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Happy with our chatbot? Service innovation, digital marketing performance, and the role of user technological proficiency

Mohammed Salem, Ralf Wagner

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HAPPY WITH OUR CHATBOT? SERVICE INNOVATION, DIGITAL MARKETING PERFORMANCE, AND THE ROLE OF USER TECHNOLOGICAL PROFICIENCY

¿CONTENTO CON NUESTRO CHATBOT? INNOVACIÓN EN EL SERVICIO, DESEMPEÑO DEL MARKETING DIGITAL Y EL PAPEL DE LA COMPETENCIA TECNOLÓGICA DEL USUARIO

Mohammed Salem*
Department of Business and Economics, Faculty of Economics and Management, University of Kassel, Kassel, Germany. Department of Technology Management, University College of Applied Sciences, Gaza, Palestine

Ralf Wagner**
Department of Technology Management, University College of Applied Sciences, Gaza, Palestine

* Corresponding author: Mohammed.Salem@uni-kassel.de

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ABSTRACT

This study investigates how innovative digital tools contribute to the success of modern marketing strategies, with a focus on three core functionalities that enhance user experience. Survey data from 326 university students in Germany reveal that these features significantly impact satisfaction levels. Additionally, the research introduces user proficiency with digital technologies as a moderating factor, amplifying the positive effects of these tools on overall engagement. The results provide actionable guidance for companies seeking to strengthen customer satisfaction through cutting-edge solutions. The study also highlights promising

* Marketing professor at the University College of Applied Sciences in Gaza and the University of Kassel in Germany, with a focus on addressing societal challenges through innovative demarketing approaches.

** Professor for Sustainable Marketing at the University of Kassel, Germany. His research interests cover interactive marketing and intercultural divergences of human behavior.

More information about the authors at the end of this article.

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avenues for future research, particularly in relation to evolving technologies and the impact of cultural contexts on user interaction and perception.

Keywords: Chatbot Adoption, Seamless Payment Systems, Feedback Integration Systems, User Technology Proficiency, User Satisfaction.

RESUMEN

Este estudio investiga cómo las herramientas digitales innovadoras contribuyen al éxito de las estrategias modernas de marketing, con especial énfasis en tres funcionalidades clave que mejoran la experiencia del usuario. Los datos de una encuesta aplicada a 326 estudiantes universitarios en Alemania revelan que dichas características influyen de manera significativa en los niveles de satisfacción. Asimismo, la investigación introduce la competencia del usuario en el uso de tecnologías digitales como un factor moderador, el cual amplifica los efectos positivos de estas herramientas sobre el compromiso general. Los resultados ofrecen recomendaciones prácticas para las empresas que buscan fortalecer la satisfacción del cliente mediante soluciones de vanguardia. El estudio también señala vías prometedoras para investigaciones futuras, especialmente en relación con la evolución de las tecnologías y la influencia de los contextos culturales en la interacción y percepción del usuario.

Palabras clave: Adopción de Chatbots, Sistemas de Pago sin Fricciones, Sistemas de Integración de Retroalimentación, Competencia Tecnológica del Usuario, Satisfacción del Usuario.

1. Introduction

Modern businesses are using cutting-edge technologies to improve customer service and engage clients in the context of the evolving digital economy (Chen et al., 2025). The dominant emphasis of digital marketing has historically resided in outreach; however, its effectiveness now is determined by the integration of technological innovation into the processes of service delivery. The relationship between service innovation and digital marketing constitutes a valuable, albeit not extensively studied, area that examines the impact of new tools and systems on service delivery to foster customer experience, loyalty, and advocacy (Al-Adwan et al., 2025).

This research examines the role of major service innovations: integration of chatbots, automated payment systems, and automated feedback systems on the success of digital marketing, as measured by customer satisfaction. There is a growing recognition that such innovations change not only the ways services are provided, but also how consumers perceive brands and engage with them through digital channels (Salvietti et al., 2025). There is a noticeable lack of research on the individual and synergistic effects of these innovations on user-oriented results (Fleury & Chaniaud, 2024).

Additionally, the technological skills of users may impact the reception of the innovations—consumers who are digital natives may appreciate

automated systems, while more traditional users may lean toward older methods of service delivery. These details indicate that the correlation between service innovation and outcomes in digital marketing probably has user characteristics as their key determinants (Ku, 2024).

To examine these relationships, the study adopts a quantitative research design using survey data collected from users across banking, insurance, hospitality, and education sectors. The data were analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) to test both direct and moderating effects. This approach allows for assessing the relative importance of each service innovation on user satisfaction while accounting for variations in technological proficiency.

Initial results indicate that seamless payment systems exert the strongest impact on user satisfaction, followed by feedback integration and, lastly, chatbot adoption. In industries such as banking and insurance, this reflects customers' high sensitivity to transaction security and efficiency, while in hospitality and education, timely feedback and interaction quality play a more visible role in shaping trust and engagement. The relatively lower effect of chatbots may stem from functional limitations or user hesitation toward automated support across sectors. For managers, these findings highlight the importance of prioritizing reliable payment solutions, while also strengthening feedback mechanisms and progressively enhancing chatbot capabilities, with strategies tailored to the technological proficiency of their customer base.

The primary focus of this research is to analyze the effect that service innovation has on the performance of digital marketing, while considering the impact that a user's technological proficiency has on this relationship. The study is guided by two research questions: First, what is the impact of integrating a chatbot, a seamless payment system, and feedback loop automation on digital marketing user satisfaction? Second, how does user technological understanding influence the usefulness of the innovations towards satisfaction?

This study addresses several key gaps in the existing literature. Previous studies (Liu et al., 2025) considered the domains of service innovation and digital marketing as separate entities with very little synergetic integration between the two. Furthermore, most of the research addressing the impact of single technologies such as chatbots or mobile payments has done so in a siloed manner, without examining the broader lens of multiple innovations working together toward a user-centric solution. There's also a significant gap in the available literature focusing how contextual factors like user expertise, impact the effectiveness of such technologies (Saihi et al., 2024).

The uniqueness of this study stems from its multi-layered approach. It doesn't only evaluate if service innovation affects the performance of digital marketing but also elaborates the degree to which such impact is felt. This framework enables a more sophisticated understanding of the ways in which a company can strategically deal with innovation as opposed to simply adopting new technologies out of instinct or trending patterns.

The contribution of this research is threefold. From a theoretical standpoint, this research positions service innovation as a significant component of the success of Digital Marketing by providing broad metrics such as satisfaction and advocacy. From an empirical standpoint, it investigates the impact of various forms of innovation on performance and establishes the underlying quantitative relationships between these variables. From a practical standpoint, the research helps marketers and service designers improve their strategies by guiding them to the appropriate framework of innovations tailored to their customers. This information is crucial for many companies that want to improve their position in the market, especially in an increasingly competitive and technologically advanced world.

Through exploring the facets of service innovation from both a technological and user perspective, this study contributes to the understanding concerning the drivers of successful digital marketing today. As such, there is an urgent need to understand how operational innovations can be strategically integrated with marketing performance while keeping customer experience central to digital transformation.

2. **Theoretical background and hypotheses testing**

2.1. *Technology acceptance model*

The adoption of modern digital services such as chatbots, seamless payment systems, and feedback integration systems can be thoroughly evaluated with the help of the Technology Acceptance Model (TAM) (Sfar et al., 2025). According to TAM, usefulness and ease of use of a given technology affect the intention to adopt that technology and subsequently influences usage behavior (Cao et al., 2025). These assumptions are in close agreement with the independent variables of this study, as each of these innovations attempts to enhance service delivery and user experience. For instance, chatbots and payment systems are anticipated to enhance these innovations' perceived convenience and efficiency, while feedback tools enhance relevance and control. TAM

aids in explaining differences in user satisfaction and engagement and is relevant for assessing the impact of technological features on favorable user outcomes in digital marketing contexts (Ezeudoka & Fan, 2024).

2.2. *User satisfaction*

Customer satisfaction is relevant for assessing the effectiveness of a business's digital marketing strategy as it indicates if customer expectations were met. It encompasses the emotional and cognitive reactions individuals have to a digital platform. Innovations such as chatbots, seamless payment systems, and feedback mechanisms enhance satisfaction (Al-Shafei, 2025). These innovations help improve functionality and customer experience, making business transactions easier. Improvements to these aspects help foster customer loyalty that leads to repeat usage. Satisfaction ultimately translates to users recommending the brand as an advocate (Aljarah et al., 2024). In this era, forward-thinking companies strive to eliminate satisfaction gaps to improve customer retention. It serves as both an operational and strategic objective . Satisfaction fosters business growth, a competitive edge, and drives the needs of the organization. Service satisfaction is often driven by competition within industry services.

2.3. *Factors affecting user satisfaction*

2.3.1. Chatbot adoption in digital marketing

Chatbots mark a notable development in the scope of modern marketing. They automate customer service and provide instant responses tailored to an individual's needs (Bhardwaj et al., 2025). With the aid of artificial intelligence and natural language processing, chatbots manage a large volume of interactions, providing support that can be scaled. Such innovative advancements in business not only improve efficiency, but also allow for immediate responses and tailored recommendations. By using chatbots, information is compiled, allowing for data-driven marketing strategies based on consumer behavior patterns. Furthermore, with chatbots, businesses can improve lead generation by guiding potential customers through the sales funnel. Chatbots, reduce the need for human involvement, which saves a great deal of time and resources for businesses, and, when accompanied with improved customer retention, this makes chatbots a vital component in digital marketing. The automation of processes using

'bots' allows businesses to remain relevant within a competitive market. With this technology, businesses are able to respond to market demands that require rapid and personalized service. In the evolving digital world, long-term strategic planning incorporates bots as one of the essentials (Xia & Shannon, 2025). On the basis of the aforementioned, we postulate:

H1. Chatbot adoption has a favorable impact on the user satisfaction.

2.3.2. Seamless payment systems in service innovation

The use of seamless payment systems boosts social strategies and customer satisfaction (Putrevu & Mertzanis, 2024). Tools such as handheld mobile wallets, one-click payments, and e-commerce peripheral systems expedite transactions at various levels. Payment convenience secures user satisfaction, while these systems ease payment processes. This results in an increase in user satisfaction and helps reclaim revenue lost due to cart abandonment (Faraz & Anjum, 2025). Known payment types add value by enabling smoother payment processes. Seamless payments, on the other hand, are critical for driving customer loyalty and increasing trust from a marketing standpoint. With the expanding fields of retargeting, seamless payments with advanced systems log customers' behavioral patterns, identifying relevant marketing initiatives (Theodorakopoulos & Theodoropoulou, 2024). Enhanced customer satisfaction driven by personalized promotions using data acquired from advanced payment systems further increases customer participation with the brand. Through smooth payment systems, businesses acquire higher revenue while attaining long-term sales growth. Compared to traditional payment systems, these types of systems improve brand reputation due to the guarantees provided and the secured transactions. Seamless payments are indisputable in making or breaking competition in the digital industry. Henceforth, we present the following hypothesis:

H2. Seamless payment systems have a favorable impact on user satisfaction.

2.3.3. Feedback integration systems in service innovation

Following the advances outlined by Narayan et al. (2022), feedback integration systems allow businesses to collect, analyze, and act on customer opinions and suggestions. These systems assist businesses in improving products, services, and marketing by providing data that can

be acted upon. Instant feedback provides companies with a snapshot of customer perception, allowing rapid change. Implementing feedback on service innovation demonstrates to customers that their contribution is appreciated, which strengthens trust and loyalty. It also enables businesses to strengthen the customer's relationship with the business, thus making marketing efforts more targeted (Nguyen et al., 2024). By assisting in making decisions, these frameworks enable organizations to remain proactive concerning developing issues, which assists in preventing problems from arising. This active interaction is expected to materialize in improved customer satisfaction and engagement. By using feedback in digital marketing approaches, brands can enhance their image. If companies heed comments made about their services, they can improve the overall experience that customers have with their services and remain in business. Based on the aforementioned, we hypothesize that:

H3. Feedback integration systems have a favorable impact on user satisfaction.

2.4. *The moderating role of user technology proficiency*

While the direct effects proposed in H1–H3 may appear intuitive, our primary theoretical contribution lies in theorizing and testing the moderating role of user technology proficiency. Prior research in service innovation and technology adoption largely treats user capabilities as background characteristics or control variables. Drawing on technology readiness theory and service-dominant logic, we argue that proficiency is not simply an enabler but a shaper of satisfaction outcomes, capable of both amplifying and attenuating the benefits of innovations such as chatbots, seamless payments, and feedback integration systems. This dual-pathway view challenges the common "more innovation is always better" assumption by introducing the concept of capability–innovation fit as a critical boundary condition. In doing so, we extend the understanding of how individual differences interact with service innovations to influence satisfaction, offering a more nuanced and context-sensitive explanation than current models provide.

User technology proficiency significantly impacts the effectiveness of digital marketing and service innovations. Users who are more proficient with technology tend to interact with its advanced elements, such as mobile applications, AI-driven recommendations, and so on. On the other hand, users with lower levels of proficiency tend to use traditional oral communication while incorporating simple interfaces (Tan et al., 2025). It is crucial

to look at all users without regard to their technological proficiency, and this also applies to service design and marketing campaigns. Social media, educational content, customer support, and guiding platforms should be as uncomplicated as possible (Shahin et al., 2024). Proficiency with technology helps companies understand in which areas marketing practices will be more inclusive and effective. Businesses must focus on different degrees of proficiency, which results in higher user engagement boosted by increased overall satisfaction. The degree of proficiency with technology also affects the interaction between consumers and new innovations, directly impacting the rate of adoption. The balance achieved by advanced options accompanied by simplified features allows other scope of outreach expansion. Customer commitment and success are policies of inclusion that leverage those and drive customers' interests in using the service (Zaghloul et al., 2024). On the basis of the aforementioned, we postulate:

H4. User technology proficiency strengthens the relationship of (a) Chatbot adoption, (b) Seamless payment systems, and (c) Feedback integration systems with user satisfaction.

As shown in Figure 1, the dependent variable "user satisfaction" is linked to the identified independent variables which include: "chatbot adoption," "seamless payment systems," and "feedback integration systems." Additionally, user technology proficiency is highlighted in the figure as a moderating variable.

3. **Methodology**

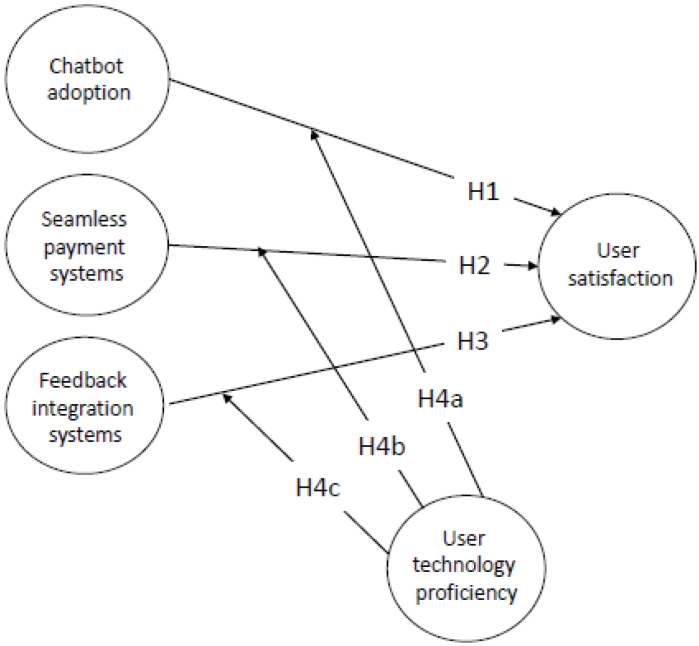
3.1. *Questionnaire*

The questionnaires were filled out by 326 students from University X in Germany [the university remains anonymous during the review process.]. A pilot study was conducted to ensure all participants understood the questions by checking the appropriateness and accuracy of the content in the local context. Since the target population was limited to Germany, back translation methods, described as translating a version into German and then back into English, were adopted to confirm that the content intended to be used was aligned with the questions posed and meant what they claimed. Therefore, the accuracy of the survey is confirmed.

For the purpose of examining the hypotheses, a self-administered questionnaire was developed and shared through the Google Forms plat-

Figure 1

The research framework



form. The participants were sent links to the social media group and were pre-screened to ensure they were enrolled as students at University X in Germany. If the response was 'No', then that participant was restricted from proceeding with the rest of the questionnaire. As mentioned before, the questionnaires were completed by 326 respondents.

A survey tool with five parts was created using a 5-point Likert scale, where 1 means "Strongly Disagree" and 5 means "Strongly Agree." (1) The first part measured Chatbot adoption based on the work of Bhardwaj et al. (2025), integrating five items. (2) The item regarding seamless payment systems was measured using five items and was adapted from Faraz & Anjum (2025), and Putrevu & Mertzanis (2024). (3) The feedback integration systems were studied using five items based on Narayan et al. (2022) and Nguyen et al. (2024). (4) The user technology proficiency was addressed by using five items from Tan et al. (2025) and Zaghloul et al. (2024). Finally, (5) we used five items from Al-Shafei (2025) and Aljarah et al. (2024) to measure user satisfaction.

3.2. *Data collection and sample*

We chose German university students for this study because they possess a high degree of digital literacy, access to new technologies, and are actively involved with the internet. This demographic engages with the digital marketing ecosystem both as consumers and as potential professionals, which helps in understanding the impact and perception of service strategies offered in a marketing blend paradigm. Students from Germany also stand out because of the country's focus on innovation and digital transformation in the context of higher education, as it allows one to study the relationship between service innovation and the results of digital marketing.

The study participants were approached using snowball sampling, where participants from the first survey were asked to recruit additional participants of their choice. Utilizing this approach enabled the researchers to reach a wider audience and improve the diversity of the study sample. The sampling technique was used because it was readily available and convenient for the researchers, acquiring an appropriate sample size with minimal resources and logistics.

Given the study's focus on emerging service innovations such as chatbots, seamless payment systems, and feedback integration tools, we employed a student-based snowball sampling approach. This population is well-suited because students are frequent and active users of these technologies in both academic and personal contexts, making them well-positioned to evaluate their effects on user satisfaction. Accordingly, we frame this study as exploratory and emphasize the need for future research to validate the model with more diverse and representative samples.

The average age of the students was 19.28 (SD = 1.02) years of age, with a minimum of 18 and a maximum of 23. Of those surveyed, 54.6% (n = 178) were male and 45.4% (n = 148) were female.

3.3. *Statistical analysis*

The data was analyzed through composite-based structural equation modeling. Analysis was performed using SmartPLS because of its efficacy with non-normally distributed data. PLS-SEM was chosen over covariance-based SEM due to its emphasis on improving the predictive accuracy of results. Given that this study seeks to investigate respondents' behaviors and underlying reasoning, PLS-SEM is more suitable for achieving these goals, whereas covariance-based SEM is generally better suited for comparing theoretical frameworks (Hair et al., 2019).

4. **Results**

4.1. *Measurement model assessment*

The data were analyzed based on a PLS-SEM model-fitting approach. The tests to compute the structural equation models were conducted in two phases. The first phase addressed with the validity and reliability issues of the outer model, while the second one assessed the inner model. Moreover, reliability, internal consistency, and construct validity were applied in the development of the scales. To assess discriminant validity, the square root of the Average Variance Extracted (AVE) for each construct was compared against the correlations among the latent variables. In order to measure the explanatory power of relationships describing the hypotheses of the study model, the Coefficient of Determination (R^2) was calculated (see Table 1).

The results of Harman's single-factor test indicated that no single factor explained most of the variance, implying that common method bias was not a major issue. The first factor accounted for only 24.458% of the total variance, which is well below the 50% threshold, thereby confirming the validity of the measurement model. Furthermore, an assessment of Variance Inflation Factors (VIF) showed that all values were below the recommended cutoff of 5, suggesting the absence of multicollinearity problems (see Table 2).

4.2. *Structural model assessment*

The outcomes from the structural model assessment that investigated the relationship among different variables within the suggested model are shown in Table 3. The findings indicate that there is a positive relationship between user satisfaction and chatbot adoption ($\beta = 0.196$, $t = 2.465$, $p < 0.000$), seamless payment systems ($\beta = 0.225$, $t = 2.623$, $p < 0.000$), and feedback integration systems ($\beta = 0.216$, $t = 2.563$, $p < 0.000$). These findings also provide evidence to support H1, H2, and H3. These results also support the moderating role of user technology proficiency in the relationships between chatbot adoption ($\beta = 0.189$, $t = 2.165$, $p < 0.034$); seamless payment systems ($\beta = 0.174$, $t = 2.224$, $p < 0.012$); and feedback integration systems ($\beta = 0.181$, $t = 2.486$, $P < 0.000$). The composite model SRMR value for the independent and dependent variables was estimated at 0.078. The adjusted R^2 value was 0.538. Hence, the model indicates that about 53.8% of the variation in user satisfaction could be attributed to the independent factors considered.

Table 1

Reliability and loading values of the constructs

Construct	Item	FL*	CA*	CR	AVE*
Chatbot Adoption	The use of chatbots improves the speed and efficiency of customer service interactions.	0.793	0.826	0.784	0.535
	Chatbots provide personalized responses that align with customer needs and preferences.	0.758			
	Chatbot adoption has reduced customer waiting times.	0.772			
	Chatbots have helped businesses resolve customer issues without human intervention.	0.769			
	The availability of chatbots has enhanced the overall user experience on digital platforms.	0.761			
Seamless Payment Systems	Seamless payment systems have made the checkout process faster and more efficient.	0.827	0.848	0.813	0.561
	The integration of seamless payment methods leads to reduce cart abandonment rates.	0.806			
	Users can easily complete purchases using multiple payment options.	0.782			
	Seamless payment systems enhance the overall trust in online transactions and their security.	0.768			
	The availability of instant payment processing improves user convenience during online purchases.	0.754			
Feedback Integration Systems	Feedback integration systems help businesses improve their services based on customer feedback.	0.773	0.839	0.815	0.536
	The integration of feedback allows for faster responses to customer concerns and complaints.	0.792			

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Construct	Item	FL*	CA*	CR	AVE*
	Customers feel more valued when they see their feedback being acted upon.	0.784			
	Feedback integration enables businesses to offer more personalized and relevant experiences.	0.766			
	The continuous collection of customer feedback leads to innovation in digital marketing strategies.	0.764			
User Technology Proficiency	Users with high technology proficiency are more likely to engage with advanced digital marketing tools.	0.754	0.827	0.803	0.513
	Customers with high technology proficiency are more likely to adopt chatbot interactions.	0.779			
	User technology proficiency influences how effectively they utilize seamless payment systems.	0.757			
	The success of service customization largely depends on the users' ability to interact with digital tools.	0.748			
	Users with low technology proficiency may face challenges in using complex digital systems, affecting their overall satisfaction.	0.762			
User Satisfaction	The overall user experience is greatly enhanced by service innovations like chatbots and seamless payments.	0.784	0.843	0.795	0.523
	Customization of services increases my satisfaction with the business's offerings.	0.806			
	Prompt responses and resolution of issues via digital tools lead to higher levels of satisfaction.	0.776			
	A smooth and secure payment process contributes to my overall satisfaction with an online transaction.	0.789			
	Integration of feedback into service improvements positively impacts my satisfaction with the brand.	0.765			

* Note: FL = factor loading; CA = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted.

Table 2

Discriminant validity of the constructs

	US	CA	SP	FI	UT
User Satisfaction (US)	0.724				
Chatbot Adoption (CA)	0.436	0.817			
Seamless Payment Systems (SP)	0.429	0.445	0.783		
Feedback Integration Systems (FI)	0.397	0.484	0.532	0.773	
User Technology Proficiency (UT)	0.384	0.398	0.395	0.427	0.786

Table 3

Structural equation modeling results

	Path coefficient	*t* Statistics	*p* Values
CA -> US	0.196	2.465	0.000
SP -> US	0.225	2.623	0.000
FI -> US	0.216	2.563	0.000
UT -> US	0.175	2.532	0.000
ME1 -> US	0.189	2.165	0.034
ME2 -> US	0.174	2.224	0.012
ME3 -> US	0.181	2.486	0.000

Note: CA = Chatbot Adoption; SP = Seamless Payment Systems, FI = Feedback Integration Systems; UT = User Technology Proficiency; US = User Satisfaction; ME1 of CA on US = Moderating Effect 1; ME2 of SP on US = Moderating Effect 2; ME3 of FI on US = Moderating Effect 3.

The moderating variable (user technology proficiency) was determined to have a SRMR composite model value of 0.076 and an adjusted R^2 of 0.578. This illustrates that the independent variables explain 57.8% of the variation in user satisfaction when the moderating influence of user technology proficiency is assumed.

5. **Discussion**

5.1. *Discussion of findings*

The outcomes highlight three essential components of service innovation: chatbot services, integrated payment interfaces, and feedback loops,

all of which are relevant to enhancing the digital experience. Additionally, users' technology skills were identified as a defining moderating factor within these frameworks.

Our results align with previous research conducted by Al-Shafei (2025) and Al-Oraini (2025) regarding the positive impact of chatbot services on user satisfaction. Customers benefit from instantaneous replies, tailored interactions, and 24/7 assistance provided by chatbots. However, our research contributes to the body of knowledge by revealing that technologically proficient users greatly benefit from chatbots' mechanized interactions. This implies that, while automated interfaces such as chatbots help in making digital communication more efficient, the user's skill level with such technologies substantially impacts users' satisfaction.

In the same vein, previous scholars have established the existence of a positive relationship between the use of contactless payment systems and user satisfaction, which has also been a focus of recent research (for example, Sharma et al., 2024). We add to this literature by pointing out that the convenience with which transactions are conducted, along with the speed at which they are completed, is a form of service innovation in digital marketing. Interestingly, this outcome was also moderated by users' technological skills, indicating that economically active users who are more technologically inclined benefit from efficient and secured payment systems more because they likely have greater expectations due to their higher level of sophistication with digital finance technologies.

The importance of the integration of user feedback systems for users' satisfaction and the impact it has on user satisfaction stands out as a key gap within the research scope, which is consistent with Narayan et al.'s (2022) findings. Allowing users to give feedback and demonstrating the improvements makes them feel as though they were part of the process increasing their trust in the brand. In addition, our research shows that participants' influence is maximized in cases where it is possible to submit the feedback by digital means due to the flexibility of the feedback tools available. This makes it clear that businesses need to create uncomplicated and flexible editable systems that invite feedback and are easy to use by people with diverse skills.

The user's level of technology proficiency as a moderator across all service innovation dimensions shows the subtle yet complex behavioral patterns of users in the context of digital engagement. It was noted that, while innovation may provide greater satisfaction, not all subgroups of users benefited equally. This resonates with the literature on the digital divide (Alotaibi et al., 2025) which states that these disparities are often

associated with the individual's ability and willingness to actively engage with digital services, technologies, and tools being pivotal to the adoption of service innovations.

This study adds to the body of knowledge in digital marketing by demonstrating the effect of service innovations on user satisfaction, specifically, by showing the impact of different levels of technology use. However, this study does not address how changes to service innovations affect user satisfaction. This is largely unexplored within empirical literature. For practitioners, the findings outline the structural requirements in supporting innovative digital technologies, which go beyond merely having the latest tools.

5.2. *Managerial implications*

The findings of this study provide important managerial insights for organizations seeking to leverage service innovations and to enhance customer satisfaction. The results in Table 3 highlight that seamless payment systems (path coefficient = 0.225) exert the strongest influence on user satisfaction, followed by feedback integration systems (0.216) and chatbot adoption (0.196). This ordering suggests that customers prioritize efficiency and security in completing transactions, as payment processes directly affect their perception of convenience and trust in the service. Feedback integration systems rank second, reflecting the growing importance of being heard and receiving timely responses, which reinforces a sense of engagement and brand attentiveness. Chatbot adoption, although still significant, shows the weakest path coefficient, which may be explained by limitations in chatbot functionality or customer skepticism about automated interactions compared to human support. For managers, this indicates that investments in seamless and reliable payment solutions should take precedence, but long-term competitive advantage also requires strengthening feedback mechanisms and gradually improving chatbot sophistication. Furthermore, since the moderating role of user technological proficiency shapes how innovations are perceived, managers should tailor strategies to different customer segments, for example, promoting chatbot use among digital natives while ensuring alternative support for less tech-savvy users.

5.3. *Limitations and further research*

This work offers a useful understanding of the impact that service innovation has on success in digital marketing. However, there are some

limitations to be discussed. Firstly, the study uses survey data and self-reported metrics, which may be skewed due to response bias or social desirability bias. Participants may exaggerate or minimize their satisfaction, which is bound to distort the findings. Secondly, the study surveys a limited scope of innovations, such as chatbots and payment systems, while overlooking other potentially crucial technologies like AR, VR, and AI (Wagner & Cozmiuc, 2022; Capasa et al., 2022). Additionally, the study does not address ethnic contrasts and spatial differences in consumers' shopping habits. It also does not examine the differences in technology use across demographics or among different age groups. Further research should include subjects from a wider range of industries to improve external validity.

Advanced AI and machine learning algorithms or AR/VR technologies in digital marketing offer service innovations not covered in this study and could be included in future research. If they were analyzed, the effect of advanced technologies on the customer's level of satisfaction would provide an extensive understanding of the customers' landscape. Longitudinal studies could determine the correlation between the adoption of service innovations and satisfaction over time, providing insight into the innovations' impact on customer loyalty, business performance, and overall value. Moreover, further research could focus on cultural and demographic factors to determine the applicability of service innovations, especially in multi-regional and global contexts. Studying the impact of age, income, or region on the acceptance of chatbots and automated payment systems would aid in forming targeted digital marketing plans. Finally, research can be conducted on the balance between automation (e.g., chatbots) and human contact integration in consumer service in industries that highly regard personalized customer service in order to maximize satisfaction and brand advocacy.

6. **Conclusion**

This study contributes to the body of knowledge in digital marketing by demonstrating the effect of service innovations on user satisfaction, specifically, by showing the impact of different levels of technology use. Notably, this study addresses how changes to service innovations affect user satisfaction. This is largely unexplored within the empirical literature. For practitioners, the findings outline the structural requirements for supporting innovative digital technologies, which go beyond merely having the latest tools.

The findings reveal that seamless payment systems have the strongest influence on user satisfaction, followed by feedback integration systems and chatbot adoption. This ordering highlights that while interactivity and automation are important, customers still place the highest value on convenience, trust, and efficiency in digital transactions. Moreover, the moderating role of user technological proficiency suggests that the same innovation can have varied effects across different customer segments, underlining the importance of tailoring digital strategies.

From a managerial perspective, these insights stress the need for organizations in sectors such as banking, insurance, hospitality, and education to prioritize robust payment infrastructures, strengthen feedback loops, and enhance chatbot capabilities progressively. Importantly, innovation should not be treated as a one-size-fits-all approach, but as a strategic process of aligning tools with customer profiles and organizational capacities.

Despite these contributions, the study is not without limitations. It does not capture the dynamic impact of evolving service innovations over time, nor does it fully account for contextual variables such as cultural differences, regulatory environments, or organizational readiness. Future research could adopt longitudinal designs or cross-industry comparisons to provide deeper insights into how service innovations shape customer satisfaction over time.

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About the authors / Sobre los autores

MOHAMMED SALEM. Marketing professor at the University College of Applied Sciences in Gaza and the University of Kassel in Germany. His work explores

consumer behavior, digital marketing, and sustainable strategies, with a focus on addressing societal challenges through innovative demarketing approaches. He collaborates internationally, using advanced research methods such as machine learning and structural equation modeling. As a published scholar and frequent conference speaker, he brings a global perspective to his writing. His work reflects a commitment to cross-cultural understanding, academic innovation, and the practical application of marketing insights.

Profesor en el área de marketing en la Universidad de Ciencias Aplicadas de Gaza y en la Universidad de Kassel, en Alemania. Su trabajo explora el comportamiento del consumidor, el marketing digital y las estrategias sostenibles, centrándose en abordar los retos sociales mediante enfoques innovadores de marketing. Colabora a nivel internacional, utilizando métodos de investigación avanzados como el aprendizaje automático y el modelado de ecuaciones estructurales. Como académico publicado y ponente habitual en conferencias, aporta una perspectiva global a sus escritos. Su trabajo refleja su compromiso con el entendimiento intercultural, la innovación académica y la aplicación práctica de los conocimientos de marketing.

RALF WAGNER. Professor for Sustainable Marketing at the University of Kassel, Germany. He received his PhD from Bielefeld University in Germany. His research interests cover interactive marketing and intercultural divergences of human behavior. Application domains are branding and IT-enabled marketing communication. Further projects cover waste disposal practices, entrepreneurial marketing and value capture. Methodological interests are cross-cultural research and the handling of missing values.

Profesor en el área de Marketing Sostenible en la Universidad de Kassel, Alemania. Obtuvo su doctorado en la Universidad de Bielefeld, Alemania. Sus intereses de investigación abarcan el marketing interactivo y las divergencias interculturales del comportamiento humano. Sus ámbitos de aplicación son la creación de marcas y la comunicación de marketing basada en las tecnologías de la información. Otros proyectos abarcan las prácticas de eliminación de residuos, el marketing empresarial y la captura de valor. Sus intereses metodológicos son la investigación intercultural y el tratamiento de los valores perdidos.