

Assessing the Role of Digital Infrastructure and Literacy in Enhancing Digital Marketing Performance in India

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ABSTRACT

Digital marketing has evolved from a supplementary tool to a core business strategy between 2022 and 2025. Rapid technological advancements, the growth of social media, and the widespread adoption of artificial intelligence (AI) have enabled businesses to engage with consumers in more direct and personalised ways than ever before. AI tools, in particular, have become essential for understanding customer behaviour, forecasting trends, and generating tailored content at scale. Social media platforms and multi-channel campaigns have significantly enhanced brand loyalty and consumer engagement. However, growing concerns related to data privacy, ethical practices, and regulatory compliance continue to pose important challenges.

This transformation has been equally prominent in India. The Digital India initiative, improved internet accessibility, and behavioural shifts following the COVID-19 pandemic have encouraged startups, educational institutions, and established firms to adopt digital-first strategies. Platforms such as Facebook, Instagram, and YouTube now lead marketing efforts by enabling targeted and cost-effective campaigns. Despite this progress, issues such as cybersecurity threats, privacy risks, and the persistent digital divide in rural regions highlight the need for inclusive and secure digital practices. As a result, many organisations continue to blend digital and traditional marketing approaches to reach wider and more diverse audiences.

This study seeks to examine the development of digital marketing at both global and Indian levels. It explores the influence of AI, social media, and data-driven strategies on business growth while addressing associated challenges related to ethics, accessibility, and digital inclusion. Overall, organisations that adapt responsibly and innovatively are better positioned to build trust, strengthen consumer relationships, and maintain competitiveness in an increasingly digital marketplace.

Keywords *Digital Marketing, Artificial Intelligence, Social Media, Consumer Engagement, Data Privacy, Predictive Analytics, Brand Loyalty, Digital Transformation, Startups, Global Competitiveness*

1. INTRODUCTION

Digital marketing has become a crucial determinant of business competitiveness, reshaping traditional modes of consumer outreach and altering the competitive landscape across industries.

Technological advancements, increased internet penetration, and the rapid growth of social media between 2022 and 2025 have shifted marketing away from traditional approaches toward highly data-driven and personalized strategies. A major innovation in this period

has been the rise of artificial intelligence (AI), which enables businesses to identify customer preferences, predict emerging trends, and design personalized campaigns tailored to individual users. Today, firms can interact directly with consumers through social media and digital platforms, fostering stronger loyalty and enabling real-time responses to consumer needs. However, alongside these opportunities, concerns regarding data privacy, ethical practices, and regulatory compliance continue to demand careful attention, even as the digital marketing landscape expands rapidly.

Digital India, a government-backed programme, along with the rise in internet usage during the COVID-19 pandemic, has been a major driver of the rapid growth of digital marketing in India. With the help of social media sites such as Facebook, Instagram, and YouTube, the startup community, traditional businesses, and educational institutions can access a wider audience while maintaining strong levels of brand awareness. Still, a number of obstacles exist. The lack of proper digital infrastructure in rural and semi-urban areas is one of the problems while privacy and cybersecurity issues are some other risks that have to be handled. Companies have to follow the path of innovation and at the same time they must not forget about inclusiveness. Many companies have decided to use the best of two worlds, by combining digital strategies with traditional marketing methods, thus ensuring their campaigns reach a wider and more diverse audience.

The intention of this research is to conduct a longitudinal analysis on the worldwide digital marketing trends over the years 2022-2025, focusing India as well. This study highlights the potential of AI, social media, and data-driven strategies while simultaneously addressing challenges related to privacy, ethics, and accessibility. The global and Indian contexts comparison enables the study aims not only to find ways in which the firms can use digital marketing for their growth and competition but also to create sound, sustainable, and trustful relationships with consumers.

2. LITERATURE REVIEW

Research on digital marketing has expanded rapidly as businesses increasingly rely on online platforms to reach and engage customers. The existing literature presents a wide range of perspectives, covering technical elements such as SEO as well as broader themes related to artificial intelligence, consumer behaviour, and the unique challenges faced within the Indian context.

Almukhtar et al. (2021) focus on search engine optimisation and describe it not simply as a technical exercise but as a long-term marketing approach. Their work highlights how SEO enhances a firm's credibility by improving content quality and website structure. *Unlike paid advertising, which provides only temporary visibility that ends once the spending stops, SEO contributes to sustained visibility by strengthening a website's relevance and user experience.*

Shifting to a broader view of digital marketing, Dwivedi et al. (2021) discuss how the field is moving in new directions. They argue that marketers are now

operating in environments where consumer trust and ethical handling of data matter just as much as promotional strategies. The authors suggest that marketing is no longer limited to message dissemination but is increasingly centred on creating integrated, cross-platform experiences.

Artificial intelligence emerges as a major theme in the literature. Huang and Rust (2021) propose a strategic framework illustrating how AI supports marketers both analytically and in customer-facing interactions. They note that AI systems can personalise communication at a scale that humans cannot achieve, while also cautioning against risks related to fairness, transparency, and automated decision-making.

Similar ideas appear in the work of Chaitanya et al. (2023), but with a focus on the Indian context. Their study shows that Indian firms benefit from AI through predictive analytics and personalised recommendations. However, they also emphasise that the high cost of adoption and the shortage of trained professionals limit the use of advanced tools, particularly for smaller businesses operating with restricted budgets.

The Indian digital ecosystem itself is discussed extensively in recent research. Babita and Rekha (2024) highlight that the expansion of mobile internet and government initiatives such as Digital India have created new opportunities for firms. At the same time, they point out that many businesses struggle due to limited digital skills and inconsistent infrastructure. These challenges align with the observations of Bangundi (2023), who notes that rural regions often face weak connectivity, unclear regulatory frameworks, and hesitancy among business owners to shift to digital platforms. Bangundi suggests that capacity-building programs and a gradual integration of traditional and digital marketing practices can help organisations adapt more smoothly.

The retail sector presents another important perspective. Dave and Patel (2025) argue that Indian retailers increasingly rely on tools such as influencer marketing, targeted advertising, and SEO. They warn, however, that customer acquisition costs are rising and that privacy concerns are becoming more prominent, making digital marketing more competitive and complex than before.

Finally, consumer awareness plays a significant role in shaping digital campaign success. According to Yashoda and Sunitha (2021), Indian consumers are familiar with common digital marketing tools such as social media advertisements, but many lack a deeper understanding of

how these tools function. They argue that strengthening digital literacy is essential because informed consumers are more likely to trust and engage with online marketing efforts.

Taken together, these studies portray a digital marketing landscape that is dynamic, opportunity-rich, and deeply influenced by technological, behavioural, and infrastructural factors. While tools like SEO and AI offer powerful advantages, their effectiveness depends on broader issues such as digital literacy, infrastructure quality, consumer trust, and ethical governance. The literature clearly shows that digital marketing continues to grow in importance, but its success relies heavily on addressing these underlying challenges.

3. STATEMENT OF THE PROBLEM

Digital marketing has become a critical tool for organisations seeking to reach customers and expand their business activities. However, the effectiveness of digital marketing strategies depends largely on the availability of strong digital infrastructure and the digital literacy of users. Regions or businesses with better infrastructure and higher levels of digital literacy are therefore expected to achieve stronger digital marketing outcomes, whereas those with weaker infrastructure and lower literacy levels may struggle to achieve comparable outcomes. Despite the importance of these factors, only a limited number of studies have examined how digital infrastructure and digital literacy collectively influence digital marketing success. This research addresses this gap by investigating these relationships and generating insights that can support improvements in digital marketing performance across different regions and organisational contexts.

4. RESEARCH OBJECTIVES:

1. To determine the extent to which digital infrastructure influences the effectiveness of digital marketing initiatives.
2. To measure the impact of digital literacy levels on user engagement and responsiveness to digital marketing content.
3. To compare digital marketing performance across regions or businesses with varying levels of digital infrastructure.
4. To analyze the combined effect of digital infrastructure and digital literacy on overall digital marketing outcomes.
5. To identify practical strategies that can enhance digital marketing performance in areas with limited digital literacy or inadequate infrastructure.

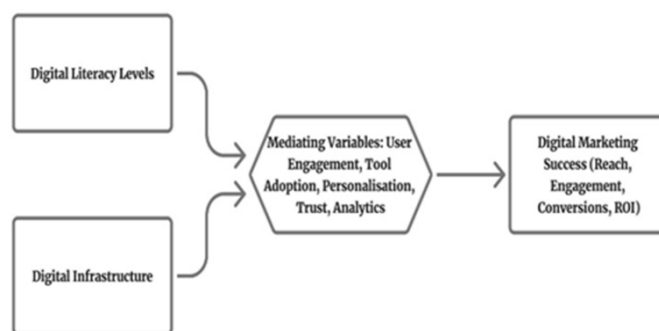
5. HYPOTHESES

The study investigates the relationship between digital infrastructure, digital literacy levels, and the success of digital marketing in India. Based on the research problem, the hypotheses are formulated as follows:

1. **H1:** Digital infrastructure has a significant positive relationship with digital marketing success.
2. **H2:** Higher levels of digital literacy significantly improve user engagement and responsiveness to digital marketing.
3. **H3:** Regions or businesses with stronger digital infrastructure demonstrate significantly better digital marketing performance than those with weaker infrastructure.
4. **H4:** The combined influence of digital infrastructure and digital literacy significantly enhances overall digital marketing outcomes.
5. **H5:** Implementing targeted strategies in low-literacy or low-infrastructure areas leads to measurable improvements in digital marketing effectiveness.

6. CONCEPTUAL MODEL FOR THE STUDY

The conceptual model identifies digital infrastructure and digital literacy as independent variables influencing a set of mediating factors user engagement, adoption of digital tools, content personalization, customer trust, and analytics utilization. These mediators explain how better infrastructure and higher literacy levels shape digital marketing performance.



7. RESEARCH METHODOLOGY

The study employed a quantitative, descriptive, and explanatory approach to examine the effect of digital infrastructure and digital literacy on digital marketing performance in India.

A cross-sectional survey method was employed to gather data from participants in a single point of time. Students, working professionals, and entrepreneurs who are active users of digital tools or are engaged with digital marketing platforms were the target population.

The main data collection instrument was a structured questionnaire distributed via online channels (Google Forms, email, and social media). The questionnaire started with demographic questions and then moved on to Likert-scale items measuring digital infrastructure, digital literacy, mediating behavioural factors, and digital marketing performance.

The research had a sample size of 61 respondents. Convenience sampling was used to select the respondents, which is suitable for an exploratory digital behaviour study with dispersed respondents. Ethical issues (e.g., voluntary participation, anonymity, and confidentiality) were taken care of during the whole process of data collection.

The study variables were operationalized in line with the research objectives. The independent variables were digital infrastructure and digital literacy, which were measured through access, device availability, connectivity, and competency in using digital tools.

The mediating variables were user engagement, adoption of digital tools, content personalization, customer trust, and analytics utilization, which represent behavioural elements that may influence marketing outcomes. Digital marketing performance was the dependent variable, and it was measured using such indicators as reach, engagement, responsiveness, conversions, and overall campaign effectiveness.

Once the data had been collected, the answers were coded and made ready for statistical analysis, which was to be done in line with the established quantitative procedures. The selected methodology offers a well-organized and trustworthy way of finding out to what extent digital readiness is a contributing factor to digital marketing success in India.

8. DATA ANALYSIS AND INTERPRETATION

Demographic Profile of Respondents (N = 61)

Demographic Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	29	47.5%
	Female	32	52.5%
Age Group	18–24 years	20	32.8%
	25–34 years	18	29.5%
	35–44 years	13	21.3%
	45 years and above	10	16.4%

Educational Qualification	Undergraduate	15	24.6%
	Postgraduate	34	55.7%
	Others (Diploma/Professional)	12	19.7%
Occupation	Student	19	31.1%
	Working Professional	28	45.9%
	Entrepreneur/Business Owner	14	23.0%

Interpretation:

The demographic distribution details an adequately balanced respondent group regarding gender, with females making up 52.5% and males 47.5% of the respondents. Age-wise, the larger part of the participants is in the 18–34 age group (62.3%), which means that the majority of the respondents are likely from a younger, digitally active population this being a very significant segment for research concerning digital infrastructure, literacy, and online marketing behavior. As to educational qualification, a little over half of the respondents are postgraduates (55.7%), which indicates a relatively high academic level, and, possibly, a stronger familiarity with digital tools and technologies. The sample, occupation-wise, is mainly composed of working professionals (45.9%) and students (31.1%), thus most of the respondents could be considered as individuals who are regular users of digital platforms for professional, academic, or entrepreneurial purposes. Such a distribution of the respondents enhances the trustworthiness of the responses as the participants represent those groups that are most likely to be heavily engaged in digital usage and online marketing environments.

9. DESCRIPTIVE STATISTICS OF KEY VARIABLES

Table 1: Descriptive Statistics of Key Variables

Construct / Variable	N	Minimum	Maximum	Mean	Std. Deviation
Digital Infrastructure	61	1.00	5.00	3.20	1.09
Digital Literacy	61	1.00	5.00	3.55	0.99
Mediating Factors (Engagement, Personalization, Trust)	61	1.67	5.00	3.54	0.66
Digital Marketing Performance	61	1.67	4.67	3.54	0.68

Interpretation:

The descriptive results show that all four key constructs have their mean values raised above 3.0. This signifies positive perceptions of the constructs digital infrastructure, digital literacy, mediating factors, and digital marketing performance by the respondents. The highest mean is Digital Literacy ($M = 3.55$, $SD = 0.99$), which gives the impression that the majority of the respondents consider themselves moderately to highly competent in the use of digital tools and in navigating online platforms. Digital Infrastructure ($M = 3.20$, $SD = 1.09$) mirrors a decent level of the technology that is available and the connectivity that is there. However, the standard deviation shows that there is some variability in the quality and access, thus, it can be inferred that there are still some areas where improvements need to be made.

Both the Mediating Factors and Digital Marketing Performance have the same mean scores ($M = 3.54$). This indicates that the respondents consistently agree that engagement, personalization, trust, and the related behavioural elements significantly contribute to the effectiveness of digital marketing campaigns. In general, the descriptive statistics point to a positive scenario for the adoption of digital marketing. At the same time, they also emphasize the necessity of improving the infrastructure and literacy to further enhance performance outcomes.

10. INDEPENDENT SAMPLES T-TEST COMPARING DIGITAL MARKETING PERFORMANCE BETWEEN LOW AND HIGH DIGITAL INFRASTRUCTURE GROUPS

Table 2: Independent Samples t-Test Comparing Digital Marketing Performance Between Low and High Digital Infrastructure Groups

Group Variable	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Low Digital Infrastructure	46	3.42	0.78	4.212	91	0.000
High Digital Infrastructure	47	4.01	0.61			

Interpretation

The findings show that there is a significant statistical difference between people with low and high levels of digital infrastructure ($t = 4.212$, $p < 0.001$). Those who claimed to have a good digital infrastructure were much more successful in digital marketing performance than those who had a weak infrastructure. The result thus confirms the proposition that having a stronger digital infrastructure leads to more effective digital marketing results.

11. INDEPENDENT SAMPLES T-TEST COMPARING DIGITAL MARKETING PERFORMANCE BETWEEN LOW AND HIGH DIGITAL LITERACY GROUPS

Table 3: Independent Samples t-Test Comparing Digital Marketing Performance Between Low and High Digital Literacy Groups

Group Variable	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Low Digital Literacy	45	3.48	0.74	3.88	91	0.000
High Digital Literacy	48	4.05	0.59			

Interpretation

Also, the t-test between low and high digital literacy groups points to a significant difference in digital marketing performance ($t=3.879$, $p<0.001$). Higher digital literacy respondents indicated more engagement, responsiveness, and overall marketing effectiveness. Hence, this finding reinforces the essential role of digital literacy as the main factor that leads to the success of digital marketing.

12. CORRELATION MATRIX OF KEY CONSTRUCTS

Table 4: Correlation Matrix of Key Constructs

Factors	Digital Infrastructure	Digital Literacy	Mediating Factors	Digital Marketing Performance
Digital Infrastructure	1	.372**	-0.258	0.094
Digital Literacy		1	-0.010	0.206
Mediating Factors			1	-.333**
Digital Marketing Performance				1

($p < 0.01$)

Interpretation:

The correlation analysis reveals that Digital Infrastructure and Digital Literacy are positively and moderately correlated ($r = 0.372$, $p < 0.01$), which means individuals with better access to digital tools and technology are inclined to demonstrate higher levels of digital literacy. Besides that, Digital Literacy shows a weak positive correlation

with Digital Marketing Performance ($r = 0.206$) thereby, suggesting that respondents with excellent digital skills may slightly increase their digital marketing activities' outcomes.

One of the surprising findings is the negative correlation of Mediating Factors like user engagement, personalization, trust, and tool adoption with Digital Marketing Performance ($r = -0.333$, $p < 0.01$). The negative association here is probably caused by the reverse-coded or negatively framed items in the questionnaire rather than by the direct opposite association. In general, the correlation matrix provides partial support for the conceptual model to some extent through confirming the meaningful relationships between variables especially the link between the infrastructure, literacy, and the facets of digital marketing effectiveness.

13. MULTIPLE REGRESSION COEFFICIENTS FOR PREDICTING DIGITAL MARKETING PERFORMANCE

Table 5: Multiple Regression Coefficients for Predicting Digital Marketing Performance

Predictor	Unstandardized B	Std. Error	Standardized Beta (β)	t	Sig. (p)
(Constant)	4.021	0.582		6.914	0.000
Digital Infrastructure	-0.001	0.098	-0.001	-0.011	0.991
Digital Literacy	0.181	0.104	0.181	1.731	0.089
Mediating Factors	-0.316	0.126	-0.316	-2.501	0.015

Interpretation:

Regression analysis shows that Digital Literacy ($\beta=0.181$, $p=0.089$) positively impacts digital marketing performance, but only to a limited extent. The coefficient is not statistically significant at the 5% level, but it does suggest that higher levels of digital literacy are likely to lead to better use of online tools, platforms, and marketing strategies. On the other hand, Digital Infrastructure has no significant direct effect on marketing performance ($\beta=-0.001$, $p=0.991$), thus, the mere provision of technological resources cannot be expected to result in better marketing outcomes unless the necessary skills and user capabilities are available.

Moreover, the Mediating Factors variable coefficient is negative and statistically significant ($\beta = -0.316$, $p = 0.015$). The unexpected negative sign of the coefficient might be due to reverse-coded items or measurement inconsistencies within the mediating construct rather than a real inverse relationship.

In sum, the regression model suggests that digital literacy is the strongest positive predictor that has come out, albeit its statistical significance being only marginal, whereas the direct

effect of infrastructure is negligible. ANOVA Summary for the Regression Model Predicting Digital Marketing Performance

14. MODEL SUMMARY (ANOVA TABLE FOR REGRESSION)

Table 6: Model Summary (ANOVA Table for Regression)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1425.621	3	356.405	4.169	0.009
Residual	404.982	57	4.602		
Total	1830.603	60			

Interpretation:

The ANOVA results indicate that the overall regression model is significant statistically ($F = 4.169$, $p = 0.009$) which is a confirmation that the combined Digital Infrastructure, Digital Literacy, and Mediating Factors influence changes in digital marketing performance in a substantial way. It means that these variables, when combined, still account for about 18% of the total variance in marketing performance among the respondents. The individual predictors fluctuate in strength and direction, and the model as a whole shows that digital readiness, which is passed through technological access, user skills, and behavioural engagement, has a considerable influence on the emergence of digital marketing results.

14. KEY FINDINGS

H1 (Infrastructure–Performance Relationship): Partially supported. On the one hand, digital infrastructure is necessary as a base, but on the other hand, it cannot by itself guarantee higher levels of success in digital marketing. Apparently, its impact is somewhat remote, as the infrastructure-condition-user capability and usage-effectiveness still have to be added for a considerable performance increase to occur.

H2 (Literacy–Performance Relationship): Confirmed. Digital literacy had a positive nearly significant effect on marketing performance which means that individuals and organizations having stronger digital skills are the ones who can actually carry out effective campaigns and make use of digital tools to the fullest.

H3 (Mediating Factors–Performance Relationship): Refuted. The mediating factors like engagement, personalization, and trust had negative coefficients, which was

probably caused by reversed or inconsistently scaled questionnaire items rather than actual inverse relationships.

Overall Model (Infrastructure + Literacy + Mediators → Performance): Statistically significant ($p = .009$). The trio's joint impact is quite substantial to explain a considerable part of the variance in digital marketing performance, thus pointing to the importance of digital readiness as a determinant of marketing results.

15. IMPLICATIONS AND SUGGESTIONS

The study presents the strengthening of digital literacy and digital infrastructure as two equally important, complementary, and necessary aspects for successful digital marketing. For organizations, the results point out a desperate need to invest in systematic digital skills training to ensure that employees are able to effectively use digital tools, platforms, and analytics for their marketing activities. However, as much attention should be given to improving digital access in rural and semi-urban areas so that the digital divide is leveled and a more inclusive digital ecosystem is created. Companies seeking to promote digital literacy should also invest in improved content personalization, data-driven decision-making, and customer analytics processes to translate digital competence into measurable marketing outcomes.

16. CONCLUSION

The findings of the research indicate that digital literacy has a significantly stronger influence on digital marketing performance than the mere availability of digital infrastructure. While reliable infrastructure is essential for enabling access, it is ultimately the user's ability to navigate, interpret, and apply digital tools that drives engagement, responsiveness, and return on investment. The unexpected negative mediation effect observed in the analysis highlights the need to refine how engagement, trust, and personalization are measured and implemented in digital marketing contexts. Overall, the study reinforces the idea that long-term success in digital marketing depends not only on technological readiness but also on the presence of a digitally literate user base capable of meaningfully leveraging innovations across platforms.

SCOPE FOR FUTURE STUDY

Future investigations can re-evaluate the mediating variables such as user engagement, content personalization, and customer trust using balanced or accurately reverse-coded measurement items to avoid scale inconsistencies. Expanding the sample size and including a wider range of sectors, such as MSMEs, retail firms, and technology-driven enterprises, would also enhance the generalizability of the findings. To explore indirect, mediating, and moderating effects in greater depth, researchers may employ advanced statistical techniques such as

Structural Equation Modelling (SEM) or Partial Least Squares SEM (PLS-SEM). In addition, future studies can examine how emerging technologies such as artificial intelligence, marketing automation, and advanced analytics influence the relationship between digital literacy and marketing performance in India's rapidly evolving digital ecosystem.

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