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The Impact of E-Commerce Delivery Factors on Consumer Satisfaction of Evidence from Guangxi Industrial Technician College, China

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Abstract- This quantitative research aimed to 1) examine the influence of e-commerce delivery factors—delivery speed (DS), delivery accuracy (DA), real-time tracking availability (RTTA), perceived delivery cost (PDC), and delivery reliability (DR)—on consumer satisfaction (CS) among students at Guangxi Industrial Technician College, and 2) analyze the relative importance of each delivery factor in affecting students' satisfaction with e-commerce delivery services. The research population comprised students enrolled at Guangxi Industrial Technician College, and the sample included 400 respondents selected using a stratified random sampling approach across six academic departments, with gender balance considered to enhance representativeness. Data were collected using a 5-point Likert-scale questionnaire measuring the five delivery factors and CS. Content validity was evaluated by the Index of Item-Objective Congruence (IOC), with IOC values exceeding 0.6, and internal consistency reliability was assessed using Cronbach's alpha, indicating good content validity and internal consistency. The data were statistically analyzed using descriptive statistics, Pearson correlation, and multiple regression analysis. Regression diagnostics included variance inflation factors (VIF) and the Durbin–Watson statistic. The results revealed that DS, DA, RTTA, and DR showed significant positive relationships with CS, while PDC showed a significant negative relationship. DA was identified as the most influential predictor of CS ($\beta = 0.184$, $p < 0.001$), followed by DR ($\beta = 0.166$, $p < 0.01$), RTTA ($\beta = 0.149$, $p < 0.01$), DS ($\beta = 0.145$, $p < 0.01$), and PDC ($\beta = -0.147$, $p < 0.01$). The regression model accounted for 33.2% of the variance in CS ($R^2 = 0.332$, Adjusted $R^2 = 0.324$). Diagnostic tests indicated no serious multicollinearity (VIF: 1.399-1.543) and no problematic autocorrelation (D-W = 1.904) in the regression model.

Keywords: E-Commerce Delivery Factors, Consumer Satisfaction, Delivery Speed, Delivery Accuracy, Real-Time Tracking Availability, Perceived Delivery Cost, Delivery Reliability, Vocational College Students.

I. Introduction

E-commerce has become a cornerstone of modern consumer behavior, with delivery service quality standing out as a critical determinant of consumer satisfaction and long-term platform loyalty. In China, the world’s largest e-commerce market boasting over 870 million active online shoppers, delivery performance has evolved from a supporting service to a key competitive edge, as 60% of consumers prioritize delivery speed and reliability in repurchase decisions, while 45% of negative reviews stem from delivery-related issues. Vocational college students represent a strategically significant segment within this market—characterized by 90%+ online shopping penetration, frequent small-value transactions, limited budgets, and campus-specific delivery constraints (e.g., centralized pickup points, class schedule restrictions). However, existing research often overlooks this group, focusing on general consumers or undergraduate populations, creating a gap in understanding how delivery factors operate in this distinct institutional context.
This study centers on two core research questions:

1. To explore the level of Delivery Speed, Delivery Accuracy, Real-Time Tracking Availability,Perceived Delivery Cost, Delivery Reliability, and Consumer Satisfaction.
2. To analyze the impact of these E-Commerce Delivery Factors on consumer satisfaction: evidence from Guangxi Industrial Technician College.

The research holds substantial practical importance: for e-commerce platforms and logistics providers, the findings will offer targeted insights to optimize services for the student market, a high-potential segment with long-term loyalty value; for vocational colleges, it can inform collaborations with logistics partners to enhance campus life quality.
Theoretically, this study contributes to the discipline by enriching the empirical foundation of e-commerce service quality research. It integrates three established theories—Service Quality Theory (SERVQUAL), Expectation-Confirmation Theory, and Perceived Value Theory—to construct a framework tailored to vocational

college contexts, testing the relative importance of delivery factors in a population with unique constraints. By focusing on a concentrated campus environment, the study controls for geographic and infrastructure variations inherent in broader consumer studies, enabling more precise causal inferences. Additionally, it addresses the literature gap by examining how functional fulfillment (accuracy, reliability) versus efficiency (speed) and cost sensitivity interact to shape satisfaction, offering a nuanced understanding that complements existing research which often treats these factors as interchangeable. The findings will extend the generalizability of e-commerce delivery research to vocational education settings, providing a template for future studies on specialized consumer segments.

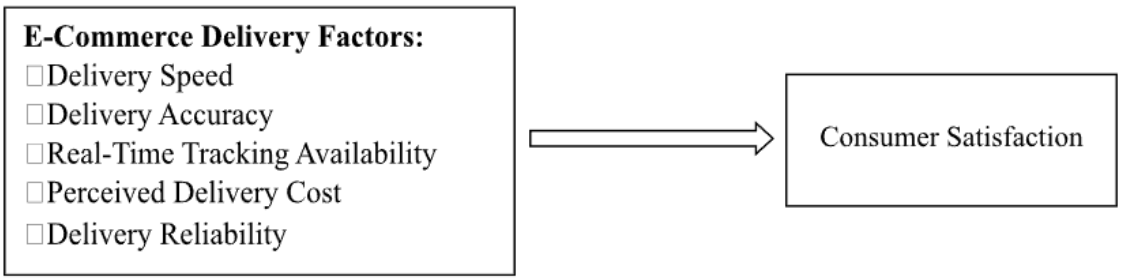

Figure 1. Conceptual Framework

II. Literature Review

2.1 Theoretical Foundations

This study integrates three theoretical foundations: Service Quality Theory (SERVQUAL), Expectation-Confirmation Theory (ECT), and Perceived Value Theory.

2.1.1 Service Quality Theory (SERVQUAL Model)

The SERVQUAL model (Parasuraman, Zeithaml, & Berry, 1988) identifies five key service quality dimensions: tangibles, reliability, responsiveness, assurance, and empathy. In e-commerce delivery contexts, these dimensions directly translate to delivery accuracy (reliability), real-time tracking (responsiveness), and delivery speed (responsiveness).

2.1.2 Expectation-Confirmation Theory (ECT)

Expectation-Confirmation Theory (Oliver, 1980) proposes that satisfaction is determined by comparing pre-purchase expectations with actual post-purchase performance. Positive confirmation (performance exceeding expectations) enhances satisfaction, while negative disconfirmation (performance falling short) leads to dissatisfaction (Bibi & Safia Shaukat, 2023).

2.1.3 Perceived Value Theory

Perceived Value Theory (Zeithaml, 1988) defines perceived value as the consumer's overall assessment of utility based on perceptions of what is received and what is given. This theory is particularly relevant for understanding perceived delivery cost among students with limited budgets.

2.2 Concept of E-Commerce Delivery Factors

2.2.1 Delivery Speed (DS)

Delivery speed, defined as the duration from order placement to goods receipt (Chen et al., 2021), is a critical competitive differentiator that significantly influences e-commerce satisfaction, with 46% of buyers abandoning carts due to lengthy delivery (Akıl & Ungan, 2024)—a key concern for Guangxi Industrial Technician College students relying on timely receipt of learning materials and daily necessities.

2.2.2 Delivery Accuracy (DA)

Delivery Accuracy refers to the degree to which physical delivery matches the original order (Fan & Ye, 2017). Kim and Park (2023) revealed that accuracy failures reduce customer lifetime value by an average of 23%.

2.2.3 Real-Time Tracking Availability (RTTA)

Real-Time Tracking Availability refers to the consumer's perceived utility of systems providing package visibility (Ngai & Wan, 2025). Lee et al. (2023) showed that AI-enhanced tracking increased satisfaction by 31% through reduced anxiety.

2.2.4 Perceived Delivery Cost (PDC)
Perceived Delivery Cost refers to the consumer's subjective assessment of monetary charges relative to service quality (Chen et al., 2021). Johnson and Brown (2022) found students were 40% more dissatisfied when shipping costs were perceived as unfair.

2.2.5 Delivery Reliability (DR)
Delivery Reliability refers to the consumer's perception of consistency and dependability in fulfilling promised delivery times (Fan & Ye, 2017). Taylor et al. (2023) demonstrated that reliability is the single most important predictor of long-term customer retention ($\beta = 0.58$).
These five factors collectively shape customer perceptions of delivery service quality.

2.3 Context of Organization
Guangxi Industrial Technician College enrolls 11,756 students across six departments. The student population consists predominantly of digital natives with high e-commerce penetration. The enclosed campus environment creates unique last-mile delivery challenges, including centralized pickup points and constrained collection schedules, making delivery reliability and real-time tracking critical determinants of satisfaction.

2.4 E-Commerce and Consumer Satisfaction
E-commerce represents the buying and selling of goods and services through electronic channels. Consumer satisfaction in e-commerce context is a multidimensional construct influenced by multiple factors including product quality, service quality, and delivery performance. Recent research emphasizes that delivery service quality significantly impacts overall customer satisfaction and loyalty in e-commerce transactions.

III. Research Methodology

This study employed a quantitative, cross-sectional survey design to examine the impact of e-commerce delivery factors on consumer satisfaction among students at Guangxi Industrial Technician College.

3.1 The Population / Sample Group
The target population comprised 11,756 students enrolled at Guangxi Industrial Technician College in the 2025-2026 academic year. Sample size was determined using Taro Yamane's formula at 95% confidence level with 5% margin of error, yielding 387 respondents. The sample was increased to 400 to account for potential incomplete responses. Stratified random sampling was employed across six departments, with proportional allocation based on department size.

3.2 Research Instrument
The primary data collection tool was a structured questionnaire comprising three parts: Part 1 collected demographic information (7 items), Part 2 measured five e-commerce delivery factors (4 items each), and Part 3 measured consumer satisfaction (4 items). All measurement items were adapted from established scales (Fan & Ye, 2017; Ngai & Wan, 2025; Chen et al., 2021) and rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

3.3 Data Collection
Data collection occurred from January to February 2026. Questionnaires were distributed through classroom announcements and official student groups. A pilot test with 30 students was conducted to assess clarity and reliability. Of 406 collected questionnaires, 400 valid responses were retained (98.52% valid response rate).

3.4 Reliability and Validity
Content validity was evaluated by three experts using the Index of Item-Objective Congruence (IOC), with all items exceeding the 0.6 threshold. Reliability was assessed through Cronbach's alpha coefficients: Delivery Speed (0.858), Delivery Accuracy (0.860), Real-Time Tracking Availability (0.865), Perceived Delivery Cost (0.860), Delivery Reliability (0.867), and Consumer Satisfaction (0.872). Overall scale reliability was 0.829.

3.5 Data Analysis
The data were statistically analyzed using descriptive statistics to summarize respondent demographics, Pearson correlation to examine bivariate relationships, and multiple regression analysis to test hypotheses regarding the influence of delivery factors on consumer satisfaction. Regression diagnostics included variance inflation factors (VIF) to assess multicollinearity and the Durbin-Watson statistic to evaluate auto correlation.

4. Research Results

4.1 Descriptive Statistics

Table 1. Basic Information of Respondents

(n=400)

Question	Item	Frequency	Percentage(%)
Q1 - Gender	Male	190	47.00
	Female	210	52.50
Total		**400**	**100.00**
Q2 - Age	15-17 years	131	32.75
	18-20 years	165	41.25
	21 and above	104	26.00
Total		**400**	**100.00**
Q3 - Department	Green Petrochemical and New Materials Industry	52	13.00
	Intelligent Manufacturing and Equipment Industry	69	17.25
	Intelligent Electrical and Energy Storage Industry	95	23.75
	Digital and Information Industry	51	12.75
	New Energy Vehicle Industry	43	10.75
	Modern Service Industry	90	22.50
Total		**400**	**100.00**
Q4 - Online shopping frequency	1-3 times	158	39.50
	4-6 times	161	40.25
	7-10 times	67	16.75
	More than 11 times	14	3.50
Total		**400**	**100.00**
Q5 - Average monthly online shopping expenditure	Less than 500 RMB	74	18.50
	500-1000 RMB	159	39.75
	1001-2000 RMB	147	36.75
	More than 2000 RMB	20	5.00
Total		**400**	**100.00**
Q6 - Have you ever made purchases via e-commerce platforms?	Yes	400	100.00
	No	0	0.00
Total		**400**	**100.00**

Table 1 presents a balanced sample with slight female predominance (52.5%). Age distribution concentrated in 15-20 years (74%), and all respondents possessed e-commerce experience. Monthly shopping frequency was primarily 1-6 times (79.75%), with expenditure concentrated in 500-2000 RMB (76.5%).

Table 2. Descriptive Statistics of Key Variables

(n=400)

Dimension	Mean	S.D.	Interpretation	Order
Delivery Speed	3.304	0.968	Moderate	4
Delivery Accuracy	3.315	0.971	Moderate	2
Real-Time Tracking Availability	3.384	0.975	Moderate	1
Perceived Delivery Cost	2.672	0.966	Moderate	6
Delivery Reliability	3.309	1.022	Moderate	3
Consumer Satisfaction	3.299	1.025	Moderate	5

Table 2 outlines the mean scores of all variables at moderate levels. Real-Time Tracking Availability showed the highest mean (M=3.384), while Perceived Delivery Cost had the lowest (M=2.672), reflecting student cost sensitivity.

Table 3. Pearson Correlation Matrix

Variable	1	2	3	4	5	6
1. Delivery Speed	1					
2. Delivery Accuracy	.421***	1				
3. Real-Time Tracking	.365***	.391***	1			
4. Delivery Cost	-.363***	-.414***	-.425***	1		
5. Delivery Reliability	.433***	.386***	.460***	-.458***	1	
6. Consumer Satisfaction	.402***	.428***	.413***	-.415***	.436***	1
***p < .001						

Table 3 shows that all independent variables correlated significantly with consumer satisfaction in expected directions.

Table 4. Multiple Regression Analysis Results

(n=400)

Variable	B	Std. Error	β (Beta)	t	p	VIF
(Constant)	1.482	0.333		4.450	0.000	
Delivery Speed	0.153	0.052	0.145	2.974	0.003	1.399
Delivery Accuracy	0.195	0.052	0.184	3.762	0.000	1.415
Real-Time Tracking	0.156	0.052	0.149	3.009	0.003	1.445
Perceived Delivery Cost	-0.156	0.053	-0.147	-2.948	0.003	1.461
Delivery Reliability	0.167	0.051	0.166	3.254	0.001	1.543
$R^2 = 0.332$, Adjusted $R^2 = 0.324$, $F(5,394) = 39.169$, $p = 0.000$, D-W = 1.904						

Table 4 presents the regression analysis results. The model was statistically significant ($F = 39.169$, $p < .001$), explaining 33.2% of variance in consumer satisfaction. All predictors significantly influenced satisfaction in expected directions, with delivery accuracy showing the strongest effect ($\beta = 0.184$), followed by delivery reliability ($\beta = 0.166$), real-time tracking availability ($\beta = 0.149$), delivery speed ($\beta = 0.145$), and perceived delivery cost ($\beta = -0.147$). VIF values (1.399-1.543) indicated no multicollinearity concerns.

V. Discussion

The findings of this study provide empirical support for all five research hypotheses, aligning with established theoretical frameworks and recent empirical research.

The significant positive effect of delivery accuracy ($\beta = 0.184$) as the strongest predictor resonates with the SERVQUAL model's reliability dimension (Parasuraman et al., 1988), emphasizing accurate service fulfillment. This finding aligns with Fan and Ye (2017), who found reliability had the strongest influence on express brand satisfaction in China. For vocational college students ordering specific learning materials, accuracy represents a non-negotiable requirement; errors disrupt academic routines and generate strong negative affect.

Delivery reliability emerged as the second strongest predictor ($\beta = 0.166$), consistent with Taylor et al. (2023), who identified reliability as the primary predictor of long-term retention. This finding supports Expectation-Confirmation Theory (Oliver, 1980), as consistently meeting promised delivery times generates neutral confirmation, cultivating long-term trust through dependable performance.

Real-time tracking availability significantly influenced satisfaction ($\beta = 0.149$), supporting Ngai and Wan (2025). Within the campus context, tracking empowers students to coordinate package pickup around class

schedules, transforming passive waiting into proactive planning. This aligns with the SERVQUAL responsiveness dimension, which emphasizes providing timely information to customers.

Delivery Speed showed significant positive effects (β = 0.145), though its relative effect ranked lower. Harter et al. (2025) noted that as speed becomes normalized, its marginal contribution may be outweighed by fundamental factors like accuracy, suggesting that in China's competitive e-commerce market, fast delivery has transitioned from competitive advantage to industry standard.

Perceived delivery cost demonstrated significant negative effects (β = -0.147), powerfully validating Perceived Value Theory (Zeithaml, 1988) within the student demographic. When delivery fees are perceived as disproportionate to service quality, satisfaction decreases. This echoes Johnson and Brown (2022), who found students show 40% higher dissatisfaction when shipping costs are perceived as unfair. For financially constrained vocational students, even modest delivery fees can trigger negative evaluation.

VI. Conclusion

The application of the e-commerce delivery factors model at Guangxi Industrial Technician College demonstrates that delivery speed, accuracy, real-time tracking availability, and reliability significantly enhance consumer satisfaction, while perceived delivery cost diminishes it. Delivery accuracy emerged as the most influential predictor, underscoring the importance of reliable order fulfillment in educational settings where precise learning materials are essential.

The study also assessed that all five delivery factors collectively explained 33.2% of variance in consumer satisfaction. The findings confirm that for vocational college students, functional fulfillment dimensions (accuracy, reliability) outweigh efficiency dimensions (speed) in importance, while cost sensitivity remains a critical consideration.

VII. Recommendations

For e-commerce platforms and logistics providers, priority investments should focus on enhancing delivery accuracy through quality control systems, barcode scanning, and improved packaging. Given reliability's importance, companies should maintain consistent delivery performance through better route planning and proactive delay communication. Real-time tracking systems should provide granular updates and push notifications. For perceived delivery cost, platforms should consider student-friendly pricing strategies such as discounted shipping for campus addresses or adjusted free shipping thresholds. Future research should examine mediating variables (trust, perceived value), conduct subgroup analyses across demographic characteristics, and employ longitudinal designs to strengthen causal inference.

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