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FACTORS AFFECTING THE ADOPTION OF WAREHOUSE BROKERAGE PLATFORMS BY LESSORS AND LESSEES IN VIETNAM

CÁC NHÂN TỐ TÁC ĐỘNG ĐẾN QUYẾT ĐỊNH SỬ DỤNG CÁC NỀN TẢNG KẾT NỐI KHO HÀNG CỦA BÊN THUÊ VÀ BÊN CHO THUÊ TẠI VIỆT NAM

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Abstract

Warehouse plays a "heart" role in a supply chain. The e-commerce boom has been driving the necessity for space demand. Rapid development of the warehousing market helped bring to birth several warehouse brokerage platforms to facilitate trade between warehouse supply and demand, which promise to enhance efficiency and reduce operational costs. However, despite the widespread potential benefits, there remains a significant gap in understanding the factors that drive the adoption of such platforms, particularly among lessors and lessees. This study integrates the Technology Acceptance Model (TAM), the Compatibility (COM) factor from Technology - Organization - Environment (TOE) framework, the Subjective Norms factor from the Theory of Planned Behavior (TPB), and Perceived Cost (PC) to identify the key factors affecting the adoption of warehouse brokerage platforms by both lessors and lessees in Vietnam. Through building theoretical models and testing with empirical data, the study aims to better understand the factors affecting the decision to use technology, thereby proposing practical solutions to improve the effectiveness of technology application in practice.

Keywords: *Warehouse brokerage platform, Lessors and Lessees, Technology acceptance model, Technology - Organization - Environment framework, Theory of Planned Behavior, Perceived Cost.*

Tóm tắt

Kho hàng đóng vai trò "trái tim" trong chuỗi cung ứng. Cơn bùng nổ thương mại điện tử đã thúc đẩy nhu cầu về không gian lưu trữ. Sự phát triển nhanh chóng của thị trường kho hàng đã giúp hình thành nhiều nền tảng môi giới kho hàng nhằm tạo điều kiện thuận lợi cho việc giao thương giữa cung và cầu kho hàng, hứa hẹn sẽ nâng cao hiệu quả và giảm chi phí vận hành. Tuy nhiên, bất chấp những lợi ích tiềm năng rộng rãi, vẫn còn một khoảng cách đáng kể trong việc hiểu các yếu tố thúc đẩy việc áp dụng các nền tảng này, đặc biệt là giữa bên cho thuê và bên thuê. Nghiên cứu này kết hợp Mô hình Chấp nhận Công nghệ (TAM), yếu tố Tính tương thích (COM) từ khuôn khổ Công nghệ - Tổ chức - Môi trường (TOE), yếu tố Chuẩn mực chủ quan từ Lý thuyết Hành vi Dự định (TPB), và Chi phí cảm nhận (PC) để xác định các yếu tố chính ảnh hưởng đến việc áp dụng các nền tảng môi giới kho hàng bởi cả bên cho thuê và bên thuê tại Việt Nam. Thông qua việc xây dựng các mô hình lý thuyết và thử nghiệm với dữ liệu thực tế, nghiên cứu này nhằm mục đích hiểu rõ hơn các yếu tố ảnh hưởng đến quyết định sử dụng công nghệ, từ đó đề xuất các giải pháp thực tiễn để nâng cao hiệu quả ứng dụng công nghệ trong thực tế.

Từ khóa: *Nền tảng kết nối kho hàng, Chủ cho thuê và Người thuê, mô hình Chấp nhận công nghệ, khuôn khổ Công nghệ - Tổ chức - Môi trường, lý thuyết Hành vi dự định, Chi phí cảm nhận.*

1. Introduction

The logistics sector in Vietnam has emerged as one of the most dynamic industries in the country, growing at a rapid pace driven by the booming e-commerce sector, global trade, domestic consumption, strategic infrastructure investments, favorable government policies, and technological adoption. These factors collectively position Vietnam as a burgeoning logistics hub in Southeast Asia, with significant potential for continued expansion and development [1]. The logistics industry accounted for approximately 4.5% of Vietnam's GDP in 2022, and this figure is expected to grow steadily due to increased demand for more advanced and efficient logistics solutions [2], [3]. Warehousing is a pivotal component of the logistics industry, significantly contributing to the storage and management of goods [4]. Its critical functions encompass buffering material flow within the supply chain to mitigate variability from factors such as product seasonality and batching in production and transportation. Warehouses also consolidate products from multiple suppliers for combined delivery to customers and engage in value-added processing, including kitting, pricing, labeling, and product customization [5].

The warehousing industry in Vietnam has faced numerous challenges and fluctuations since the outbreak of Covid-19. However, thanks to the flexibility in transitioning operational models and the robust growth of the e-commerce sector, it has overcome the difficult period and made significant breakthroughs [6]. In 2020, revenue from warehousing and transportation support activities in Vietnam decreased by more than 1 billion USD, down to about 15.6 billion USD. However, the forecast shows that the market will recover, reaching 18 billion USD in 2023 [7]. In addition, in 2022, the industrial real estate sector recorded positive growth with an increase of 10% for industrial land and 7% for warehouses, in the context of Vietnam reopening international flights [8]. Logistics demand is mainly concentrated in the Northern region (34%) and the Southern region (40%) in the first half of 2022 [9]. The limited supply relative to demand has led to an average rental cost increase of 1.5% to 4% per year. At the same time, the growth of e-commerce, with expected revenue of 39 billion USD by 2026 (an average growth rate of 25%/year), will create a need for more than 2.2 million m² of additional warehouse space to meet market demand [10].

One of the key advancements transforming the logistics landscape is the rise of digital platforms, especially warehouse brokerage platforms. These platforms provide a technology solution that connects warehouse owners (lessors) with businesses in need of storage space (lessees) through a streamlined, real-time connection system. Warehouse brokerage platforms aim to improve supply chain efficiency, reduce operating costs, and provide businesses with flexibility in managing their storage needs. With the expansion of global supply chains and the rise of domestic retail demand, the adoption of these platforms promises to significantly improve the operational capacity of the logistics industry in Vietnam.

However, the adoption of warehouse brokerage platforms remains limited, as small and medium-sized enterprises (SMEs) continue to rely on traditional operations and have not yet fully transitioned to digital models. Additionally, issues such as underdeveloped technology infrastructure, high initial investment costs, and a shortage of skilled personnel in modern warehouse management are significant barriers. To promote digital transformation in logistics, the government has implemented several policies, including the National Digital Transformation Program by 2025, with a focus on logistics as a priority sector. Notably, Decision No. 876/QĐ-TTg on green logistics encourages the development of environmentally friendly warehouses that use renewable energy and integrate smart management technologies. These policies, alongside the national master plan for logistics centers, provide a strong foundation for the growth of modern warehouse brokerage platforms.This study attempts to find answers for three questions:

Research question 1: What are the key factors influencing the adoption of warehousing brokerage platforms by lessors and lessees in Vietnam?

Research question 2: How are the key factors influencing the adoption of warehousing brokerage platforms by lessors and lessees in Vietnam?

Research question 3: What are the recommendations to increase the adoption and usage of warehouse trading platforms by lessors and lessees in Vietnam?

The remainder of this paper is structured as follows: Section 2 presents the literature review, including definitions of warehouse brokerage platforms and the theoretical foundations. Section 3 describes the research methodology. Section 4 reports the data

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analysis and results. Section 5 provides the discussion, and Section 6 concludes the study with implications, limitations, and directions for future research.

2. Literature Review

2.1. Warehouse Brokerage Platform and Stakeholders

A warehouse brokerage platform allows demand-side matching with supply-side related to space availability and space demand through predefined constraints [11]. Lessors are allowed to advertise their real estate. Lessees can search for available space at reasonable spot prices. Lessors are individuals or businesses that own or control storage space and lease it out. They provide warehouses, factories, and specialized storage spaces, and are responsible for the maintenance and upkeep of the infrastructure and equipment to ensure safety and readiness for use. Lessors also manage security, and compliance with legal regulations, and may offer auxiliary services such as loading and unloading goods and inventory management to ensure smooth storage operations and support customers with value-added services. Lessees are individuals or businesses that rent storage space from lessors for a specified period. They can be manufacturers, distributors, or commercial enterprises needing to store goods and materials. Lessees are responsible for complying with contract terms, protecting the leased property, and making timely payments. They may also require auxiliary services such as loading, inventory management, and transportation from the lessor to support their business operations, optimize activities, and reduce infrastructure investment costs. Globally, warehouse brokerage platforms, also known as on-demand warehousing, have developed rapidly, exemplified by platforms like Flexe and Stord (in the US) or Stowga (in the UK). These platforms act as an Airbnb for warehousing, connecting businesses with surplus warehouse space to those needing short-term rentals. In Vietnam, amidst the e-commerce boom and supply chain disruptions, the demand for flexible warehousing is increasing. Pioneering platforms such as Wareflex have begun to emerge, offering technology solutions to optimize warehouse utilization; however, this market remains in its nascent stages.

2.2. Theoretical framework

Information systems and organization literature offer several theoretical models to explain why individuals or firms adopt new technologies. Three widely cited frameworks are the TAM, TPB, and TOE framework. TAM is an influential model introduced by [12] that focuses on users' perceptions of a technology's usefulness and ease of use as primary determinants of acceptance. TPB, proposed by [13], extends the Theory of Reasoned Action by incorporating subjective norms (social pressure) and perceived behavioral control in addition to attitude, to predict behavioral intentions. Meanwhile, the TOE framework explains adoption at the firm level by looking at Technological factors, Organizational factors, and Environmental factors [14].

Key factors such as subjective norms (SN), compatibility (COM), perceived ease of use (PEU), perceived usefulness (PU), perceived cost (PC), and intent to use (IU) play a pivotal role in shaping actual use (AU). [15] demonstrated that both PU and PEOU were significant predictors of WMS adoption within the logistics industry. [16] applied an e-TAM integrated with Diffusion of Innovations (DOI) theory to maritime logistics platforms, highlighting that flow experience and perceived usefulness had a greater impact on adoption than ease of use, emphasizing the importance of emotional engagement and immersive user interfaces. [17] introduced an integrated TAM-TOE framework to evaluate technology adoption in last-mile logistics, highlighting the significance of user-centric design, sustainability strategies, and stakeholder engagement for successful digital transformation.

In Vietnam's rapidly advancing digital landscape, studies from [18], [19] have identified critical factors for technology adoption in logistics, including infrastructure readiness, IT capabilities, managerial support, and investment costs. However, research specifically focusing on the adoption of warehouse brokerage platforms remains scarce, particularly from the dual perspectives of lessors and lessees.

Several recent studies have examined various factors influencing technology adoption in logistics and warehousing. [20] utilized an extended UTAUT model to analyze the adoption of online platforms in Thailand's freight forwarding sector. The study revealed that performance expectancy, effort expectancy, social influence, and facilitating conditions positively influenced the intention to use, while perceived risk had a negative effect. Similarly, [21] applied the TOE model and identified factors such as relative advantage, compatibility with existing systems, and top leadership support as key drivers of new technology adoption in warehousing.

Furthermore, barriers like security concerns and data privacy issues significantly affect technology adoption, as indicated by [22]. Studies by [23] and [24] emphasized that perceived ease of use, usefulness, cost perception, and compatibility with existing systems were critical in the adoption of new technologies. [25] and [26] also underscored the importance of top leadership support and awareness of indirect benefits in technology adoption within logistics and agriculture companies. Finally, [27] and [28] proposed designs for warehouse sharing platform systems, identifying attitudes toward technology, social norms, and perceived behavioral control as significant factors influencing technology adoption.

Perceived cost is a crucial factor influencing consumer behavior and decision-making on online platforms. It encompasses not only the direct price but also factors such as time, search effort, and convenience, which can negatively affect the perceived value of the transaction. According to the research by [29], transaction costs and perceived benefits significantly influence the user's perceived value, thereby impacting their intention to use sharing platforms. Other studies, such as those by [30], show that platform usage costs directly affect decisions to adopt new platforms, particularly in industries like online beauty services. In the FinTech sector, [31] emphasizes that perceived costs and risks are critical factors in the adoption of online financial services. Thus, transaction costs go beyond financial aspects, including time, effort, and less tangible factors, all of which play a key role in driving the acceptance and use of online platforms.

In the context of the rapidly growing logistics and e-commerce market, warehousing brokerage platforms have great potential in optimizing the storage and transportation of goods. However, there is currently very little in-depth research on the factors affecting the adoption of these platforms, especially in the logistics environment in Vietnam. This study aims to fill this gap and provide practical conclusions and solutions for stakeholders.

3. Methodology

This study employs a quantitative research design using a structured questionnaire adapted from prior validated scales in technology adoption literature. All variables in the model were measured using items on a 5-point Likert scale (1= Strongly disagree; 5= Strongly agree). This study will use SPSS 27 and Partial Least Square Structural Equation Modelling (PLS-SEM) to analyze the collected data. First, we will use descriptive statistics methods to summarize the sample characteristics, including demographic variables such as business scale and industry sector. Then, PLS-SEM analyses, reliability and validity tests were conducted using Smart PLS 3.0 software. PLS-SEM was chosen because it is a powerful analytical method that allows modeling relationships between independent and dependent factors, while also meeting the requirements of small sample sizes and non-standard sampling distributions. In addition, this method also helps ensure the validity and reliability of the research model.

3.1. Research Hypothesis

This research advances the following hypotheses:

H1: SN have a positive effect on PEU.

H2: SN have a positive effect on PU.

H3: COM has a positive effect on PEU.

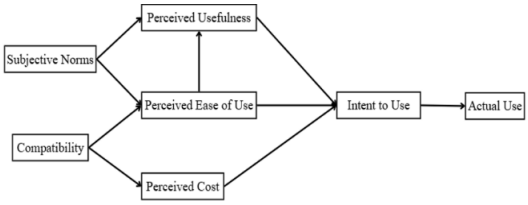

Figure. 1. Research Model

H4: COM has a positive effect on PC.

H5: PEU has a positive effect on PU.

H6: PEU has a positive effect on IU.

H7: PU has a positive effect on IU.

H8: PC has a negative effect on IU.

H9: IU has a positive effect on AU.

4. Data analysis

4.1. Demographic

The research identified two main subject matters: Lessors and Lessees. According to the theory by [32], the appropriate sample size is determined using the formula "N ≥ n*5", where N is the sample size and n is the number of questions. With 29 questions, the minimum required sample size is 145. Data were collected from logistics providers, warehouse operators, and businesses actively involved in warehouse leasing or rental activities across major logistics hubs in Vietnam, including Ha Noi, Hai Phong, Bac Ninh, Da Nang, Binh Duong, and Ho chi Minh City. A three-week survey collected responses from 306 logistics company executives and managers.

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The responses showed diversity in the types of industries and positions of the survey participants, indicating that the study provides insights from both the lesser and the lessee perspectives, with the demand for leasing and finding warehouses being balanced (48.56% - 51.44%).

4.2. Measurement Model Analysis

Based on the PLS-SEM results, most of the indicators have values above the threshold of ***0.7***, reflecting good convergence and ensuring reliability. However, the COM2 indicator in the COM scale has a loading value of ***0.597*** (Table 1), lower than the recommended level of ***0.7*** according to the standard of [33]. This shows that COM2 has not reached the required level of convergence and may affect the Composite Reliability (CR) and Average Variance Extracted (AVE) of the Compatibility scale. Therefore, it is necessary to remove COM2 from the model to improve internal consistency and ensure convergent validity of the scale.

After removing the indicator COM2 from the COM construct due to its insufficient factor loading, the reliability and convergent validity metrics improved noticeably. Specifically, the rho_c for COM increased to 0.885, and the AVE increased to 0.719, which is higher than the recommended threshold of ***0.5***. This indicates that the remaining indices explain a significant proportion of the variance in the construct. Additionally, Cronbach's Alpha = 0.807 continued to confirm the internal consistency of the scale (Table 2).

Removing COM2 does not weaken the overall

Table1. Measurement model evaluation results (1st time)

	Outer Loadings	Cronbach's alpha	rho_a	rho_c	AVE
.AU1	0.936	0.825	0.879	0.884	0.659
AU2	0.782				
AU3	0.747				
AU4	0.768				
COM1	0.797	0.736	0.73	0.836	0.564
COM2	0.597				
COM3	0.806				
COM4	0.783				
IU1	0.909	0.887	0.919	0.917	0.689
IU2	0.786				
IU3	0.796				
IU4	0.835				
IU5	0.819				
PC1	0.934	0.826	0.836	0.886	0.662
PC2	0.77				
PC3	**0.778**				
PC4	0.76				
PEU1	**0.799**	0.863	0.864	0.907	0.709
PEU2	0.852				
PEU3	**0.87**				
PEU4	0.846				
PU1	**0.921**	0.929	0.929	0.95	0.825
PU2	0.92				
PU3	**0.925**				
PU4	0.866				
SN1	**0.83**	0.852	0.913	0.896	0.683
SN2	0.754				
SN3	**0.858**				
SN4	0.86				

Table 2. Measurement model evaluation results (2nd time)

	Outer Loadings	Cronbach's alpha	rho_a	rho_c	AVE
AU1	0.936	0.825	0.879	0.884	0.659
AU2	0.782				
AU3	0.747				
AU4	0.768				
COM1	0.878	0.807	0.831	0.885	0.719
COM3	0.833				
COM4	0.833				
IU1	0.909	0.887	0.919	0.917	0.689
IU2	0.786				
IU3	0.796				
IU4	0.835				
IU5	0.819				
PC1	0.934	0.826	0.837	0.886	0.662
PC2	0.770				
PC3	0.778				
PC4	0.759				
PEU1	0.800	0.863	0.864	0.907	0.709
PEU2	0.852				
PEU3	0.870				
PEU4	0.846				
PU1	0.921	0.929	0.929	0.950	0.825
PU2	0.920				
PU3	0.925				
PU4	0.866				
SN1	0.830	0.852	0.913	0.896	0.683
SN2	0.754				
SN3	0.858				
SN4	0.860				

reliability of the scale; instead, it enhances the accuracy and robustness of the measurement model. All latent variables in the model now show **CR > 0.7** and **AVE > 0.5**, meeting the accepted standards for composite reliability and convergent validity. These results confirm that all constructs exhibit strong convergent validity [34].

HTMT is defined as the value generated by comparing the mean values of the correlations of the indicators across different constructs and within each construct (based on consistent loadings) [35]. The HTMT ratio helps to better detect problems related to discriminant validity [36]. If HTMT is less than ***0.85***, then there is discriminant reliability between the two reflective constructs. The highest HTMT value obtained in this study was 0.841. The HTMT results indicate that the model has excellent reliability and validity (Table 3).

4.3. Testing hypothesis

The results from the PLS-SEM analysis reveal several statistically significant relationships among the constructions. First, Compatibility has a significant positive effect on PEU (β = 0.121, p = 0.041), but its effect on Perceived Cost is not significant (β = -0.035, p = 0.610). This suggests that the perceived fit of the warehouse exchange platform with users' values and needs mainly facilitates ease of use but does not influence their cost perceptions.

Subjective Norms have a significant influence on both Perceived Ease of Use (β = 0.154, p = 0.003) and Perceived Usefulness (β = 0.164, T-statistic = 3.811),

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Table 3. Discriminant validity - Heterotrait-monotrait ratio (HTMT) - Matrix

	AU	COM	IU	PC	PEU	PU	SN
AU							
COM	0.097						
IU	0.841	0.105					
PC	0.555	0.058	0.530				
PEU	0.593	0.153	0.522	0.076			
PU	0.686	0.093	0.699	0.068	0.564		
SN	0.126	0.085	0.127	0.138	0.172	0.256	

Table 4. Path Coefficients results

	Original sample	Sample means	Standard deviation	T statistics	P values	Support
SN→PEU	0.154	0.16	0.051	3.023	0.003	Yes
SN →PU	0.164	0.168	0.043	3.811	0.000	Yes
COM→ PEU	0.121	0.126	0.059	2.049	0.041	Yes
COM →PC	-0.035	-0.038	0.069	0.51	0.61	No
PEU→PU	0.482	0.485	0.051	9.494	0.000	Yes
PEU→IU	0.205	0.205	0.04	5.144	0.000	Yes
PU →IU	0.57	0.568	0.042	13.55	0.000	Yes
PC →IU	0.504	0.505	0.033	15.242	0.000	Yes
IU →AU	0.759	0.76	0.023	33.27	0.000	Yes

Table 5. R squared results

	R Square	R Square Adjusted
AU	0.576	0.574
IU	0.703	0.700
PC	0.001	-0.002
PEU	0.041	0.035
PU	0.285	0.281

indicating that social influence plays a meaningful role in shaping users' perceptions about the platform's usability and usefulness.

Perceived Ease of Use significantly affects Perceived Usefulness (β = 0.482, T-statistic = 9.494) and has a direct effect on Intent to Use (β = 0.205, T-statistic = 5.144), confirming the core assumptions of the original TAM. Perceived Usefulness has a strong influence on Intent to Use (β = 0.570, T-statistic = 13.55), reaffirming that perceived usefulness is a critical determinant of user intention.

Perceived Cost has a significant positive effect on Intent to Use (β = 0.504, T-statistic = 15.542), this shows that the higher the cost, the lower the intention to use the platform.

Finally, Intent to Use strongly predicts Actual Use (β = 0.759, T-statistic = 33.27), validating the mediating role of intention in the TAM framework.

According to the results of PLS-SEM analysis, this study applied the bootstrapping method with 5000 samples to evaluate the PLS-SEM results [33]. The results of PLS-SEM analysis of the structural model are shown in Table 5. The above analysis results

predict that the proposed model has excellent explanatory power. Intention to Use has the highest explanatory power, with an R^2 = 0.703, which suggests that the independent variables in this study (PEU, PU, PC) are strong predictors of users' Intention to Use the warehouse brokerage platform.

Similarly, R^2 = 0.576 for AU confirms that IU is a substantial predictor of actual usage, reinforcing the theoretical assumptions of the TAM framework.

In contrast, the model shows low explanatory power for PC (R^2 = 0.001) and PEU (R^2 = 0.041), indicating that COM and SN only contribute a small part to users' perceptions of cost and ease of use. PU has an R^2 = 0.259, which suggests that the model does not fully capture the factors that influence users' PU. This suggests that other variables, not included in the proposed model, may influence PU.

5. Discussion

The study highlights several factors crucial for the adoption of warehouse brokerage platforms in logistics. First, compatibility with existing systems like WMS and ERP makes platforms easier to use, fostering smoother integration into logistics workflows. Subjective norms, such as industry trends and peer behavior, also significantly influence adoption, as companies are more likely to adopt technologies seen in use by competitors or industry leaders. Perceived usefulness is a key driver, with platforms that improve efficiency, reduce costs, or enhance service delivery being prioritized. Similarly, perceived ease of use plays a critical role - user - friendly platforms that integrate seamlessly into existing operations are more likely to be embraced. While perceived cost typically deters adoption in other industries, logistics firms may view higher costs as an investment in quality and long-term efficiency gains. Finally, the strong relationship between intent to use and actual use suggests that once a platform is perceived as both useful and easy to use, its adoption is likely, especially with sufficient training and support. Developers should focus on creating platforms that are compatible, user-friendly, and clearly demonstrate their value to encourage adoption in the logistics sector.

6. Conclusion

Key factors influencing adoption include subjective norms (social influence), compatibility with existing systems, perceived ease of use, and perceived usefulness. These factors align with previous research, particularly studies related to the TAM, TOE framework, TPB. Previous studies, such as those by [12], [13] and [14], have confirmed that compatibility and perceived usefulness are critical factors in technology adoption, and this study reinforces these conclusions within the context of warehouse brokerage platforms in Vietnam. Additionally, the study reveals that perceived cost significantly affects intention to use, which reflects the current realities of the logistics industry, where businesses face high costs when adopting new technologies. This finding is consistent with prior studies, such as [22], which highlighted that transaction costs and perceived benefits directly influence the decision to use platforms. This aligns with the logistics industry's current state, where businesses may view higher costs as an investment in long-term efficiency. Furthermore, the study confirms that intention to use is a strong predictor of actual use, reaffirming the core assumptions of the TAM framework. The results show that once a platform is perceived as both useful and easy to use, its adoption is likely, especially with sufficient training and support. This aligns with findings from [20], [21] and [37], which emphasized the role of ease of use and tangible benefits in driving technology adoption in logistics.

From these findings, the study offers practical recommendations for stakeholders in the Vietnamese logistics industry, including platform developers, lessors, and lessees. Developers should focus on creating platforms that are compatible with existing systems, user-friendly, and clearly demonstrate their value proposition to encourage adoption. This is consistent with the current logistics industry's needs, where companies are looking for efficient, cost-effective, and easy-to-use solutions. The study also opens avenues for future research, particularly in exploring the integration of advanced technologies like AI and IoT into warehouse brokerage platforms. These technologies could enhance the compatibility and ease of use of the platforms, ultimately improving adoption rates. This aligns with global trends in logistics, where such technologies are already reshaping the industry and providing significant opportunities for innovation.

Although our study has provided insights into the factors influencing the adoption of warehousing brokerage platforms, there are still some limitations that need to be addressed. We have applied some factors in the TAM and TPB models, there are still many other important factors, such as trust, perceived

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risk, or network effects, that have not been mentioned and studied in this paper. To extend and deepen future research, we suggest integrating other factors such as platform trust, the impact of perceived risk, and the development of warehousing brokerage platforms. Furthermore, further research could also focus on analyzing the influence of cultural and social factors on the technology adoption process in the logistics sector.

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