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INFLUENCE OF DIGITALIZATION ON INTERACTIONS BETWEEN PHARMACEUTICAL COMPANIES AND HEALTHCARE PROFESSIONALS IN MOROCCO

INFLUENCE DE LA DIGITALISATION SUR LES INTERACTIONS ENTRE L'INDUSTRIE PHARMACEUTIQUES ET LES PROFESSIONNELS DE SANTE AU MAROC

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Abstract

In healthcare, digitalization has become omnipresent, precipitating substantial changes across various procedures and dimensions of the sector. Healthcare practitioners are now under pressure to integrate digital technologies into their daily routines to trim costs, streamline specific tasks, and elevate overall care standards. Nevertheless, doubts persist regarding the efficacy of the tools ushered in by this technological shift, particularly regarding their impact on healthcare professionals' contentment. With this backdrop, this article seeks to scrutinize this phenomenon by emphasizing the linkages between healthcare professionals' satisfaction and the digitalization of the pharmaceutical domain. Through the administration of a comprehensive questionnaire to 133 healthcare practitioners in Rabat, featuring 25 items, we conduct statistical analyses to gauge reliability (Cronbach's alpha), assess correlation between variables (Pearson coefficient), and empirically model interactions (linear regression). This study endeavors to illuminate the nuanced connection between digitalization and healthcare professionals' satisfaction, imparting valuable insights into the ongoing discourse within this realm.

Keywords: Digital; e-health; healthcare professionals; satisfaction; telemedicine.

Résumé

Dans le domaine de la santé, la numérisation est devenue omniprésente, entraînant des changements substantiels dans diverses procédures et dimensions du secteur. Les praticiens de la santé sont sous pression pour intégrer les technologies numériques dans leurs routines afin de réduire les coûts, améliorer des tâches spécifiques et élever les normes globales de soins. Mais, des doutes persistent quant à l'efficacité des outils apportés par ce changement, notamment en ce qui concerne leur impact sur les professionnels de la santé. Ainsi, cet article cherche à examiner ce phénomène en déterminant les liens entre la satisfaction des professionnels de la santé et la numérisation du secteur de santé. À travers les réponses au questionnaire de 133 praticiens de la santé à Rabat, comprenant 25 questions, nous menons des analyses statistiques pour évaluer la fiabilité (alpha de Cronbach), évaluer la corrélation entre les variables (coefficient de Pearson) et modéliser les interactions (régression linéaire). Cette étude élucide la connexion entre la numérisation et la satisfaction des professionnels de la santé, fournissant ainsi des perspectives précieuses pour le débat en cours dans ce domaine.

Mots clés : Digital ; e-santé ; professionnels de santé ; satisfaction ; télémédecine.

Introduction

The digital transformation is no longer a luxury but a necessity (Bengrich & Abdou, 2022). In an increasingly digitalized world, the pharmaceutical industry is undergoing a profound transformation that impacts not only its internal processes but also its interactions with healthcare professionals. The growing influence of digital technologies in the healthcare sector has been amplified by the COVID-19 pandemic, as highlighted by Ting, et al. (2020) in their analysis of digital technology and its impact on pandemic response. This shift towards digitalization has also been studied by Stoumpos, et al. (2023) (Hilmi et Kaizer, 2023), who examined digital transformation in the healthcare sector and its broader implications.

In the specific context of the relationship between the pharmaceutical industry and healthcare professionals, the increasing adoption of digital technologies has opened up new opportunities and also introduced new challenges. Researchers such as Rosa, et al. (2021) have explored the use of digital technologies in clinical trials, highlighting the current and future applications of these tools in the medical field. Similarly, the marketing practices of pharmaceutical companies and their impact on medical ethics have been examined in specific contexts, such as Morocco, as highlighted by Saad Eddine & Ammi (2018).

Furthermore, studies such as those of Petracca, et al. (2020) have examined the importance of context in the adoption of digital health technologies, highlighting the specific implications of the COVID-19 pandemic on their use and acceptance. Parviainen, et al. (2017) have also addressed the challenge of digitalization in practice, highlighting ways to leverage these technologies effectively. Fagherazzi, et al. (2020) have also provided specific recommendations for combating the pandemic through digital health strategies.

In this perspective, this article aims to explore the influence of the digitalization of the pharmaceutical industry on healthcare professionals' satisfaction. By integrating the different perspectives from existing literature, we will seek to understand the implications of this transformation on professional relationships and identify strategies to maximize the benefits while minimizing the risks associated with this shift towards digitalization. Hence, the central question of our research: **To what extent does the digitalization of the pharmaceutical industry meet the needs of healthcare professionals?** The answer to this question will allow us to advance an empirical research model aimed at explaining the interactions between the different facets of digitalization such as communication tools, training platforms, or telemedicine and online consultations, as well as healthcare professionals' satisfaction.

To ascertain the potential effect under examination, we utilized a hypothetico-deductive and quantitative methodology, manifested through the distribution of a questionnaire via WhatsApp to healthcare professionals situated in Rabat, Morocco. Sampling was conducted utilizing a non-probabilistic convenience method. Subsequently, the gathered data underwent analysis utilizing SPSS Statistics 25, including reliability assessments, chi-square tests, correlation analyses, and regression tests.

In addressing the core inquiry of this study, this article is structured into three main sections: a theoretical conceptual exploration to investigate potential hypotheses and establish the framework, a description of the survey methodology employed, and subsequent presentation of results and discussions.

1. Healthcare professionals' digitalization views: A social exchange theory perspective

The reason for the major transformation undergone by the pharmaceutical industry lies in the behavior of healthcare professionals. Stakeholders in the pharmaceutical sector frequently use advanced technologies to achieve their goals, particularly healthcare professionals, who are now turning towards digital health, seen as less costly and faster (Mydlo, 2021). In accordance with the social exchange theory, social behavior is conceptualized as an exchange process designed to optimize benefits and minimize costs (Surma, 2016). These healthcare professionals are increasingly interested in the opportunities provided by technological advances such as artificial intelligence, virtual training, and telemedicine (Robinson, 2022). The pharmaceutical industry is aware of this shift in habits among healthcare professionals, leading some industry giants like Sanofi to allocate significant sums to digital transformation. The extent of this transformation is also evidenced by the global increase in e-health spending from $32 billion in 2020 to $57 billion in 2021 (CBInsights, 2022). This digitization is becoming indispensable due to the solutions it provides, such as easy access to health information (Marinez-Pérez, et al., 2013; Petracca, et al., 2020), satisfaction of patients and healthcare professionals (Abimbola, et al., 2019), and the revolution of care offerings in hospitals (Jacquet, 2019; Rosa, et al., 2021; Stoumpos, 2023; Ubaldi, 2013). The digitalization of the pharmaceutical industry also allows for increased market share by integrating a new channel for advertising and information sharing (Mohamed, et al., 2023), or by facilitating the promotion of medical representatives (Zugasti Murillo, et al., 2022). The new configuration of communication in the pharmaceutical industry falls within the scope of

the new formula for digital marketing, which has proven effective with healthcare professionals (Jawaid & Ahmed, 2018; Kumar & Panigraphi, 2014). It is an opportunity to establish a permanent relationship with doctors, pharmacists, nurses, and paramedical staff, who are increasingly connected through social networks and websites.

1.1. Virtual communication tools in the pharmaceutical industry

The pharmaceutical industry has increasingly adopted virtual communication tools to interact with healthcare professionals, thus transforming how it promotes its products and services. A national survey conducted in Pakistan revealed that digital pharmaceutical marketing significantly influences physicians' healthcare decisions, highlighting the importance of these tools in practitioners' decision-making processes (Jawaid & Ahmed, 2018). Similarly, modern marketing techniques have been identified as an effective way to empower pharmaceutical sales teams by improving their communication with physicians (Kumar & Panigraphi, 2014).

Furthermore, social media and online platforms offer unique opportunities for communication and engagement between the pharmaceutical industry and healthcare professionals. A systematic review of social media uses in health communication highlighted potential benefits such as information sharing and the creation of professional communities, while also acknowledging certain limitations and challenges (Moorhead, et al., 2013). Similarly, a Spanish study highlighted the growing importance of digital visits, online education, and the interaction model between healthcare professionals and the industry, illustrating how digital transformation is shaping this relationship (Zugasti Murillo, et al., 2022).

Digital advertising and online information sharing play a central role in communication between the pharmaceutical industry and healthcare professionals. A framework of principles for digitally providing medical information to healthcare professionals emphasizes the importance of ensuring the accuracy and relevance of shared information in online advertising and communication (Mohamed, et al., 2023). These advancements in virtual communication tools redefine interactions between the pharmaceutical industry and healthcare professionals, offering new opportunities for education, collaboration, and healthcare promotion. Based on these observations, we can formulate the following hypothesis:

H1: The virtual communication tools provided by the digitalization of the pharmaceutical industry positively impact healthcare professionals' satisfaction.

1.2. Virtual training platforms and e-learning in the pharmaceutical industry

Virtual training platforms and e-learning have revolutionized how the pharmaceutical industry provides ongoing training to its stakeholders and promotes the adoption of its products. A study conducted among pharmacists working in a public healthcare system shed light on the use of e-learning in continuing education, highlighting the experiences and challenges faced by these healthcare professionals (Lorenzoni, et al., 2021). Similarly, a theoretical review on the value of telehealth as a patient-oriented digital innovation emphasizes the importance of virtual training platforms in providing information effectively and conveniently to healthcare professionals (Abimbola, et al., 2019).

The COVID-19 pandemic has accelerated the adoption of digital health technologies, underscoring the crucial importance of virtual training tools in professional development, as well as in disseminating relevant information. Digital health strategies have been implemented worldwide to address the challenges posed by the pandemic, offering unique opportunities to enhance continuing education and access to medical information (Belasri & Mohammed, 2023; Petracca, et al., 2020).

Furthermore, digital technologies have been identified as an effective means of strengthening relationships with healthcare professionals and retaining these key players. Digital pharmaceutical marketing campaigns have a significant impact on physicians' prescription decisions, highlighting the importance of virtual training tools in providing accurate and up-to-date information (Jawaid & Ahmed, 2018; Kumar & Panigraphi, 2014; Robison, 2022). Thus, virtual training platforms and e-learning play a crucial role in the adaptation and growth of the pharmaceutical industry, offering innovative ways to interact with healthcare professionals and ensure evidence-based clinical practices. Based on these findings, we can propose the following hypothesis:

H2: Virtual training platforms established by the digital vector of the pharmaceutical industry positively impact healthcare professionals' satisfaction.

1.3. Digital channel advertising in the communication strategy of the pharmaceutical industry

In light of current research and trends, it is clear that advertising on digital channels is playing an increasingly prominent role in the communication strategy of the pharmaceutical industry. Pharmaceutical companies are faced with the challenge of adapting to society's growing digitalization, which involves rethinking their marketing approaches to leverage the benefits

offered by digital channels (Parviainen, et al., 2017; Vanni, 2018). This transition to digital advertising is also evident in the field of medical education, where medical students are increasingly exposed to pharmaceutical industry marketing efforts via online platforms and social media (Bellin, et al., 2004; Camacho, 2014).

In the specific context of France, the promotional policies of pharmaceutical companies are also evolving to integrate digital channels more into their communication strategy. The perspectives of this reconfiguration highlight the growing importance of these channels in promoting pharmaceutical products and interacting with healthcare professionals (Saad Eddine & Ammi, 2018). Furthermore, a national survey conducted in Pakistan revealed the significant impact of digital pharmaceutical marketing on physicians' healthcare decisions, thus emphasizing the effectiveness of advertising on digital channels in influencing practitioners (Kumar & Panigraphi, 2014; Jawaid & Ahmed, 2018).

Additionally, patient empowerment, an increasingly discussed concept in the healthcare field, also has implications for pharmaceutical advertising. Marketing strategies must now consider the increased role of patients in healthcare decision-making and their access to information via the internet and social media (Camacho, 2018; Ding, et al., 2014). The interpretation derived from these observations is as follows:

H3: Advertising on digital channels adopted by the pharmaceutical industry positively impacts healthcare professionals' satisfaction.

1.4. Telemedicine and online consultation

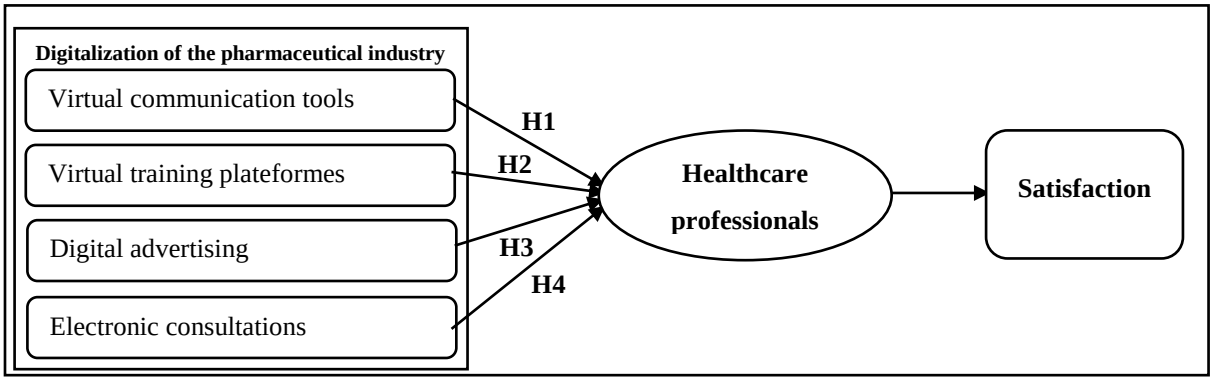
Healthcare dynamics are constantly evolving, influenced by technological advancements. Among these developments, telemedicine and online consultations have taken a prominent role, reshaping the way medical services are delivered, especially after the COVID-19 period. A systemic analysis of social networks in the context of telemedicine reveals the multiple facets of these new tools, highlighting both their benefits and limitations (Moorhead, et al., 2013). Concurrently, the digital transformation of the pharmaceutical sector is altering interactions between the industry and healthcare professionals, integrating virtual visits and other digital solutions (Zugasti Murillo, et al., 2022).

Relevantly, research has underscored the significant impact of remote visits or teleconsultations on physicians' clinical decisions, suggesting an influence in the treatment process (Jawaid & Ahmed, 2018; Mydlo, 2021). These findings are corroborated by the strategic changes observed within the pharmaceutical industry, marked by increased

partnerships with companies specializing in digital health (Robinson, 2022). This evolution towards a more advanced digitization of medical services and pharmaceutical promotion underscores the importance of understanding and integrating these new paradigms into healthcare delivery, leading us to formulate the following hypothesis:

H4: Teleconsultation positively influences healthcare professionals' satisfaction.

Figure N°1: Conceptual Model of the Survey



Source: Developed by the authors based on the literature review

Figure n°1 outlines all the hypotheses that the analysis of empirical data allows to confirm or reject the null hypothesis. The interactions between satisfaction (dependent variable) and the digitalization of procedures in the pharmaceutical industry (independent variables) correspond to the parameters of the entire empirical model of our survey.

2. Methodology

Taking into consideration the findings highlighted by the research mentioned in the previous section demonstrates that healthcare professionals' satisfaction presents hypothetical links with the adoption of digitalization by the pharmaceutical industry. Analyzing this phenomenon requires adopting a quantitative approach based on a hypothetico-deductive approach. According to this logic, the survey should focus on healthcare professionals in a context that allows for the collection and analysis of interactions.

Therefore, we chose the Moroccan context and specifically healthcare professionals practicing in Rabat. We administered a questionnaire composed of five sections including satisfaction (dependent variable), virtual communication tools, virtual training tools, digital advertising, and telemedicine. Each section comprises five questions measured on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree".

The population targeted by our survey comprises healthcare professionals practicing under the provincial delegation of Rabat. To ensure comprehensive coverage of the entire delegation,

we administered the questionnaire via various channels, primarily WhatsApp groups, to provide each member of the population with an equal chance of selection, akin to simple random sampling.

In the end, we collected 133 responses, with a gender breakdown of 74% female and 26% male. Regarding the profession of the respondents, 15% are nurses, 77% are doctors, and 8% are pharmacists. 38% of the respondents work in health centers, 28% in local hospitals, 18% in oncology centers, while the rest work either in university hospitals (7%), regional hospitals (5%), or private hospitals (5%).

From the items belonging to the studied sections, we first calculated Cronbach's Alpha to assess the internal reliability of our variables. Subsequently, we calculated the mean of the five components of each section in order to analyze the Pearson correlation coefficient (bivariate analysis) and proceed with the multiple regression of the research variables (empirical modeling). The multiple analysis was preceded by an assessment of the risk of multicollinearity. All analyses were performed using SPSS Statistics 25.

3. Results and discussion

To analyze the interactions between healthcare professionals' satisfaction and the digitalization of health laboratory procedures, we analyzed the data collected from 133 responses to the administered questionnaires. The first step of the analysis is based on calculating Cronbach's alpha, which aims to assess the internal reliability of the items. The survey questionnaire comprises 4 sections including virtual communication tools, virtual training platform, digital advertising, as well as telemedicine and online consultations.

These 4 sections represent our independent variables, while the dependent variable is linked to healthcare professionals' satisfaction. Table n°1 presents the assessment of internal reliability based on the reliability coefficients derived from Cronbach's alpha:

Table N°1: Internal reliability of measurement scales

Variable	Cronbach's alpha
Satisfaction of healthcare professionals	0,943
Virtual communication tools	0,944
Virtual training platform	0,937
Digital advertising	0,942
Telemedicine and online consultations	0,946

Source: The authors, based on the results obtained from SPSS Statistics 25

The assessment of internal reliability of the questionnaire items yielded a value of 0.970, which represents an acceptable threshold for internal consistency. This result indicates that the measurement scales adopted are reliable for analyzing the interactions between healthcare professionals' satisfaction and the digitalization of healthcare procedures.

To analyze the impact of the independent variables related to the digitalization of pharmaceutical laboratories' procedures, the empirical study relied on both univariate and multivariate analyses. The univariate analysis primarily used the Pearson correlation coefficient.

The interpretation of the Pearson correlation coefficient is based on evaluation intervals (Schober, et al., 2018) of the intensity of the impact between two variables, as follows:

- A coefficient between 0 and 0.5 represents a weak positive correlation, while a coefficient above 0.5 indicates a strong impact.
- A coefficient between -0.5 and 0 represents a weak negative correlation, whereas a coefficient below -0.5 corresponds to a strong negative correlation.

Table 2 presents the results of the bivariate analysis based on the Pearson correlation between the independent variables and healthcare professionals' satisfaction.

Table N°2: Correlation between Healthcare Professionals' Satisfaction and Independent Variables

Variable	Satisfaction	Virtual communication	Virtual training	Digital advertising	Telemedicine
Satisfaction	1,000	0,540*	0,654*	0,627*	0,402*
Virtual communication	0,540	1,000	0,444	0,465	0,598
Virtual training	0,654*	0,444	1,000	0,599	0,599
Digital advertising	0,627*	0,465	0,599	1,000	0,528
Telemedicine	0,402*	0,598	0,599	0,528	1,000
* The correlation is significant at the 1% level.					

Source: The authors, based on the results obtained from SPSS Statistics 25

Based on the results of the correlation between healthcare professionals' satisfaction and the digitalization of pharmaceutical laboratories' procedures, we observe that virtual communication ($r = 0.540$, $p < 0.01$) is positively and significantly correlated with the degree of satisfaction of healthcare professionals. This means that doctors, pharmacists, and nurses

are satisfied with pharmaceutical laboratories that have the necessary tools for virtual communication.

This finding is supported by the work of Jawaid & Ahmed (2018), as the digital medium provides an opportunity for pharmaceutical laboratories to strengthen their relationships with healthcare professionals. This strengthening is based mainly on the interactivity and versatility of the digital medium.

In addition to virtual communication, training tools are also a causal link to healthcare professionals' satisfaction ($r = 0.654$, $p < 0.01$), given the strong correlation between the two variables. Moreover, this relationship is positive, demonstrating that the behavior of the Moroccan healthcare sector is more interested in pharmaceutical laboratories that have integrated training platforms. This result is logical since the professions of healthcare professionals require continuous training to provide quality care. These results echo the work of Moorhead, et al. (2013), as training is among the primary concerns of healthcare professionals.

On the other hand, telemedicine ($r = 0.402$, $p < 0.01$) and digital advertising ($r = 0.627$, $p < 0.01$) are positively correlated with healthcare professionals' satisfaction. The difference lies in the intensity of the relationship, as the Pearson correlation coefficient of telemedicine corresponds to a moderate impact on satisfaction, while that of digital advertising represents a strong impact on the variable being explained. This observation is similar to the conclusions drawn by Kumar & Panigraphi (2014).

Following the positive and relevant results of the Pearson correlation, we conducted a multivariate analysis to assess the multilateral interactions between the research variables. However, before proceeding with this modeling, we need to eliminate the risk of multicollinearity among the research parameters. The process of eliminating the aforementioned risk is generally based on calculating the variance inflation factor (VIF), the value of which should be less than 5 (Marcoulides, et al., 2019). Table 3 presents the variance inflation factors of the independent variables related to the digitalization of pharmaceutical laboratories' procedures.

Table N°3: Variance Inflation Factors of Independent Variables

Variable	Collinearity Statistics	
	Tolerance	VIF
Virtual communication	0,610	1,640
Virtual training	0,529	1,889
Digital advertising	0,577	1,735
Telemedicine	0,491	2,036

Source: Authors, based on the results obtained from SPSS Statistics 25

The variance inflation factors presented in Table 3 are below the value of 5, which allows us to eliminate the risk of multicollinearity between the research variables and proceed with the empirical modeling through multiple linear regression. Table 4 presents the results of the multiple linear regression between healthcare professionals' satisfaction and the digitalization of pharmaceutical procedures.

Table N°4: Multiple Linear Regression of Research Variables

Variable	Beta	Student's t	Sig.
Constant		2,344	0,021
Virtual communication	0,329	4,510	0,000
Virtual training	0,456	5,825	0,000
Digital advertising	0,327	4,357	0,000
Telemedicine	-0,240	-2,953	0,004
R2 = 0,584			

Source: Authors, based on the results obtained from SPSS Statistics 25

The results of the multiple linear regression continue the same trend as the Pearson correlation coefficient analysis, with an R2 of 0.584, meaning that approximately 59% of the variance in healthcare professionals' satisfaction is explained by virtual communication, virtual training, digital advertising, and telemedicine.

Testing the research hypotheses outlined in our study is based on the statistical inferences derived from the t-test and the p-value.

Table 4 shows that virtual communication has a positive and significant impact ($\beta = 0.329$, $p < 0.01$) on healthcare professionals' satisfaction, confirming hypothesis 1. Similarly, the hypothesis that virtual training provided by pharmaceutical companies influences healthcare

professionals' satisfaction is confirmed ($\beta = 0.456$, $p < 0.01$). The trend is similar for the remaining two hypotheses, as digital advertising ($\beta = 0.327$, $p < 0.01$) and telemedicine ($\beta = -0.240$, $p < 0.01$) show satisfactory regression results. The outcomes of the linear regression analysis led to similar conclusions as those drawn in prior studies (Jawaid & Ahmed, 2018; Kumar & Panigraphi, 2014; Moorhead, et al., 2013; Zugasti Murillo, et al., 2022). However, the direction of the impact of telemedicine is contrary to our assumptions, as the regression parameter sign is negative.

Conclusion

Healthcare professionals' satisfaction with the digitalization of pharmaceutical laboratory procedures is influenced by virtual communication and training, online advertising, and telemedicine. The results of our survey of 133 healthcare professionals demonstrate that their satisfaction largely relies on these factors. Virtual communication is also the main digital marketing channel adopted by pharmaceutical companies (Jawaid & Ahmed, 2018). It is an opportunity for the pharmaceutical industry to interact continuously and rapidly with the healthcare sector. Alongside communication, training is a crucial issue for healthcare professionals, as their roles require them to be informed about procedures, protocols, and all necessary information in the field. In this same vein, online advertising becomes essential in a largely connected world, where healthcare professionals are no exception (Kumar & Panigraphi, 2014).

Echoing the nature of scientific inquiry, our exploration of digitalization's impact on interactions within the pharmaceutical sector offers several notable implications, including:

- **Strategic Decision-Making:** Insights from the study could inform pharmaceutical companies' strategic decisions regarding digitalization initiatives, such as the development of digital marketing strategies or the implementation of digital tools for communication with healthcare professionals.
- **Resource Allocation:** The study findings may guide the allocation of resources towards digitalization efforts, such as investing in digital platforms or training for healthcare professionals on using digital tools effectively.
- **Partnership Development:** Understanding the impact of digitalization on interactions between pharmaceutical companies and healthcare professionals could

lead to the development of collaborative partnerships aimed at optimizing digital engagement and improving patient care.

- **Regulatory Compliance:** Insights from the study may also have implications for regulatory compliance, as pharmaceutical companies may need to ensure that their digitalization efforts adhere to relevant laws and regulations governing interactions with healthcare professionals.
- **Research Advancement:** From a scientific perspective, the study could contribute to the advancement of knowledge in the field of digital health and pharmaceutical marketing by providing empirical evidence of the impact of digitalization on professional interactions in the healthcare sector.

Overall, the managerial and scientific implications of the study can guide both industry stakeholders and researchers in leveraging digital technologies to enhance interactions between pharmaceutical companies and healthcare professionals in Morocco.

However, scientific research is not without constraints, as our study has some limitations and sets the stage for further future research. We focused on certain variables such as virtual communication and training, advertising, and telemedicine, but there are other variables like Customer Relationship Management (CRM) or parameters related to the profiles of the respondents (age, gender, role, or specialty).

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