Advances in Consumer Research
https://acr-journal.com/
Volume-2 | Issue-6 | Dec: 2025
Original Researcher Article

Factors Influencing Customer Satisfaction with Last-mile delivery Services in E-Commerce: Empirical Evidence from Hai Phong City

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ABSTRACT

The rapid growth of e-commerce has increased the importance of last-mile delivery services in shaping customer experience and satisfaction. This study aims to identify factors affecting customer satisfaction with the last-mile delivery service in Hai Phong city. Data was collected from 650 customers through a structured survey and analyzed using a linear regression model. The results showed that all six factors, reliability, delivery speed, delivery personnel quality, information transparency, delivery cost, and perceived value, had a significant impact on satisfaction, with delivery personnel quality and delivery cost having the most potent effects. The research contributes to the theory of service quality in e-logistics. It offers essential management implications for businesses, including optimizing the delivery process, enhancing human resource capacity, and improving the customer experience

Keywords: last-mile delivery, customer satisfaction, e-commerce, Hai Phong City..

1. INTRODUCTION

In the age of digital transformation, e-commerce has become a crucial economic driver, especially in Southeast Asia. Global sales hit 7 trillion USD in 2024, making up 17.2% of retail transactions, and are expected to surpass 8.5 trillion USD by 2029 (Statista, 2024). Vietnam has quickly risen as a regional leader, with its e-commerce market valued at 25 billion USD in 2024 and projected to reach 60 billion USD by 2030 (Le et al., 2025). This growth is fueled by a young, tech-savvy population and an expanding logistics industry, where last-mile delivery (LMD) plays a key role in improving customer satisfaction and operational efficiency. LMD, as the final stage in the supply chain, is the most direct point of contact between companies and customers. Service quality in areas like timeliness, accuracy, responsiveness, and personalization has been proven to greatly impact satisfaction, purchase intent, and loyalty.

In Vietnam, e-commerce has the highest growth rate in the region, putting significant pressure on the national logistics system. Ministry of Industry and Trade (2024) notes that the demand for warehousing, transportation, and forwarding has risen sharply, but transportation infrastructure, distribution processes, and intra-city logistics capacity remain limited. This makes the last-mile delivery service face major challenges in speed, reliability, and cost. However, academic studies on customer satisfaction with the last-mile delivery service in Vietnam are still quite fragmented. For example, research by Nguyen et al. (2021) in Hanoi shows that factors such as reliability, service capacity, and perceived value greatly influence customer satisfaction. Similarly, MPRA research (2025) indicates that service quality, trust, and perceived value are key factors in home delivery services overall. Although these studies provide important theoretical foundations, they mainly focus on large cities or specific industries and use standard measurement models like SERVQUAL or ACSI, which do not fully capture the unique characteristics of each local market.

More importantly, there has not been any research to develop and test a model that includes the factors influencing satisfaction with the last-mile delivery service in the specific context of type I cities with seaports like Hai Phong. These cities have unique characteristics such as transport infrastructure, delivery frequency, and consumption habits that are significantly different from Hanoi or Ho Chi Minh City. Additionally, the practical gap has become evident, as forwarding enterprises and e-commerce platforms still lack local-specific empirical data to optimize last-mile delivery activities, which make up the largest share of costs in the entire urban logistics chain (Ministry of Industry and Trade, 2024). Therefore, it is necessary to conduct an empirical study in Hai Phong to assess the factors affecting customer satisfaction with the last-mile delivery service. This will not only add to the missing empirical evidence in the current literature but also contribute to completing the theoretical model in the field of e-logistics for emerging cities.

This study aimed to explore the factors affecting customer satisfaction with last-mile delivery services in Hai Phong city's e-commerce sector. The findings are expected to provide new empirical insights into logistics management and customer behavior in e-commerce, as well as expand the satisfaction assessment model within this underserved local context. Additionally, the research offers a foundation for logistics enterprises, shipping providers, and e-commerce platforms in Hai Phong City to develop solutions that enhance last-mile delivery quality, improve customer experience, and boost market competitiveness.

2. Literature Review

2.1. Related concepts

Last-mile delivery (LMD) is the final phase of logistics, moving goods from distribution centers to consumers, and it represents the only physical contact between e-commerce providers and buyers. It is widely recognized as the most complicated and expensive part of logistics, often making up over 50% of delivery costs, and it significantly influences perceptions of convenience, dependability, and brand trustworthiness (Vakulenko et al., 2018). Beyond just efficiency, LMD is now seen as a crucial factor in customer satisfaction and loyalty, affected by on-time delivery, accuracy, parcel condition, and the attitude of delivery personnel (Ranieri et al., 2018).

Customer satisfaction is defined as the alignment between perceived performance and expectations (Kotler & Keller, 2016). High performance enhances loyalty and encourages repeat purchases (Oliver, 1980; Anderson & Srinivasan, 2003), while delivery failures can lead to dissatisfaction and loss of customers. In e-commerce, logistics performance, tracking systems, responsiveness, and return policies are therefore essential to managing the customer experience.

2.2. Analytical framework

Based on previous studies on last-mile delivery service quality (Aljohani, 2024), customer behavior in e-commerce (Chang et al., 2008), and service quality evaluation models such as SERVQUAL (Parasuraman et al., 1988), SERVPERF (Cronin & Taylor, 1992), and ACSI (Fornell et al., 1996), adjusted to the urban logistics context in Vietnam, the study model is constructed as shown in Figure 1 below:

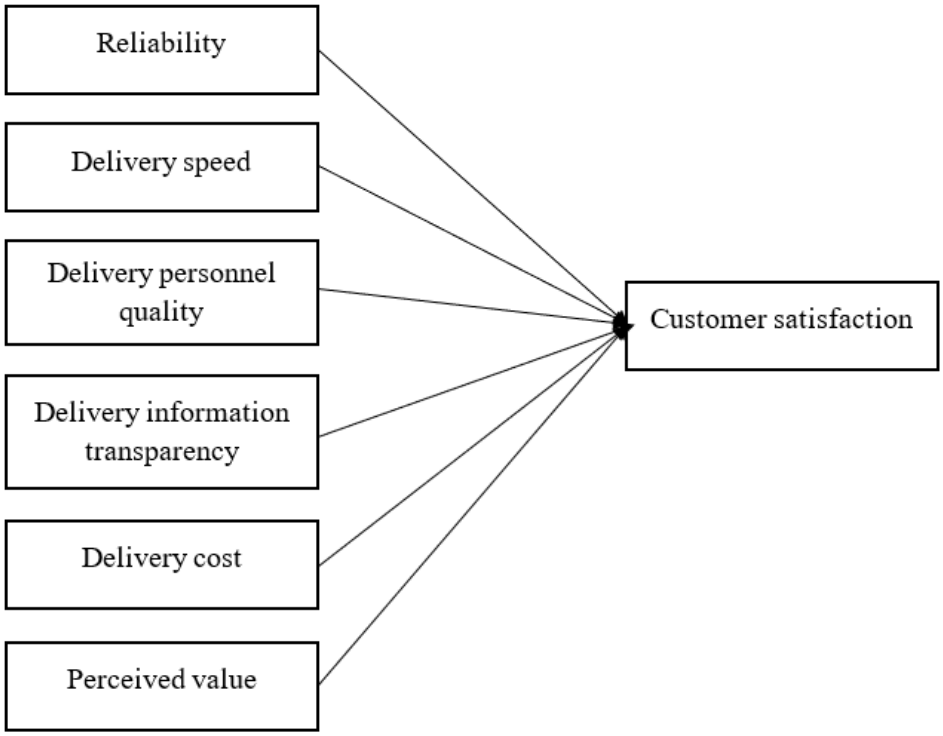

Figure 1: Analytical framework

Source: Proposed by the author

2.3. Hypothesis development

Reliability is the ability to consistently provide services accurately and as promised, especially in delivering goods on time, with the correct products, and without errors (Parasuraman et al., 1988). In the context of last-mile delivery, reliability reflects how well the delivery process meets customer expectations, including the accuracy of information, the success rate of delivery, and minimizing damage to the goods (Aljohani, 2024). Empirical studies show that reliability is a key factor in customer satisfaction with e-commerce services, as customers value consistency and timely order completion (Nguyen et al., 2021). When customers receive reliable service, they feel secure, perceive less risk, and are more likely to leave positive reviews of the overall experience. Based on the above arguments, the research hypothesis is proposed as follows:

H1: Reliability positively affects customer satisfaction.

Delivery speed is the time from when an order is confirmed to when the customer receives the product, including the ability to respond quickly and promptly (Janjevic & Winkenbach, 2020). In e-commerce, delivery speed is a key aspect of service quality because it directly shows how efficient the logistics chain is and influences the customer's perception of value (Rita et al., 2019). Studies have indicated that shorter delivery times increase the likelihood of customers leaving positive reviews and feeling that the service is worth the cost and expectations (Nguyen & Huynh, 2025). Additionally, delivery speed is often a top priority for customers, especially amidst rapid

urbanization and a significant rise in online shopping behaviors. Based on the above arguments, the research hypothesis is proposed as follows:

H2: Delivery speed positively affects customer satisfaction.

Delivery personnel quality includes service attitude, professional manners, communication skills, and the ability to handle situations when interacting with customers (Mentzer et al., 2001). In e-commerce, delivery staff are the only direct touchpoint between the business and the customer; therefore, they play a crucial role in shaping the service impression (Esper et al., 2003). Previous research has shown that positive employee behaviors, such as kindness, enthusiasm, and respect, contribute to increased feelings of trust, reduced perceptual risk, and higher overall satisfaction (Nguyen et al., 2021). When delivery staff demonstrate professionalism, customers feel respected and evaluate the service more favorably. Based on these arguments, the research hypothesis is proposed as follows:

H3: Delivery personnel quality positively affects customer satisfaction.

Information transparency is defined as the completeness, accuracy, and timeliness of information related to shipment status, including real-time order tracking, change notifications, and the ability to predict delivery times (Liang & Ye, 2024). In an e-commerce environment where customers do not have direct contact with the product before receiving it, transparency of information helps reduce uncertainty and perceived risk (Hong & Cha, 2013). Studies show that when customers are provided with clear information, they form a more positive assessment of the quality of service and feel secure during the waiting process (Aljohani, 2024). Based on the above arguments, the research hypothesis is proposed as follows:

H4: Information transparency positively affects customer satisfaction.

Delivery cost includes the fees customers must pay to receive goods, such as shipping charges, speed surcharges, and related expenses (Ling et al., 2010). According to perceived value theory, customers constantly compare the costs they incur with the benefits they gain to form an overall evaluation of the service (Zeithaml, 1988). Research indicates that delivery costs significantly influence satisfaction, especially when the fee does not match the speed and quality of delivery (Manapul et al., 2021). Additionally, delivery costs are a key part of perceived value, meaning that lower or reasonable costs can enhance the positive assessment of the service's value. Based on the above arguments, the research hypothesis is proposed as follows:

H5: Delivery cost positively affects customer satisfaction.

Perceived value is an overall assessment of the customer's sense of worth when weighing the benefits received against the costs involved in using the service (Zeithaml, 1988). In e-commerce, perceived value is a key factor influencing satisfaction because it captures the entire customer experience, including delivery speed, reliability, and price (Chang & Chen, 2008). Research shows that when customers perceive high value, they view the service more favorably and develop greater satisfaction (Sirdeshmukh et al., 2002). Simultaneously, perceived value serves as a bridge between service factors (such as speed, cost) and satisfaction, as customers judge service features through the context of overall value. Based on the above arguments, the research hypothesis is proposed as follows:

H6: Perceived value positively affects customer satisfaction.

3. Methodology

3.1. Measurement scales

The scales in the study are built on the inheritance and adaptation of previous studies that are highly reliable and generalistic in the areas of service quality, customer behavior and e-commerce logistics. All observed variables are measured using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), which is consistent with the context of measuring customer attitudes and feelings during the last-mile delivery service evaluation. The use of this scale is also in line with the recommendations of studies that measure behavior in e-commerce (Parasuraman et al., 1988; Fornell et al., 1996).

The reliability scale is derived from SERVQUAL (Parasuraman et al., 1988) and research on delivery quality (Suresh et al., 2020). The measures indicate the ability to deliver on time, provide the correct product without damage, and meet commitments. In Vietnam, the scale is adapted to include factors like the low rate of lost deliveries and the accuracy of estimated delivery times, which are highly valued by online consumers.

The delivery speed scale was created based on research by Rita et al. (2019) and Janjevic and Winkenbach (2020) on urban delivery performance. Observation variables assess how customers perceive delivery times, how quickly they respond, and their ability to reduce lead times. For the Vietnamese market, measurement items are added to reflect customer perceptions of same-day delivery, intra-regional fast deliveries, and on-time deliveries compared to carrier commitments.

The delivery personnel quality scale is adapted from the logistics service quality scale by Mentzer et al. (2001) and Esper et al. (2003). The observed variables focus on manners, service attitudes, communication skills, and the ability to support customers when problems arise. These factors are important because the delivery person is the only touchpoint between the business and the customer in e-commerce. The scale is customized to fit the Vietnamese cultural context, emphasizing politeness, proactive support, and the ability to clearly explain delivery situations.

The delivery information transparency scale is based on research by Liang and Ye (2024) and Hong and Cha (2013). Measurement items assess the completeness, accuracy, and timeliness of order tracking details, the ability to predict delivery times, and the clarity of notifications about shipping status changes. In the context of Vietnamese e-commerce, the scale is adapted to reflect the characteristics of real-time tracking systems and the reliability of notifications from e-commerce platforms/apps.

The delivery cost scale was developed based on Ling et al. (2010) and Manapul et al. (2021), reflecting the reasonableness of delivery costs, competitiveness compared to other services, and customers' perceptions of the proportionality between costs and benefits. In the Vietnamese market, where price competition among shipping providers is very intense, the scale is adjusted to also measure perceptions of "hidden costs" such as peak time surcharges and expedited delivery fees.

The perceived value scale is founded on the theoretical principles of Zeithaml (1988) and the value model for e-commerce by Chang and Chen (2008). Observational variables assess the customer's perception of cost-effectiveness, benefit versus cost, and overall satisfaction with the service's value. The scale also adjusts to account for the customer's considerations of speed, reliability, and cost, which are critical factors in last-mile delivery.

The customer satisfaction scale is based on the ACSI model (Fornell et al., 1996) and adapted to e-commerce studies (Sirdeshmukh et al., 2002). The scale measures overall satisfaction, how well customer expectations are met, and the general evaluation of the delivery service. The measurement items are revised to suit the Vietnamese market, focusing on service quality perception and customers' willingness to continue using the service.

3.2. Data collection and analysis

The data for this study was collected through a quantitative survey using a structured questionnaire to measure customers' perceptions of the factors influencing satisfaction with the last-mile delivery service in e-commerce in Hai Phong city. The survey method was chosen because of its ability to gather standardized data, suitability for multivariate regression analysis, and ability to ensure reliability when measuring underlying structures (Hair et al., 2010).

The study employed a combination of convenience and purposive sampling, selecting respondents who had recent online shopping experiences and used delivery services within the past 6 months. This criterion aims to ensure participants possess accurate information and clear memories of the delivery process, aligning with research practices in the e-commerce field.

The data collection process is carried out through two methods: online surveys and face-to-face surveys. For online surveys, questionnaires are sent via Google Forms on online shopping community groups, social networks, and user forums in Hai Phong City. For face-to-face surveys, printed questionnaires are handed out to customers at delivery points, post offices, shopping malls, and busy residential areas to enhance sample diversity and reduce bias associated with online surveys. Before the official data collection, a pilot test was conducted with 30 people to evaluate the clarity of the questions and make adjustments to the language, phrasing, and length as needed.

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This study selected Hai Phong City as the research setting because Hai Phong is a grade I urban area and a major seaport economic hub in the North, experiencing rapid growth in e-commerce and a significant rise in urban logistics demand in recent years. This context allows the study to accurately represent the practical issues of last-mile delivery while providing valuable empirical data for Vietnam's e-logistics sector.

4. Results and Discussion

4.1. Results

The descriptive statistical results show that the research sample has a relatively diverse distribution of demographic characteristics, reflecting fairly well the group of customers using the last-mile delivery service in Hai Phong city. In terms of gender, the ratio of males to females is quite balanced, with females making up a higher proportion (about 56.3%), while males account for 43.7%. This aligns with the trend of female consumers shopping online more frequently, especially in the consumer goods and fashion industries, which make up a large part of e-commerce. Regarding age, the study sample mainly focuses on young people of working age. The 18-25 age group accounts for 32.8%, followed by the 26-35 group with 38.5%, accurately reflecting the primary customer base of e-commerce platforms. The 36-45 age group makes up 19.4%, and only 9.3% are over 45 years old. This structure indicates that young people are the group that most frequently uses delivery services and has better access to technology. Concerning education, most survey participants hold a college degree or higher. Those with a university degree constitute the largest segment at 51.2%, followed by college graduates at 21.7%, and graduate students at 11.5%. About 15.6% belong to the high school level or below. This distribution highlights that e-commerce customers tend to be well-educated or higher, suitable for engaging with digital platforms and online payments. In terms of income, the study shows a relatively broad distribution. The income group earning between 7-15 million VND represents the largest proportion at 44.9%, followed by those earning under 7 million VND at 28.3%, indicating a large share of young consumers and office workers. The 15-25 million VND group makes up 18.6%, while those earning over 25 million VND account for 8.2%. This structure suggests that e-commerce customers in Hai Phong are primarily middle-income, fitting the inner-city consumer market. Regarding occupation, the largest group is office workers at 34.2%, followed by students at 26.7%, and self-employed or individual entrepreneurs at 22.1%. Other occupational groups like technical workers, state employees, or others make up a smaller share at 17%. This distribution reflects the online shopping habits of groups with busy schedules who prioritize the convenience of door-to-door delivery. Overall, the demographic

characteristics of the study sample demonstrate a reasonable diversity and are representative of the customer group that frequently uses last-mile delivery services in Hai Phong city. The sample structure also provides appropriate conditions for analyzing customer behavior patterns and evaluating factors influencing satisfaction in the e-commerce context.

Table 1: Sample characteristics

Characteristics	Items	Ratio (%)
Gender	Male	43.7
	Female	56.3
Age	18-25 years old	32.8
	26-35 years old	38.5
	36-45 years old	19.4
	Over 45 years old	9.3
Income	Under 7 million VND	28.3
	7-15 million VND	44.9
	15-25 million VND	18.6
	Over 25 million VND	8.2
Education	High school	15.6
	Intermediate/College	21.7
	University	51.2
	Postgraduate	11.5
Occupation	Student	26.7
	Office worker	34.2
	Lao động tự do/Kinh doanh	22.1
	Công chức/Khác	17.0

Source: Analysis results from SPSS 26

The results of Cronbach's Alpha reliability test indicate that all values exceed 0.7, and no observed variables have a Corrected Item-Total Correlation below 0.3. Therefore, all scales that meet the Cronbach's Alpha criteria are included in the EFA analysis, as recommended by Hair et al. (2010) (see Table 2).

Table 2: The results of Cronbach's Alpha

Scale	Sign	Items	Cronbach 's Alpha
Reliability (REL)	REL 1	The delivery unit always delivers on time as committed.	0.813
	REL 2	My orders are rarely misdelivered or lost.	
	REL 3	The product is delivered in intact, undamaged condition.	
	REL 4	The delivery information provided is always accurate and reliable.	
	REL 5	I always receive my order within the expected timeframe that the system notifies me of.	
Delivery speed (SPD)	SPD 1	The delivery time was faster than I expected.	0.809
	SPD 2	The delivery unit processed the order very quickly after I placed the order.	
	SPD 3	The waiting time to receive the goods is reasonable.	
	SPD 4	I usually receive my order on time or earlier than expected.	
Delivery personnel quality (DPQ)	DPQ 1	The delivery staff has a polite and respectful attitude towards customers.	0.825
	DPQ 2	The delivery staff communicated clearly and were friendly.	
	DPQ 3	The delivery staff has a professional manner.	
	DPQ 4	The delivery staff supported me well when problems arose.	

Scale	Sign	Items	Cronbach's Alpha
	DPQ 5	I feel satisfied with the face-to-face interaction with the delivery staff.	
Delivery information transparency (DIT)	DIT1	I can always track my order in real-time.	0.817
	DIT2	Shipping status updates are sent promptly.	
	DIT3	A notice of the change in delivery time is clearly provided.	
	DIT4	I trust the accuracy of the order tracking information.	
	DIT5	The e-commerce application/platform provides complete information about each step of delivery.	
Delivery cost (COS)	COS 1	The delivery cost I had to pay was reasonable.	0.810
	COS 2	The delivery cost is commensurate with the quality of service I receive.	
	COS 3	The delivery rates for this shipping unit are more competitive than those of other shipping units.	
	COS 4	I didn't encounter any unexpected surcharges when I picked it up.	
Perceived value (PV)	PV1	The delivery service offers good value for the cost I pay.	0.815
	PV2	The benefits received from the delivery service are worth it.	
	PV3	The delivery time and cost are entirely reasonable, based on my experience.	
	PV4	Overall, the delivery service brings high value to me.	
Customer satisfaction (CS)	CS1	I feel satisfied with the delivery service I used.	0.820
	CS2	The delivery service met my expectations.	
	CS3	My delivery experience was better than what I expected.	
	CS4	I am willing to continue using this delivery service in the future.	

Source: Analysis results from SPSS 26

The results of EFA of the independent variable shows a KMO of 0.832 (greater than 0.5), a significance level of 0.000 (less than 0.05), an Eigenvalue greater than 1, and factor loadings for the 27 observed variables greater than 0.5. These variables were extracted into 6 factors as originally proposed by the model. Additionally, the total variance explained reached 69.63%, which is greater than 50%, indicating that these 6 factors accounted for 69.63% of the variation in the data of the 16 observed variables participating in the EFA (see Table 3).

Table 3: The results of EFA of independent variables

Items	Factor					
	1	2	3	4	5	6
REL4	0.898					
REL2	0.887					
REL5	0.870					
REL1	0.862					
REL2	0.850					

Items	Factor					
	1	2	3	4	5	6
DPQ 4		0.897				
DPQ 2		0.882				
DPQ 5		0.872				
DPQ 1		0.863				
DPQ 3		0.855				
DIT2			0.894			
DIT5			0.881			
DIT1			0.869			
DIT4			0.851			
DIT3			0.845			
SPD3				0.890		
SPD1				0.877		
SPD4				0.859		
SPD2				0.848		
PV3					0.893	
PV4					0.880	
PV1					0.865	
PV2					0.846	
COS 2						0.895
COS 4						0.874
COS 1						0.866
COS 3						0.850

Source: Analysis results from SPSS 26

The EFA results for the dependent variable show that the KMO value of 0.815 is above 0.5, and the significance of Bartlett's Test is 0.000, which is less than 0.05, indicating that the factor analysis is appropriate. One factor was extracted with an Eigenvalue of 2.153, which is greater than 1, and the cumulative explained variance is 67.42%, exceeding 50%. This factor accounts for 67.42% of the variance in the four observed variables involved in the EFA.

The results of the correlation analysis showed that the significance of the correlation between the independent and dependent variables was less than 0.05. Therefore, there is a linear relationship between all six independent and dependent variables (see Table 4).

Table 4: Correlation analysis

	CS	REL	SPD	DPQ	DIT	COS	PV
CS	1						
REL	0.514**	1					
SPD	0.477***	0.212**	1				
DPQ	0.526***	0.189***	0.216**	1			
DIT	0.451**	0.157**	0.114***	0.163**	1		
COS	0.500***	0.200**	0.153**	0.261***	0.157**	1	
PV	0.495**	0.162***	0.201**	0.168**	0.186***	0.215***	1
*** $p < 0.001$, ** $p < 0.01$							

Source: Analysis results from SPSS 26

The regression results in Table 5 show that the adjusted R^2 reached 0.693, indicating that the independent variables in the model could explain 69.3% of the customer satisfaction. Simultaneously, the analysis showed that the VIF was less than 5, indicating that the data did not violate the multicollinearity assumption. Additionally, the Durbin-Watson value of 1.869 falls within the range of 1.5 to 2.5, indicating no violation of the assumption of error independence. Furthermore, the t-values for the independent variables are less than 0.05, suggesting they are statistically significant.

Table 5: The results of regression model

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	0.937	0.076		2.167	0.005		
	REL	0.267	0.070	0.321	2.729	0.011	0.786	1.824
	SPD	0.301	0.075	0.356	2.108	0.008	0.793	2.147
	DPQ	0.378	0.081	0.425	2.378	0.001	0.782	1.992
	DIT	0.256	0.085	0.303	2.812	0.003	0.771	1.913
	COS	0.324	0.083	0.389	2.971	0.002	0.782	1.902
	PV	0.333	0.080	0.400	2.008	0.004	0.777	2.002
Adjusted R^2 = 0.693, Sig. F = 0.000, Durbin-Watson = 1.869								
Notes: *REL = Reliability, SPD = Delivery speed, DPQ = Delivery personnel quality, DIT = Delivery information transparency, COS = Delivery cost, PV = Perceived value, CS = Customer satisfaction*								

Source: Analysis results from SPSS 26

A regression equation with a standardized coefficient is expressed as follows:

CS = 0.425DPQ + 0.400PV + 0.389COS + 0.356SPD + 0.321REL + 0.303DIT

4.2. Discussion

The regression results indicated that the study model was statistically significant ($p < 0.05$), confirming that the quality of service during last-mile delivery significantly influences customer satisfaction in e-commerce, consistent with prior research on e-logistics and last-mile delivery (Aljohani, 2024; Nguyen et al., 2021).

First of all, the quality of delivery personnel has the strongest impact on satisfaction ($\beta = 0.425$, $p = 0.001$), highlighting the central role of the "human touchpoint" in delivery services. Although e-commerce operates in a digital environment, the interaction between delivery staff and customers still greatly influences the user experience. This finding aligns with studies by Mentzer et al. (2001) and Esper et al. (2020), which demonstrate that the professionalism, service attitude, and customer support provided by delivery staff are crucial factors in building trust and satisfaction. It also reflects the unique characteristics of the Vietnamese market, where expectations for friendliness and direct support from delivery personnel are quite high.

Perceived value also plays a significant role ($\beta = 0.400$, $p = 0.004$). This supports the idea that satisfaction depends not only on individual factors but also on the combined effects of cost, speed, and actual customer experience. Research by Chang and Chen (2008) and Sirdeshmukh et al. (2002) further highlights the importance of perceived value as an intermediary variable in e-commerce, showing that service providers need to enhance speed, cost, and reliability simultaneously to boost overall customer reviews.

Next, delivery cost significantly affects satisfaction ($\beta = 0.389$, $p = 0.002$). This indicates that customers are particularly sensitive to service prices amid intense competition among e-commerce platforms and shipping providers. When the delivery fee is reasonable and matches the quality of service, customers tend to value the delivery experience more. This finding aligns with Zeithaml's (1988) theory that cost is a key factor in perceived value formation.

Additionally, delivery speed has a positive impact ($\beta = 0.356$, $p = 0.008$), aligning with the modern market where customers expect fast delivery, sometimes within the same day. Although its impact is not as strong as that of delivery personnel quality or delivery cost, speed remains an important factor in choosing a carrier. This finding aligns with studies by Rita et al. (2019) and Janjevic and Winkenbach (2020), which highlighted that speed is a key competitive factor in last-mile delivery.

Reliability also has a positive and meaningful impact ($\beta = 0.321$, $p = 0.011$), showing that customers value on-time delivery, correct products, and no damage. However, its level of influence is lower than other factors, which may reflect that consumers now see reliability as the "default" in delivery services and only become dissatisfied when problems arise. This aligns with the trend in e-logistics, where reliability has become a basic standard rather than a distinguishing feature.

Finally, delivery information transparency has a positive impact ($\beta = 0.303$, $p = 0.003$). In a context where customers increasingly expect real-time updates, GPS tracking, and timely notifications, information transparency helps reduce cognitive risk and provides peace of mind. This finding aligns with studies by Liang and Ye (2024) and Hong and Cha (2013), which confirm that clear information systems significantly contribute to satisfaction in e-commerce.

5. Implications

The research findings significantly enhance the theoretical foundation of service quality in last-mile delivery and

customer behavior in e-commerce. First, the study affirms and broadens the role of traditional service quality components such as reliability, speed, information, and cost within the context of urban logistics in Vietnam. Empirical evidence indicates that not only do speed and reliability influence satisfaction, but the quality of delivery personnel plays the most prominent role. This supports the SERVQUAL model and service quality theories by highlighting the importance of "service encounter" even in digital-based services.

The study further develops the theory of perceived value by showing it has a strong and direct influence on satisfaction and acts as a mechanism that combines the effects of various service components. This finding aligns with but is more significant than traditional models like ACSI, indicating that perceived value is crucial in a fast-paced, cost-sensitive delivery environment. Furthermore, the experiment conducted in Hai Phong, a specific seaport city, provides valuable evidence for the theory of e-logistics in Grade I cities within emerging economies, where infrastructure and consumer behaviors differ markedly from those in large megacities.

Practically, the results of the study offer many strategic implications for logistics businesses, shipping units, and e-commerce platforms. First, the delivery staff factor has the strongest influence on satisfaction, indicating that companies need to focus on training communication skills, service attitude, and professional manners. Performance review and reward programs based on customer feedback will help enhance service quality.

Next, delivery costs are the second-biggest factor influencing decisions, highlighting that businesses must optimize their operating models to reduce expenses, ensure surcharge transparency, and offer flexible fee policies by region or time frame. This is especially crucial in a highly competitive market where customers are very fee-sensitive.

Finally, to improve perceived value, businesses must optimize speed, reliability, and fees simultaneously. This can be achieved by investing in technology that predicts delivery times, optimizes routes, and enhances same-day order processing. Additionally, transparency of delivery information should be improved through a real-time tracking system and fast, accurate status updates, which help reduce customer perception risks.

6. Conclusion

This study aims to identify factors influencing customer satisfaction with last-mile delivery services in e-commerce in Hai Phong city. The regression results indicated that the model was highly relevant, explaining 69.3% of the variation in satisfaction through six key factors: reliability, delivery speed, delivery personnel quality, transparency of delivery information, delivery cost, and perceived value. Notably, the quality of delivery staff and delivery costs have the strongest impact, reflecting the characteristics of the Vietnamese market, where customers value direct support and are sensitive to price.

However, the study also had some limitations, such as using a convenient sample and focusing only on one location. Therefore, future research could expand the geographic area, adopt a probabilistic sampling method, or include additional regulatory variables like customer expectations, population density, or category characteristics to improve the model's generalizability

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