https://doi.org/10.63062/trt/WR25.068

THE REGIONAL TRIBUNE

Pages: 150 – 172 | Volume: 4 | Issue: 1 (Winter 2025) | ISSN (Online): 3006-8428 | DOI: 10.63062/trt/WR25.068

Impact of Digital Adoption on Consumer Trust and Risk Perceptions

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ABSTRACT: Using Social Cognitive Theory (SCT) as the base this research evaluates the elements affecting the digital adoption. The analysis evaluates the effects of self-efficacy, social influence, perceived trust, perceived risk together with facilitating conditions on the behavioral intention of online pharmacy adoption. The study evaluates how observational learning impacts the connection between behavioral intentions to adopt digital options. The research implements a quantitative design through survey data collection from 350 participants using online digital platforms. To measure the effectiveness, a 5-point Likert scale was used. Data collection used convenience sampling methods while the data analysis involved PLS-SEM (Smart PLS 4) to evaluate the assumed relationships. Behavioral intention receives significant impact from self-efficacy together with perceived trust but adoption behavior experiences positive effects due to perceived risk. Social influence strengthens trust and adoption between consumers and online pharmacies and observational learning provides additional advantages to their engagement. This research yields guidance which helps both online pharmacy providers and policymakers and healthcare regulatory bodies. The adoption rates can expand by strengthening trust mechanisms and implementing digital literacy education together with maintaining regulatory compliance.

KEYWORDS: Social Cognitive Theory, Online Pharmacies, Self-Efficacy, Trust, Perceived Risk, Social Influence, Observational Learning, PLS-SEM

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Introduction

Digital technologies drive rapid industrial progress in the global pharmacy sector as they improve efficiency and healthcare service delivery and productivity levels. Digitalization advances have transformed customer expectations regarding personalized convenience because smartphones and on-demand platforms transformed market behaviors(Ahmad et al., 2020; Kotler, 2017). Healthcare receives special impact from these developments because more people use telemedicine and Digital Solution Adoptions to obtain medical products along with consultations.

Users adopt new technologies based on the assessment of performance expectancy combined with effort expectancy and social influence and facilitating conditions that form essential elements of different technology adoption frameworks (Dwivedi et al., 2019). These factors determine how pharmaceutical

customers conduct medicine purchases both through online platforms and mobile health applications. Customer behavior has undergone a transformation which includes the adoption of personalized and immediate access solutions in healthcare and other domains (Singh et al., 2020).

The trust levels of digital pharmaceutical customers depend strongly upon their perception of brand sanctity as well as service transparency and regulatory adherence and digital security measures (Chandra et al., 2010; Mehta et al., 2021). The suspicion about both product authenticity and data privacy prevents numerous people from buying medications online according to various researchers (Hansen et al., 2018; Huang et al., 2013). Consumer concerns about both wrong medicines and identity theft practices increase their subjective perception of risk. The pharmaceutical industry underwent drastic changes through digital technology development which created online prescription frameworks and AI-driven healthcare suggestions. Digital platforms demonstrate the capacity of digital innovations to enhance healthcare delivery because they provide rapid access to a wide range of information in addition to offering convenience. Effective strategies must be developed to build trust in healthcare products because in-person interactions are absent while healthcare products remain complex (Esmaeilzadeh, 2024). This research investigates how digital adoption elements affect pharmaceutical customers' trust levels together with their assessment of risk while using behavioral intention as a variable of influence. The study examines performance expectancy along with effort expectancy and social influence and facilitating conditions as it seeks to deliver valuable information for healthcare providers together with policymakers who want to boost digital healthcare adoption (Dwivedi et al., 2019).

Introduction to the Industry

Operations in modern pharmaceutical lead towards technological advancements through healthcare. Innovations in operation which includes telemedicine solutions with AI diagnostics alongside with electronic health records to gain improved wellness of patient together with excellence in operation. Consumer expectations adapt in response to widespread digital adoption because people anticipate streamlined services as well as quick service and customized healthcare standards (Kotler, 2017). The adoption of digital solutions with mobile health applications exhibits the transformative effects in digital transformation has on patients' healthcare experience. These platforms enable medicine delivery on demand while providing real-time professional support in addition to data-driven recommendations yet construct new authentication and privacy and quality assurance challenges (Singh et al., 2020). With the growth of consumer awareness, expectations for user-friendly, reliable, and transparent online healthcare platforms grows. Research studies demonstrate that addressing concerns in these tandem with maintaining a strong technological structure which can positively increase rates of adoption (Chandra et al., 2010; Huang et al., 2013; Mehta et al., 2021). Initiatives of building trust, such as: third-party verifications and robust customer service, seems crucial in a wide competitive digital market. Although quick improvements in technology offer possible convenience by Digital Solution Adoptions and e-Health apps. Similarly, multiple customers remained skeptical to the authenticity alongside safety of medications purchased via online (Huang et al., 2013) Additionally, breaches in data, transparency lackness and regulatory guidelines vagueness could accelerate among uncertainties which significantly make it difficult to widespread adoption. This research study highlights the significance of behavioral intention with trust, perceived risk, and perceived usefulness in effective adoption in digital

healthcare services. In addition, combining robust regulations with design which focused consumer requirements, overcoming organization's barriers and envision the full technological potential for improving healthcare quality and accessibility. Furthermore, with the industry continues to evolve and shift, strategic alignment among healthcare providers and technology organizations will be essential for harnessing customer's trust and enhancing patient satisfaction (Al Halbusi et al., 2024).

Review of Literature

Transparency in sourcing, regulatory and knowing where the Digital Solution adoption owes its origins is often an important element in building consumer trust around the Digital Solution Adoption oversight, and the professional competence of service providers. This trust factor is particularly important when users cannot physically check out the items they order (Al Halbusi et al., 2024; Assin et al., 2024; Baid & Ghosh, 2021). It intensifies concerns about authenticity and safety, as it relates to medications. Platforms that display a verified pharmacist credential and a transparent supply chain tend to have higher consumer acceptance(Bakar et al., 2022). Additionally, educational initiatives—such as detailing users can further build trust when it comes to medication usage guidelines and potential side effects assurance that are delivery products genuine and that assist them broaden their cognizance of healthcare products (Alsadoun et al., 2023).

The components of risk perception include product risk and privacy risk according to (Alraja et al., 2019; Alsadoun et al., 2023). The anxiety regarding delivery of fraudulent and substandard medications makes up the first section of the risks while the second component includes worries about exposure of personal health details. second concerns misuse of personal data, such as the exposure of private health records. Regions lacking strong oversight systems result in patients experiencing greater concern about potential risks (Bakar et al., 2022). However, Digital Academia Solution Adoptions reduces customer apprehensions by developing tamper-resistant packages and protected payment infrastructure and easy return procedures and user-friendly return policies (Assin et al., 2024).

Research typically identifies behavioral intention as the primary predictor in examinations of technology acceptance because it demonstrates the probability that people will use digital services as well as their personal innovativeness levels (Al Halbusi et al., 2024; Alsadoun et al., 2023). Numerous studies have shown that personal intentions act as the mediator linking attitudes to actual usage behavior the degree of usage depends on the attitudes that users experience (trust, perceived usefulness) and their actual behaviors (Bakar et al., 2022). Heightened risk typically weakens the level of intentional behavior weakens when users have weak trust combined with a complex interface although strong trust and user-friendly interfaces enhance intention which drives users toward consistent behavior usage (Anand et al., 2021).Uniformly behavioral intention functions as the psychological together with operational foundation that explains whether prospective users will transition to active adopters. The process reveals when prospective users transition into active system adopters.

Digital adoption factors which incorporate internet accessibility and well-designed interfaces together with supporting healthcare policies significantly contribute to the success of digital solutions (Al Halbusi et al., 2024; Assinet al., 2024). In regions with robust digital modern healthcare infrastructure fosters a positive reaction toward online healthcare solutions among consumers (Alsadoun et al., 2023). The process of digital adoption meets obstacles because of low digital literacy levels and regulatory inconsistencies despite achieving trust

and reduced concerns (Baid & Ghosh, 2021). Medical trust along with perceived risk should be properly managed. Recognizing these macro-level enablers and studying both enabling factors and obstacles is essential to create complete knowledge about Digital Solution Adoption (Bakar et al., 2022).

Digital adoption factors combine perceived trust with perceived risk together with health literacy and personal innovativeness and behavioral intention and digital adoption to define the path toward adoption. The various adoption factors create a dependent relationship that together determine the digital adoption process (Baid & Ghosh, 2021; Bakar et al., 2022). Trust works to lower perception of risks, yet it simultaneously drives strong adoption intentions. Digital conditions that are advantageous facilitate the transformation of intentions into actual practice (Al Halbusi et al., 2024; Alsadoun et al., 2023). The adoption of sustainable Digital Solution Adoption depends on an integrated approach among all components. A transparent business environment combined with supportive regulatory systems together with user-focused design practices creates an ecosystem which drives trust and lowers risk perception. The establishment of trust as well as the reduction of perceived risk happen through these strategies (Assin et al., 2024).

Theoretical Development

This section explicates the key theoretical frameworks, SCT, SLT and Risk-Trust paradigms that underpin the current research. The essential components covered in this section originate from all theoretical frameworks. The research evaluates why the selected models work effectively to understand digital adoption patterns in pharmaceutical companies. The research aims to integrate trust and risk elements into established studied by conducting pharmaceutical industry analysis. This paper adopts technology acceptance theories to create an integrated model which analyzes the behavior of consumers during adoption processes.

Social Learning Theory (SLT)

Social learning significantly influences how customers form trust beliefs and evaluate risks within the pharmaceutical and OTC field. The evaluation of products through user-created content applies to product results and safety as well as reliability and directly impacts digital health purchase confidence and self-medicating risk outlooks (Chen et al., 2017). The need for shared knowledge among digital consumers has become a common phenomenon across online marketplaces because social learning directs their decision-making process. Digital consumers actively participate in social platforms to refine their preferences through sharing information that enables them to make educated purchase decisions (Boyd et al., 2011; Ghahtarani et al., 2020; Jiang et al., 2014).

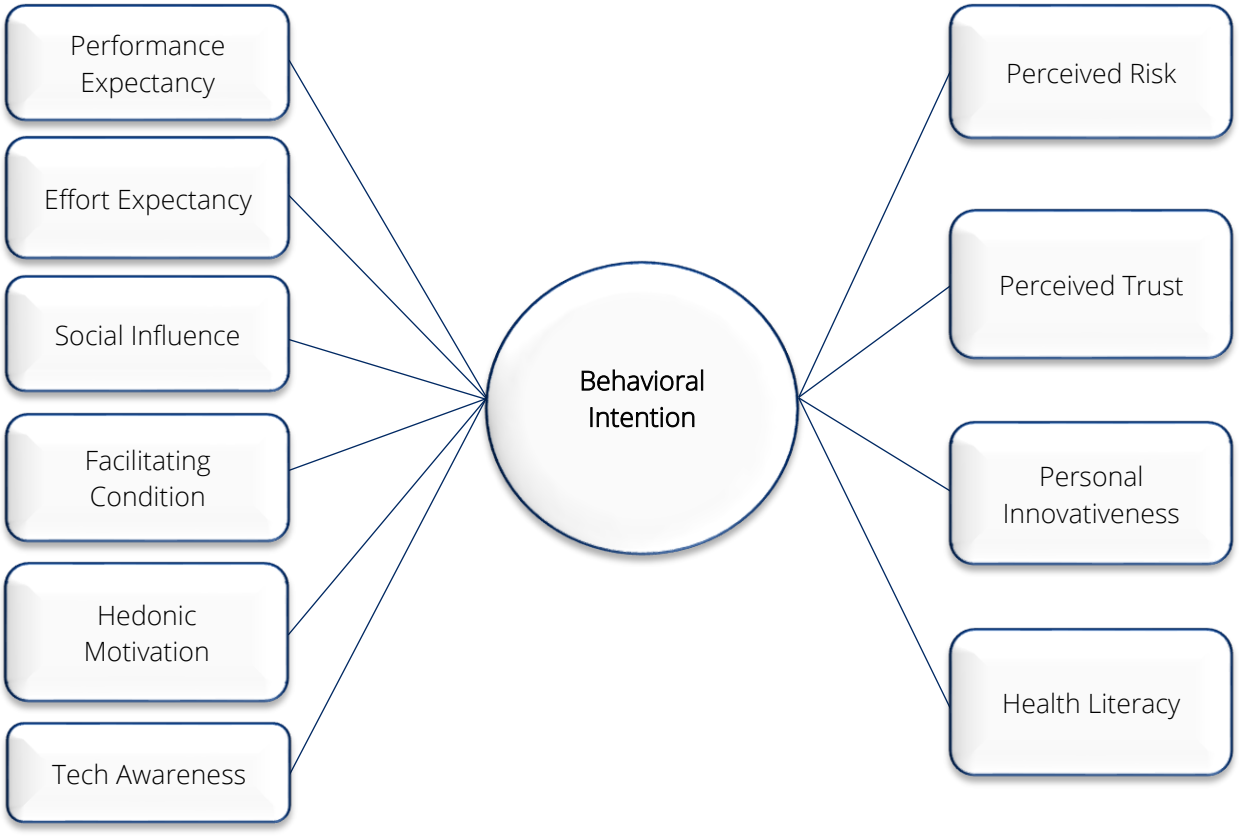
Social Cognitive Theory

Various psychological and social elements determine which digital healthcare technologies people embrace especially those focused on online pharmacies. The research uses Social Cognitive Theory (SCT) developed by Bandura, (1998) to examine consumer trust development alongside their management of perceived risks and intention formation regarding online pharmacy services. SCT provides strong analytical power for healthcare technology adoption research because it illustrates how behavioral results develop through the mutual relationship between personal elements and environmental components. According to SCT adoption functions as an active learning process through three dimensions comprising observational learning as well

as self-efficacy and social influence (Bandura, 2013). The fundamental concept of SCT called self-efficacy fundamentally influences consumer confidence when using digital health services. Self-confident individuals tend to adopt and maintain usage of online pharmacy services because they trust their ability to effectively utilize these technical systems Observer learning and social influence practices shape trust development with online pharmacies since consumers rely on peer experiences and family feedback and digital customer reviews. The development of trust and reduction of perceived risk happens through these important elements which together lead to better digital pharmacy adoption intentions (Bandura, 2013).

Figure 1

Conceptual Model



Hypothesis Development

Performance Expectancy and Behavioral Intention

Performance Expectancy (PE) refers to an individual's belief that utilizing an online pharmacy will enhance healthcare access and overall efficiency. When consumers perceive that digital health technologies provide convenience, affordability, and improved health management, they are more likely to adopt them (Lee & Kim, 2022). EE has proven essential in technology acceptance research through numerous past investigations. The concept of PE maintains importance in the acceptance of healthcare innovations which encompasses both e-health and m-Health applications. In the consumer adoption in the online pharmacy context will increase due to a robust perception of usefulness (Rouidi et al., 2022).

H1: PE has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Effort Expectancy and Behavioral Intention

The accessibility aspect (EE) represents how easy it is to operate an online pharmacy platform. People tend to endorse digital healthcare innovations when systems deliver simple and streamlining interfaces that need small user input. Research shows EE stands as a major element which affects intentions to use technology (Tannady et al., 2024). Online pharmacies require user-friendly navigation systems and straightforward information display and simple purchase processes to attract more customers (Fedorko et al., 2021). Research findings demonstrate that Effort Expectancy plays an essential role in determining customers' decisions towards using online pharmacies.

H2: EE has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Social Influence and Behavioral Intention

Social influence (SI) is defined as the extent to which people find that people in social circles promote an option of online pharmacy services Fedorko et al., 2021. Consumers are interested in new health technologies when they receive recommendations from trustworthy people or when they confirm that they are widely adopted by their communities. Given the fact that healthcare decisions are often influenced by external sources, SI will play an important role in the introduction of online pharmacies (Venkatesh, 2022). The evidence reveals that Social Influence plays an essential part in influencing consumers to adopt online pharmacies.

H3: SI has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Facilitating Conditions and Behavioral Intention

The availability of resources together with technical infrastructure and regulatory support qualifies as Facilitating Conditions (FC) for online pharmacy services. The necessary framework and technology infrastructure together with support mechanisms constitute Facilitating Conditions for using online pharmacy services (Müller & Mildenberger, 2021). The likelihood that consumers will adopt digital increases because of these circumstances. The availability of dependable internet infrastructure and protected payment choices and customer service access serves as key factors which make consumers choose healthcare solutions support. The implementation of regulatory frameworks together with data protection measures helps establish increased consumer confidence for using online pharmacies (Zhong et al., 2021).

H4: FC has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Hedonic Motivation and Behavioral Intention

Consumers experience enjoyable outcomes from their usage of digital products which falls under the category of Hedonic Motivation (HM) healthcare services. Various users choose online platforms as a matter of both convenience and engagement-based advantages an interactive, engaging experience (Deng & Yu, 2023). Our modern society benefits from online drug stores that deliver high-quality user experiences through their simple operations. The user experience directly affects the ability of digital healthcare services to maintain existing client base and acquire new users (Chang et al., 2023). These research evidence highlight the critical role of Hedonic Motivation in shaping consumers' behavioral intention to adopt online pharmacies.

H5: HM has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Technology Awareness and Behavioral Intention

Technology Awareness (TA) refers to consumers' knowledge and familiarity with digital healthcare. Digital healthcare solutions consisting of e-pharmacies together with AI-driven consultations and telemedicine exist for use by consumers higher awareness levels (Chang et al., 2023). These measures create trust between consumers while eliminating their doubts which drives them to adopt the technologies consumers who understand the security. People whose knowledge extends to digital healthcare platform security measures and benefits demonstrate greater willingness to utilize them (Venkatesh et al., 2016).

H6: TA has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Behavioral Intention and Personal Innovativeness

People with higher levels of personal innovation accept new technologies readily and adopting new digital technologies. The adoption probability of digital health services increases among consumers who demonstrate higher levels of personal innovative behavior (Müller & Mildenberger, 2021). Web-based pharmacy services appeal to customers who avidly pursue innovation and accept new developments. Prior studies. Research demonstrates that personal innovativeness acts as a fundamental factor for technology adoption throughout different domains starting from e-commerce up to digital banking (Tannady et al., 2024).

H7: PI has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Behavioral Intention and Perceived Risk

The concerns consumers have regarding security risks in addition to privacy threats and prescription reliability and drug counterfeits make up Perceived Risk (PR) and counterfeit medicines in online pharmacy transactions (Tannady et al., 2024). People generally show hesitation toward products they encounter in digital spaces healthcare platforms due to fears of identity theft, fraudulent prescriptions, and unauthorized data usage. Numerous studies demonstrate how PR creates positive effects on customer trust levels and adoption willingness (Almaiah et al., 2023).

H8: PR has a significant influence on consumers' behavioral intention to adopt online pharmacies.

Behavioral Intentions and Perceived Trust

The perception of trust among customers concerning online pharmacy operations forms Perceived Trust (PT), product authenticity, regulatory compliance, and secure transactions. The essential quality in digital environments begins and ends with trust. Consumers choose digital healthcare because they need assurance about data confidentiality during medical service transactions confidential. The degree of trust consumers have in online platforms boosts their readiness to use digital pharmacy services pharmacy services (Almaiah et al., 2023).

H9: PT has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Behavioral Intention and Health Literacy

The term Health Literacy described the capability of people to get healthcare information for making sound medical decisions. People need essential medical data to make educated healthcare decisions. Consumers with higher health literacy (Müller & Mildenberger, 2021). Online pharmacy customers with better literacy

skills can better assess pharmacy credibility through which their perception of risk decreases. The reduced perception of risk leads consumers to adopt the digital pharmacy services more frequently (Alalwan et al., 2020).

H10: HL has a significant and positive influence on consumers' behavioral intention to adopt online pharmacies.

Performance Expectancy, Behavioral Intention and Perceived Risk

The anticipation of successful performance with an online pharmacy service typically produces positive attitudes towards such services. Receipts that consumers grant to online pharmacies to improve healthcare remain in place even though they recognize these platforms enhance their experience (Venkatesh, 2022). Online pharmacy users maintain security and accuracy and fraud concerns regarding data handling even with a positive perception of the service. Behavioral Intention (BI). BI functions as an intermediary which offer the straight link between PE and PR evaluation. This means that if the stronger consumers' intent to utilize online pharmacies becomes the more their concerns for risks decrease. The system confidence of consumers rises due to this development (Alalwan et al., 2018).

H11: Behavioral Intention mediates the relationship between Performance Expectancy (PE) and Perceived Risk (PR)

Effort Expectancy, Behavioral Intention and Perceived Trust

The factors that influenced consumers adoption of online pharmacy services was Effort Expectancy (EE)(Venkatesh et al., 2016). Generally, individuals prefer user friendly, accessible systems. This, in addition to making it easy to use, actually makes it encourage higher. It leads to higher trust over time of the platform, in addition to higher Behavioral Intention (BI). This mediation effect it suggests that by the time the user gets comfortable with the platform, their trust of online pharmacy services strengthens (Fedorko et al., 2021).

H12: Behavioral Intention mediates the relationship between Effort Expectancy (EE) and Perceived Trust (PT).

Social Influence, Behavioral Intentions and Perceived Trust

The pleasures and satisfactions associated with digital healthcare are referred to as Hedonic Motivation (HM) services (Mohd Thas Thaker et al., 2022). If users have found an online pharmacy as engaging, fun or interactive it increases their BI to continue using it. It increases Personal over the time where users are more willing to explore new features and digital health solutions is another one the PI or innovativeness (Fedorko et al., 2021).

H13: Behavioral Intention mediates the relationship between Social Influence (SI) and Perceived Trust (PT).

Facilitating Conditions, Behavioral Intentions and Personal Innovativeness

Facilitating Conditions (FC) ensure that consumers have access to the resources, support, and infrastructure needed to adopt digital pharmacy services. When these conditions are favorable, consumers develop higher Behavioral Intention (BI), leading to greater Personal Innovativeness (PI). This means that when an individual perceives strong institutional and technical support, they feel more comfortable experimenting with and adopting new online healthcare technologies (Mohd Thas Thaker et al., 2022).

H14: Behavioral Intention mediates the relationship between Facilitating Conditions (FC) and Personal Innovativeness (PI).

Hedonic Motivation, Behavioral Intention and Personal Innovativeness

Hedonic Motivation (HM) is the pleasure of life from using digital health services. The more engagement, fun, or interactive an online pharmacy is to the user, the more behavioral the user will have to that online pharmacy (Müller & Mildenberger, 2021). A willingness to use BI to continue using it. This results in more personal over time. Users that are more willing to explore new features and digital health solutions, PI.

H15: Behavioral Intention mediates the relationship between Hedonic Motivation (HM) and Personal Innovativeness (PI).

Technology Awareness, Behavioral Intention and Health Literacy

TA represents the level of consumer's awareness of AI based Healthcare tools, telemedicine, and online pharmacies. Those with higher TA are also better by fit to operate in digital but Behavioral Intention (BI) is an important factor for translating awareness to actual health solutions. Health Literacy (HL). In other words, just becoming aware that there are digital health solutions out there isn't enough. In order to understand medical, these technologies must have users actively intend to engage with them information (Fedorko et al., 2021).

H16: Behavioral Intention mediates the relationship between Technology Awareness (TA) and Health Literacy (HL).

Conceptualization

Social Learning Theory (SLT) provides a robust foundational research framework by emphasizing the role of observational learning, social influence, and motivational processes in shaping behavior. Social Learning Theory (SLT) operates as a strong fundamental model to study human behavior because it stresses the developmental aspect of observing others while under social influence to drive behavior changes (S. Li et al., 2023). SLT believes that people learn new behaviors through observing others within social environments and this evidence supports making social influence an essential research variable. The theory demonstrates that people are more prone to take up behaviors because they believe such actions will bring positive results and maintain their drive to repeat them. SLT reinforces the core component of your framework which is behavioral intention through its explanation of how cognitive processes convert witnessed behaviors into operational intentions. SLT simultaneously establishes framework validity by approving variables and supplies theoretical tools to understand how these elements affect social behavior patterns (Ott, 2024).

Methodology

The survey follows a quantitative research approach through its cross-sectional survey design for analyzing online pharmacy service adoption. The research adopts a structured questionnaire to examine consumer online pharmacy interaction through digital adoption factors and behavioral intention together with perceived trust and perceived risk. Technical adoption sciences often use this approach because it succeeds both in cost-effectiveness and ability to generalize findings (Al Halbusi et al., 2024).

The researcher created the framework by employing the combination of theories from Social Learning Theory (SLT), Social Cognitive Theory (SCT) and additional constructs including hedonic motivation, technology awareness and personal innovativeness and health literacy. Through its SLT- and SCT-based structure the framework analyzes user conduct together with digital pharmacy adoption patterns. Observational learning

and social influence and expectancy along with motivation build the base of SLT which supports the framework as its main theoretical framework. SCT expands on this model by showing how personal elements (such as self-efficacy) and external elements and behavioral outcomes shape one another as consumers start using digital pharmacies. By working together SLT and SCT recognize the essential elements of the framework which includes behavioral intent and performance expectations as well as social connections. These theories combine into an effective model which recognizes social elements together with psychological aspects to deliver better research results within fields of healthcare practice. These theories of Social Learning Theory and Social Cognitive Theory supply a strong method to study digital pharmacy implementation through observation-based learning and self-efficacy development and social interaction which leads to better user experience evaluations in digital healthcare platforms.

Sampling

The research investigates users of online pharmacy services and those who want to join them. E-pharmacy users lack a centralized database so the researchers will apply convenience sampling as an alternative (Speak et al., 2018). 350 questionnaires were sent through social media and digital platforms. The intended research sample size includes 350 survey participants for achieving statistical significance in hypothesis verification. The research method matches approaches in adoption studies that utilize SEM techniques (Cheung et al., 2019). The research will utilize admission criteria based on participant age above 18 years and their usage of the internet and online pharmacy background.

A structured questionnaire was developed, consisting of two sections. Firstly, Demographic Information (Age, Gender, Education, Frequency of Online Pharmacy Use). Second section contain questions related to variables such as: Digital Adoption Factors (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions), Behavioral Intention (Likelihood of adopting online pharmacy services), Perceived Trust & Perceived Risk (Consumer confidence in online pharmacy services) and Health Literacy & Personal Innovativeness (Awareness and openness to new digital health solutions). A 5-point Likert scale was used for all survey items to measure responses effectively. The survey items were adapted from past validated measures to make sure the reliability and content validity (Hair et al., 2017).

Data Analysis

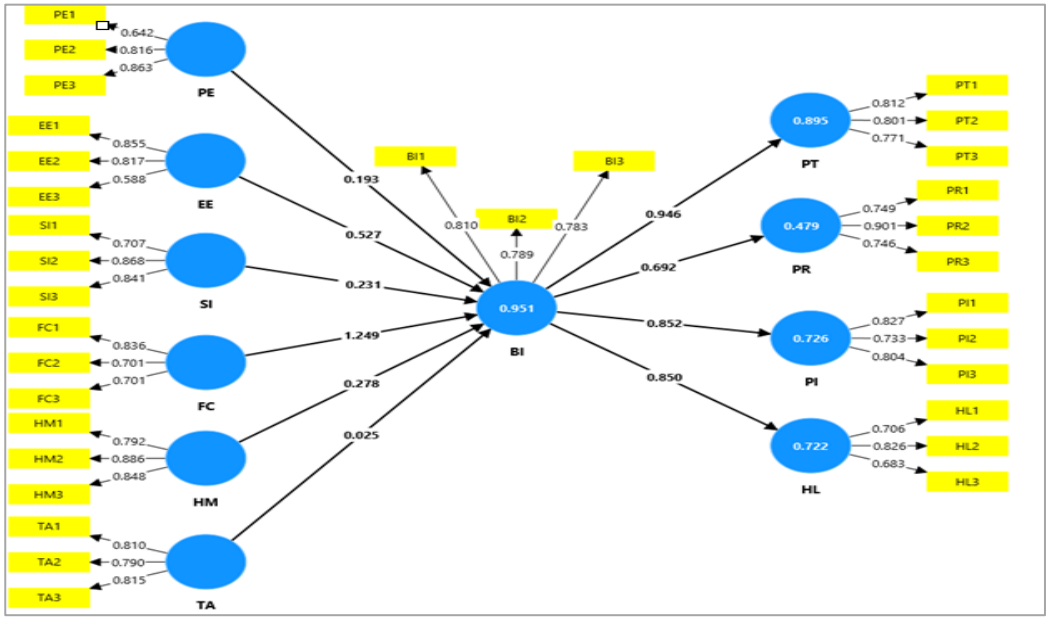
Data analysis of this study used Partial Least Squares Structural Equation Modeling (PLS-SEM) processed through Smart PLS software. PLS-SEM operates perfectly for understanding complicated relationships within technology adoption models and functions without strict data distribution requirements(Hair et al., 2017). Harman's single-factor test serves to detect possible bias according to (MacKenzie & Podsakoff, 2012). The study utilized marker variable techniques when required for statistical remediation. The analysis will use bootstrapping with 5,000 replications and a p-value of 0.05 to determine path coefficient significance (Hair et al., 2017). The analysis using bootstrapping will verify the statistical strength of all proposed hypotheses. The research study will respect ethical regulations by obtaining voluntary consent from all research participants. Data privacy and complete anonymity will be upheld by secure storage systems together with restricted access protocols. The researcher needs to obtain ethical authorization prior to starting data collection.

Results and Discussion

The measurement model in Figure 2 suggests that while performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation and tech awareness have more influence on perceived risk, perceived trust, personal innovativeness and health literacy, particularly when channeled through consumer behavioral intention. Measures of outer loadings in measurement models show the intensity of relationships between specific observed variables and their underlying constructs. Majority of the model loadings surpass the minimum recommended threshold of 0.70 which demonstrates both reliable and convergent valid measurement indicators. The measurement model demonstrates strong reliability since constructs Performance Expectancy (PE), Social Influence (SI), Facilitating Conditions (FC), and Hedonic Motivation (HM) produce substantial outer loadings that validate their importance in assessing their related latent variables. The two variables EE3 (0.588) and HL3 (0.683) have outer loadings that slightly fall beneath the threshold yet maintain sufficient validity in explaining their constructs. The high values of outer loadings in the model confirm that indicators accurately measure intended variables which enhances the overall strength of the measurement model.

Figure 2

PLS SEM Results



Confirmatory Factor Analysis (CFA)

This study evaluated the internal consistency of the components using Cronbach's alpha, composite reliability (CR), factor loadings and average variance extracted (AVE) with the findings presented in Table 3. The examination of reliability and convergence validity reveals significant insights into the constructs related to environmental management. Constructs such as Hedonic Motivation, Personal Innovativeness, Perceived risk and Technology Awareness demonstrate strong reliability, with Cronbach's alpha values exceeding 0.7, indicating effective measurement (Nitzl & Chin, 2017). Researchers employ Confirmatory Factor Analysis (CFA) as a significant statistical method which helps evaluate the measurement model to determine how well observed variables reflect their underlying latent constructs.

Results from this CFA demonstrate that the constructed measurement model has strong internal reliability and measures most constructs validly with strong convergent validity. The researchers should either revise or remove weak performing items or perform an Exploratory Factor Analysis (EFA) and reconfigure the wording of items to build stronger construct distinctiveness. The model shows suitability for structural equation modeling analysis (SEM).

Table 3

Confirmatory Factor Analysis

Construct Name	Items	Factor Loading	Cronbach's alpha	CR	AVE
Behavioral Intention	BI1	0.810	0.836	0.836	0.630
	BI2	0.789			
	BI3	0.783			
Effort expectancy	EE1	0.855	0.781	0.802	0.581
	EE2	0.817			
	EE3	0.588			
Facilitating Conditions	FC1	0.836	0.792	0.792	0.561
	FC2	0.701			
	FC3	0.701			
Health Literacy	HL1	0.706	0.780	0.784	0.549
	HL2	0.826			
	HL3	0.683			
Hedonic Motivation	HM1	0.792	0.879	0.880	0.710
	HM2	0.886			
	HM3	0.848			
Performance Expectancy	PE1	0.642	0.815	0.821	0.607
	PE2	0.816			
	PE3	0.863			
Personal Innovativeness	PI1	0.827	0.833	0.831	0.622
	PI2	0.733			
	PI3	0.804			
Perceived risk	PR1	0.749	0.840	0.843	0.643
	PR2	0.901			
	PR3	0.746			
Perceived Trust	PT1	0.812	0.836	0.837	0.631
	PT2	0.801			
	PT3	0.771			
Social influence	SI1	0.707	0.846	0.849	0.653
	SI2	0.868			
	SI3	0.841			
Technology Awareness	TA1	0.810	0.847	0.847	0.648
	TA2	0.790			
	TA3	0.815			

Discriminant Validity

HeteroTrait-MonoTrait ratio (HTMT)

The Heterotrait-Monotrait Ratio (HTMT) values reveal significant interrelationships among sustainability constructs (Anuar et al., 2018). Determining discriminant validity in structural equation modeling uses the Heterotrait-Monotrait (HTMT) ratio of correlations as a vital assessment method to verify constructs remain separate in their conceptual meanings. The evaluation of acceptable discriminant validity relies on HTMT values falling under 0.85 for strict cases and 0.90 for more lenient criteria. Most pairs of constructs demonstrated measurement of intended theoretical concepts from within the established thresholds that appear in the provided table. The construct pairs EE-FC (0.959), PT-FC (0.964) and PT-EE (0.970) achieve greater correlation values than 0.90 thus indicating potential measurement overlap between these constructs. A low discriminant validity arises from these high values thus resulting in model conceptual confusion and identification of unnecessary constructs that underlies unreliable research findings. The measurement constructs appear to share overlapping characteristics which might result from duplicate item wording or general conceptual domain overlap or measurement errors. The researchers should address this issue by performing additional analyses including confirmatory factor analysis (CFA), evaluating the Fornell-Larcker criterion or reworking the measurement model through better item wording and indicator reduction and construct consolidation. The validity of model conclusions depends on correct discriminant validity assessment because improper validation can result in wrong theoretical principles coupled with diminished practical worth. The overall model appears acceptable according to HTMT values yet the construct correlations exceeding .85 demand more assessment to enhance construct uniqueness and strengthen research findings.

b) Fornell and Larcker Criterion

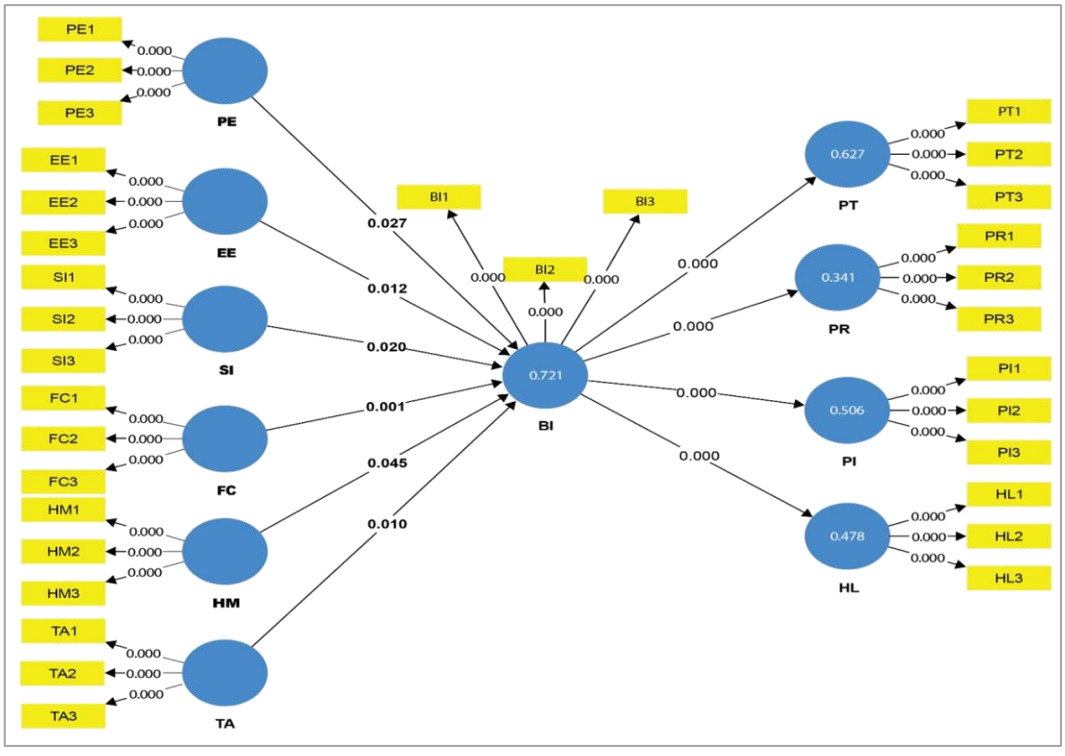
It presents the relevant findings, indicating that all the square roots of the AVE exceed the correlations between variables. This confirms the discriminant validity of the constructs (Fornell & Larcker, 1981). The Fornell and Larcker criterion results indicate strong discriminant validity among the constructs, with HM (0.843) showing the highest distinctiveness. SI (0.808) and TA (0.805) also demonstrate significant validity, suggesting interrelatedness among these purchasing decisions. HL (0.741) plays a crucial role in influencing consumers intend to purchase.

Structural Model

The research has produced a structural model by employing bootstrapping techniques on 5,000 subsets. The structural model has been studied by evaluating the standardized pathways to determine the outcome. All paths that relate to the hypotheses have been examined in this study. Within the presented structural model all latent constructs connect to Behavioral Intention (BI) through visual paths where BI serves as the key dependent variable. The model comprises different independent constructs connected to BI through standardized path coefficients which include Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Trust (TA), Perceived Risk (PR), Health Literacy (HL), and Personal Innovativeness (PI). The path coefficients demonstrate the wealth and organizational patterns linking different variables while higher values affirm robust relationship strengths.

Figure 3

Structural Model



Common Bias Method

Table 7 provides the overall VIF values which suggest that most constructs demonstrate low to moderate levels of multicollinearity. The Common Method Bias (CMB) assessment relied on Variance Inflation Factor (VIF) values presented in Table 7: Common Bias Variance. The VIF values assist researchers in recognizing the level of construct multicompetence to check for signs of common method bias. (Kock, 2015) states that a VIF value under 3.3 indicates little concern exists for common method bias in the dataset. The research study shows minimal construct intercorrelation because all VIF values stay under 3.3. The values of EE1 (3.083), EE2 (3.179), and HM2 (3.152) reach just beyond the 3 value yet maintain proximity to the acceptable border.

Hypothesis Results

The most robust finding is the significant positive relationship between PE and BI performance (H1). With a substantial beta value of 0.168 and a p-value of 0.027, this relationship demonstrates that customers are intending to purchase and changing their decisions. Several other hypotheses (H4, H5, H7, H8, H9, H10 and H11) also show significant direct effects on Behavioral intention. The p-values (all < 0.05) indicate statistically significant positive relationships. One of the most intriguing findings is the partial mediation effect identified in H11 (p-value: 0.023). This mediation effect highlights the complex interplay between BI, PE, and PR. Hypotheses H2, H3, H6, H12, H13, H14, H15 and H16 were accepted (p-values: 0.012, 0.020, 0.010, 0.015, 0.020, 0.002, 0.046 and 0.005), indicating that all proposed relationships significantly impact Behavioral intention.

Table 9

Hypothesis Testing

Hypothesis	Regression Path	Effect Type	Beta Value	Standard deviation (SD)	T statistics	P values
H1	PE -> BI	Direct Effect	0.168	0.076	2.206	0.027
H2	EE -> BI	Direct Effect	0.123	0.094	1.302	0.012
H3	SI -> BI	Direct Effect	0.109	0.075	1.463	0.020
H4	FC -> BI	Direct Effect	0.306	0.096	3.185	0.001
H5	HM -> BI	Direct Effect	0.187	0.093	2.007	0.045
H6	TA -> BI	Direct Effect	0.067	0.075	0.892	0.010
H7	BI -> PI	Direct Effect	0.710	0.041	17.405	0.000
H8	BI -> PR	Direct Effect	0.580	0.056	10.378	0.000
H9	BI -> PT	Direct Effect	0.792	0.032	25.06	0.000
H10	BI -> HL	Direct Effect	0.688	0.049	14.066	0.000
H11	PE -> BI -> PR	Indirect Effect	0.097	0.097	2.266	0.023
H12	EE -> BI -> PT	Indirect Effect	0.097	0.075	1.297	0.015
H13	SI -> BI -> PT	Indirect Effect	0.086	0.059	1.46	0.020
H14	FC -> BI -> PI	Indirect Effect	0.217	0.069	3.141	0.002
H15	HM -> BI -> PI	Indirect Effect	0.133	0.066	1.994	0.046
H16	TA -> BI -> HL	Indirect Effect	0.046	0.051	0.897	0.005

Hypotheses Validation

PE positively influences BI. The results of the present study indicate that PE has considerable beneficial effects on BI, with an effect size of β= 0.168. (Rouidi et al., 2022) conclude in their study that PE exhibits a significant and positive influence on consumers' behavioral intention towards adopting online pharmacies practices.
EE has a favorable effect on BI. The results of the investigation indicate that EE has a statistically important and favorable influence on BI, with an effect size of β= 0.123. Research across different cultures confirmed that EE maintains universal power for predicting technology adoption throughout various population types (Blut et al., 2022).

SI has a not a significant impact on BI. The findings suggest that SI has a strong beneficial impact on BI, as evidenced by the effect size β= 0.109. The endorsement power of social networks gets stronger due to increased trust in online pharmacies because consumer engagement with positive testimonials leads to superior perceptions of the platform (Chatterjee et al., 2024).

FC positively influences BI. The results of the present study indicate that FC has considerable beneficial effects on BI, with an effect size of β= 0.306. the research study affirms that the implementation of regulatory and facilitating frameworks together with data protection measures helps establish increased consumer confidence for using online pharmacies (Zhong et al., 2021). HM has a favorable effect on BI. The results of the investigation indicate that HM has a statistically important and favorable influence on BI, with an effect size of β= 0.187. The user experience directly affects the ability of digital healthcare services to maintain existing client base and acquire new users (Chang et al., 2023).

TA has a significant impact on BI. The findings suggest that TA has a substantial and beneficial impact on BI, as evidenced by the effect size β= 0.067. The level of TA indicates consumer awareness about both the

existence and operational features and advantages of online pharmacy services thus affecting their decision to adopt the technology (Sang et al., 2023). PI has a promising influence on BI. This research found that PI has a significant and positive influence on BI, as shown by the effect size of β = 0.71. Research studies demonstrates that personal innovativeness acts as a fundamental factor for technology adoption throughout different domains starting from e-commerce up to digital banking (Tannady et al., 2024).

PR has a favorable effect on BI. The present study indicates that PR has a favorable impact on BI, as evidenced by the effect size β= 0.58. Research study demonstrate that PR may not create positive effects on customer trust levels and adoption willingness in pharmacy (Almaiah et al., 2023). PT has a favorable impact on BI. This research suggests that the effect size β= 0.792 indicates that PT has a substantial and beneficial impact on the BI. According to (Almaiah et al., 2022), perceived trust is directly linked to consumers' behavioral intention. Additionally, they argue that perceived trust contributes to quality in digital environments by facilitating data confidentiality during medical service transactions.

HL has a promising influence on BI. The results of the present study indicate that HL has considerable beneficial effects on BI, with an effect size of β= 0.688. The study highlighted that reduced perception of risk leads consumers to adopt the digital pharmacy services more frequently (Alalwan et al., 2020).

BI function as an intermediary in the relationship between PE and PR. The study discovered that there were significant mediation effects of BI on the link between PE and PR with an effect size of β= 0.097. (Venkatesh, 2022) discovered that stronger consumers' intent serves as a connection between performance expectancy and perceived risk. BI serve as an intermediary between EE and PT. The research found that BI there were significant mediation among effort expectancy and perceived trust, with an impact size of β= 0.097. Results from empirical studies show that consumer acceptance of online pharmacies increases when they experience easy use and minimal effort requirements which leads to enhanced reliability and security trust (Fan & Ukaegbu, 2024).

BI function as an intermediary between SI and PT. The research found that BI there were positive mediation among social influence and perceived trust, with an impact size of β= 0.086. A large number of previous research studies show behavioral intention (BI) operates as a substantial mediator which connects Social Influence (SI) to perceived trust (PT) (Muhammad & Yvonne, 2024). BI serve as an intermediary between FC and PI. The research found that BI there were no significant mediation among facilitating conditions and personal innovativeness, with an impact size of β= 0.217. According to (Lim et al., 2020), there is no significant correlation between behavioral intention, facilitating conditions and personal innovativeness and does not show significant impact facilitating purchase behavioral intention.

BI play a mediating role between Hedonic Motivation and Personal Innovativeness, has not a favorable impact. The study indicates that BI has not considerable beneficial impact on Hedonic Motivation and Personal Innovativeness, with an effect size of β= 0.133. The mediation role of consumer behavior intention demonstrates a non-significant variable that drive between motivation and innovativeness (Li et al., 2021). BI serve as an association between technology awareness and health literacy. The study found that BI serving as a mediator have a significant impact on technology awareness and health literacy, with an impact size of β= 0.046. According to (Ezeudoka & Fan, 2024) health-literate consumers with adequate product knowledge will be more likely to execute their intentions. BI serves an important role by turning information awareness

into practical actions among those who understand how to use health data to evaluate and operate online pharmacies (Blut et al., 2022).

Theoretical Implications

The research delivers concrete recommendations to both online pharmacy service providers and policy officials who need to increase consumer usage of their services. First, online pharmacies should make their functional platform benefits prominent because PE and PT strongly affect consumer behavioral intentions while establishing trust through practice transparency and secure transactions and reliable customer support. Second, the effects of perceived risk (PR) on online services require pharmaceutical companies to develop risk-mitigation strategies which should include clear return policies together with verified product authenticity measures along with user-friendly dispute resolution mechanisms. Third, research confirms that facilitating conditions (FC) combined with hedonic motivation (HM) and personal innovativeness (PI) create positive effects that should be utilized to develop accessible platforms and captivating features for early adopters who share a passion for technology. Lastly, research findings demonstrate the importance of effort expectancy (EE) and social influence (SI) so resources should move away from platform usability simplification and social network strategies to invest in health literacy (HL) and technology awareness (TA) enhancement.

Conclusion

The findings of this study offer significant contributions to the literature on technology adoption, particularly in the context of online pharmacies. The results validate the substantial importance of performance expectancy (PE), facilitating conditions (FC), hedonic motivation (HM), technology awareness (TA), personal innovativeness (PI), perceived risk (PR), perceived trust (PT) and health literacy (HL) for driving consumers toward adopting online pharmacies. The results verify and expand the accepted frameworks of social cognitive theory (SCT) and social learning theory (SLT) while demonstrating performance enhancements and personal innovativeness together with trust as fundamental motivators of technology adoption. Behavioral intention acts as a mediator to reduce the connection between PE and PR based on H11 thereby revealing new relationships between performance expectations and perceived risks between the domains of technology adoption and risk perception. The acceptance of H2, H3, H12, H13, H14, H15, and H16 contradicts traditional perspectives regarding the power of effort expectancy (EE) and social influence (SI) as well as behavioral intention mediation in dynamic relationships. The findings discredit prior assumptions about social influence and ease of use in online pharmacies because they demonstrate these elements have less impact in this setting even though behavioral intention always enhance relationships between constructs like EE and PT together with SI and PT along with TA and HL.

Managers need to understand the necessity of providing superior performance alongside establishing trust while addressing user security concerns to promote online pharmacy adoption. Online pharmacy providers should establish friendly platforms that provide honest and secure services while marketing to consumers who are both technology proficient and informed about health. Stakeholders who respond to these factors will boost both adoption rates and maintain enduring customer loyalty through trust development. This research study enhances future researcher and academicians' comprehension of digital

pharmacy adoption strategic suggestions to healthcare professionals who require to adopt within digital healthcare. (Chandra et al., 2010; Mehta et al., 2021).

Limitations and Future Research Directions

This research delivers useful knowledge about behavioral intention to adopt online pharmacies but contain several limitations. The analysis takes place in a single context thus reducing potential universal application of its research findings across multiple industries and geographic areas. The findings from this study neglect how cultural along with economic and regulatory configurations between countries affect consumer actions. Moreover, the research utilizes self-reported information from respondents that might introduce social desirability bias together with recall limitations. Additional studies should employ objective measurement techniques together with long-term data collection methods to support these discovered outcomes. Furthermore, the analysis examines only a small number of variables without exploring additional significant aspects which include price reactions and regulatory factors as well as medical staff influence on healthcare system acceptance.

This research study focused on multiple cultural contexts which analyzed how consumers' behavior change based on the cultural characteristics. Researchers must investigate supplementary adoption elements which include pricing dynamics together with national oversight measures along with healthcare provider influence to achieve comprehensive adoption insight. Moreover, the adoption of qualitative interviewing and focus grouping techniques would enable researchers to discover the deep explanations behind how consumers view online pharmacies as well as their obstacles to utilization. Furthermore, experimental or longitudinal designs should be developed to evaluate how constructs previously identified within research makes changes in customer behaviors throughout time periods. Research can develop holistic adoption factors through the resolution of these limitations while establishing new directions to improve online pharmacy understanding and promote adoption throughout different settings.

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