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The effects of perceived usefulness, perceived ease of use, and trust on online sales performance in the refrigeration product sector

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Abstract: This study examines the effects of perceived usefulness (PU), perceived ease of use (PEOU), and trust (TRUST) on online sales performance (OSP) in the refrigeration product sector in Hanoi, Vietnam, within the context of digital transformation and e-commerce growth. Using primary data collected from 350 employees working in firms engaged in online sales, the study applies reliability analysis, exploratory factor analysis (EFA), and multiple regression using SPSS. The results indicate that all three factors have significant positive effects on OSP ($p < 0.05$), with perceived usefulness exerting the strongest influence ($\beta = 0.353$), followed by perceived ease of use ($\beta = 0.224$) and trust ($\beta = 0.156$). The model explains 37.4% of the variance in online sales performance ($R^2 = 0.374$). These findings highlight the importance of enhancing functional value, usability, and trust in digital platforms, particularly for high-value products such as refrigeration appliances. The study contributes to the literature by extending TAM and trust theory to a specific product category in an emerging market. Managerial implications suggest that firms should prioritize user-centered design, transparent service policies, and AI-enabled digital solutions to improve online sales performance. Future research should explore additional determinants and apply more advanced analytical approaches.

Keywords: *Business administration, Economics, perceived usefulness (PU), History of economic thought, Online sales performance (OSP), Perceived ease of use (PEOU), Trust (TRUST).*

1. Introduction

The rapid diffusion of e-commerce has fundamentally reshaped how firms market and sell consumer durables, especially high-value products such as refrigeration appliances. In Vietnam, online retail has expanded strongly in recent years; official and industry reports indicate that the national e-commerce market continued to grow robustly in 2024, reaching around US$25 billion, while e-commerce remained one of the fastest-growing segments of the retail economy [1, 2]. This broader digital transformation has encouraged firms to move beyond traditional channels and to integrate online platforms into sales, customer service, and after-sales operations [3].

From a theoretical perspective, online sales performance in digital markets can be explained by technology acceptance and trust-based mechanisms. The Technology Acceptance Model (TAM) argues that users' behavioral responses to digital systems are strongly shaped by perceived usefulness and perceived ease of use. In e-commerce settings, consumers are more likely to engage with online platforms when they perceive them as beneficial, efficient, and easy to navigate. Davis's foundational work established these constructs as central determinants of technology acceptance, and subsequent research extended them into online shopping and digital service environments [4].

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In parallel, trust has become a decisive factor in online transactions, particularly for high-involvement products such as air conditioners, refrigerators, and washing machines. Unlike low-value routine purchases, refrigeration products involve greater financial commitment, installation requirements, warranty expectations, and perceived post-purchase risk. Prior research demonstrates that trust in the platform, seller, and transaction environment significantly affects online shopping decisions and works jointly with TAM variables in explaining digital purchasing behavior. In contemporary e-commerce, this issue is even more salient because consumers increasingly interact with AI-enabled recommendation systems, chatbots, and personalized interfaces, all of which can improve convenience but also create new concerns about credibility and reliability.

The refrigeration product sector provides a particularly relevant context for this investigation. In digitally transforming retail markets, refrigeration firms are not only selling products online but are also competing through delivery speed, installation coordination, warranty transparency, and digitally mediated customer support. In Hanoi, one of Vietnam's most dynamic consumer markets, this transformation is reinforced by dense urban demand, the spread of platform-based retail, and the increasing use of AI-supported personalization and digital customer engagement in business operations. Consequently, online sales performance is no longer determined solely by price or promotion; it also depends on whether customers perceive online channels as useful, easy to use, and trustworthy.

Although the literature on online shopping behavior is extensive, there is still limited evidence focusing specifically on online sales performance in the refrigeration product sector in emerging markets such as Vietnam. Much prior research has examined the intention to adopt technology, customer satisfaction, or repurchase intention in general e-commerce contexts, but fewer studies have directly linked TAM-based perceptions and trust to business outcomes in high-value household appliance markets. This gap is important because refrigeration products involve a distinct combination of technological, logistical, and service-related considerations. Therefore, this study investigates how PU, PEOU, and TRUST influence online sales performance (OSP) in firms operating in the refrigeration product sector in Hanoi.

2. Theoretical Background and Hypothesis

2.1. Theoretical Background

2.1.1. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis [4], proposes that two key beliefs determine individuals' acceptance of information systems: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which a person believes that using a system will enhance performance, while perceived ease of use refers to the extent to which the system is considered effortless to use. TAM has been widely applied beyond organizational IT adoption, including e-commerce, mobile applications, and digital services, because it offers a parsimonious yet powerful explanation of how users respond to technology-enabled environments.

In the context of online retailing of refrigeration products, TAM is highly relevant because consumers interact directly with websites, apps, digital catalogs, payment systems, and sometimes AI-driven product recommendation features. If online channels help customers compare specifications, save time, and reduce search costs, these platforms are likely to be seen as more useful. Likewise, if consumers find the purchase process intuitive and convenient, they are more likely to complete transactions. Thus, TAM provides a strong theoretical basis for explaining why PU and PEOU may influence online sales performance in this sector.

2.1.2. Trust Theory in E-Commerce

Trust theory argues that trust reduces uncertainty and perceived risk in exchange relationships, especially when direct inspection and face-to-face interaction are absent. In online environments, consumers must rely on signals such as seller reputation, platform reliability, payment security, service

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transparency, and previous customer reviews. Trust becomes a central mechanism that enables transactions under uncertainty.

Applied to this study, trust is particularly important in the refrigeration product sector because these products typically involve high monetary value, technical complexity, and strong expectations regarding installation and warranty services. A consumer may perceive a platform as useful and easy to use, but still avoid purchasing if trust is weak. Moreover, in the era of AI-enabled e-commerce, personalization algorithms, recommendation engines, and automated customer service can improve user experience, but their positive effect depends heavily on whether consumers trust the digital environment in which these tools operate. Therefore, trust is not merely an additional factor; it is a critical condition for translating digital convenience into actual sales performance.

2.1.3. Digital Transformation and AI in E-commerce

Digital transformation in e-commerce involves integrating digital technologies into core activities such as sales, marketing, logistics, and customer service. Recently, AI has become increasingly important through recommendation systems, demand prediction, dynamic pricing, chatbot support, and personalized communication. These tools can enhance customers' perception of usefulness by making shopping faster and more relevant, while also improving ease of use with more intuitive interfaces and real-time assistance.

For refrigeration-product firms in Hanoi, digital transformation and AI are especially relevant because customer journeys often involve extensive information search, price comparison, and service evaluation before purchase. AI-supported e-commerce systems can help customers identify suitable products, understand features, and receive timely support. However, the effectiveness of these systems depends on their ability to create both functional value and trust. Therefore, the current study places PU, PEOU, and TRUST at the center of the model linking digital technology use to online sales performance.

2.2. Literature Review

Recent studies have increasingly examined the determinants of online consumer behavior, particularly within the framework of the Technology Acceptance Model (TAM), emphasizing the roles of perceived usefulness (PU), perceived ease of use (PEOU), and trust (TRUST).

Ernawati et al. [5] found that perceived ease of use and trust have a direct and significant influence on e-commerce usage intention, while perceived usefulness indirectly affects behavior through attitude. This finding suggests that ease of interaction and trust in platforms are critical drivers of online engagement, particularly in post-pandemic digital environments. However, the study focuses primarily on behavioral intention rather than actual performance outcomes, leaving a gap in understanding how these factors influence business-level results.

Farhat et al. [6] highlight that trust plays a central role in shaping online purchasing behavior and long-term customer engagement, particularly within sustainable e-commerce frameworks. The study also integrates UTAUT and digital behavior perspectives, emphasizing that trust enhances customer loyalty and satisfaction. However, it primarily examines customer-side outcomes rather than operational or performance-related indicators.

A meta-analysis by Handoyo [7] confirms that trust is one of the most influential determinants of e-commerce behavior, interacting with perceived risk and security. The study demonstrates that trust significantly influences purchasing decisions and can act as a mediating or moderating variable. Despite its comprehensive nature, the research focuses on consumer behavior across platforms and does not address sector-specific contexts such as refrigeration products or industry-level performance.

Research on AI adoption in e-commerce [8] shows that perceived usefulness and trust are key drivers of consumer acceptance of AI-powered online shopping systems. The study indicates that AI enhances customer experience and satisfaction but may also introduce new concerns related to trust and

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transparency. However, it mainly investigates technology adoption rather than its direct impact on business performance outcomes.

Although prior studies consistently confirm the importance of perceived usefulness, perceived ease of use, and trust in shaping online consumer behavior, several limitations remain.

First, most studies focus on behavioral intention or purchase intention, rather than actual performance outcomes, such as online sales performance. This creates a gap in understanding how consumer perceptions translate into measurable business results.

Second, existing research is largely consumer-centric, with limited attention to firm-level perspectives, particularly in specific industries. There is a lack of empirical evidence examining how these factors influence sales performance in niche sectors such as refrigeration products.

Third, while recent studies acknowledge the role of digital transformation and AI, they often treat technology as a contextual factor rather than integrating it into the analytical framework. As a result, the interaction between technological adoption and traditional TAM variables remains underexplored.

Fourth, there is limited research conducted in emerging economies, where digital infrastructure, consumer behavior, and market dynamics differ significantly from those in developed markets.

To address these gaps, this study extends the existing literature by: moving beyond behavioral intention to examine online sales performance (OSP) as the dependent variable; integrating TAM variables (PU, PEOU) with trust within a unified framework; applying the model to a specific industry context (refrigeration product sector), which has received limited attention in prior research; embedding the analysis within the broader context of digital transformation, AI adoption, and e-commerce development in emerging markets.

By doing so, the study contributes to both theory and practice, offering a more comprehensive understanding of how technological perceptions and trust influence not only consumer behavior but also firm-level performance outcomes.

2.3. Hypothesis Development

2.3.1. Perceived Usefulness Positively Affects Online Sales Performance

Perceived usefulness captures the extent to which customers believe that online shopping platforms improve the effectiveness of the purchasing process. In the refrigeration sector, online channels may be perceived as useful when they enable faster product searches, easier specification comparisons, more transparent price information, and more efficient decision-making. According to TAM, when a technology is viewed as useful, users are more likely to adopt it and engage more intensively with it.

In practical e-commerce settings, greater perceived usefulness should translate into better online sales outcomes because customers are more willing to browse, compare, and complete purchases through digital channels. This is especially relevant for high-value products, where informative and efficient digital interfaces can reduce search costs and support decision confidence. Therefore, the following hypothesis is proposed:

H_1: Perceived usefulness (PU) positively affects online sales performance (OSP).

2.3.2. Perceived Ease of Use Positively Affects Online Sales Performance

Perceived ease of use refers to the degree to which online shopping systems are simple, understandable, and free of effort. In e-commerce, consumers are more likely to purchase when websites or applications are easy to navigate, product categories are clearly organized, and payment procedures are straightforward. TAM suggests that ease of use directly influences user acceptance and often reinforces the functional benefits of digital systems.

In the refrigeration product sector, this factor is especially important because consumers often need to review technical features, installation options, and service conditions before purchasing. If the platform is difficult to use, customers may abandon the process or return to offline channels. Conversely, user-friendly design, mobile responsiveness, and clear online purchasing procedures can improve conversion and, ultimately, online sales performance. Thus, the following hypothesis is proposed:

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H_2: Perceived ease of use (PEOU) positively affects online sales performance (OSP).

2.3.3. Trust Positively Affects Online Sales Performance

Trust refers to customers' confidence in the online seller, the platform, and the transaction process. In online shopping, trust helps reduce uncertainty related to payment, product authenticity, delivery reliability, and after-sales service. Gefen et al. [9] showed that trust is as important to online commerce as the core TAM beliefs because it reduces perceived risk and facilitates transaction completion.

This relationship is likely to be even stronger for refrigeration products because customers often rely on promises regarding installation, maintenance, warranty, and service responsiveness. In AI-enabled e-commerce environments, trust also influences how consumers interpret personalization, automated assistance, and digital recommendations. If trust is high, these technologies may enhance purchasing confidence; if trust is low, even advanced digital systems may fail to improve sales performance. Accordingly, the following hypothesis is proposed:

H_3: Trust (TRUST) positively affects online sales performance (OSP).

3. Methodology

3.1. Research Design

This study adopts a quantitative research design to test the effects of perceived usefulness (PU), perceived ease of use (PEOU), and trust (TRUST) on online sales performance (OSP) in the refrigeration product sector. The study focuses on firms engaged in online sales of refrigeration products in Hanoi, where digital commerce, platform competition, and technology-enabled customer interaction have become increasingly important in business practice.

3.2. Data Collection and Sample

Primary data were collected through a survey of employees working in firms that sell refrigeration products via online channels in Hanoi. The respondents included staff involved in online sales, e-commerce operations, digital customer service, and related business support activities. This respondent group was selected because they are directly involved in implementing and observing online sales processes and are therefore well-positioned to evaluate the firm's online sales performance and the role of digital-channel factors.

The study uses a final sample size of 350 valid responses. This sample size is adequate for multivariate statistical analysis and is sufficient for testing the proposed model: OSP = f(PU, PEOU, TRUST).

3.3. Measurement Scales

All constructs were measured using multi-item scales adapted from prior studies and adjusted to fit the context of online sales in the refrigeration product sector. A five-point Likert scale was employed, ranging from 1 = strongly disagree to 5 = strongly agree.

All measurement items are adapted from established studies to ensure content validity (see Table 1). The scales are modified to fit the context of online shopping for refrigeration products in Hanoi. Prior to the main survey, a pilot test was conducted to refine the questionnaire and ensure clarity and reliability.

Online sales performance reflects the effectiveness of online channels in generating sales outcomes and customer satisfaction. It captures both financial and non-financial performance aspects in e-commerce environments [10, 11].

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Table 1.
Scales for the independent and dependent variables.

Code	Description	Sources
Online Sales Performance (OSP)		
OSP1	Online sales revenue has increased significantly.	Morgan, et al. [10]; Trainor, et al. [11]
OSP2	The conversion rate from browsing to purchasing is high.	
OSP3	Online market share has improved.	
OSP4	Customer satisfaction with online purchases is high.	
Perceived Usefulness (PU) Perceived usefulness refers to the extent to which customers believe that online shopping enhances their purchasing efficiency.		
PU1	Online shopping saves time when purchasing refrigeration products.	Davis [4]
PU2	Online platforms make it easier to compare products.	
PU3	Online shopping improves decision-making efficiency	
PU4	Online shopping enhances overall purchasing effectiveness.	
Perceived Ease of Use (PEOU) Perceived ease of use reflects the degree to which customers believe that online platforms are easy to use and require minimal effort.		
PEOU1	The website/app is easy to navigate.	Davis [4]
PEOU2	Searching for refrigeration products is simple.	
PEOU3	The purchasing process is clear and understandable.	
PEOU4	Payment procedures are convenient and user-friendly.	
Trust (TRUST)		
TRUST1	I trust the online seller of refrigeration products.	Gefen, et al. [9]; Pavlou [12]
TRUST2	I believe the product quality matches the description.	
TRUST3	I feel secure when making online payments.	
TRUST4	I trust the warranty and return policies.	

3.4. Data Analysis

The collected data will be processed using SPSS. The analytical procedures include: reliability analysis with Cronbach's Alpha; Exploratory Factor Analysis (EFA) to assess construct validity; and multiple linear regression analysis to test the proposed hypotheses and estimate the effects of PU, PEOU, and TRUST on OSP.

The regression model can be specified as follows:

$$OSP=\beta_0+\beta_1 PU+\beta_2 PEOU+\beta_3 TRUST+\varepsilon$$

4. Results

4.1. The Quality Scale Analysis Result

Reliability analysis was conducted using Cronbach's alpha. According to Hoang and Chu [13] and Hair Jr, et al. [14], a scale is considered reliable when Cronbach's alpha exceeds 0.6, and the corrected item-total correlation is greater than 0.3. The online sales performance (OSP) (four components/attributes) is influenced by analysis through the investigation of Cronbach's alpha determinant (in this case study, Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Trust (TRUST)), as shown in Tables 2a and 2b below:

Table 2a.
Analysis of factors' confidence in scales.

Determinants	N	Cronbach's Alpha	Corrected Item-Total Correlation
Perceived Usefulness (PU)	4	0.948	0.849
Perceived Ease of Use (PEOU)	4	0.913	0.763
Trust (TRUST)	4	0.900	0.765
online sales performance (OSP)	4	0.870	0.645

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Table 2b.
Results of Cronbach's alpha testing of attributes and item-total statistics.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Perceived Usefulness (PU): α = 0.948				
PU1	10.774	4.055	0.913	0.922
PU2	10.886	3.867	0.850	0.942
PU3	10.806	4.054	0.897	0.926
PU4	10.734	4.052	0.849	0.940
Perceived Ease of Use (PEOU): α = 0.913				
PEOU1	8.600	5.484	0.763	0.900
PEOU2	8.700	5.150	0.814	0.882
PEOU3	8.703	5.230	0.832	0.876
PEOU4	8.549	5.469	0.796	0.889
Trust (TRUST): α = 0.900				
TRUST1	10.809	5.238	0.801	0.868
TRUST2	10.980	4.472	0.784	0.871
TRUST3	10.851	4.889	0.765	0.875
TRUST4	10.886	4.743	0.780	0.870
Online sales performance (OSP): α = 0.870				
OSP1	10.549	5.899	0.645	0.864
OSP2	10.514	5.528	0.740	0.826
OSP3	10.786	5.556	0.740	0.827
OSP4	10.631	5.316	0.767	0.815

Table 2a and Table 2b show that the differences in the correlation of observed variables are above 0.3, and all Cronbach's alpha coefficients are over 0.6. All constructs met the reliability criteria and were therefore retained for subsequent analysis.

4.2. Exploratory Factor Analysis (EFA)

Exploratory factor analysis (EFA) was conducted using principal component extraction with varimax rotation to assess construct validity. According to the findings, there are 12 qualities for independent variables.

Table 3.
KMO and Bartlett's Test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**0.904**
Bartlett's Test of Sphericity	Approx. Chi-Square	3,669.344
	Df	66
	Sig.	0.000

According to Table 3's findings, KMO = 0.904. According to Bartlett's evidence, sig. = 0.000 < 0.05 indicates that there is a correlation between all of the variables. Three components with factor loadings above 0.5 have eigenvalues greater than 1 after the rotation matrix was applied, and the explained variance is 81.792%. These results confirm the data's adequacy for factor analysis and support the construct validity of the measurement model. We identify three elements that influence online sales performance (OSP) through scale quality control and the EFA test [13, 14].

4.3. Result of Regression Model Analysis

We have a multiple regression model based on the adjusted model following the execution of EFA:

$$OSP = \alpha + \beta_1 PU + \beta_2 PEOU + \beta_3 TRUST + \mathcal{L}$$

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Table 4.
Model Summary[b].

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.612[a]	0.374	0.369	0.61227	2.044

Note: a. Predictors: (Constant), TRUST, PEOU, PU
b. Dependent Variable: OSP

Table 5.
ANOVA[a].

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	77.484	3	25.828	68.898	0.000[b]
	Residual	129.706	346	.375		
	Total	207.190	349			

Note: a. Dependent Variable: OSP
b. Predictors: (Constant), TRUST, PEOU, PU

Table 6.
Regression model.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.798	0.200		3.999	0.000		
	Perceived Usefulness	0.411	0.062	0.353	6.620	0.000	0.636	1.571
	Perceived Ease of Use	0.228	0.053	0.224	4.310	0.000	0.668	1.496
	Trust	0.167	0.057	0.156	2.952	0.003	0.645	1.551

Note: a. Dependent Variable: OSP.

Data in Tables 4-6 demonstrate that all variance inflation factors (VIFs) tested for multicollinearity in separate samples are less than 2, indicating a low level of multicollinearity [13, 14]. As a result, the model maintains the Classical Linear Regression Model (CLRM) fundamental premise.

A significance level (Sig.) of 0.000 in the ANOVA results indicates that the data are appropriate for the multiple regression method. According to Hoang and Chu [13] and Hair Jr, et al. [14], the model explains 37.4% of the variance in online sales performance (OSP) ($R^2 = 0.374$).

Results from the research model demonstrate that all 3 factors, including Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Trust (TRUST), have a statistically significant positive effect on online sales performance (OSP) ($p < 0.05$) [13, 14].

Factors influencing the online sales performance (OSP) in the refrigeration product sector in Hanoi, Vietnam, are presented as follows:

$$OSP = \alpha + 0.353PU + 0.224PEOU + 0.156TRUST + \mathcal{L}$$

Next, Table 7 presents the results of testing the research hypotheses.

Table 7.
Results of testing the research hypotheses.

No	Hypotheses	Test results	Trends of influence
1	H1	Accept	+
2	H2	Accept	+
3	H3	Accept	+

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4.4. Residual Analysis Result

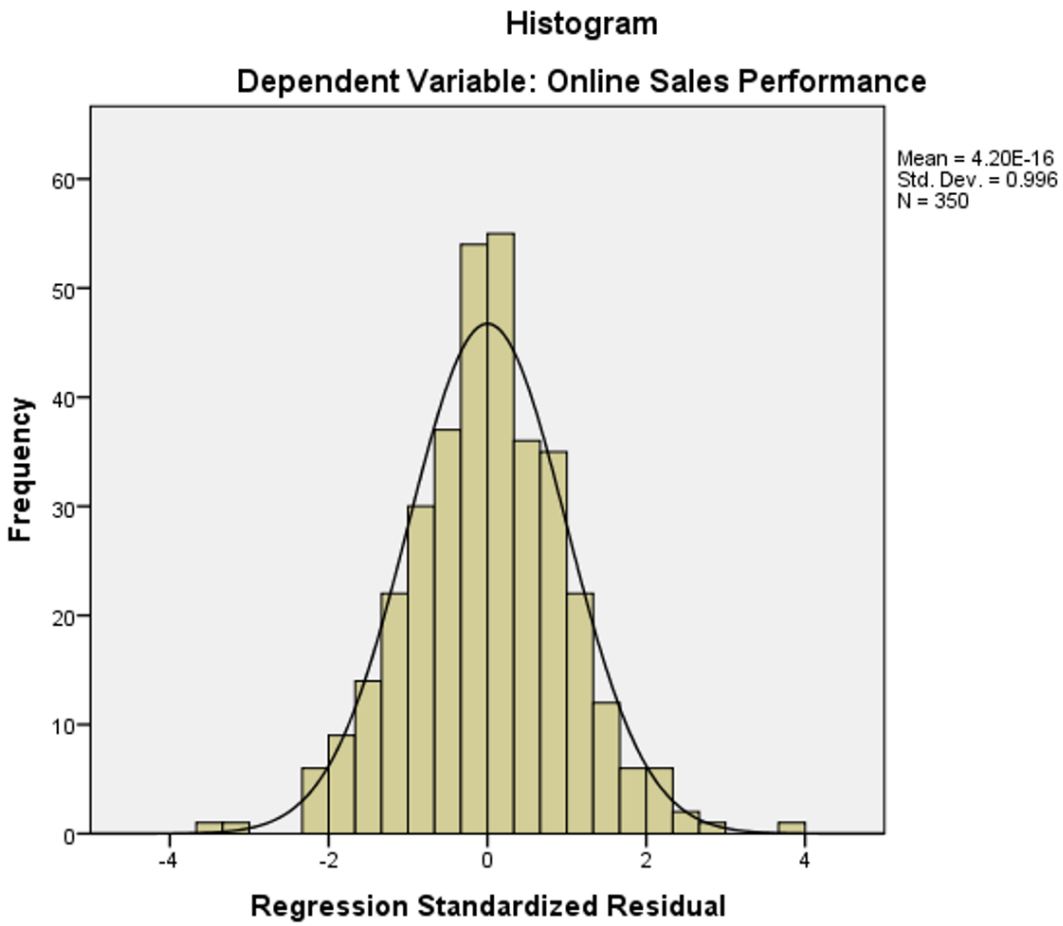

Figure 1.
Regression Standardized Residual.

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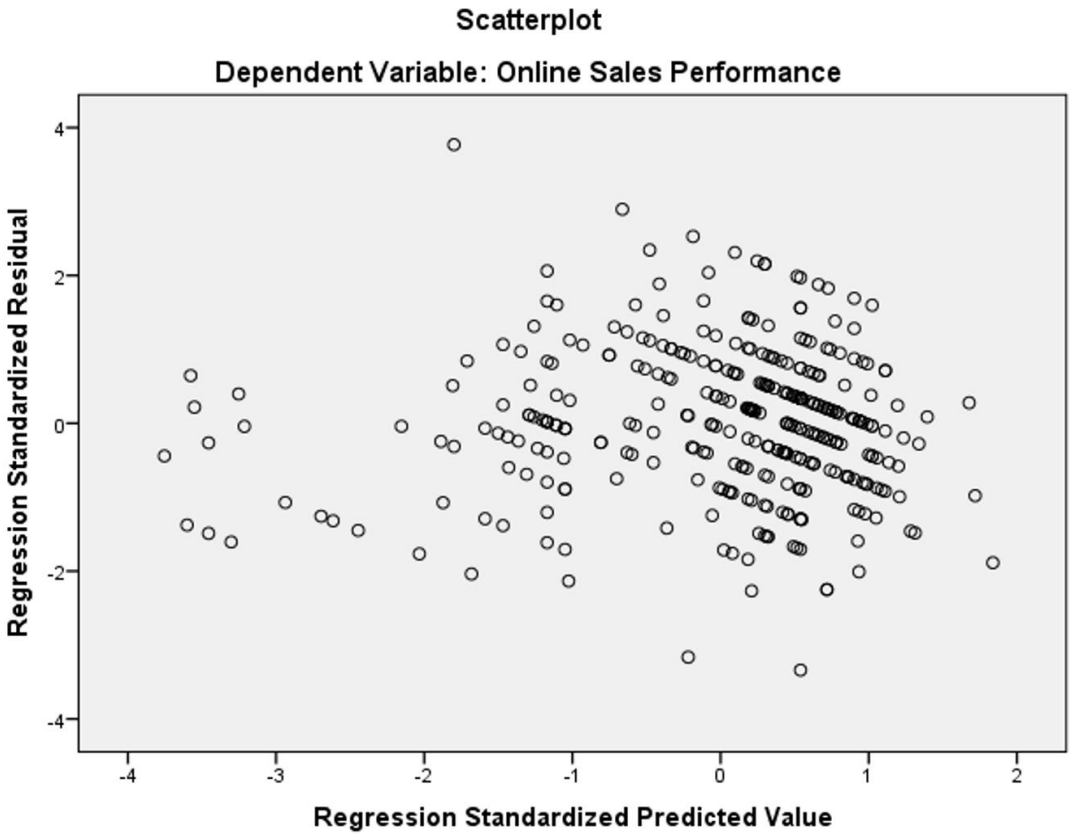

Figure 2.
Regression Standardized Predicted Value.

The mean value of the residuals, which is displayed in Figures 1 and 2, is 4.20E-16. As a result, the mean of the standardized residuals is approximately zero (4.20E−16), indicating no systematic bias. The residual distribution suggests normality, and the Durbin–Watson statistic (2.044) indicates no evidence of autocorrelation. These results support the validity of the regression model assumptions, and the estimation results are accurate [13, 14].

4.5. Discussion

The empirical results confirm that perceived usefulness (PU), perceived ease of use (PEOU), and trust (TRUST) all exert statistically significant positive effects on online sales performance (OSP) in the refrigeration product sector in Hanoi. Among these factors, PU shows the strongest effect ($\beta = 0.353$), followed by PEOU ($\beta = 0.224$) and TRUST ($\beta = 0.156$). This finding reinforces the core proposition of the Technology Acceptance Model (TAM) that perceived usefulness is the most critical determinant of technology-related outcomes [4].

The dominant role of PU suggests that customers prioritize functional value and efficiency when purchasing high-value appliances online. Refrigeration products involve complex specifications, installation requirements, and long-term usage considerations; therefore, consumers rely heavily on online platforms that enhance decision-making efficiency, provide transparent product comparisons, and reduce search costs. This result aligns with prior studies in e-commerce, which show that perceived usefulness has a stronger influence on performance outcomes than ease of use in utilitarian purchase contexts [15].

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The positive effect of PEOU (β = 0.224) indicates that usability and system simplicity remain important drivers of online sales performance. In the context of digital transformation and AI-enabled platforms, ease of navigation, intuitive interfaces, and seamless payment processes reduce cognitive effort and increase transaction completion rates. This finding aligns with TAM and subsequent research emphasizing that ease of use not only directly influences outcomes but also enhances perceived usefulness.

Trust (β = 0.156), although weaker than PU and PEOU, still plays a significant role in explaining OSP. This is particularly relevant for refrigeration products, where customers face higher perceived risks related to product quality, installation, and after-sales services. Consistent with Gefen et al. [9], trust acts as a risk-reduction mechanism that facilitates online transactions. The relatively smaller coefficient suggests that while trust is necessary, it may function as a threshold condition, whereas usefulness and usability drive actual performance outcomes.

Finally, the model explains 37.4% of the variance (R^2 = 0.374) in online sales performance, which is considered acceptable in behavioral and e-commerce research contexts [14]. This indicates that although PU, PEOU, and TRUST are important determinants, additional factors such as service quality, logistics, pricing strategies, and digital marketing may also contribute to OSP and should be explored in future studies.

5. Implications

First, given that perceived usefulness has the strongest impact (β = 0.353), firms should prioritize enhancing the functional value of online platforms. This includes providing detailed product information, comparison tools, AI-based recommendation systems, and decision-support features. For refrigeration products, integrating interactive specifications, energy consumption estimators, and installation guidance can significantly improve customer decision-making and boost sales performance.

Second, the significant effect of perceived ease of use (β = 0.224) suggests that firms must invest in user-centered digital design. Online platforms should ensure intuitive navigation, mobile optimization, simplified checkout processes, and multiple secure payment options. In the context of AI-driven e-commerce, chatbots and virtual assistants can further reduce complexity and improve user experience, thereby increasing conversion rates.

Third, although trust has a relatively smaller coefficient (β = 0.156), it remains a critical factor in online transactions involving high-value products. Firms should strengthen trust through transparent policies, verified product information, customer reviews, and reliable warranty services. Building brand credibility and maintaining consistent service quality are essential for reducing perceived risk and encouraging online purchases.

Fourth, firms should integrate digital transformation and AI technologies into their business strategies. AI can support personalized marketing, demand forecasting, and customer engagement, which enhance both perceived usefulness and ease of use. However, the effectiveness of these technologies depends on maintaining customer trust, especially regarding data privacy and system reliability.

Finally, managers should adopt a holistic e-commerce strategy, combining platform usability, functional value, and trust-building mechanisms. Since the model explains only part of the variance in OSP, firms should also consider complementary factors such as logistics efficiency, after-sales service, and digital marketing communication to achieve sustainable online sales growth.

6. Conclusion

This study investigates the effects of perceived usefulness, perceived ease of use, and trust on online sales performance in the refrigeration product sector in Hanoi. The findings confirm that all three factors significantly influence OSP, with perceived usefulness emerging as the most important determinant. The study contributes to the literature by extending TAM and trust theory to a high-

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value product context in an emerging e-commerce market, highlighting the importance of functional value, usability, and trust in driving online sales performance.

However, this study has several limitations. First, the use of cross-sectional survey data may limit causal inference. Second, the sample is restricted to firms operating in Hanoi, which may affect the generalizability of the findings. Third, the model explains 37.4% of the variance, suggesting that other relevant factors were not included. Future research should incorporate additional variables such as e-service quality, logistics performance, and customer experience. Moreover, advanced analytical techniques such as SEM or PLS-SEM could be employed to explore mediating and moderating effects, while comparative studies across regions or industries would enhance generalizability.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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