FIMEK

*Journal of Agronomy, Technology and Engineering Management*
*ISSN 2620-1755*

*Review*

# Contemporary Challenges of Digital Marketing in the Pharmaceutical Industry

**Olivera Milutinović [1], Slavica Anđelić [2,*] and Miljan Adamović [1]**

[1] Faculty of Pharmacy Belgrade, Educons University, Poenkareova 14, 11000 Belgrade, Serbia.
[2] Faculty of Management Sremski Karlovci, University "Union - Nikola Tesla" Belgrade, Njegoševa 1a, 21205 Sremski Karlovci, Serbia.
* Correspondence: slavicaandjel@gmail.com

Received: 22 April 2026; Accepted: 2 August 2026

**Abstract:** The digitalization of the healthcare sector has brought about significant changes in the ways in which pharmaceutical organizations communicate, provide information, and establish connections with patients and other stakeholders. Digital marketing in the pharmaceutical industry represents a contemporary approach to the promotion of products and services, but also an important instrument for user education, trust building, and the improvement of relationships with target groups. The aim of this study was to examine respondents' level of knowledge of digital marketing, their attitudes towards its advantages and challenges, and their perceptions of its future role in the pharmaceutical sector. The majority of respondents believe that digital marketing can contribute to increasing patient trust (68.6%), while a substantial proportion of respondents recognize the need for additional education in this field. The results indicate that digital marketing represents significant potential for the development of the pharmaceutical sector; however, its successful implementation requires continuous education, the development of digital competencies, and a responsible approach to communication with users.

**Keywords:** *Digital marketing; pharmaceutical industry; patient communication; patient trust.*

## 1. Introduction

The contemporary development of information and communication technologies has significantly transformed the way business is conducted in virtually all areas of society, including the healthcare sector. The digital transformation of healthcare systems represents one of the key directions in the development of modern medicine and pharmacy, as it enables improved access to information, more efficient communication, and the development of new models of healthcare service delivery [22; 1]. The pharmaceutical industry, as one of the most dynamic areas of healthcare, faces the need to adapt to new forms of communication, changing user expectations, and increasingly demanding market requirements. In this context, digital marketing is becoming an important tool for improving business processes, promoting pharmaceutical products and services, and developing higher-quality relationships with patients [11, 22].

Digital marketing involves the use of digital channels and technologies for the purpose of communicating with target groups, promoting products and services, gathering information about users' needs, and establishing long-term relationships with consumers [2]. Unlike traditional marketing approaches, digital marketing enables two-way communication, more precise targeting of messages to specific user groups, and continuous monitoring of the effects of marketing activities [16, 11]. In the pharmaceutical industry, these possibilities are of particular importance because they facilitate greater access to patient information, health education, and improved communication between pharmaceutical organizations and healthcare service users [12].

The application of digital marketing in the pharmaceutical sector is specific due to the nature of the products and services being promoted. Unlike other market sectors, pharmaceutical communication must be based on professional information, scientific evidence, and compliance with regulatory requirements [5, 9]. Digital channels, such as websites, social media, mobile applications, and various digital platforms, provide considerable opportunities for disseminating health information, while simultaneously creating a risk of inaccurate, incomplete, or unverified content [21; 14]. Therefore, it is essential to develop responsible models of digital communication that ensure both the accessibility of information and the protection of patients' interests [26].

The particular importance of digital marketing in the pharmaceutical industry lies in its potential to build patient trust. In the contemporary digital environment, users increasingly search for health-related information online and through social media, giving pharmaceutical organizations an opportunity to improve user education and strengthen their credibility through high-quality and professionally developed content [14, 17]. However, building trust requires transparency, professionalism, and consistent adherence to ethical principles in healthcare communication [5; 9].

In addition to its numerous advantages, the application of digital marketing in the pharmaceutical sector faces various challenges. Rapid technological development, the need for continuous improvement of employees' digital competencies, reputation management on social media, and quality control of available information represent significant factors affecting the success of digital strategies [21, 22]. Therefore, continuous education of professionals in the pharmaceutical sector represents one of the key prerequisites for the effective and responsible implementation of digital marketing [24].

Given the growing importance of digital technologies in healthcare, examining the attitudes and experiences of employees and other stakeholders in the pharmaceutical sector represents an important step towards a better understanding of the opportunities and limitations of digital marketing. An analysis of the level of knowledge of digital marketing, its perceived advantages and challenges, as well as attitudes towards its future role, may contribute to the development of more effective digital communication strategies in the pharmaceutical industry [1, 22].

The aim of this study was to examine respondents' level of knowledge of digital marketing, identify its key advantages and challenges in the pharmaceutical sector, and analyse the association between selected factors and perceptions of the future role of digital marketing in pharmacy. Particular attention was devoted to examining the relationship between the professional use of digital channels, the need for additional education, and attitudes towards the importance of digital marketing for the future development of pharmaceutical organizations.

## 2. Methodology

The study was conducted with the aim of examining the attitudes and perceptions of employees in the pharmaceutical sector regarding the application of digital marketing, its importance, advantages, challenges, and future role in pharmaceutical practice. Particular attention was given to assessing the level of knowledge of digital marketing, the prevalence of digital marketing activities in pharmaceutical institutions, perceptions of the impact of digital channels on patient trust, and the need for additional employee education.

The study was quantitative, non-experimental, and descriptive-correlational in design. Data were collected using a survey method and a structured questionnaire designed to assess the attitudes, experiences, and perceptions of employees in the pharmaceutical sector.

Study sample: A total of 86 respondents employed in the pharmaceutical sector participated in the study. The sample was formed using convenience sampling, and the inclusion criterion was employment in the field of pharmacy.

The following socio-demographic characteristics of the respondents were analysed: gender; age group; and length of professional experience.

The inclusion of respondents of different ages and with varying levels of professional experience enabled the assessment of attitudes among employees with different levels of experience in professional practice and the use of digital technologies.

Research instrument: A structured questionnaire developed in accordance with the objectives of the study was used for data collection. The questionnaire included questions related to:

- socio-demographic characteristics of respondents;
- the application of digital marketing in institutions;
- self-assessed knowledge of digital marketing;
- perceived advantages and challenges of digital marketing in pharmacy;
- attitudes towards the impact of digital marketing on patient trust;
- the need for additional employee education.

The level of knowledge of digital marketing was assessed using a five-point response scale (very poor, poor, moderate, good, and very good), while the remaining questions were primarily structured using categorical response options.

Data collection procedure: Data were collected through a survey of employees in the pharmaceutical sector. Prior to completing the questionnaire, respondents were informed about the purpose of the study and the manner in which the collected data would be used.

Participation in the study was voluntary, with the principles of anonymity and confidentiality being respected. The collected data were used exclusively for research purposes.

Statistical analysis: Descriptive and inferential statistical methods were used for data analysis.

The following measures were used to present sample characteristics and response distributions:

- absolute frequencies (n);
- percentages (%).

Spearman's rank correlation analysis was used to examine associations between variables, specifically:

- the level of knowledge of digital marketing and its perceived future role;
- the professional use of social media and the perceived future role of digital marketing.

One-way analysis of variance (ANOVA) was used to examine differences in the level of knowledge of digital marketing among age groups.

The statistical significance level was set at:

$$p < 0.05$$

Ethical considerations: The study was conducted in accordance with the fundamental ethical principles of scientific research. Respondents were guaranteed anonymity, voluntary participation, and data confidentiality. The results were analysed exclusively at the group level, without the possibility of identifying individual participants.

## 3. Ethical Challenges of Digital Marketing in the Pharmaceutical Industry

Digital marketing in the pharmaceutical industry provides numerous opportunities for improving communication between pharmaceutical companies, healthcare professionals, and patients. At the same time, however, it raises significant ethical dilemmas concerning responsibility in the presentation of health information, transparency of promotional activities, and the protection of patients' interests. Unlike other economic sectors, pharmaceutical marketing directly influences decisions that may have consequences for human health; therefore, companies are expected to demonstrate a high level of professional and social responsibility [26].

One of the most significant ethical challenges is the dissemination of misleading or incomplete information through digital channels. Social media, online portals, and influencer marketing enable the rapid dissemination of promotional content, while simultaneously increasing the risk of publishing inaccurate or scientifically unsubstantiated claims regarding the efficacy and safety of medicines. A particular concern is covert advertising, whereby promotional content is not clearly identified as advertising or is presented as objective health information. Such practices may lead to users developing misconceptions and making health-related decisions based on inaccurate information [21].

An additional ethical challenge concerns the responsible advertising of medicines and medical products. Pharmaceutical companies have an obligation to ensure that information is balanced, accurate, and based on scientific evidence, while indications, contraindications, and potential side effects must be clearly stated. Promoting products solely by emphasizing their benefits, without adequately presenting associated risks, is considered unethical and may compromise patient safety [21].

Particular attention is required when marketing is directed towards vulnerable population groups, including older adults, individuals with chronic diseases, and persons with limited health literacy. Digital algorithms enable precise targeting of users but simultaneously raise ethical questions regarding the use of personal data to create personalized promotional campaigns. Inappropriate use of such data may constitute an invasion of privacy and a breach of users' trust [21].

The ethical conduct of digital marketing also requires transparency in collaborations between pharmaceutical companies and healthcare professionals, influencers, and patient organizations. Users must be clearly informed whenever particular content is sponsored or funded by a pharmaceutical company so that they can objectively assess its credibility.

## 4. Legal and Regulatory Challenges

The digital transformation of pharmaceutical marketing requires compliance with a wide range of national and international regulations governing the advertising of medicines, personal data protection, and communication with patients. The regulatory framework aims to ensure patient safety, prevent misleading advertising, and preserve public trust in the healthcare system [5].

One of the fundamental regulatory challenges concerns restrictions on the advertising of prescription-only medicines. In most European countries, including the Member States of the European Union, direct advertising of these medicines to the general public is not permitted. Digital marketing must therefore be carefully adapted to the target audience, with promotional activities directed exclusively towards healthcare professionals through appropriate professional platforms [6].

The development of social media has created new regulatory challenges. User posts, comments, influencer campaigns, and patient-generated content often exist at the boundary between personal experience and commercial promotion. Regulatory authorities require pharmaceutical companies to assume responsibility for promotional activities that they finance or control, even when such activities are conducted through third parties [6].

The international nature of the Internet represents an additional challenge. Digital content may be accessible to users in different countries that apply different legal frameworks. Pharmaceutical companies must therefore ensure compliance with the regulations of all markets in which they operate, which significantly increases the complexity of managing digital marketing activities.

An important regulatory aspect concerns the protection of users' personal data. The processing of health data is considered a particularly sensitive category of data and is subject to strict rules established by the General Data Protection Regulation (GDPR). Organizations must clearly define the purpose of data collection, obtain informed consent from users, and implement appropriate measures to protect data against unauthorized access [4].

## 5. Technological Challenges

The development of digital technologies has significantly expanded the possibilities of pharmaceutical marketing through the use of artificial intelligence, big data analytics, marketing automation, and personalized communication. At the same time, these technologies introduce new challenges, primarily related to data protection, cybersecurity, and the rapid obsolescence of technological solutions. One of the key challenges concerns the protection of users' personal data. Digital marketing collects large amounts of information about users' behavior, interests, health needs, and interactions with digital content. Since health data belong to the most sensitive categories of personal data, their processing requires the highest standards of security and privacy [4].

Cybersecurity represents an additional challenge. Pharmaceutical companies are increasingly becoming targets of cyberattacks because of the large amounts of valuable data they possess. The theft of health data may have serious consequences for users, including identity theft, violations of privacy, and financial losses. For this reason, companies invest substantial resources in developing information security systems, data encryption, multi-factor authentication, and continuous monitoring of security risks [27].

The development of artificial intelligence is further transforming the way marketing campaigns are created. Algorithms enable automated content personalization and the prediction of user behavior, but they also raise questions concerning algorithmic transparency, potential discriminatory effects, and accountability for decisions made by such systems. The European Union is therefore developing a regulatory framework governing the responsible use of artificial intelligence across various sectors, including healthcare.

Technological changes occur extremely rapidly, requiring pharmaceutical companies to continuously adapt their digital strategies to new platforms, tools, and methods of communicating with users. This requires ongoing investment in infrastructure, employee education, and the development of digital competencies.

## 6. User-Related Challenges

The success of digital marketing in the pharmaceutical industry largely depends on users' trust in the information they receive through digital channels. However, the contemporary digital environment is characterized by a vast amount of available health information of varying quality, making it difficult for users to distinguish between reliable and unreliable sources.

Trust represents the foundation of successful communication between pharmaceutical companies and users. If users perceive that a company conceals information, employs aggressive promotional techniques, or fails to respect data privacy, trust may be seriously undermined, directly affecting the company's reputation and the effectiveness of its marketing activities [11].

Digital literacy represents another important challenge. Although the Internet provides easy access to a large amount of health information, many users lack sufficient knowledge to assess the scientific validity of published content. Consequently, they often rely on information from social media or the experiences of other users, increasing the risk of misinformation and independent health-related decision-making without consulting healthcare professionals [26].

A particular problem is the phenomenon of an infodemic, that is, an excessive amount of information that includes both accurate and inaccurate content. During the COVID-19 pandemic, it became evident that misinformation can spread almost as rapidly as infectious diseases themselves, significantly complicating the process of making appropriate health-related decisions [26].

Pharmaceutical companies therefore have an important role in developing educational digital content that is scientifically grounded, understandable to the general public, and adapted to different levels of health literacy. Transparent communication, clear citation of information sources, and cooperation with healthcare professionals represent key factors in building long-term user trust.

## 7. Research into Contemporary Challenges of Digital Marketing in Pharmacy

A total of 86 respondents employed in the pharmaceutical sector participated in the study. Analysis of socio-demographic characteristics showed that women predominated in the sample (72.1%), while men accounted for 27.9% of respondents. This gender distribution is consistent with the characteristics of the pharmacy profession, in which women traditionally constitute the majority of employees, particularly in community pharmacy practice.

With regard to age structure, the largest proportion of respondents belonged to the 41–50-year age group (34.9%), followed by the 31–40-year age group (33.7%), meaning that more than two-thirds

of the sample (68.6%) consisted of individuals of middle adulthood. Respondents aged 20–30 years accounted for 14.0%, while respondents over 50 years of age accounted for a total of 17.4%. This structure indicates that the study predominantly included respondents with substantial professional experience who are actively engaged in contemporary processes within pharmaceutical practice.

**Table 1.** Socio-demographic characteristics of respondents (N = 86).

| Variable | Category | n | % |
|---|---|---|---|
| **Gender** | Male | 24 | 27.9 |
| | Female | 62 | 72.1 |
| **Age group** | 20–30 years | 12 | 14.0 |
| | 31–40 years | 29 | 33.7 |
| | 41–50 years | 30 | 34.9 |
| | 51–60 years | 8 | 9.3 |
| | >60 years | 7 | 8.1 |
| **Work experience** | <5 years | 21 | 24.4 |
| | 5–10 years | 21 | 24.4 |
| | 11–20 years | 26 | 30.2 |
| | >20 years | 18 | 20.9 |

Analysis of work experience showed that the largest proportion of respondents had 11–20 years of professional experience (30.2%), while an equal percentage of respondents (24.4%) had less than five years or between five and ten years of work experience. More than 20 years of professional experience was reported by 20.9% of participants. The distribution obtained indicates a relatively balanced representation of employees across different categories of professional experience, contributing to a more comprehensive assessment of attitudes towards the application of digital marketing in the pharmaceutical sector.

Overall, the socio-demographic structure of the sample encompasses different generations and levels of professional experience among employees in pharmacy, thereby providing a sound basis for analysing attitudes towards contemporary challenges in digital marketing and examining potential differences between individual respondent groups in the subsequent analysis.

**Table 2.** Application of digital marketing in institutions.

| Response | n | % |
|---|---|---|
| Yes | 60 | 69.8 |
| No | 9 | 10.5 |
| Not sure | 17 | 19.8 |

The results presented in Table 2 show that 69.8% of respondents stated that various forms of digital marketing are used in the institution in which they are employed. This finding indicates that digital marketing has become a significant component of the business strategy of most pharmaceutical institutions, confirming the intensive digital transformation of the pharmaceutical

sector and the growing importance of electronic communication channels with patients and healthcare service users.

Conversely, 10.5% of respondents reported that digital marketing is not used in their institution. This result may indicate the existence of organizational, financial, or regulatory constraints that slow the adoption of contemporary digital marketing activities, particularly in smaller institutions or those operating with limited resources.

Also noteworthy is the finding that nearly one-fifth of respondents (19.8%) stated that they were unsure whether their institution uses digital marketing. This result may be interpreted as an indication of insufficient employee awareness of the organization's marketing activities or their limited involvement in digital communication processes. At the same time, this finding highlights the need for improved internal communication and greater employee involvement in activities related to digital marketing, as employees themselves represent important stakeholders in building user trust and promoting healthcare services.

Taken as a whole, the results indicate that digital marketing is present in the majority of pharmaceutical institutions included in the study, while there remains considerable scope for further improvement, particularly in terms of employee awareness, the development of digital competencies, and the integration of marketing activities into everyday professional practice. These findings provide a sound basis for further analysis of the impact of digital marketing implementation on employee attitudes and perceptions of its importance in the pharmaceutical sector.

**Table 3.** Self-assessment of knowledge of digital marketing.

| **Response** | **n** | **%** |
|---|---|---|
| Very poor | 4 | 4.7 |
| Poor | 10 | 11.6 |
| Moderate | 28 | 32.6 |
| Good | 23 | 26.7 |
| Very good | 21 | 24.4 |

The results presented in Table 3 indicate that respondents generally assessed their knowledge of digital marketing as satisfactory. The largest proportion of respondents (32.6%) rated their knowledge as moderate, while 26.7% reported good and 24.4% very good knowledge of digital marketing. Taken together, more than half of the respondents (51.1%) considered their level of knowledge to be good or very good, indicating a relatively high degree of familiarity among pharmaceutical sector employees with contemporary digital marketing concepts.

Conversely, 11.6% of respondents assessed their knowledge as poor, while only 4.7% considered their knowledge to be very poor. These results show that the proportion of respondents with an insufficient level of knowledge is relatively small (16.3%), but they nevertheless indicate a need for additional professional development and continuous education, given the rapid development of digital technologies and the increasing use of digital communication channels in pharmaceutical practice. The findings may be associated with the intensive digital transformation of the healthcare system and pharmaceutical industry, which requires employees to develop new digital competencies and continuously monitor technological innovations. Knowledge of digital marketing

represents an important prerequisite for effective communication with patients, appropriate use of digital platforms, and the application of ethical and regulatory principles in the digital environment.

Overall, the results indicate that respondents recognize the importance of digital marketing and perceive themselves as having an adequate level of knowledge for its application. However, the fact that nearly one-third of respondents rate their knowledge as moderate, while approximately one in six rate it as poor or very poor, indicates room for further improvement of digital competencies through professional development programs, which could contribute to more effective implementation of digital marketing in the pharmaceutical sector and higher-quality communication with healthcare service users.

**Table 4.** Major advantages of digital marketing in pharmacy.

| Advantage | n | % |
|---|---|---|
| Greater reach of target groups | 39 | 45.3 |
| Faster adaptation to market needs | 36 | 41.9 |
| Increased competitiveness | 11 | 12.8 |

The results presented in the table indicate that respondents identified greater reach of target groups as the greatest advantage of digital marketing in pharmacy, as reported by 39 respondents (45.3%). This finding highlights the importance of digital communication channels in enabling pharmaceutical organizations to connect more effectively with users, healthcare professionals, and other relevant stakeholders.

The second most frequently identified advantage was faster adaptation to market needs, reported by 36 respondents (41.9%). This indicates that respondents perceive digital marketing as enabling continuous monitoring of changes in consumer behavior, analysis of market trends, and more flexible development of marketing activities in accordance with users' needs.

The smallest number of respondents, 11 (12.8%), identified increased competitiveness as the key advantage of digital marketing in pharmacy. Although competitive advantage is an important effect of business digitalization, the results show that respondents place greater immediate value on opportunities for broader user reach and adaptation to market requirements.

Overall, the results indicate that respondents primarily perceive digital marketing in pharmacy as a means of improving communication with target groups and increasing market flexibility, while its contribution to competitive positioning is recognized to a lesser extent.

**Table 5.** Major challenges of digital marketing in pharmacy.

| Challenge | n | % |
|---|---|---|
| Distinguishing reliable information | 34 | 39.5 |
| Rapid technological changes | 21 | 24.4 |
| Insufficient digital literacy | 20 | 23.3 |
| Negative comments on social media | 11 | 12.8 |

The results presented in the table show that respondents identified distinguishing reliable information as the greatest challenge of digital marketing in pharmacy, reported by 34 respondents

(39.5%). This result highlights the importance of the credibility and quality of information in the digital environment, particularly in pharmacy, where inaccurate or incomplete information may directly affect users' decisions and public health.

The second most significant challenge identified by respondents was rapid technological change, recognized by 21 respondents (24.4%). This finding indicates the need for continuous monitoring of developments in digital technologies, adaptation of marketing strategies, and ongoing improvement of employees' knowledge in the pharmaceutical sector.

Insufficient digital literacy was identified as a challenge by 20 respondents (23.3%), indicating that successful implementation of digital marketing requires an appropriate level of digital competence among employees, as well as the ability of users to appropriately assess and use available health information.

The smallest number of respondents, 11 (12.8%), considered negative comments on social media to be one of the major challenges. Although this aspect was less frequently identified, it represents an important component of reputation management in pharmaceutical organizations, as communication on digital platforms may significantly affect user trust.

Taken as a whole, the results indicate that the key challenges of digital marketing in pharmacy primarily concern the quality and reliability of information, the need to adapt to technological changes, and the development of digital competencies, while challenges associated with managing communication on social media are perceived to a lesser extent as priorities.

**Table 6.** Patient trust.

| Response | n | % |
|---|---|---|
| Yes | 59 | 68.6 |
| No | 5 | 5.8 |
| Not sure | 22 | 25.6 |

The results presented in the table show that the majority of respondents believe that digital marketing can contribute to increasing patients' trust in pharmaceutical organizations. Specifically, 59 respondents (68.6%) answered affirmatively, indicating a recognized role of digital communication channels in informing patients, improving access to health information, and developing higher-quality relationships between pharmaceutical organizations and users.

A negative response was given by 5 respondents (5.8%), representing a small proportion and indicating that only a limited number of participants do not recognize a significant impact of digital marketing on patient trust.

At the same time, 22 respondents (25.6%) stated that they were unsure, indicating a certain degree of reservation regarding the impact of digital marketing on patient trust. This result may be associated with the specific characteristics of the pharmaceutical field, where user trust depends not only on the quality of digital communication but also on professional competence, transparency of information, compliance with regulatory requirements, and the reputation of a healthcare institution or pharmaceutical company.

Overall, the results indicate that respondents predominantly view the potential of digital marketing to build patient trust positively; however, the substantial proportion of uncertain

responses demonstrates the need for further improvement of transparent, professional, and responsible digital communication in the pharmaceutical sector.

**Table 7.** Need for additional education.

| Response | n | % |
|---|---|---|
| Yes | 40 | 46.5 |
| No | 12 | 14.0 |
| Maybe | 34 | 39.5 |

The results presented in the table indicate a pronounced need among respondents for additional education in the field of digital marketing in pharmacy. The largest proportion of respondents, 40 (46.5%), considered additional education necessary, indicating awareness of the importance of continuously developing the knowledge and skills required for the successful implementation of digital marketing strategies in the pharmaceutical sector.

The response "maybe" was selected by 34 respondents (39.5%), demonstrating that a substantial proportion of respondents recognize a potential need to improve their knowledge but may not yet be fully certain about the scope and importance of additional education. This result may indicate the need for better information regarding the opportunities provided by digital marketing and its role in contemporary pharmaceutical practice.

The smallest number of respondents, 12 (14.0%), considered additional education unnecessary. This finding indicates that a smaller proportion of respondents perceive themselves as having a sufficient level of knowledge and competence to implement digital marketing activities.

Overall, the results show that 86.0% of respondents (those answering "yes" or "maybe") recognize some degree of need for additional professional development, highlighting the importance of organizing educational programs, professional training, and digital competency development for employees in the pharmaceutical sector.

**Table 8.** Spearman's rank correlation analysis.

| Variables | ϱ | p |
|---|---|---|
| Knowledge of digital marketing – Future role of digital marketing | 0.169 | 0.155 |
| Professional use of social media – Future role of digital marketing | **0.287** | **0.007** |

*Note. Bold values indicate statistically significant associations ($p < 0.05$).*

The results of Spearman's rank correlation analysis presented in the table indicate associations between selected variables related to digital marketing in pharmacy and perceptions of its future role.

The analysis of the relationship between knowledge of digital marketing and its perceived future role revealed a weak positive correlation ($\varrho = 0.169$), which was not statistically significant ($p = 0.155$). This means that respondents with a higher level of knowledge of digital marketing tended

to evaluate its future role somewhat more positively; however, this association was not sufficiently pronounced to be considered statistically confirmed at the $p < 0.05$ significance level.

A weak-to-moderate positive correlation was found between the professional use of social media and the perceived future role of digital marketing ($\varrho = 0.287$), and this association was statistically significant ($p = 0.007$). This result indicates that respondents who use social media more frequently in a professional context tend to hold more positive attitudes towards the future importance of digital marketing in pharmacy. The statistical significance of this association suggests that practical experience in using digital platforms may contribute to a better understanding of the potential and importance of digital marketing activities.

Overall, the results demonstrate that the professional use of social media is more strongly associated with perceptions of the future role of digital marketing than general knowledge of the field alone. The findings highlight the importance of practical experience and active use of digital channels in developing positive attitudes towards the digital transformation of the pharmaceutical sector.

**Table 9.** Results of one-way ANOVA.

| Dependent variable | Factor | F | p |
|---|---|---|---|
| Knowledge of digital marketing | Age group | 1.838 | 0.132 |

*Note. No statistically significant difference was found between age groups.*

The results of the one-way ANOVA presented in the table indicate that there was no statistically significant difference in the level of knowledge of digital marketing among respondents from different age groups. The obtained test value was $F = 1.838$, while the statistical significance level was $p = 0.132$, which is greater than the threshold value of $p < 0.05$.

This result indicates that differences in self-assessed knowledge of digital marketing among age groups cannot be considered statistically significant. In other words, membership in a particular age category did not have a significant effect on respondents' level of knowledge of digital marketing.

Although the results show certain variations among age groups, as reflected in the F-test value, these differences were not sufficiently pronounced to confirm age as a factor determining the level of knowledge of digital marketing.

This finding may indicate that knowledge of digital marketing is currently more closely associated with education, professional experience, previous use of digital tools, and interest in the field than exclusively with age-group membership. The results also suggest that digital marketing education may be equally important across all age categories of respondents.

## 8. Critical Analysis and Synthesis

The digital transformation of the healthcare sector in recent years has significantly affected communication between pharmaceutical organizations, healthcare professionals, and patients. The results of this study indicate that respondents recognize the importance of digital marketing in pharmacy and its potential to improve access to information, facilitate more effective connections with target groups, and enable adaptation to market requirements. The findings confirm that digital

marketing is becoming an important instrument of contemporary pharmaceutical business, while simultaneously highlighting certain challenges that require a responsible and strategic approach.

The study found that the majority of respondents possessed a certain level of knowledge of digital marketing, with the largest proportion assessing their knowledge as moderate, good, or very good. This result indicates the growing recognition of digital marketing activities in the pharmaceutical sector. However, the fact that a substantial proportion of respondents did not assess their knowledge at the highest level indicates the need for continuous professional development. The contemporary pharmaceutical environment requires a combination of professional pharmaceutical competencies and digital skills, particularly in the areas of content management, social media communication, data analysis, and the development of responsible digital communication.

The results showed that respondents identified greater reach of target groups (45.3%) as the greatest advantage of digital marketing in pharmacy, followed closely by the ability to adapt more rapidly to market needs (41.9%). These findings indicate that digital channels enable pharmaceutical organizations to communicate more directly and effectively with users, as well as respond more flexibly to changes in their needs and expectations. Compared with traditional marketing approaches, digital marketing provides opportunities for more precise targeting of communication towards specific groups and monitoring of marketing outcomes.

On the other hand, the results indicate that respondents identified distinguishing reliable information (39.5%), rapid technological changes (24.4%), and insufficient digital literacy (23.3%) as the greatest challenges of digital marketing in pharmacy. These findings are particularly important in the pharmaceutical context, where the quality and accuracy of information have a direct impact on users' health. Unlike other market sectors, pharmaceutical communication must be based on professional expertise, scientific evidence, and compliance with regulatory restrictions. The increased availability of health information online simultaneously represents an opportunity for patient education and a risk of spreading inaccurate or unverified content.

A particularly important finding concerns respondents' assessment of the impact of digital marketing on patient trust. The majority of respondents (68.6%) believe that digital marketing can contribute to increasing patient trust, while one-quarter of respondents were uncertain. This result confirms that digital channels may play an important role in building trust-based relationships, but only when used in a transparent, professional, and ethically acceptable manner. Patient trust in the digital environment depends not only on the online presence of pharmaceutical organizations but also on the quality of content, reliability of information, and responsible treatment of users.

The results concerning the need for additional education further confirm the importance of developing digital competencies in pharmacy. Nearly half of the respondents (46.5%) considered additional education necessary, while 39.5% selected the response "maybe". This result demonstrates broad awareness of the need to improve knowledge in the field of digital marketing. Continuous education of employees in the pharmaceutical sector represents an important prerequisite for the successful implementation of digital strategies and their alignment with the specific requirements of healthcare communication.

Spearman's rank correlation analysis showed a statistically significant positive association between the professional use of social media and perceptions of the future role of digital marketing ($\varrho = 0.287$; $p = 0.007$). This finding indicates that individuals with practical experience in using social media for professional purposes hold more positive attitudes towards the future importance of digital marketing. In contrast, the association between general knowledge of digital marketing and

perceptions of its future role was not statistically significant ($\varrho = 0.169$; $p = 0.155$). This may indicate that theoretical knowledge of digital marketing alone is insufficient for developing positive attitudes, and that practical experience plays an important role in understanding its potential.

The one-way ANOVA demonstrated no statistically significant difference in knowledge of digital marketing among different age groups ($F = 1.838$; $p = 0.132$). This result indicates that age itself is not a decisive factor determining the level of knowledge of digital marketing. One possible explanation is that digital technologies have become an integral part of the everyday and professional environments of different generations, while competency levels are more likely to be influenced by education, professional engagement, and opportunities for practical application of digital tools.

The findings have significant practical implications for pharmaceutical organizations. Effective implementation of digital marketing requires the development of clear strategies that combine technological opportunities with the principles of professional ethics and responsible communication. Particular attention should be devoted to employee education, quality control of digital content, and the development of mechanisms for maintaining patient trust.

Overall, the results of this study indicate that respondents recognize digital marketing in pharmacy as an important tool for future development, particularly with regard to improving communication with target groups and increasing access to information. At the same time, challenges related to information reliability, digital competencies, and rapid technological changes highlight the need for continuous professional development and responsible management of digital channels in the pharmaceutical sector.

## 9. Conclusion

Digital marketing represents one of the key elements of contemporary business in the pharmaceutical sector, enabling more effective communication with patients, healthcare professionals, and other target groups. The results of this study demonstrated that respondents recognized the importance and potential of digital marketing in pharmacy, while also indicating the need for further development of knowledge, skills, and responsible approaches to its implementation.

Based on the results obtained, it can be concluded that the majority of respondents possess a certain level of knowledge of digital marketing and recognize it as an important factor in the future development of the pharmaceutical sector. Respondents identified greater reach of target groups and the ability to adapt more rapidly to market needs as the greatest advantages of digital marketing, highlighting its importance for improving communication and increasing access to relevant information.

At the same time, the study demonstrated that significant challenges exist in the implementation of digital marketing in pharmacy. The most important challenge identified was the need to distinguish reliable information, which is particularly relevant in healthcare, where the quality and accuracy of communication directly affect user trust and health-related decision-making. In addition, rapid technological changes and insufficient digital literacy represent factors that may limit the effective implementation of digital strategies.

The findings also indicate that digital marketing can have a positive role in building patient trust, with the majority of respondents believing that high-quality and transparent digital

communication can contribute to improved relationships between pharmaceutical organizations and users. However, realizing this potential requires professionalism, ethical conduct, and compliance of digital content with professional and regulatory requirements.

The analysis of associations demonstrated that the professional use of social media is significantly and positively associated with perceptions of the future role of digital marketing, whereas general knowledge of digital marketing did not demonstrate a statistically significant association. This finding indicates that practical experience in using digital tools represents an important factor in understanding their importance and potential applications in pharmaceutical practice. Furthermore, no statistically significant difference in knowledge of digital marketing was found among different age groups, suggesting that age is not a decisive factor in respondents' digital competencies.

The results indicating a pronounced need for additional education in digital marketing are of particular importance. The development of digital competencies among employees in the pharmaceutical sector represents an important prerequisite for the successful use of contemporary communication channels, the improvement of relationships with patients, and the creation of competitive advantage on the market.

Based on all the findings presented, it can be concluded that digital marketing has significant potential to improve pharmaceutical practice; however, its successful implementation requires strategic planning, continuous education, responsible communication, and adherence to ethical and regulatory principles. The future development of pharmaceutical marketing will involve even greater application of digital technologies, while maintaining the fundamental values of healthcare communication—professionalism, reliability, and patient trust.

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

**Declaration of Generative AI Use:** The authors declare that no generative artificial intelligence (GenAI) tools were used in the preparation of this manuscript.

## References

1. Agarwal, R.; Gao, G.; DesRoches, C.; Jha, A.K. The digital transformation of healthcare: Current status and the road ahead. *Inf. Syst. Res.* **2010**, *21*, 796–809.
2. Chaffey, D.; Ellis-Chadwick, F. *Digital Marketing: Strategy, Implementation and Practice*, 8th ed.; Pearson, 2022.
3. Davenport, T.; Kalakota, R. The potential for artificial intelligence in healthcare. *Future Healthc. J.* **2019**, *6*, 94–98.
4. European Data Protection Board. *Guidelines 3/2020 on the Processing of Data Concerning Health for the Purpose of Scientific Research in the Context of the COVID-19 Outbreak*; European Data Protection Board: Brussels, Belgium, 2020.
5. European Medicines Agency. *Guideline on Good Pharmacovigilance Practices (GVP)*; European Medicines Agency: Amsterdam, The Netherlands, 2021.

6. European Parliament; Council of the European Union. Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community Code Relating to Medicinal Products for Human Use. *Off. J. Eur. Communities* **2001**, *L311*, 67–128.
7. European Parliament; Council of the European Union. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 (General Data Protection Regulation—GDPR). *Off. J. Eur. Union* **2016**, *L119*, 1–88.
8. European Parliament; Council of the European Union. Regulation (EU) 2024/1689 Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act). *Off. J. Eur. Union* **2024**, *L2024/1689*.
9. International Federation of Pharmaceutical Manufacturers & Associations. *IFPMA Code of Practice: Ethical Promotion and Communication of Medicines*; IFPMA: Geneva, Switzerland, 2019.
10. Kaplan, A.M.; Haenlein, M. Users of the world, unite! The challenges and opportunities of social media. *Bus. Horiz.* **2010**, *53*, 59–68.
11. Kotler, P.; Kartajaya, H.; Setiawan, I. *Marketing 5.0: Technology for Humanity*; John Wiley & Sons: Hoboken, NJ, USA, 2021.
12. Kreps, G.L.; Neuhauser, L. New directions in eHealth communication: Opportunities and challenges. *Patient Educ. Couns.* **2010**, *78*, 329–336.
13. Kruse, C.S.; Frederick, B.; Jacobson, T.; Monticone, D.K. Cybersecurity in healthcare: A systematic review of modern threats and trends. *Technol. Health Care* **2017**, *25*, 1–10.
14. Moorhead, S.A.; Hazlett, D.E.; Harrison, L.; Carroll, J.K.; Irwin, A.; Hoving, C. A new dimension of health care: Systematic review of the uses, benefits, and limitations of social media for health communication. *J. Med. Internet Res.* **2013**, *15*, e85.
15. Norman, C.D.; Skinner, H.A. eHealth literacy: Essential skills for consumer health in a networked world. *J. Med. Internet Res.* **2006**, *8*, e9.
16. Ryan, D. *Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation*, 4th ed.; Kogan Page, 2016.
17. Smailhodzic, E.; Hooijsma, W.; Boonstra, A.; Langley, D.J. Social media use in healthcare: A systematic review of effects on patients and on their relationship with healthcare professionals. *BMC Health Serv. Res.* **2016**, *16*, 442.
18. Sørensen, K.; Van den Broucke, S.; Fullam, J.; Doyle, G.; Pelikan, J.; Slonska, Z.; Brand, H. Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health* **2012**, *12*, 80.
19. Topol, E.J. High-performance medicine: The convergence of human and artificial intelligence. *Nat. Med.* **2019**, *25*, 44–56.
20. U.S. Food and Drug Administration. *Prescription Drug Promotion: Questions and Answers*; Center for Drug Evaluation and Research, U.S. Food and Drug Administration: Silver Spring, MD, USA, 2023.
21. Ventola, C.L. Social media and health care professionals: Benefits, risks, and best practices. *P T* **2014**, *39*, 491–520.
22. Wang, Y.; Hossain, M.S.; Shum, P. Digital marketing in healthcare: Opportunities and challenges. *J. Bus. Res.* **2020**, *116*, 1–10.
23. World Economic Forum. *The Future of Jobs Report 2020*; World Economic Forum: Geneva, Switzerland, 2020.
24. World Health Organization. *Global Strategy on Digital Health 2020–2025*; World Health Organization: Geneva, Switzerland, 2021; pp. 94–98.

25. World Health Organization. *Health Promotion Glossary of Terms 2021*; World Health Organization: Geneva, Switzerland, 2021.
26. World Health Organization. *Ethics and Governance for Digital Health: A Global Framework for Responsible Use of Digital Technologies in Health*; World Health Organization: Geneva, Switzerland, 2022.
27. World Health Organization. *Infodemic Management: A Key Component of the COVID-19 Global Response*; World Health Organization: Geneva, Switzerland, 2022.
28. Zarocostas, J. How to fight an infodemic. *Lancet* **2020**, *395*, 676.

© 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).