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GREENING THE GIG: FRONTLINE PERSPECTIVES ON GREENING THE LAST MILE IN DELIVERY SYSTEMS

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ABSTRACT

The rapid expansion of last-mile delivery platforms has transformed urban logistics, creating both operational opportunities and critical challenges for sustainable supply chain management. While environmental sustainability has become a strategic priority for logistics organizations, the perceptions, attitudes, and behavioral responses of frontline delivery executives remain largely underexplored. This study investigates how delivery personnel engaged in app-based delivery platforms understand, evaluate, and respond to sustainability practices embedded within digital last-mile delivery ecosystems. The primary data was collected using a structured questionnaire from 53 delivery executives across major doorstep delivery platforms. The data was analyzed using descriptive statistics, reliability analysis, Exploratory Factor Analysis (EFA), Pearson correlation, and simple linear regression models in SPSS. The study highlights how platform-related factors, nudges, and individual attitudes significantly influence delivery executives' behavioral intentions toward adopting eco-friendly delivery practices. The findings provide actionable empirical insights for platform designers, supply chain managers, and policymakers seeking to embed frontline sustainability into digital delivery ecosystems.

Keywords: Last Mile Delivery, Sustainability, Last Mile Logistics, Delivery Executives, Platform Nudges

1.0 INTRODUCTION

The rapid expansion of digital delivery platforms such as Swiggy, Zomato, Dunzo, and Amazon has fundamentally reshaped urban last-mile logistics, offering unparalleled speed and customer convenience. However, this convenience comes at a severe environmental cost, as last-mile delivery is widely recognized as the most resource-intensive, inefficient, and emission-heavy segment of the entire supply chain network. In response to growing environmental concerns, digital delivery platforms have begun integrating various sustainable practices, including electric vehicle (EV) adoption incentives, route optimization algorithms, eco-friendly packaging initiatives, and digital nudges.

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However, the practical success of these platform-led sustainability initiatives does not rely solely on technological infrastructure or organizational directives. It heavily depends on the operational execution and behavioral willingness of frontline delivery executives. While extensive research focuses on managerial strategies and consumer demand for green logistics, the frontline workers who directly execute daily delivery operations are frequently overlooked in sustainability frameworks. Understanding their awareness, attitudes, and responses to platform prompts is critical for achieving true operational sustainability.

1.1 STATEMENT OF THE PROBLEM

Despite the rapid integration of green technologies in digital logistics, there remains a critical implementation gap between platform-level sustainability policies and frontline operational execution. While logistics companies invest heavily in sustainable delivery tools, frontline executives often face tight delivery schedules, algorithmic time pressures, and income constraints that may conflict with green behaviors. Without understanding the frontline delivery worker's awareness, behavioral intent, and the influence of platform design, organizational sustainability goals cannot be effectively realized.

1.2 OBJECTIVES

To evaluate delivery executives' awareness and understanding of sustainable supply chain practices in doorstep delivery platforms.

To analyze delivery executives' attitudes and behavioral intentions toward adopting sustainability measures in last-mile logistics.

To identify the platform-related factors influencing delivery executives' engagement with sustainable supply chain initiatives.

1.3 NEED FOR THE STUDY

While existing literature extensively covers managerial decision-making, systemic urban logistics, and consumer preferences for green delivery, the frontline delivery executive is rarely positioned as a central stakeholder in sustainability research. A micro-level stakeholder analysis is urgently needed to evaluate how operational constraints, platform nudges, and personal motivations dictate green behavior during actual delivery runs. This study fills this gap by evaluating frontline perspectives directly within the digital delivery ecosystem.

1.4 SIGNIFICANCE OF THE STUDY

This study provides empirical ground-level insights that can guide app-based logistics platforms in designing better choice architectures, training modules, and incentive structures. By identifying how platform influence directly drives frontline behavioral intention, the study helps platform operators create balanced workflows that align speed, delivery performance, and environmental sustainability.

1.5 METHODOLOGY

This study utilizes a quantitative, empirical research design. Primary data was gathered using a structured questionnaire administered to 53 active frontline delivery executives operating across major app-based delivery platforms. Data analysis was performed using statistical

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software (SPSS) to conduct Reliability Analysis (Cronbach's Alpha), Exploratory Factor Analysis (EFA), Pearson Correlation, and Simple Linear Regression.

1.6 RESEARCH DESIGN

A descriptive and analytical research design was adopted to measure delivery executives' awareness, attitudes, behavioral intentions, and platform influence. Sampling was conducted among active gig-workers operating across urban doorstep delivery platforms.

1.7 LIMITATIONS OF THE STUDY

- The primary data collection was restricted to a sample size of 53 respondents due to field accessibility constraints among gig workers.
- The study relies on self-reported survey responses, which may introduce social desirability bias regarding environmental behaviors.
- Sampling was limited to specific urban delivery zones, which may reflect regional infrastructural conditions.

2.0 REVIEW OF LITERATURE

Maniatis (2023) explored the viability of last-mile delivery solutions for sustainable supply chains, emphasizing technological interventions like route optimization and EV fleets. However, the study focused on systemic barriers and lacked empirical insight into frontline worker perceptions.

Beck et al. (2025) examined last-mile logistics models integrating customer choices, demand sustainability, and data economies. While robust on consumer-side demand and policy frameworks, it overlooked the role of the frontline logistics workforce.

Demir, Syntetos & van Woensel (2022) reviewed research trends in last-mile logistics, identifying sustainability as a critical growth area. They highlighted severe operational and financial constraints but noted a clear lack of empirical studies focusing on delivery personnel.

Heikkinen (2024) investigated how logistics managers make sense of sustainability adoption in last-mile operations. While providing valuable organizational insights, the study excluded frontline operational workers.

Li, Mirosa & Bremer (2020) analyzed the environmental impacts of online food delivery platforms, focusing on packaging waste and emissions. Their study evaluated platform-level policies but did not assess frontline executive compliance or awareness.

Vandna & Kumar (2023) evaluated challenges and opportunities for sustainable practices in Indian delivery platforms. They identified key infrastructure and packaging gaps but recommended further empirical research on worker attitudes.

Chen & Ryu (2025) investigated consumer attitudes and behavioral intentions toward autonomous green delivery. Their behavioral modeling provides a theoretical framework applicable to studying frontline logistics human factors.

Jan & Ji (2019) demonstrated how external expectations, resources, and operational constraints directly impact frontline employees' attitudes and behavioral intentions in service delivery settings.

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World Economic Forum (2024) published a global benchmark on transforming urban logistics through micro-hubs and EV fleet integration, focusing on macro-level policy rather than micro-level worker behavior.

Choice Architecture Study (2024) demonstrated that app-based digital nudges and choice architecture significantly promote eco-friendly behavior in online platforms, supporting the premise of platform-driven influence.

3.0 SUSTAINABILITY AND PLATFORM LOGISTICS CONSTRUCTS

3.1 FRONTLINE SUSTAINABILITY AWARENESS

Frontline sustainability awareness refers to the degree to which delivery executives understand eco-friendly practices promoted by their platforms, such as route optimization algorithms, low-emission delivery modes, and waste reduction protocols. Awareness serves as the foundation for cognitive engagement with corporate green goals.

3.2 ATTITUDES AND BEHAVIORAL INTENTIONS IN LAST-MILE DELIVERY

Attitude reflects the delivery worker's personal evaluation of whether green delivery practices are beneficial, meaningful, or practical. Behavioral intention represents their conscious willingness to execute eco-friendly actions, such as following route suggestions, utilizing reusable packaging, or adopting electric two-wheelers during regular delivery shifts.

3.3 PLATFORM INFLUENCE AND DIGITAL NUDGES

Platform influence encapsulates the structural and digital mechanisms deployed by delivery apps to encourage green behavior. This includes algorithmic route suggestions, real-time app nudges, eco-performance training tips, recognition policies, and financial incentive structures designed to align frontline routines with corporate sustainability targets.

4.0 DATA ANALYSIS & INTERPRETATION

4.1 RELIABILITY ANALYSIS

To verify the internal consistency of the survey instrument, Cronbach’s Alpha reliability statistics were computed across all constructs.

Table 4.1: Reliability Statistics across Survey Constructs

Construct	**No. of Items**	**Cronbach's Alpha**	**Internal Consistency**
Sustainability Awareness	5	0.836	High
Attitude Toward Sustainability	6	0.827	High

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Construct	No. of Items	Cronbach's Alpha	Internal Consistency
Behavioral Intention	6	0.883	High
Platform Influence	6	0.850	High
Overall Instrument	32	0.927	Excellent

Source: Computed data

Interpretation:

All individual constructs demonstrated strong internal consistency with Cronbach's Alpha values exceeding the standard threshold of 0.70. The overall instrument scale (32 items) yielded an Alpha of 0.927, confirming high reliability for empirical testing.

4.2 EXPLORATORY FACTOR ANALYSIS (EFA)

Exploratory Factor Analysis was executed to evaluate factor structures and sampling adequacy for each analytical construct.

Table 4.2: KMO and Bartlett's Test Summary across Constructs

Construct	KMO Value	Bartlett's Test (Approx. Chi-Square)	Sig. (p-value)	Variance Explained (%)	Factor Structure
Sustainability Awareness	0.780	105.464	.000	60.70%	Unidimensional
Attitude Toward Sustainability	0.698	124.122	.000	53.90%	Unidimensional
Behavioral Intention	0.851	162.518	.000	63.51%	Unidimensional

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Construct	**KMO Value**	**Bartlett's Test (Approx. Chi-Square)**	**Sig. (p-value)**	**Variance Explained (%)**	**Factor Structure**
Platform Influence	0.867	117.265	.000	58.05%	Unidimensional

Source: Computed data

Interpretation:

The Kaiser-Meyer-Olkin (KMO) measures for all constructs ranged between 0.698 and 0.867, exceeding the minimum threshold of 0.50, confirming sampling adequacy. Bartlett's Test of Sphericity was statistically significant ($p < 0.001$) across all constructs, justifying the application of principal component analysis. Each construct explained over 50% of total variance as a clean, unidimensional factor.

Table 4.3: Pearson Correlation Matrix Between Attitude and Behavioral Intention

	Constructs	**Attitude Toward Sustainability**	**Behavioral Intention**
Attitude Toward Sustainability	Pearson Correlation	1	.784**
	Sig. (2-tailed)		.000
	N	53	53
Behavioral Intention	Pearson Correlation	.784**	1
	Sig. (2-tailed)	.000	
	N	53	53

*** Correlation is significant at the 0.01 level (2-tailed).*

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Source: Computed data

Interpretation:

Pearson correlation analysis revealed a strong, statistically significant positive relationship between delivery executives' attitudes toward sustainability and their behavioral intentions to adopt green delivery practices ($r = 0.784, p < 0.001$). This indicates that executives who hold positive attitudes toward green operations display significantly higher intentions to follow route optimizations, use eco-packaging, and adopt low-emission delivery habits.

4.4 REGRESSION ANALYSIS: IMPACT OF PLATFORM INFLUENCE ON BEHAVIORAL INTENTION

Simple linear regression analysis was performed using Platform Influence as the independent predictor and Behavioral Intention as the dependent variable.

Table 4.4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.898^a	.806	.802	2.19422

a. Predictors: (Constant), Platform Influence

Source: Computed data

Table 4.5: ANOVA Table

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1017.209	1	1017.209	211.275	.000^b
Residual	245.545	51	4.815		
Total	1262.755	52			

a. Dependent Variable: Behavioral Intention

b. Predictors: (Constant), Platform Influence

Source: Computed data

Interpretation:

The regression model is statistically significant ($F(1,51) = 211.28, p < 0.001$), confirming that platform influence is a robust, highly significant predictor of frontline behavioral intention. The model yielded an R of 0.898 and an R^2 of 0.806, indicating that 80.6% of the total

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variance in delivery executives' behavioral intentions toward sustainability is directly explained by platform-related nudges, training, incentives, and app features.

5.0 FINDINGS

Instrument Reliability: The survey instrument exhibited high construct validity and overall reliability ($\alpha = 0.927$), proving effective for measuring frontline supply chain behaviors. Attitude-Behavior Link: A strong, statistically significant positive correlation ($r = 0.784, p < 0.001$) exists between delivery executives' personal attitudes toward sustainability and their intention to perform green delivery actions.

Dominance of Platform Influence: Platform influence is the primary driver of frontline sustainability adoption ($R^2 = 0.806$), demonstrating that app prompts, incentives, algorithmic route efficiency, and corporate recognition account for over 80% of frontline engagement.

6.0 SUGGESTIONS

- Enhance App Choice Architecture: Platform developers should integrate explicit, real-time green nudges (e.g., fuel-saving route highlights, eco-delivery prompts) into executive delivery interfaces.
- Align Performance Evaluations with Sustainability: Platforms should incorporate green metrics into executive reward structures, providing direct financial incentives or recognition for maintaining eco-friendly delivery habits.
- Targeted Frontline Training: Companies should deploy interactive in-app micro-training modules to elevate frontline awareness regarding carbon footprint reduction and waste minimization.

7.0 CONCLUSION

Achieving environmental sustainability in last-mile digital logistics requires bridging the gap between corporate policies and frontline execution. This study demonstrates that frontline delivery executives are highly receptive to green practices when supported by positive personal attitudes and structured platform mechanisms. Because platform influence accounts for over 80% of behavioral variation, delivery apps hold immense agency. By deploying smart digital nudges, equitable incentive structures, and operational support, platforms can successfully mobilize frontline workers to drive sustainable, low-carbon last-mile ecosystems.

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