

Exploring the relationship between AI service quality dimensions and consumers' perceived competence: a study in the online retail industry

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Abstract. This study examines how artificial intelligence (AI) service quality dimensions influence consumers' perceived competence in the online retail sector. Based on an online survey of 411 consumers in Hue City and using multivariate regression analysis, the study found that all four dimensions of AI service quality, including technical security, technical reliability, perceived personalization, and hyperconnectivity, significantly and positively affect perceived competence. Perceived personalization emerged as the strongest predictor ($\beta = 0.357$), indicating that highly tailored experiences primarily drive consumers' evaluations of AI intelligence. Technical reliability ($\beta = 0.299$), hyperconnectivity service capability ($\beta = 0.278$), and technical security ($\beta = 0.257$) also demonstrated substantial positive impacts. These findings highlight the crucial role of AI's functional and personalized attributes in shaping consumer perceptions of its capability. The study offers theoretical insights by exploring how AI service quality affects perceived competence in an emerging market and provides practical implications for retailers aiming to enhance AI adoption and consumer engagement in the online retail industry.

Keywords: AI service quality, online retail industry, perceived competence

1. Introduction

The pervasive integration of artificial intelligence (AI) into customer service in the online retail sector is a burgeoning phenomenon. AI-powered services have transformed how businesses interact with consumers, offering personalized recommendations, instant support, and efficient transaction processing (Shen et al., 2025). This digital evolution is not merely a technological upgrade but a fundamental shift impacting consumer experiences and perceptions. In Vietnam, where the e-commerce market is rapidly expanding, the adoption of AI is critical for maintaining competitiveness and meeting evolving consumer demands. However, the success of AI integration heavily relies on consumer acceptance, which is profoundly shaped by their perceptions of these advanced technologies.

A critical yet less-examined aspect in the online retail context, particularly within emerging markets, is consumers' perceived competence of AI (Shen et al., 2025). Perceived competence, in this study, refers to the extent to which consumers believe the AI system possesses the necessary skills, knowledge, and abilities to perform its functions effectively, reliably, and accurately (Parasuraman et al., 2005). This perception is crucial, as it directly influences consumer trust, satisfaction, and ultimately, their willingness to adopt and continue engaging with AI-powered services. Understanding how different dimensions of AI service quality contribute to this perceived competence is therefore vital for retailers aiming to optimize their AI strategies and enhance the consumer experience.

Existing literature has extensively explored various facets of AI service quality, often focusing on dimensions such as responsiveness, reliability, and personalization (Huang & Rust, 2018; Huang & Rust, 2021; Noor et al., 2022a). Furthermore, numerous academic studies have delved into the connection between AI service quality and crucial factors such as trust, perceived value, satisfaction levels, and customer loyalty (Chen et al., 2023; Noor et al., 2022b). However, there remains a significant gap in understanding how these specific AI service quality dimensions translate into consumers' overall belief in the AI system's capability—its perceived competence—especially in distinct geographical and cultural contexts. While studies have examined aspects like service quality and customer satisfaction, the direct link between the nuanced characteristics of AI service quality and consumers' judgment of the AI's inherent ability or effectiveness warrants further investigation. This study aims to bridge this gap by investigating the relationship between key dimensions of AI service quality and consumers' perceived competence within the online retail industry. This study specifically focuses on consumers in Hue City, Vietnam, as a representative case within this rapidly developing e-commerce landscape. The selection of Hue City was intentional to provide a nuanced understanding of AI adoption and consumer perceptions in a distinct geographical and cultural context, which has been under-researched compared to more developed markets.

Specifically, this research seeks to identify and define the relevant dimensions of AI service quality in the online retail context, examine the influence of these AI service quality dimensions on consumers' perceived competence regarding AI, and provide practical implications for online retailers, policymakers, and AI developers to enhance consumer acceptance and engagement with AI technologies. The remainder of this paper is structured as follows: Section 2 reviews the relevant literature and develops the research hypotheses. Section 3 outlines the research methodology. Section 4 presents the results and discusses the key findings. Finally, Section 5 concludes the paper, highlighting theoretical and practical implications, as well as limitations and avenues for future research

2. Theoretical background and Research hypotheses

2.4 Theoretical underpinnings

This study is fundamentally grounded in Social Cognitive Theory (SCT), complemented by the Computers Are Social Actors (CASA) paradigm, to elucidate how consumers evaluate AI in an online retail environment. Developed by Bandura (1999), SCT posits a dynamic interplay between environmental stimuli, personal cognition, and human behavior. According to this theory, individuals do not passively receive information; rather, they actively process external environmental cues to form cognitive judgments. In the contemporary retail landscape, AI agents (such as smart recommendation systems and chatbots) act as prominent environmental stimuli. When consumers interact with these AI systems, they engage in a cognitive evaluation process based on the service quality they experience. To explain why consumers attribute "competence" to a machine, this study draws upon the CASA paradigm (Nass et al., 1994), which asserts that humans subconsciously treat computers and AI agents as social entities. Consequently, consumers apply human social rules and cognitive frameworks when interacting with AI.

By integrating SCT and the CASA paradigm, this study establishes a direct theoretical link between AI service quality and perceived competence. AI service quality dimensions serve as the explicit external signals. Consumers cognitively process these technical and functional signals to form a unified social judgment about

the AI's "intelligence" and "capability". This theoretical lens perfectly frames our investigation into how specific AI service dimensions directly shape perceived competence in the online retail context.

2.4 AI service quality

Service quality generally refers to consumers' value judgments of both tangible and intangible services provided by firms (Parasuraman et al., 1988). With the advancement of AI technology, AI service quality has emerged as a crucial research topic (Chen et al., 2023; Cheng et al., 2021; Noor et al., 2022a; Noor et al., 2022b; Shen et al., 2025; Zhang et al., 2022). AI can act, react, learn, and assist like humans. In e-commerce, AI is employed in various technologies, such as chatbots to support online conversations and solve customer problems like human agents, and recommendation engines that screen customer information by examining algorithms and suggest compatible products to customers. The perceived quality of AI services by customers determines their value. Unlike other services, AI is technology-oriented, incorporating information and system characteristics that influence customers' perceptions.

Building on existing literature and insights from the provided context, AI service quality in a retail context is defined as consumers' overall judgment and perception of the overall quality of the entire AI service delivery process when using service agents such as apps, chatbots, and virtual assistants. This study adopts four key dimensions of AI service quality that are particularly relevant to the online retail environment (Shen et al., 2025).

These dimensions were specifically chosen due to their direct relevance to the functional and performance aspects of AI services, which are critical for shaping consumers' perceptions of competence in an online retail environment. Unlike other dimensions such as empathy or anthropomorphism, which relate to emotional perceptions, these four dimensions directly speak to the AI's ability to perform tasks effectively, reliably, securely, and in a tailored, accessible manner—all hallmarks of perceived competence. This focus allows for a precise investigation into the cognitive evaluations of AI's capabilities as a service provider.

Table 1. Definitions of AI service quality's dimensions

Dimensions	Definitions	References
Technical Security	The degree of security consumers perceive when using AI technology from a retailer. This encompasses feeling safe with online payments and the assurance that personal information will not be misused.	Noor et al. (2022a); Noor et al. (2022b); Shen et al. (2025)
Technical Reliability	The level of reliability consumers feel when using AI technology from a retailer. This refers to the AI service performing correctly, consistently, and without failures.	Noor et al. (2022a); Parasuraman et al. (1988); Shen et al. (2025)
Perceived Personalization	The degree of customization and differentiation consumers perceive when using AI technology from a retailer. This includes the AI's ability to make accurate recommendations based on preferences, meet personalized needs, and analyze spending habits.	Chen et al. (2023); Noor et al. (2022a); Shen et al. (2025)

Hyperconnectivity Service Capability	The extent to which consumers perceive AI technology from a retailer as being responsive to and capable of meeting their needs anytime, anywhere. This involves 24/7 availability, accessibility from any location or device, and prompt responses.	Chen et al. (2023); Noor et al. (2022b); Shen et al. (2025)
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Source: Compiled by authors, 2025

2.4 Perceived competence

Perceived competence, as a fundamental dimension of social judgment, reflects characteristics such as efficiency, skills, creativity, confidence, and intelligence (Hoegg & Alba, 2011; Shen et al., 2025). It is more closely associated with cognitive evaluations (Fiske et al., 2007; Shen et al., 2025). In the context of AI, consumers form perceptions of competence based on a nuanced understanding that integrates two key interrelated aspects. AI intelligence refers to the consumer's belief in the AI system's underlying cognitive capabilities, such as its capacity to learn from data, reason, solve problems, and adapt flexibly. This aspect captures the AI's "thinking" aptitude, exemplified by its ability to accurately analyze spending habits or make precise recommendations. Conversely, overall service effectiveness pertains to the consumer's evaluation of how well the AI system performs its functions reliably, accurately, and efficiently in practical service delivery. This focuses on the AI's demonstrable operational performance, such as providing prompt responses, handling inquiries without errors, or ensuring secure transactions. Thus, perceived competence in AI encompasses both the AI's intrinsic cognitive prowess and its observable, consistent functional outcomes in assisting the shopping journey.

2.4 Relationship between AI service quality and Perceived competence

It is argued that the specific dimensions of AI service quality directly contribute to consumers' perceived AI competence (Shen et al., 2025). When AI services demonstrate strong functional attributes and a high degree of personalization and accessibility in the online retail context, these dimensions can enhance consumers' perception of the AI's capabilities and effectiveness. Specifically, each of the four distinct AI service quality dimensions plays a unique role in shaping perceived competence.

Technical security (TS): Technical security refers to the degree of protection consumers perceive regarding their privacy and online transactions when interacting with AI. In the digital retail environment, safeguarding sensitive financial and personal data is a complex technological challenge. According to Shen et al. (2025), when an AI system successfully demonstrates robust security measures and prevents data breaches, consumers interpret this as a signal of high-level technological sophistication. Consequently, as supported by the framework of Noor et al. (2022b), the ability to guarantee security leads consumers to infer that the AI possesses strong comprehensive capabilities, thereby elevating their perception of its overall competence. Therefore, the first research hypothesis is proposed as follows:

Hypothesis 1 (H1): Technical security has a positive effect on perceived competence.

Technical reliability (TR): Technical reliability captures the AI's ability to perform its promised services correctly, consistently, and without technical failures. Reliability serves as a fundamental benchmark for professionalism and operational proficiency. As noted by Shen et al. (2025), reliable AI services significantly

reduce consumer uncertainty. When AI agents, such as chatbots or recommendation engines, continuously and stably provide accurate information without glitches, they directly demonstrate their effectiveness. This consistent, error-free performance reinforces the cognitive judgment that the AI is a highly skilled and capable entity (Shen et al., 2025). Hence, the author proposes the second research hypothesis as follows:

Hypothesis 2 (H2): Technical reliability has a positive effect on perceived competence.

Perceived personalization (PP): Perceived personalization reflects the AI's capacity to analyze individual preferences and deliver customized content, recommendations, and services. Delivering tailored experiences requires the AI to effectively process massive datasets and recognize complex patterns, which Chen et al. (2023) identify as a core strength of AI over human agents. These advanced analytical tasks demand a high level of algorithmic intelligence. Therefore, as highlighted by Shen et al. (2025), when consumers receive highly accurate personalized recommendations, they directly perceive the AI as possessing superior intelligence and advanced problem-solving skills, which significantly enhances their evaluation of its competence. From this, the third research hypothesis is proposed as follows:

Hypothesis 3 (H3): Perceived personalization has a positive effect on perceived competence.

Hyperconnectivity service capability (HC): Hyperconnectivity service capability refers to the AI's ability to provide omnipresent, prompt, and seamless assistance across multiple devices and times. In the fast-paced online retail sector, consumers expect immediate responses. Chen et al. (2023) argue that an AI system's ability to maintain 24/7 availability and solve problems instantaneously signals a robust infrastructural capability. Furthermore, Shen et al. (2025) emphasize that this ubiquitous accessibility and responsiveness lead consumers to evaluate the AI system as highly capable and functionally efficient. Thus, the author proposes the fourth research hypothesis as follows:

Hypothesis 4 (H4): Hyperconnectivity service capability has a positive effect on perceived competence.

Figure 1 demonstrates the research model.

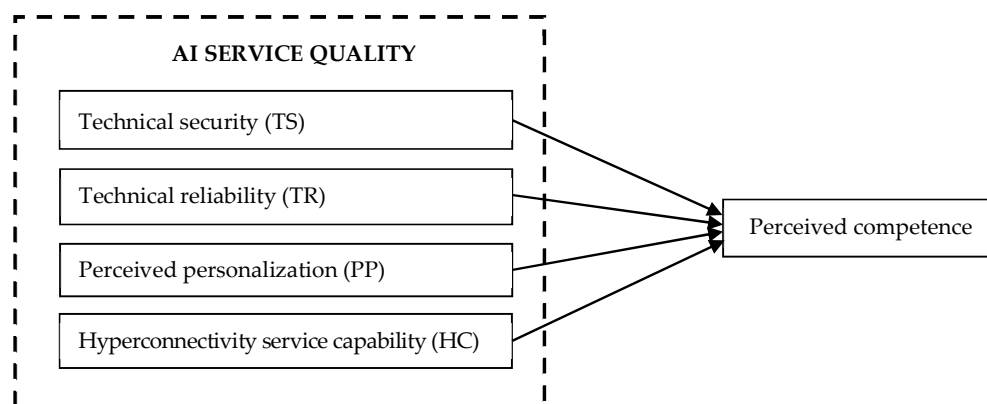


Figure 1. Research model

Source: Compiled by authors, 2025

3. Research Methods

3.1 Research Design

This study employs a quantitative research design utilizing an online survey method. This approach allows for the collection of data from a large number of consumers, enabling statistical analysis of the hypothesized relationships. The study's survey instrument incorporates previously validated scales adapted to the AI service context. While the original scales may have utilized a 7-point format, this study adapted the measurement to a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to better align with the specific research context. Methodologically, in an online survey environment where respondents primarily use mobile devices, a 5-point scale reduces cognitive load, minimizes survey fatigue, and significantly enhances completion rates. Culturally, Vietnamese respondents in general, and consumers in Hue city in particular, often exhibit a cultural tendency toward moderation and harmony, frequently avoiding extreme response categories. Consequently, a 5-point scale provides sufficient granularity to capture their perceptions accurately without forcing artificial distinctions at the extremes, thereby ensuring higher data reliability and cultural validity.

AI service quality (AI-SQ): This construct is measured across four dimensions (adopted from Shen et al. (2025)):

- Technical security (TS): "The retailer's AI service ensures that my privacy is not compromised," "I feel safe using the retailer's AI services," "The retailer will not freely misuse my personal information through AI technology," and "I have no concerns about providing sensitive information (e.g., ID number) to the retailer's AI devices."

- Technical reliability (TR): "The retailer was able to deliver AI services consistently and consistently," "This retailer's AI services are performed correctly the first time around," "The retailer's AI services are accurate," and "The retailer's AI services are reliable."

- Perceived personalization (PP): "The retailer's AI service can meet my personalized needs," "The retailer's AI service can accurately analyze my spending habits," "The retailer's AI service recommends content I am interested in," and "I can customize the content of this retailer's AI services."

- Hyperconnectivity service capability (HC): "This retailer's AI services can be available 24/7," "I can access the retailer's AI services at any time," "The retailer's AI service is always available to respond to my requests," "I can use the retailer's AI service on multiple devices," and "The retailer's AI service will be available regardless of location."

Perceived competence (PC): This construct is measured using four items (efficient, intelligent, skilled, and robust) to assess the retailer's AI services. These items were adapted from Aaker et al. (2010), Kim & Hur (2024), and Shen et al. (2025).

3.2. Sampling and Data collection

The target population for this study comprises consumers in Hue city, Vietnam, who have experienced AI-powered customer services—such as chatbots, intelligent recommendation systems, voice/image search functionalities, or personalized website and app experiences—when purchasing or browsing products online. To reach this target population effectively, the sampling frame utilized prominent local e-commerce

community groups and university-affiliated network forums based in Hue city. Data collection was conducted via an online survey platform utilizing a convenience sampling approach.

To ensure the relevance and validity of the data, specific screening criteria were implemented: participants were strictly required to verify their residency in Hue city and confirm their prior interactions with AI in an online retail setting. Only those who affirmed this experience and could identify the relevant online retailer were permitted to proceed with the full survey. An initial batch of 450 survey invitations was distributed via targeted online links. After the rigorous application of the aforementioned screening criteria to ensure data quality, a final sample size of 411 valid questionnaires was retained. This yielded an effective response rate of 91.3%, which is consistent with similar quantitative studies in the field. Furthermore, to ensure the scientific rigor and representativeness of the sample, a comparison with population statistics was considered in Section 4.1.

3.3. Data processing and analysis methods

Upon completion of data collection, the raw survey questionnaires were meticulously input and prepared for analysis. This preparation phase included essential data-cleaning procedures, such as identifying and excluding cases with patterns indicative of low-effort responding (e.g., straight-lining or identical answers across all items) to enhance the dataset's integrity and reliability. Subsequently, the quantitative data were analyzed using IBM SPSS Statistics version 27.0. The analytical approach involved several key statistical techniques: descriptive statistics to summarize the sample characteristics, scale reliability testing to assess internal consistency of constructs, Exploratory Factor Analysis (EFA) to confirm underlying constructs, and linear regression analysis to test hypothesized relationships between variables.

4. Research results and Discussion

4.1. Characteristics of survey participants

The application of descriptive statistical methods provided an initial overview of the survey participants, identifying a total of 411 consumers from Hue city. A detailed breakdown of demographic data indicated a noticeable tilt towards female participation, accounting for 54.7% of the respondents, in contrast to 45.3% male respondents. This observed gender distribution may be indicative of a higher propensity among females to engage in survey-based research or perhaps reflects their stronger engagement with online consumer behaviors and experiences.

Age-wise, the most prominent segment within the sample was the 25–39-year-old group, representing 48.4% of all participants. The subsequent largest group comprised individuals aged 18–24, making up 39.4%. This demographic patterning underscores the considerable representation of young adults and those in the early stages of their professional careers. This age structure is particularly pertinent, aligning with published industry analyses that identify these cohorts as central to the consumer base for online retail ventures throughout Vietnam.

Regarding professional and educational backgrounds, the majority of the participants were categorized as employees (encompassing civil servants and other staff, at 55.7%) or students (28.9%). The reported average monthly income for these individuals spanned a range of 5 to 15 million VND. Collectively, these socio-demographic characteristics of the sample are considered to offer a strong degree of representativeness for the

broader consumer population of Hue city, thereby lending support to the external validity of the study's conclusions.

4.2. Assessing scale reliability and exploratory factor analysis

Assessing scale reliability

Table 2 presents the results of the reliability analysis assessing the internal consistency of the proposed scale for AI-powered service quality in the online retail context. The findings indicate excellent reliability across all four component factors. Given that all Cronbach's Alpha coefficients substantially exceed the widely accepted threshold of 0.7, and the item-total correlations for all observed variables consistently remain above 0.5, no variable elimination was necessary. Ultimately, these results confirm the robust internal consistency of the measurement instruments, rendering them highly suitable for subsequent analyses.

Table 2. Cronbach's Alpha reliability analysis results

	Cronbach's Alpha
TS (Technical security)	0.899
TR (Technical reliability)	0.908
PP (Perceived personalization)	0.907
HC (Hyperconnectivity service capability)	0.927
PC (Perceived competence)	0.905

Source: Data processing results by authors, 2025

Exploratory factor analysis

The results of the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity presented in Table 3 were examined to verify the suitability of the data for factor analysis. The KMO measure yielded a value of 0.908. Because this value substantially exceeds the recommended threshold of 0.50, it demonstrates strong sampling adequacy. Concurrently, Bartlett's test of sphericity was highly significant ($p < 0.001$), rejecting the null hypothesis that the correlation matrix is an identity matrix. Together, these results confirm that the observed variables are sufficiently intercorrelated, thereby thoroughly justifying the application of Exploratory Factor Analysis.

Table 3. KMO and Bartlett's test results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.908
Bartlett's Test of Sphericity	Approx. Chi-Square	6084.099
	df	210
	Sig.	0.000

Source: Data processing results by authors, 2025

Table 4 details the outcomes of the Exploratory Factor Analysis (EFA), conducted to evaluate the underlying dimensionality and construct validity of the measurement model. Principal Axis Factoring (PAF) paired with an oblique Promax rotation was utilized, a methodological choice that appropriately accounts for the expected intercorrelations among latent constructs in social science research.

Table 4. Pattern matrix from EFA

Items	Component				
	1	2	3	4	5
HC3	0.868				
HC4	0.847				
HC2	0.846				
HC1	0.841				
HC5	0.831				
PP3		0.876			
PP4		0.854			
PP2		0.822			
PP1		0.817			
TR4			0.859		
TR1			0.845		
TR3			0.843		
TR2			0.824		
TS2				0.854	
TS1				0.853	
TS4				0.820	
TS3				0.796	
PC4					0.865
PC2					0.843
PC3					0.818
PC1					0.746
Eigenvalues	7.074	3.254	2.571	2.461	1.011
Cumulative total variance extracted (%)				71.067%	

Source: Data processing results by authors, 2025

By incorporating all measurement items from the four independent variables and the single dependent variable into a comprehensive pattern matrix, the analysis yielded a distinct, well-defined five-factor solution. Each extracted component comfortably surpassed the Kaiser criterion with an eigenvalue greater than 1.0. Collectively, these five latent factors explain a substantial 71.067% of the cumulative total variance, reflecting the strong explanatory power of the proposed theoretical framework. Crucially, an examination of the pattern matrix reveals that all items loaded robustly and exclusively onto their theoretically designated constructs. The pristine factor structure, characterized by the complete absence of significant cross-loadings, firmly establishes both convergent and discriminant validity. Ultimately, these empirical findings confirm that the empirical structure of the data aligns perfectly with the conceptual design, rendering the measurement scales psychometrically sound and optimally prepared for subsequent analyses.

4.3 Regression analysis

Through the application of multivariate regression analysis, this research explores the intricate relationships between the various dimensions of AI service quality and consumers' perceived competence, specifically focusing on the online retail sector in Hue city, Vietnam.

Testing the explanatory power of the multivariate regression model

The findings presented in Table 5 reveal that the four predictors in the proposed model explain 53.5% of the variance in consumers' perceived competence, serving as the dependent variable. Methodologically, the Durbin-Watson *d* statistic of 2.097 indicates that the residuals are independent, thereby negating concerns about autocorrelation. Moreover, an examination of the Variance Inflation Factor (VIF) for the independent variables, detailed in Table 6, shows all values to be below 2, confirming the absence of multicollinearity. Consequently, the linear regression model adheres to established evaluation conditions and demonstrates an adequate goodness of fit, providing a sound basis for deriving research conclusions.

Table 5. Testing the explanatory power of the multivariate regression model

Model	R	R square	Adjusted R square	Std. Error of the Estimate	Durbin-Watson
1	0.735	0.540	0.535	0.49577	2.097

Source: Data processing results by authors, 2025

Regression model analysis results

The outcomes of the regression analysis in Table 6 provide insights into the relationship between the four component factors of AI service quality and consumers' perceived competence in the online retail industry in Hue City, Vietnam. Notably, all standardized coefficients within the regression equation exhibited positive values, indicating a direct relationship wherein each of the four factors positively influences the dependent variable. This finding suggests that a positive assessment of AI services encountered during the online shopping journey leads to an enhancement in consumers' perceived competence. Crucially, the significance level for every independent factor included in the research model was less than 0.05, which provides strong statistical support for the acceptance of the research hypotheses.

Table 6. Regression model analysis results

Model	Unstandardized Coefficients		Standardized	t	Sig.	VIF
	B	Std. Error	Beta			
(Constant)	-0.959	0.223		-4.305	0.000	
TR	0.302	0.035	0.299	8.527	0.000	1.082
TS	0.275	0.037	0.257	7.353	0.000	1.075
HC	0.286	0.036	0.278	8.039	0.000	1.055
PP	0.369	0.036	0.357	10.211	0.000	1.080

Source: Data processing results by authors, 2025

Table 6 summarizes the outcomes of the multiple regression analysis, which unequivocally affirm all four of our research hypotheses. This provides substantial evidence that the selected independent variables significantly impact the dependent variable. Further details regarding the model testing framework and the hypotheses can be found in Table 7.

Table 7. Hypothesis testing results

Hypothesis	Relationship	Standardized Coefficient	p-value	Result
H1	TS → PC	0.257	0.000	Supported
H2	TR → PC	0.299	0.000	Supported
H3	PP → PC	0.357	0.000	Supported
H4	HC → PC	0.278	0.000	Supported

Source: Data processing results by authors, 2025

The findings of this study generally resonate with prior research, including works by Noor et al. (2022a); Noor et al. (2022b); Shen et al. (2025), in underscoring the critical role of specific AI service quality dimensions in shaping consumers' perceived competence within the online retail context. This study comprehensively explored how the dimensions of AI service quality in online retail influence consumers' perceived competence among consumers in Hue city, Vietnam. Our findings consistently demonstrate that all four identified dimensions of AI service quality—technical security, technical reliability, perceived personalization, and hyperconnectivity service capability—positively contribute to consumers' perceptions of competence. This aligns with previous research suggesting that AI attributes enable consumers to develop stronger perceptions of the service agent's competence, which, in turn, can lead to improved consumer evaluations.

Notably, perceived personalization (PP) exerts the strongest influence on perceived competence (beta coefficient = 0.357, p-value < 0.001). In the dynamic online retail environment, the ability of AI to deliver highly tailored recommendations directly signals advanced algorithmic capability. When systems accurately interpret individual preferences and shopping habits, consumers immediately recognize a high level of

technological sophistication and problem-solving skill. This finding strongly aligns with the conclusions of Shen et al. (2025), who also identified personalization as the primary driver of perceived competence, emphasizing that customization is a unique technological advantage that distinctly highlights AI's superiority over traditional human services.

Following PP, technical reliability (TR) emerges as the second most impactful factor (beta coefficient = 0.299, p-value < 0.001). The expectation of seamless, error-free transactions is paramount for modern online shoppers. An AI system that consistently performs without technical glitches or incorrect outputs demonstrates operational stability, which translates directly into perceived competence. Interestingly, this represents a stronger relative impact compared to the findings of Shen et al. (2025), where reliability ranked third. This shift suggests that within specific regional online retail markets, foundational system stability and consistent accuracy remain critical benchmarks for evaluating AI intelligence.

Hyperconnection service capability (HC) also plays a substantial role (beta coefficient = 0.278, p-value < 0.001). The capacity of an AI agent to offer uninterrupted, omnipresent support across multiple devices signals a robust infrastructural competence. While Shen et al. (2025) found this to be the weakest predictor of competence, the current results indicate a strong consumer reliance on ubiquitous access. As digital ecosystems evolve, the ability to maintain immediate, 24/7 responsiveness is increasingly viewed as a core measure of an AI system's functional capability.

Finally, while technical security (TS) significantly influences perceived competence (beta coefficient = 0.257, p-value < 0.001), it exhibits the weakest relative impact among the four dimensions. This suggests that while robust privacy and payment protections are essential, consumers may increasingly view them as baseline hygiene factors—basic prerequisites for online retail—rather than direct indicators of advanced “intelligence”. This diverges from the findings of Shen et al. (2025), where security was the second strongest predictor. This contrast implies that as AI adoption matures, consumers expect security by default, reserving their highest competence evaluations for systems that deliver distinct, personalized, and reliable proactive value.

5. Conclusion and Implications

This study rigorously examined how specific dimensions of AI service quality impact consumers' perceived competence within the online retail industry of Hue city, Vietnam. Our findings consistently reveal that all four identified AI service quality dimensions—technical security, technical reliability, perceived personalization, and hyperconnectivity service capability—positively contribute to consumers' perceptions of AI competence. Notably, perceived personalization emerged as the most significant driver of perceived competence in this regional context.

The research yields significant implications for both theoretical understanding and practical application. Theoretically, this study makes a crucial contribution by expanding the scope of AI service quality research to directly address its impact on consumers' perceived competence, a less explored dependent variable compared to more common outcomes like satisfaction or trust. By empirically validating these relationships within the distinct context of Hue City, Vietnam—an under-researched emerging market—the study offers novel insights into how these dynamics unfold in diverse cultural and economic landscapes. The specific finding that perceived personalization holds the paramount influence in this setting adds a critical nuance to existing theories on

consumer-AI interaction, suggesting that the drive for tailored experiences is particularly pronounced, thereby refining our understanding of AI's role in shaping perceptions of capability. Furthermore, the repositioning of technical security as a baseline expectation rather than the primary driver of competence highlights an evolutionary shift in consumer technology acceptance. This outcome both aligns with and diverges from recent scholarship. For instance, while Shen et al. (2025) also underscored the critical role of personalization, they identified technical security as a highly dominant predictor of competence. The findings of this study contrast this by demonstrating that in emerging e-commerce markets like Vietnam, consumers may already take security for granted as a fundamental prerequisite, heavily prioritizing the AI's ability to customize interactions instead. Additionally, whereas previous studies, such as those by Chen et al. (2023) and Noor et al. (2022b), primarily linked AI service quality to relational outcomes like trust, flow experience, and customer loyalty, this research extends their frameworks by proving that these quality dimensions fundamentally alter cognitive evaluations of the AI's inherent intelligence. This highlights a vital theoretical progression: as AI integration matures, consumers are moving beyond basic functional acceptance to demanding highly intelligent, tailored digital engagements.

Practically, for online retailers, the study provides valuable insights for designing and enhancing AI-powered customer services. Given the paramount importance of perceived personalization, retailers should focus on developing AI solutions capable of deeply analyzing consumer behavior and preferences to deliver highly personalized product recommendations, customer service, and shopping experiences. This not only caters to individual needs but also showcases the superior capability of AI in understanding and serving customers. Retailers should also prioritize investment in improving the technical reliability of their AI systems, ensuring that chatbots, recommendation engines, and other AI tools operate accurately and consistently without errors.

Additionally, ensuring the hyperconnectivity service capability of AI (24/7 availability, easy accessibility across multiple devices, and prompt responses) is crucial to meet modern consumer expectations for ubiquitous support. Providing seamless and timely AI support will significantly enhance the overall perceived competence of the AI system. Finally, while technical security exhibited the weakest relative impact, it remains a critical hygiene factor. Retailers must clearly communicate their data security and privacy measures to foster a baseline sense of trust, especially concerning sensitive financial transactions. These findings can assist business managers and policymakers in Vietnam in formulating more effective strategies to foster consumer adoption of and engagement with AI technologies in the digital transformation context.

Despite the aforementioned contributions, this study is subject to certain limitations that delineate avenues for future research. Firstly, while the study employed established AI service quality dimensions, it offers minimal theoretical advancement of the AI service quality concept itself. Future research could introduce new dimensions relevant to rapidly evolving AI technologies and consumer expectations. Secondly, this study deliberately focused on the "competence" dimension of AI (a cognitive evaluation) and did not explore the "warmth" dimension, which encompasses emotional interactions such as friendliness or human-likeness. Investigating perceived warmth could provide a more holistic understanding. Furthermore, the geographical focus on Hue city limits the direct generalizability of the findings. Future studies are encouraged to replicate this research in diverse geographical areas and explore specific socio-cultural factors that may influence consumer-AI interactions. Finally, utilizing SEM in future research will allow for the simultaneous examination of more complex structural relationships.

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