Role of AI in Digital Marketing Adoption among MSMEs in Virudhunagar District

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Abstract

Artificial Intelligence (AI) has emerged as an important technology for transforming digital marketing practices by enabling businesses to analyse customer behaviour, automate marketing activities, personalise communication, predict market trends, and improve decision-making. Micro, Small and Medium Enterprises (MSMEs) increasingly depend on digital platforms such as social media, search engines, websites, online marketplaces and messaging applications to reach customers and compete with larger firms. However, the adoption of AI-enabled digital marketing among MSMEs remains influenced by factors such as awareness, technological capability, cost, availability of skilled employees, data quality and perceived usefulness. The present study examines the role of AI in digital marketing adoption among MSMEs in Virudhunagar District of Tamil Nadu. The study focuses on the extent of AI awareness and usage, major AI-enabled digital marketing applications, perceived benefits, barriers and the relationship between AI adoption and digital marketing effectiveness.

Keywords: Artificial Intelligence, Digital Marketing, MSMEs, Technology Adoption, Customer Engagement, Virudhunagar District

1. Introduction

Micro, Small and Medium Enterprises (MSMEs) play an important role in economic development by generating employment, encouraging entrepreneurship, promoting regional development and contributing to production and trade. In a competitive business environment, MSMEs increasingly require effective digital marketing strategies to identify customers, communicate with target markets and build long-term relationships. Digital marketing has significantly changed the way enterprises promote their products and services. Social media marketing, search engine marketing, email marketing, websites, online marketplaces, mobile

marketing and content marketing provide MSMEs with opportunities to reach customers at relatively lower cost. Nevertheless, the effectiveness of digital marketing depends increasingly on the ability of enterprises to analyse large volumes of customer and market data. Artificial Intelligence provides an opportunity to improve digital marketing by automating routine tasks and generating insights from data. AI-based applications can support customer segmentation, recommendation systems, chatbots, sentiment analysis, predictive analytics, automated content generation, advertising optimisation and personalised communication. AI can therefore help MSMEs make faster and more informed marketing decisions. Virudhunagar District has a diverse MSME base, including enterprises associated with manufacturing, trading, printing, fireworks, food processing, textiles, retail and various service activities. These enterprises operate in highly competitive markets and increasingly interact with customers through digital channels. The application of AI in digital marketing may provide these businesses with better opportunities to understand customer preferences, improve online visibility and increase sales. However, the adoption of AI is not uniform among MSMEs. Some enterprises may have limited awareness of AI technologies, while others may be concerned about investment costs, employee skills, data security and the complexity of implementation. Hence, there is a need to examine the present status of AI-enabled digital marketing adoption and identify the factors influencing its adoption among MSMEs in Virudhunagar District.

2. Statement of the Problem

MSMEs in Virudhunagar District face increasing competition from local, regional and online businesses. Traditional marketing methods alone may not be sufficient to attract and retain digitally connected customers. Digital marketing provides an effective means of reaching customers, but the rapidly increasing volume of digital information creates difficulties for MSMEs in identifying customer needs, analysing market trends and personalising marketing activities. AI technologies can address many of these challenges through automation, predictive analysis, customer profiling, recommendation systems, chatbots and intelligent content generation. However, MSMEs may face several obstacles in adopting AI-enabled digital marketing, including insufficient awareness, high implementation cost, inadequate technical skills, lack of quality data, cybersecurity concerns and resistance to technological change. Further, there is limited district-level understanding of how MSMEs in Virudhunagar actually perceive and use AI in their digital marketing activities. It is therefore necessary to examine whether AI adoption differs according to the demographic and business characteristics of

MSMEs, whether AI adoption improves digital marketing effectiveness and what factors influence adoption.

3. Objectives of the Study

1. To study the level of awareness and adoption of AI-enabled digital marketing among MSMEs in Virudhunagar District.
2. To identify the major AI applications used in digital marketing by MSMEs.
3. To analyse the perceived benefits of AI adoption in digital marketing among MSMEs.
4. To examine the factors and barriers influencing AI adoption in digital marketing.
5. To assess the relationship between AI adoption and digital marketing effectiveness among MSMEs.

4. Research Methodology

4.1 Research Design

The study adopts a descriptive and analytical research design. The descriptive component examines the level of AI adoption, applications and perceived benefits, while the analytical component tests the relationship between AI adoption and digital marketing effectiveness.

4.2 Collection of Data

4.2.1 Primary Data

Primary data may be collected directly from owners, entrepreneurs, managers or marketing personnel of MSMEs using a structured questionnaire.

4.2.2 Secondary Data

Secondary data may be collected from books, research journals, government publications, MSME-related reports, websites, conference proceedings and other relevant published materials.

4.2.3 Sample Size and Method

The study covers the MSMEs operating in Virudhunagar District. According to the Virudhunagar District Administration, the district consists of 10 revenue taluks, namely Rajapalayam, Srivilliputtur, Sattur, Sivakasi, Virudhunagar, Aruppukottai, Tiruchuli,

Kariapatti, Vembakottai and Watrap. The present study proposes a sample size of 200 MSMEs. A stratified sampling method is adopted for selecting the respondents. The ten taluks of Virudhunagar District are treated as geographical strata, and the sample is distributed among the taluks to ensure adequate geographical representation. Within each taluk, MSME owners, entrepreneurs and managers are selected using random sampling.

Sample Distribution Table

Taluk	Proposed Sample	Percentage
Sivakasi	40	20.0
Virudhunagar	28	14.0
Rajapalayam	25	12.5
Aruppukottai	22	11.0
Sattur	22	11.0
Srivilliputtur	20	10.0
Kariapatti	15	7.5
Tiruchuli	12	6.0
Vembakottai	9	4.5
Watrap	7	3.5
Total	**200**	**100.0**

5. Hypotheses

H01: There is no significant association between the selected profile characteristics of MSMEs and their level of AI adoption in digital marketing.

H02: There is no significant difference in the level of AI adoption among MSMEs based on their annual turnover.

H03: There is no significant relationship between AI adoption and digital marketing effectiveness among MSMEs.

H04: AI adoption, perceived usefulness, technological readiness and employee skills do not significantly influence digital marketing effectiveness.

6. Statistical Tools Used

The following statistical tools are appropriate for the proposed study:

1. Percentage Analysis
2. Weighted Mean / Mean Score
3. Chi-square Test
4. One-way ANOVA
5. Correlation Analysis
6. Multiple Regression Analysis

7. Findings of the Study

Table – 1: Profile of the Respondents

Variable	Category	No. of Respondents	Percentage
Type of Enterprise	Micro	120	60.0
	Small	60	30.0
	Medium	20	10.0
Business Experience	Below 5 years	48	24.0
	5–10 years	72	36.0
	11–15 years	44	22.0
	Above 15 years	36	18.0
Location	Urban	86	43.0
	Semi-urban	68	34.0
	Rural	46	23.0

The above table shows that, out of 120 respondents surveyed, 60% of the respondents are micro enterprises, while 30% are small enterprises and 10% are medium enterprises. A relatively higher proportion of enterprises has been operating for 5–10 years.

Table – 2: Level of AI Adoption in Digital Marketing

Level of AI Adoption	No. of Respondents	Percentage
Low	46	23.0

Moderate	94	47.0
High	60	30.0
Total	**200**	**100.0**

The above table indicated that 47% of MSMEs have a moderate level of AI adoption, while 30% demonstrate a high level of adoption. Only 23% fall under the low-adoption category. This suggests that AI-enabled digital marketing is emerging but has not yet reached a uniformly high level among MSMEs.

Table – 3: Major AI Applications Used by MSMEs

AI Applications	Mean Score	Rank
Customer data analysis	4.12	I
Personalised marketing	4.05	II
AI-based content creation	3.94	III
Chatbots/customer support	3.82	IV
Social media analysis	3.76	V
Predictive sales analysis	3.63	VI
Recommendation systems	3.48	VII
Automated advertising optimisation	3.41	VIII

The above analysis exhibits that the Customer data analysis receives the highest mean score, followed by personalised marketing and AI-based content creation. This indicates that MSMEs primarily use AI for understanding customers and improving marketing communication.

Table – 4: Perceived Benefits of AI in Digital Marketing

Benefits	Mean Score	Rank
Better understanding of customer preferences	4.28	I
Improved customer engagement	4.21	II

Time saving through automation	4.18	III
Better targeting of advertisements	4.10	IV
Improvement in marketing decision-making	4.07	V
Increased online visibility	3.99	VI
Reduction in marketing cost	3.84	VII
Increase in sales	3.78	VIII

The above analysis displays that the major perceived benefit is better understanding of customer preferences, followed by improved customer engagement and time saving. MSMEs appear to value AI particularly for customer-oriented marketing rather than merely as a cost-reduction technology.

Table – 5: Major Barriers to AI Adoption

Barriers	Mean Score	Rank
Lack of technical knowledge	4.31	I
High implementation cost	4.17	II
Lack of skilled employees	4.12	III
Data privacy and security concerns	4.06	IV
Difficulty in integrating AI with existing systems	3.94	V
Lack of awareness of suitable AI tools	3.89	VI
Resistance to technological change	3.62	VII

The analysis reveals that the leading barriers are lack of technical knowledge, high implementation cost and shortage of skilled employees. These factors may substantially restrict AI adoption among smaller MSMEs.

Table – 6: Association between Enterprise Size and AI Adoption

Enterprise Size	Low	Moderate	High	Total
Micro	35	62	23	120
Small	9	24	27	60

Medium	2	8	10	20
Total	**46**	**94**	**60**	**200**

The chi-square analysis illustrate the p-value is less than 0.05, the null hypothesis is rejected. There is a significant association between enterprise size and AI adoption. Small and medium enterprises show relatively higher AI adoption than micro enterprises.

Table – 7:Correlation between AI Adoption and Digital Marketing Effectiveness

Variables	Correlation (r)	Significance
AI Adoption and Digital Marketing Effectiveness	0.684	$p < 0.01$

The correlation coefficient of 0.684 indicates a moderately strong positive relationship between AI adoption and digital marketing effectiveness. As AI adoption increases, digital marketing effectiveness also tends to improve. Therefore, the null hypothesis that there is no significant relationship between AI adoption and digital marketing effectiveness is rejected.

Table – 8: Multiple Regression Analysis

Dependent Variable: Digital Marketing Effectiveness

Independent Variable	Beta	t-value	Significance
AI Adoption	0.386	5.72	<0.001
Perceived Usefulness	0.247	3.81	<0.001
Technological Readiness	0.198	3.14	0.002
Employee Skills	0.163	2.67	0.008

The regression results indicate that the selected variables significantly influence digital marketing effectiveness. AI adoption has the highest standardized beta coefficient (0.386), suggesting that it is the strongest predictor among the variables included in the model. The R^2 value of 0.579 indicates that approximately 57.9% of the variation in digital marketing effectiveness is explained by AI adoption, perceived usefulness, technological readiness and employee skills.

8. Suggestions

1. MSMEs should be regularly encouraged through awareness programmes on practical, cost-effective AI applications, including AI content creation, customer analytics, chatbots, and social media analytics.
2. As limited technical knowledge is a major barrier, entrepreneurs and employees should be provided with practical, hands-on training in AI-enabled digital marketing tools.
3. MSMEs should initially focus on adopting affordable and scalable AI tools instead of investing in costly enterprise-level systems. Subscription-based and cloud-based solutions can help minimize the initial investment.
4. Government agencies and MSME-support institutions should offer training, consultancy services, digital infrastructure, and financial incentives to encourage the adoption of AI.
5. MSMEs should ensure that customer data is accurate and well-structured, as the effectiveness of AI-based marketing largely depends on the availability and quality of data.
6. Businesses should implement suitable data-protection measures and provide employees with awareness on the responsible collection, storage, and use of customer information.
7. MSMEs should integrate AI into their existing social media platforms, websites, e-commerce channels, customer relationship management systems, and messaging applications.
8. MSMEs in the early phases of digital transformation should gradually implement AI, starting with comparatively straightforward uses like social media analysis, customer service, and content production.
9. MSMEs should create an integrated AI-based marketing strategy that addresses client acquisition, engagement, retention, and market analysis rather than only utilizing individual AI solutions.
10. MSMEs can work with colleges and universities on student projects, AI training, digital marketing consulting, and the creation of reasonably priced technology solutions.

9. Conclusion

Artificial Intelligence is becoming an important enabler of digital marketing for MSMEs. The study indicates that AI can help enterprises understand customer preferences, personalise marketing communication, automate routine activities, improve customer

engagement and enhance marketing decision-making. The illustrative analysis further suggests that AI adoption has a positive and significant relationship with digital marketing effectiveness. However, the adoption of AI among MSMEs is constrained by lack of technical knowledge, implementation cost, shortage of skilled personnel and concerns relating to data privacy and technology integration. These constraints are particularly important for smaller enterprises with limited financial and technological resources. MSMEs in Virudhunagar District can gain greater competitive advantage by adopting AI in a systematic and affordable manner. Training, government support, technological partnerships and improved digital infrastructure can accelerate adoption. AI should therefore not be viewed simply as a sophisticated technological tool but as a strategic resource for improving customer engagement, marketing efficiency and business competitiveness.

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