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Original Research Article

Digital marketing in the Indian pharmaceutical sector: Adoption patterns, strategic frameworks, and emerging trends

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Abstract

Background: The Indian pharmaceutical industry is witnessing a strategic shift toward digital engagement, driven by rapid technological advancements and evolving healthcare professional (HCP) expectations. However, empirical data on adoption trends across company types remains limited. This study explores digital marketing patterns, strategic differences, and emerging innovations across domestic and multinational pharmaceutical companies in India.

Materials and Methods: A sequential explanatory mixed-methods approach was employed. Quantitative data were collected through a structured survey from 199 pharmaceutical marketing professionals, assessing the adoption of 15 digital strategies. Comparative analyses were conducted by company type (Indian vs. MNC) and rank (Top 50 vs. Beyond). Qualitative insights from open-ended responses were thematically analyzed to identify novel digital practices. Frameworks used include 5D, 6M, Diffusion of Innovations (DOI), and Organizational Information Processing Theory (OIPT).

Results: MNCs and top-ranked firms showed significantly higher adoption of advanced tools like AI-driven personalization, SEO, e-detailing, and omnichannel campaigns. Domestic and lower-ranked companies relied more on messaging platforms and social media. Emerging trends included phygital engagement (i.e., strategies that blend physical and digital interactions), generative AI, chatbots, and IoT integration. Thematic findings highlighted organizational maturity as a key differentiator in digital readiness.

Conclusion: This study provides India-specific insights into digital transformation in pharmaceutical marketing. The results underscore the need for strategic alignment, infrastructure investment, and digital capability-building—particularly for domestic firms—to ensure scalable, ethical, and competitive marketing practices.

Keywords: Digital marketing, Pharmaceutical sector, India, Adoption patterns, Strategic frameworks, Artificial intelligence, Healthcare professionals, Omnichannel engagement, Generative AI

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1. Introduction

Digital transformation is reshaping the pharmaceutical industry by redefining how companies engage with healthcare professionals (HCPs) and patients. The integration of artificial intelligence (AI), big data analytics, and omnichannel strategies has opened new possibilities for personalized, data-driven communication.[1] Advanced technologies such as virtual reality (VR) and augmented reality (AR) are further transforming pharmaceutical operations by enabling interactive educational experiences that simplify complex medical content and improve HCP engagement.[2-3]

In the Indian context, pharmaceutical firms are increasingly adopting digital marketing strategies to enhance the quality and reach of engagement with HCPs.[4] Personalized and technology-enabled approaches are being used to deliver targeted, effective messaging, supported by innovations in content formats and delivery channels.[5] These include SEO optimization, educational video campaigns, and interactive platforms.[6-7]

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Digital competencies are now considered essential to succeed in this evolving landscape, as marketing strategies must not only drive innovation but also remain compliant with strict regulatory frameworks.[8-10] While global studies project a digital-first, patient-centric future for pharmaceutical marketing,[11] there remains a paucity of India-specific empirical data that explores how digital adoption is shaping local market dynamics, engagement quality, and regulatory alignment.[12]

This study addresses this gap by systematically assessing the adoption and effectiveness of fifteen key digital marketing strategies used by pharmaceutical companies in India. It evaluates differences between multinational and domestic firms, top 50 versus beyond top 50 ranked companies, and highlights emerging digital innovations that may influence future practices.

2. Literature Review

Recent advancements in artificial intelligence (AI), big data analytics, and omnichannel strategies have significantly reshaped pharmaceutical operations, including marketing and HCP engagement.[1] Technologies such as augmented reality (AR) and virtual reality (VR) enable immersive experiences, aiding in the delivery and retention of complex medical content.[2-3] AI-driven analytics are particularly effective in predicting HCP preferences and delivering tailored communication strategies.[4] Concurrently, big data allows firms to analyze customer behavior and refine campaigns for greater impact.[13]

Digital competencies have become vital for companies aiming to lead amidst rapid technological change and increasing regulatory demands.[8] Strategies such as search engine optimization (SEO), educational content, and targeted campaigns are widely adopted to boost online visibility and HCP engagement.[1] The 7Ps framework has been adapted to pharmaceutical marketing, emphasizing the integration of digital touchpoints with compliance and engagement models.[8] Bibliometric trends highlight a rise in AI-driven personalization and regulatory themes, yet empirical validation remains limited.[10] Ethical and regulatory compliance—especially concerning data privacy—is a growing concern in the adoption of AI and Internet of Things (IoT) technologies in marketing.[5] These tools, while enhancing efficiency, also raise risks that demand careful governance. The COVID-19 pandemic further accelerated IoT adoption, making oversight even more critical.[14]

Despite extensive global literature, India-specific research on pharmaceutical digital marketing is scarce.[8] Few studies explore differences between multinational corporations (MNCs) and domestic firms or between top 50 and lower-ranked companies. Addressing these gaps is essential for formulating adaptive, evidence-based strategies tailored to the Indian pharmaceutical landscape.

3. Research Objectives

This study aims to:

1. Evaluate the adoption patterns of fifteen digital marketing strategies within the Indian pharmaceutical industry.
2. Compare the extent of digital marketing usage between domestic pharmaceutical firms and multinational corporations (MNCs) operating in India.
3. Examine variations in digital strategy adoption among top-ranked companies versus those ranked beyond the top 50.
4. Identify emerging digital marketing trends and assess their potential impact on future practices.
5. Provide actionable insights to support innovation, regulatory compliance, and improved healthcare professional engagement through digital marketing.

4. Theoretical Frameworks

This study draws upon multiple theoretical frameworks to understand how digital marketing strategies are adopted and implemented within the Indian pharmaceutical industry.

The 6M framework—Market, Mission, Message, Media, Money, and Measurement—offers a structured approach to designing and evaluating digital marketing campaigns. It ensures alignment of campaign elements from content creation to performance metrics, which is especially critical in the highly regulated and outcome-driven pharmaceutical sector.[15]

The 5D framework—Digital Devices, Platforms, Media, Data, and Technology—provides a broader lens for understanding digital marketing integration. It helps analyze how companies deploy digital tools like mobile apps, AI analytics, and interactive platforms to enhance HCP engagement and marketing effectiveness.[16]

The Organizational Information Processing Theory (OIPT) explains how companies process and manage large volumes of information, especially in data-intensive environments like digital pharmaceutical marketing. It is useful in understanding how firms balance innovation with structured data management under regulatory scrutiny.[17]

Each framework offers a unique lens—whether strategic, structural, informational, or behavioral—collectively enabling a comprehensive understanding of how Indian pharmaceutical companies, both multinational and domestic, are adopting, adapting, and optimizing digital marketing strategies.[18]

5. Materials and Methods

5.1. Research design

This study employed a sequential explanatory mixed-methods design to investigate how pharmaceutical companies in India adopt digital marketing strategies. The process began with a quantitative phase, followed by qualitative validation. A structured questionnaire comprising 15 items was designed to assess the prevalence and extent of digital strategy adoption. A summary of the instrument is available in the Supplementary Material. Quantitative data were collected using a Likert scale to measure the degree of adoption.[19] Qualitative insights were obtained from open-ended responses embedded within the same questionnaire, allowing for exploration of emerging practices and contextual depth.[20] Participants were selected based on their direct involvement in pharmaceutical marketing, and were approached via email, WhatsApp, and LinkedIn. A convenience sampling method was used to ensure responses from informed and experienced professionals.[21]

5.2. Survey development, validation, and reliability

The survey instrument was developed to assess the adoption of fifteen digital marketing strategies by pharmaceutical companies in India. Drawing on published research and industry knowledge, the questionnaire included items covering diverse promotional approaches—such as social media, e-detailing, AI-based personalization, and real-world evidence generation—to reflect current practices and strategic relevance,[4,22-25] References for each strategy are detailed in the Supplementary Material.

To ensure content accuracy and clarity, a panel of subject matter experts evaluated all items for relevance, language, and practical alignment. Content validity was calculated using Lawshe's method, which confirmed that each item met accepted thresholds for expert agreement.[26] The Content Validity Index (CVI) achieved perfect scores at both item-level (I-CVI = 1.0) and scale-level (S-CVI = 1.0), indicating universal consensus among evaluators.[28] Internal consistency was measured using Cronbach's alpha, yielding a value of 0.888, suggesting strong reliability.[27] Additionally, the questionnaire incorporated elements grounded in CSR-linked value communication and real-world healthcare applications.[5-7] Contextual relevance was further reinforced through earlier empirical studies on pharmaceutical promotion and information strategies in India.[4]

5.3. Data collection and analysis

Quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS, Version 25.0) to determine the prevalence and variation in the adoption of fifteen digital marketing strategies among pharmaceutical companies in India.[29] Descriptive statistics—including mean, median, mode, and standard deviation—were calculated to capture central tendencies and variability. To assess differences in adoption patterns across company types (Indian vs. MNC) and rankings (Top 50 vs. Beyond 50), independent samples t-tests were conducted at a 5% significance level. Effect sizes were computed using Cohen's d, offering a standardized interpretation of group differences regardless of sample size.[30-31]

Qualitative data from open-ended survey responses were subjected to thematic analysis, using a hybrid approach that combined manual coding with NVivo[32] and AI-assisted tools to enhance efficiency and interpretive depth. Themes were developed inductively, allowing for the emergence of nuanced, context-specific digital marketing practices not captured through closed-ended questions. The analysis framework followed guidelines for qualitative rigor in information systems research.[33]

This integrated mixed-methods approach enabled the triangulation of quantitative trends with qualitative insights, offering a comprehensive understanding of digital strategy adoption across organizational tiers. The analytical design aligns with best practices for applied digital marketing research in regulated sectors, ensuring that findings are both statistically robust and practically relevant.

5.4. Ethical considerations and modern research practices

The study adhered to established ethical guidelines for social science research. Participation was voluntary, and confidentiality was strictly maintained. Respondents were informed that aggregated survey findings would be shared post-study to ensure transparency and foster trust.[34] No personal identifiers were collected, and data were stored securely. To support methodological efficiency, IBM SPSS (Version 25.0) was used for statistical analysis, ensuring precision in group comparisons and effect size estimations.[29] A ChatGPT-based AI assistant was employed to facilitate thematic synthesis, streamline open-ended response analysis, and assist in drafting narrative sections. Its role was supportive and did not influence the original interpretation or statistical output, aligning with current best practices for ethical integration of AI in research.[35]

6. Results

The survey included 199 professionals from diverse segments of the pharmaceutical industry, including marketing managers and digital marketing specialists. Respondents were categorized based on the rank of their companies within the Indian Pharmaceutical Market (IPM). A substantial majority (81.4%) were from companies ranked within the top 50 in the IPM, while 18.6% represented firms ranked beyond the top 50. Respondents were also classified by corporate type, with 76% affiliated with Indian

pharmaceutical companies and 24.1% with multinational corporations (MNCs). This stratification allowed for comparative analyses across company rankings and operational model

6.1. Narrative update

Adoption of digital marketing strategies. A heatmap visualization (**Figure 1**) was used to assess the intensity and distribution of digital marketing strategy adoption across the surveyed companies. Email and messaging platforms like WhatsApp were among the most frequently used channels. In contrast, online events and webinars were less commonly adopted. Notably, AI and machine learning applications for personalized communication are gaining traction, while social media marketing and SEO showed broad uptake. Conversely, chatbots for HCP engagement, although currently underutilized, exhibit significant growth potential.

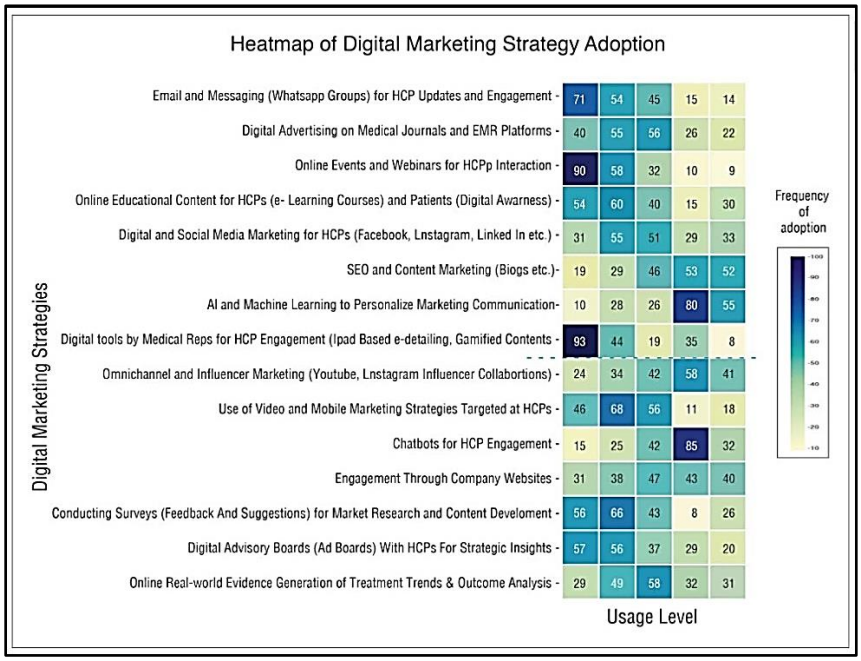

Figure 1: Heatmap of digital marketing strategy adoption among surveyed pharmaceutical companies

This heatmap depicts the usage intensity of various digital strategies, with green representing the most commonly used and red indicating the least used. Abbreviations: AI (Artificial Intelligence), HCP (Healthcare Professionals), ML (Machine Learning), SEO (Search Engine Optimization).

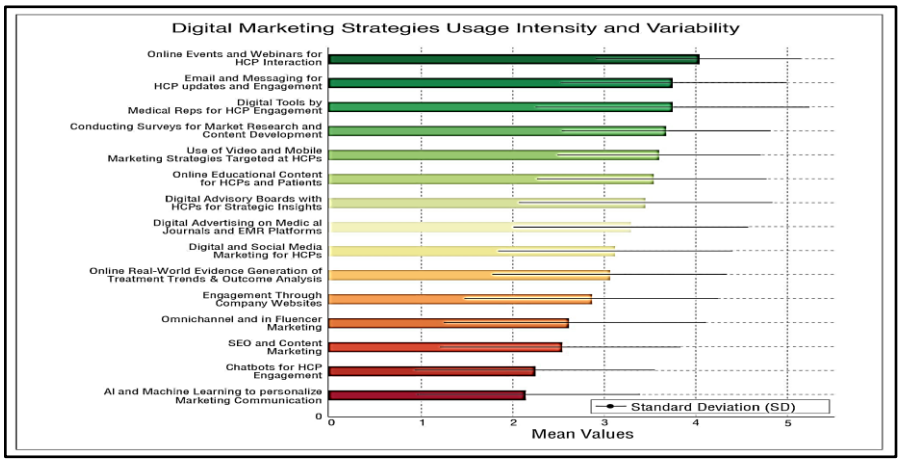

Figure 2: Average usage and variability of 15 digital marketing strategies across surveyed firms

Abbreviations: AI (Artificial Intelligence), HCP (Healthcare Professionals), SEO (Search Engine Optimization), MNC (Multinational Corporations).

A bar chart visualization (**Figure 1**) further illustrates the relative adoption rates and variability across digital marketing strategies. Traditional tools—such as email campaigns, social media, and webinars—show the highest average usage, indicating their entrenched position in the current marketing mix. Newer tools like AI-driven personalization and chatbot engagement display greater variability, suggesting a more selective or evolving adoption pattern. A comprehensive statistical breakdown—including mean, median, mode, and standard deviation for each strategy—is available in the Supplementary Material, offering additional insight into distribution patterns and consistency of usage across companies.

6.2. Comparative Adoption by Indian vs. Multinational companies

Significant differences were observed in the adoption of digital marketing strategies between Indian pharmaceutical firms and multinational corporations (MNCs) operating in India. These differences reflect the contrasting operational contexts, strategic priorities, and resource allocations of the two groups. The detailed statistical results are available in the Supplementary Material. MNCs were notably more proactive in leveraging direct messaging platforms such as WhatsApp groups to engage healthcare professionals (HCPs), with adoption rates significantly higher than Indian firms ($T = -2.66$, $p = 0.0093$; Cohen's $d = -0.42$).

Social media marketing—a resource-intensive channel—was also more commonly employed by MNCs ($T = -4.44$, $p < 0.0001$; Cohen's $d = -0.59$). Likewise, SEO optimization, essential for enhancing online discoverability, showed a strong MNC preference ($T = -3.75$, $p = 0.00034$; Cohen's $d = -0.62$). MNCs also led in the adoption of AI and machine learning technologies for targeted marketing, indicating a technological edge ($T = -2.70$, $p = 0.0084$; Cohen's $d = -0.45$).These findings, visually summarized in **Figure 2**, highlight medium-to-large practical differences in digital marketing behavior between the two segments, as measured by Cohen’s d.

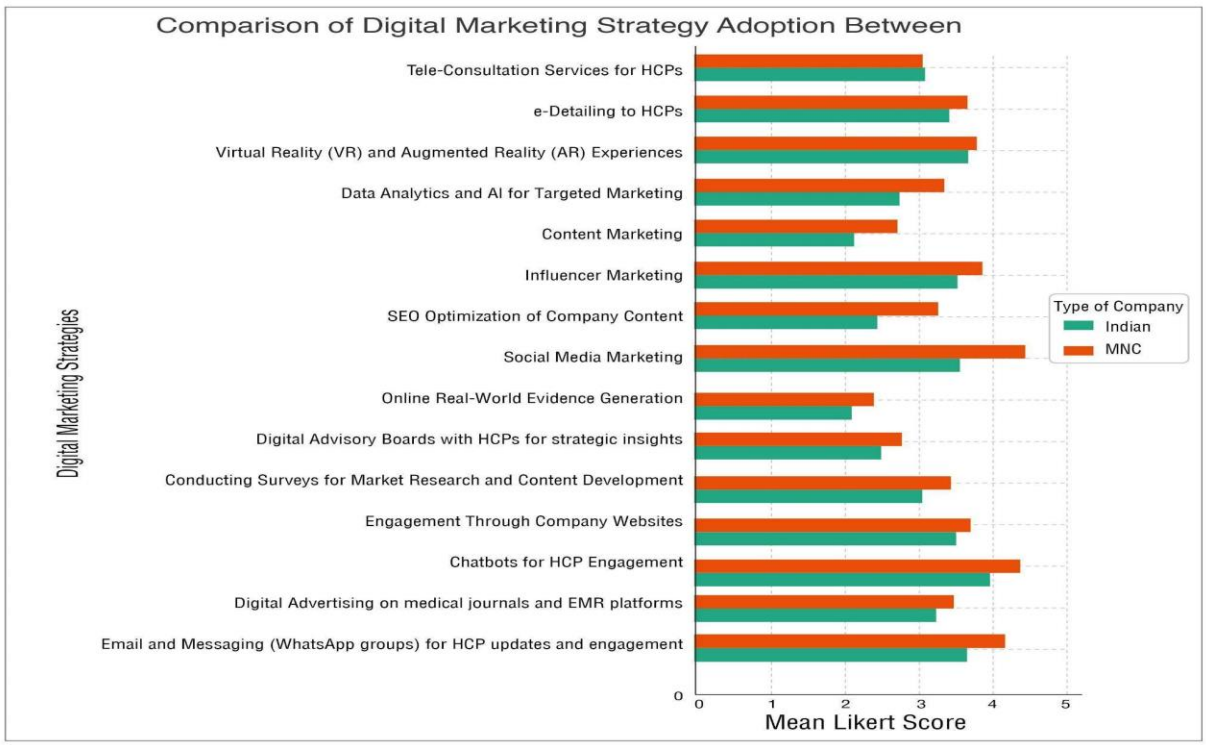

Figure 3: Digital marketing adoption by indian vs. multinational companies

This bar chart compares adoption levels of key digital strategies between Indian and multinational pharmaceutical companies. Abbreviations: AI (Artificial Intelligence), HCP (Healthcare Professionals), MNC (Multinational Corporations), SEO (Search Engine Optimization).

6.3. Comparative adoption among top 50 vs. beyond top 50 Companies

The analysis revealed significant differences in digital marketing strategy adoption between companies ranked within the top 50 of the Indian Pharmaceutical Market (IPM) and those ranked beyond. T-tests were applied to identify statistical significance in usage patterns, and effect sizes were calculated using Cohen’s d. Detailed results are available in the Supplementary Material.

Top 50 companies demonstrated a significantly higher adoption of company website-based engagement ($p = 0.038$; Cohen's $d = -0.43$) and social media marketing ($p = 0.034$; Cohen's $d = -0.41$), reflecting greater investment in established digital channels. Conversely, companies ranked beyond the top 50 showed a higher adoption of online real-world evidence (RWE) generation strategies ($p = 0.029$; Cohen's $d = 0.52$), potentially due to their emphasis on innovation and niche evidence-building.

E-detailing to HCPs was also more widely adopted by top 50 companies ($p = 0.002$; Cohen's $d = -0.65$), suggesting a stronger infrastructure and reach for one-on-one digital engagement.Effect size, as indicated by Cohen's d, quantifies the magnitude of these differences. A value of -0.65 for e-detailing indicates a substantial disparity, reinforcing the strategic edge of top 50 firms in deploying personalized engagement technologies, as illustrated in **Figure 3**.

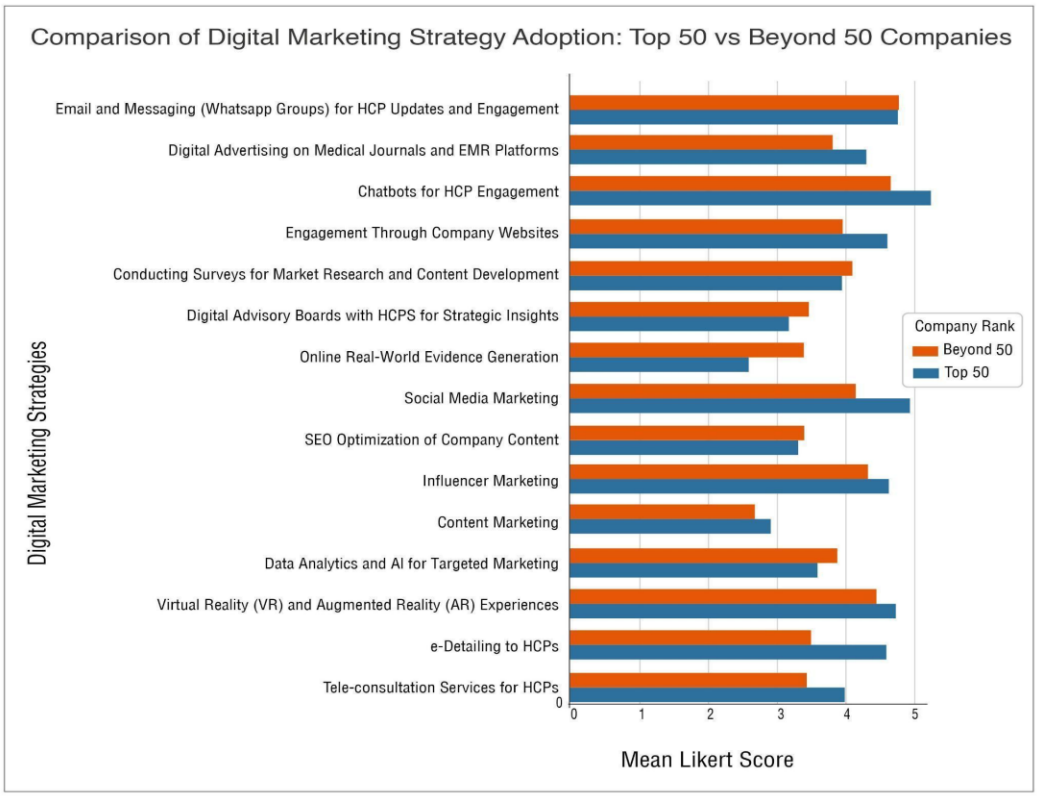

Figure 4: Digital marketing strategies comparison by Top 50 vs. Beyond 50 Companies

This figure compares the adoption rates of selected digital marketing strategies between top 50 and beyond top 50 pharmaceutical companies. Abbreviations: AI (Artificial Intelligence), HCP (Healthcare Professionals).

Table 1: Thematic analysis of emerging digital marketing strategies

Theme	Description
AI and Personalization	Use of AI to tailor marketing efforts to individual HCP behaviors and preferences.
Innovative Content Delivery	Adoption of VR and AR for immersive educational experiences.
Advanced Data Analytics	Use of machine learning for precise communication strategies.
Phygital and Omnichannel Marketing	Integration of online and offline channels for a seamless engagement experience.
AI-enabled Chatbots and NLP	Use of AI-enabled chatbots and NLP for real-time, context-aware interactions.
GenAI and Hyper-Personalization	Use of Generative AI for agile content creation and real-time personalization.
Eye-Tracking Technologies	Use of eye-tracking tools to optimize visual aids and digital communication.
Internet of Things (IoT)	Incorporation of IoT devices to enable real-time data access and facilitate predictive analysis.

6.4. Emerging and lesser-studied digital marketing strategies

Thematic analysis of open-ended responses revealed eight emerging digital marketing strategies gaining traction in the Indian pharmaceutical industry. These include AI-driven personalization, immersive VR/AR-based content delivery, advanced analytics for precision messaging, and phygital marketing, a hybrid approach that integrates physical

touchpoints with digital interfaces. AI-enabled chatbots and NLP tools are increasingly used for real-time engagement, while generative AI supports hyper-personalized content creation. Eye-tracking technologies and IoT integration were also cited for optimizing visual communication and enabling predictive engagement, respectively. These strategies, though less studied in formal literature, represent innovative frontiers that may define future digital marketing paradigms. A summary of these themes is presented in

Table 1.

7. Discussion

This study employed a mixed-methods approach to capture both the prevalence and nuance of digital marketing practices in the Indian pharmaceutical industry. By integrating quantitative data from 199 professionals with qualitative thematic analysis, the research offers a comprehensive lens on digital strategy adoption. The findings provide India-specific insights into how digital marketing is evolving, particularly across organizational types and rankings, and offer practical guidance for future-ready, compliant, and personalized engagement with healthcare professionals (HCPs).

7.1. Advanced technologies and strategic adoption

The Indian pharmaceutical industry is witnessing a strategic shift toward advanced digital technologies such as artificial intelligence (AI), machine learning (ML), the Internet of Things (IoT), and predictive analytics. These tools are increasingly employed to deliver personalized, data-driven campaigns that enhance healthcare professional (HCP) engagement and improve targeting efficiency. This study found that AI-powered personalization, real-time messaging through platforms like WhatsApp, and predictive outreach strategies are becoming more prominent, especially among top-tier and multinational companies with stronger digital infrastructure.

This trend reflects global movements where AI is transforming digital engagement from static content delivery to adaptive, behavior-responsive strategies.[35] Tools such as AI-enabled chatbots, recommendation engines, and IoT-integrated apps are enabling pharma companies to deliver content when, where, and how HCPs prefer to consume it.[36] Moreover, the post-pandemic acceleration in digital maturity has led to increased use of remote detailing, virtual events, and immersive technologies like AR and VR in pharmaceutical promotions.[37] These shifts mark the transition from conventional campaign design to real-time, intelligence-driven marketing ecosystems.[38-39] Firms that invest in these capabilities are more likely to maintain agility, improve personalization, and ensure relevance in a highly regulated and competitive landscape.[35-39]

7.2. Organizational maturity and digital variability

Our findings highlight clear disparities in digital marketing maturity across different types of pharmaceutical companies in India. Multinational corporations (MNCs) consistently lead in the adoption of advanced digital strategies, benefiting from superior infrastructure, global digital playbooks, and larger marketing budgets. In contrast, Indian pharmaceutical companies, while increasingly investing in digital tools, often operate with more constrained resources, limiting their ability to scale high-end technologies like AI, predictive analytics, or immersive digital content. Similar differences are seen when comparing companies ranked within the top 50 of the Indian Pharmaceutical Market (IPM) to those ranked beyond. Top-ranked firms are more likely to integrate resource-intensive strategies such as e-detailing, SEO, AI-powered personalization, and online real-world evidence generation—areas closely aligned with the 5D framework, which encompasses Devices, Platforms, Media, Data, and Technology.[16] These companies exhibit higher digital fluency and more structured execution models.

On the other hand, companies beyond the top 50 tend to adopt simpler, lower-cost digital strategies such as WhatsApp outreach or social media presence but often lack the analytics infrastructure and technical staff to optimize these tools fully. This gap presents an opportunity: smaller and mid-sized firms can bridge the divide by focusing on scalable digital interventions—such as modular CRM systems, low-code automation platforms, or partnerships with digital health startups—while investing in building internal digital capabilities.[40-41] Strategically, narrowing the maturity gap will require more than just tool adoption. It demands culture shifts, leadership buy-in, and sustained investments in workforce upskilling. The findings offer a practical lens to assess how organizational type and ranking influence digital readiness and highlight that with focused execution, even resource-limited firms can build effective, future-ready digital marketing systems.[10,16,41]

7.3 Digital personalization, CRM tools, and the evolving HCP experience

Personalization is at the heart of effective digital marketing in the pharmaceutical industry. Customer Relationship Management (CRM) systems and Digital Marketing Communication (DMC) platforms are essential enablers of consistent, tailored engagement with healthcare professionals (HCPs). These systems help track interactions, segment audiences, and deploy targeted messages across multiple touchpoints—enhancing relevance, timing, and continuity of brand communication.[6,35]

As revealed in our study, the use of AI and machine learning within CRM workflows allows for deeper behavioral insights, enabling campaigns to shift from static segmentation to dynamic, hyper-personalized experiences.

This aligns with broader industry transitions toward predictive, context-aware communication models.[35-36] Hyper-personalization, in particular, has emerged as a key differentiator, allowing companies to customize not only content but also delivery formats and timing, thus improving message receptivity and trust.

Content marketing and search engine optimization (SEO) are increasingly used in Indian pharmaceutical marketing to support personalization. High-quality, insight-driven content—distributed via email campaigns, HCP portals, or knowledge-sharing platforms—enhances brand positioning, while SEO ensures discoverability through organic channels.[42] The integration of these elements contributes to a seamless HCP journey, one that maps preferences, responds to evolving needs, and strengthens long-term engagement.

While top-ranked companies leverage full-stack digital ecosystems—including mobile apps, analytics dashboards, and multi-platform integration—smaller firms can adopt focused strategies. These include curated content campaigns, regional language customization, or CRM-light tools that offer basic automation, all of which are more affordable and scalable.[41,43] Regardless of scale, the emphasis must remain on clarity, consistency, and adaptability of HCP communication, powered by actionable data and continuous feedback loops.

7.4. Digital strategy frameworks: application and insights

The findings of this study align closely with several established strategic and organizational frameworks that help explain patterns in digital marketing adoption across the pharmaceutical sector.

The 6M framework—Market, Mission, Message, Media, Money, and Measurement—offers a structured lens through which top-performing companies design their campaigns. It explains why firms with greater clarity on their objectives, messaging, and metrics are better positioned to deliver coherent omnichannel experiences. This is particularly evident in the way leading firms integrate SEO, CRM, and personalized content within a unified marketing ecosystem.[15,35]

Complementing this, the 5D framework—Devices, Platforms, Media, Data, and Technology—helps interpret the varying levels of tool deployment across organizations. It captures how companies combine mobile apps, webinars, social media platforms, and analytics tools to reach and influence HCPs. Our study showed that high-ranking and multinational firms consistently leverage the full spectrum of these components, whereas smaller firms may focus only on media and device channels due to resource constraints.[16,43]

The Diffusion of Innovations (DOI) theory further contextualizes the observed variability in adoption. As predicted by the theory, firms that perceive clear relative advantages and compatibility with existing systems adopt new digital strategies more readily. Top 50 firms exhibit characteristics of early adopters, including leadership commitment, trialability, and observability of outcomes, while laggards often struggle with uncertainty or lack of internal champions.[18,40]

Finally, the Organizational Information Processing Theory (OIPT) explains why companies with robust data infrastructures are more adept at managing the complexity of digital campaigns. These firms can process, interpret, and respond to large volumes of HCP interaction data—translating analytics into actionable strategy. OIPT reinforces the idea that digital success depends not only on tool adoption but also on an organization's internal capability to manage information flow efficiently.[17,41] Together, these frameworks illuminate the strategic differences between firms and underscore the importance of alignment between digital goals, infrastructure, and organizational readiness.

7.5. Emerging trends and generational shifts

The rise of Generation Z in healthcare—both as physicians and pharmaceutical professionals—is reshaping how digital marketing must evolve. Gen Z, as digital natives, expect high interactivity, seamless user experiences, and personalized communication. Their comfort with on-demand content, mobile-first platforms, and social media engagement calls for pharmaceutical marketers to shift away from static communication and embrace agile, technology-enabled models.[44]

Beyond channel preferences, Gen Z's expectations are accelerating the adoption of emerging technologies such as generative AI, virtual reality, and behavioral analytics. One notable advancement is the integration of AI-driven eye-tracking technologies into digital campaigns. These tools capture gaze patterns and fixation points to assess how HCPs consume visual content. Such insights help optimize layout, hierarchy, and message placement—improving engagement efficiency and return on investment[45]. When paired with generative AI, marketers can dynamically create and refine content formats based on real-time interaction data.[46]

These innovations are not simply enhancements—they mark a new phase in the evolution of pharmaceutical communication. As Gen Z becomes the dominant workforce demographic, digital marketing strategies will need to reflect their expectations for interactivity, immediacy, and personalization. Organizations that embrace this shift and integrate emerging tools into their workflows will be better prepared for future cycles of digital transformation

7.6. Strategic recommendations for digital marketers

Based on the study's insights, two strategic pathways emerge for pharmaceutical companies at different stages of digital maturity. Top 50 companies, with access to advanced infrastructure and broader market reach, must now focus on consolidating their leadership by optimizing omnichannel strategies, expanding AI-driven personalization, and deepening real-time data integration across platforms. Sustaining their edge will also require enhancing interactivity through immersive technologies and refining content agility to adapt to evolving HCP behaviors.[16]

Conversely, companies ranked beyond the top 50 can gain ground by focusing on niche and regional strategies—such as hyper-localized campaigns, WhatsApp-based communication, and targeted social media engagement. Adopting lightweight digital solutions like modular CRM platforms or low-code automation can offer scalability without heavy upfront investments.[43] Importantly, they should prioritize building internal capabilities to interpret data and create responsive, compliant digital content.

For all companies, regardless of scale, the imperative is clear: continual upskilling and digital fluency are now essential organizational assets. Investing in digital capability-building—through internal training, cross-functional integration, and agile experimentation—not only enhances marketing efficiency but also fosters greater trust among healthcare professionals (HCPs). For Indian pharmaceutical marketers, aligning these digital investments with organizational maturity, regulatory expectations, and personalization goals is crucial for sustainable advantage. These strategic choices will ultimately shape both competitive positioning and long-term digital resilience. As the industry continues to evolve, it is this proactive adaptation and innovation-readiness that will distinguish future-ready market leaders from those that lag behind.[47]

7.7. Contribution to literature and industry

This study contributes original, India-specific evidence on how pharmaceutical firms adopt digital strategies, offering actionable insights for marketers and researchers alike. It reinforces the relevance of established models—such as the Unified Theory of Acceptance and Use of Technology (UTAUT), which helps explain digital tool acceptance and behavioral intention among users.[48] Frameworks like the 6M model for campaign planning,[15] the 5D structure for tool deployment,[16] and the Organizational Information Processing Theory (OIPT) for internal data management[17] offer practical explanations for firm-level differences. Additionally, the Diffusion of Innovations (DOI) theory contextualizes how firms adopt new digital tools based on perceived advantage, compatibility, and observability.[18] These findings suggest future research directions: validating these frameworks in therapeutic segments, measuring ROI from digital efforts, and conducting longitudinal studies on digital capability-building.

7.8. Future outlook and research directions

The future of pharmaceutical digital marketing will depend on how effectively companies integrate diverse technologies—such as CRM platforms, content management systems, telehealth, and analytics—into cohesive, responsive ecosystems[39]. As regulatory scrutiny intensifies and ethical expectations rise, firms must prioritize compliant innovation, customer-centricity, and real-time responsiveness. Hyper-personalization, enabled by behavioral data and AI tools, is expected to play a central role in shaping healthcare professional (HCP) engagement strategies.[6,35] The convergence of artificial intelligence (AI), the Internet of Things (IoT), and immersive technologies will further transform static communication into dynamic, personalized interactions that meet the evolving expectations of digitally fluent physicians.

Nonetheless, this study has certain limitations. It is geographically restricted to India and uses a convenience sampling method, which may not fully represent the heterogeneity of the pharmaceutical sector. The analysis focuses on digital adoption trends but does not assess downstream impacts such as return on investment (ROI), market share variations, or clinical outcomes. Furthermore, the scope is limited to B2B, HCP-facing strategies, excluding patient-facing initiatives such as OTC/OTX campaigns.

Future research should broaden the geographic scope, adopt probabilistic sampling methods, and evaluate long-term outcomes using metrics such as ROI, engagement quality, or patient access. Empirical studies can further validate the strategic frameworks applied in this study—namely, the 5D, 6M, Diffusion of Innovations (DOI), and Organizational Information Processing Theory (OIPT)—across various organizational types and therapeutic areas.48 Additionally, the AI-C2C governance model offers a promising lens for exploring ethical AI integration aligned with organizational maturity. As digital transformation accelerates, future investigations must also examine broader ethical governance frameworks to ensure innovation remains transparent, accountable, and trustworthy in the eyes of all stakeholders.

8. Conclusion

This study presents a comprehensive analysis of digital marketing adoption patterns in the Indian pharmaceutical sector, highlighting distinctions between multinational corporations and domestic firms. While MNCs lead in adopting resource-intensive strategies such as AI-driven personalization, omnichannel campaigns, and advanced CRM systems, domestic firms rely more on accessible tools like email, messaging platforms, and social media. By

applying four strategic frameworks—5D, 6M, Diffusion of Innovations (DOI), and Organizational Information Processing Theory (OIPT)—the study offers an integrated lens to interpret digital maturity, infrastructure variability, and organizational readiness. These models reinforce the importance of aligning digital tools with strategic goals, regulatory expectations, and operational capacity. Looking forward, future research should evaluate multichannel strategies that integrate digital and traditional approaches, adopt ROI-focused metrics, and extend the scope to include other key stakeholders such as patients and regulators. By bridging academic theory with field evidence, this study contributes to the ongoing discourse on ethical, adaptive, and scalable digital transformation in pharmaceutical marketing.

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10. Author Contributions

1. Thamburaj Anthuvan: Conceptualization, Methodology, Data Collection, Formal Analysis, Writing – Original Draft, Supervision.
2. Dr. Kajal Maheshwari: Conceptualization, Methodology Evaluation, Writing – Review & Editing, Validation.
3. Dr. Sailatha Ravi: Data Analysis, Writing – Review & Editing, Manuscript Management.
4. Dr. Ezhil Arasan Ramanan: Data Review, Statistical Interpretation, Writing – Review & Editing.

All authors read and approved the final manuscript.

11. Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request. Supplementary materials such as the questionnaire and supporting statistical analyses can also be shared if required for review or clarification.

12. Patents

Not applicable.

13. Source of Funding

None.

14. Conflict of Interest

None.

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