, particularly in developing nations such as Algeria. This research paper fills this void by conducting an exhaustive examination of the effects that artificial intelligence has on the digital marketing capacities of Algerian service sector SMEs.

Consistent with the findings, the implementation of AI substantially improves digital marketing capabilities. The aforementioned functionalities comprise social media marketing, content marketing, email marketing, and web analytics. These capabilities are critical for engaging with consumers and partners in an efficient manner. By enhancing data analysis, personalization, and automation, AI revolutionizes these capabilities and consequently affects marketing strategies. Nevertheless, the integration of AI gives rise to ethical considerations, specifically with respect to its impact on susceptible consumers. Mitigating potential adverse effects necessitates the delicate equilibrium between ethical considerations, human supervision, and technological progress.

By considering these facets, this research offers a comprehensive comprehension of the way in which AI can augment the capabilities of digital marketing. The empirical findings provide significant contributions to the fields of academia and practice. This research makes an academic contribution to the current corpus of knowledge by providing a comprehensive analysis of the ways in which artificial intelligence (AI) transforms digital marketing strategies. Practically speaking, the findings provide policymakers and enterprises with actionable insights. AI can be strategically integrated by businesses to improve their marketing efforts, while policymakers have the ability to establish conducive frameworks that encourage AI-powered marketing. Moreover, the research emphasizes the favorable societal ramifications of incorporating AI into marketing strategies, including work creation and economic growth, thereby highlighting the more extensive advantages of incorporating AI.

To sum up, this research offers substantial support for the notion that the implementation of AI substantially improves the digital marketing capacities of small and medium-sized enterprises (SMEs) operating in the service sector of El Oued, Algeria. This development facilitates enhanced audience engagement for businesses, thereby generating value and stimulating expansion. Policymakers, including the Algerian National Agency for Investment Development and the Algerian Ministry of Industry and Mines, as well as managers across diverse industries, will find the results significant. For the development of policies and entrepreneurship programs that increase the learning capacity and competitive advantage of SMEs, these insights are indispensable. Additional research is warranted to investigate the correlation between the adoption of artificial intelligence and the capabilities of digital marketing. This study provides a comprehensive comprehension that can inform the successful transmission of knowledge and the integration of AI into operational business procedures.

### **Limitation and direction for future studies**

Several limitations of this investigation merit careful consideration. Initially, as a result of financial and schedule limitations, this study exclusively utilized cross-sectional data. For further investigation into the temporal evolution of the proposed relationships, it is advisable to employ a longitudinal design. To address this constraint, employing a longitudinal methodology would enable the examination of the ever-changing landscape of AI implementation and its effects on the digital marketing capacities of small and medium-sized enterprises (SMEs).

Furthermore, this research was carried out in the Algerian province of El Oued, which is classified as a developing nation due to its unique characteristics encompassing market magnitude, economic development, political systems, and cultural heritage. Due to this, caution should be exercised when extrapolating the findings of this study to different nations. Further investigation in this area ought to incorporate small and medium-sized enterprises (SMEs) from diverse regions and countries in order to augment the applicability of the results. An examination of Algeria in comparison to other developing nations would yield significant knowledge regarding the contextual elements that impact the implementation of artificial intelligence and the capabilities of digital marketing.

Furthermore, the research primarily examined small and medium-sized enterprises (SMEs) operating in the service sector, potentially restricting the generalizability of the results to SMEs operating in manufacturing or agriculture. Further research should incorporate a wider array of sectors in order to attain a more holistic comprehension of the ways in which AI influences the capabilities of digital marketing in various industries. This would aid in the identification of opportunities and challenges sector-specific to the adoption of AI.

Moreover, the dependence on data provided by SMEs themselves raises possible concerns regarding biases, including social desirability or erroneous self-evaluation. Supplementing survey data with qualitative methodologies, such as in-depth interviews or case studies, could enhance the understanding of the experiences and perspectives of small and medium-sized enterprise (SME) owners and managers. By utilising a mixed-methods approach, the potential drawbacks of self-reported data may be alleviated, and a more comprehensive comprehension of the phenomena being investigated may result.

Although the main emphasis of this study is on the favorable outcomes associated with the implementation of AI in digital marketing, it fails to thoroughly investigate potential adverse ramifications, including the displacement of jobs or ethical concerns pertaining to AI utilization. Further investigation is warranted to thoroughly examine these potential adverse consequences, encompassing ethical implications, data privacy concerns, and employment ramifications. An examination of these facets may contribute to a more impartial assessment of the implementation of AI and facilitate the development of approaches to alleviate any negative consequences.

Finally, future research should explore the potential of AI in analysing customer communications and information, such as social media posts, to inform the development of future communications strategies aimed at enhancing customer engagement. Additionally, incorporating a broader range of critical business performance metrics beyond customer engagement, such as enterprise resilience and sustainability, social and environmental impacts, risk management, and the interests of key stakeholders, would provide a more comprehensive assessment of AI's overall impact on business performance. This expanded approach would offer a more holistic perspective on AI's role in business success.

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