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Investigating the Intention to Adopt Green Logistic Services in Indonesia

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ABSTRACT: This study examines the determinants of intention to adopt green logistics services by applying the Theory of Planned Behavior (TPB) framework. The research investigates the roles of green logistics knowledge, environmental concern, public opinion, attitude, subjective norm, and perceived behavioral control in shaping adoption intention. A quantitative approach was employed using primary data collected through an online survey with purposive sampling. A total of 233 valid responses were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The measurement model assessment confirmed satisfactory reliability and validity. The structural model results reveal that green logistics knowledge and environmental concern significantly influence attitude, while public opinion significantly affects subjective norm. Furthermore, attitude, subjective norm, and perceived behavioral control positively and significantly influence intention to adopt green logistics services, with perceived behavioral control and attitude emerging as the strongest predictors. The model explains 58.9% of the variance in intention, indicating substantial explanatory power. The findings highlight the importance of enhancing environmental awareness, strengthening social endorsement, and improving enabling conditions to encourage sustainable logistics adoption. This study contributes to the growing literature on green logistics by extending the TPB framework to the logistics service context and providing practical implications for policymakers and industry practitioners.

KEYWORDS: Green logistics; Intention to adopt; Theory of Planned Behavior; Environmental concern; Perceived behavioral control

I. INTRODUCTION

Recently, the Government of Indonesia has strengthened its dedication to environmental sustainability by implementing low-carbon development strategies, setting emission reduction targets, and promoting policies that facilitate the transformation of green industries. The logistics sector, a major source of carbon emissions due to transportation and distribution activities, has emerged as a key area of focus for sustainability initiatives [1]. Green logistics is acknowledged worldwide as a crucial strategy for minimizing environmental impact while ensuring supply chain efficiency [2]. As a result, environmental factors are progressively integrated into logistics planning and operational decision-making.

In light of regulatory pressures and sustainability trends, various industries in Indonesia have initiated the adoption of green logistics practices, encompassing route optimization, energy-efficient transportation, sustainable packaging, and reverse logistics systems [3], [4], [5]. The initiatives seek to diminish carbon footprints and simultaneously improve corporate reputation and long-term competitiveness. Recent empirical studies demonstrate that firms adopting green logistics strategies can enhance both environmental and operational performance concurrently [6], [7]. These findings indicate that sustainability and profitability are not inherently contradictory but can be strategically integrated.

Despite the increasing scholarly focus on firm-level adoption, there is a notable scarcity of research addressing the demand-side perspective, especially in emerging economies, especially in Indonesia. Green logistics necessitates market acceptance, as consumers significantly influence the adoption of environmentally friendly delivery options, green packaging, and sustainable distribution systems. Previous research on green consumption indicates that environmental awareness, perceived value, and social norms play a significant role in shaping intentions toward sustainable behavior [8]. However, these insights have not been adequately applied to the specific context of green logistics services.

Comprehending consumer readiness is crucial, as behavioral intention frequently acts as a significant predictor of actual adoption behavior [9]. Indonesia as one of the biggest potential markets for green logistic need to understand how their consumer adopts the green logistic services. Insufficient consumer support for green logistics initiatives may result in resistance

stemming from perceived increased costs, extended delivery times, or a lack of awareness regarding environmental advantages. Additionally, in emerging markets, contextual factors like price sensitivity and trust in environmental claims may further influence adoption intentions. Consequently, empirical research on consumer intention is essential to connect policy aspirations with practical execution.

This study aims to investigate consumers' intentions to adopt green logistics by identifying the primary psychological and contextual factors that influence their willingness to support environmentally friendly logistics services in Indonesia using Theory of Planned Behavior model. This research integrates environmental sustainability discourse with behavioral intention theory to enhance understanding of sustainable supply chain management. It aims to offer practical implications for policymakers and industry practitioners to encourage wider societal engagement in the transformation of green logistics.

II. LITERATURE REVIEW

A. Green Logistic

Green logistics involves incorporating environmental factors into logistics and supply chain management processes, such as transportation, warehousing, packaging, distribution, and reverse logistics [10]. The aim is to reduce carbon emissions, energy use, and waste production while ensuring operational efficiency and service quality are maintained. The concept has transitioned from a traditional cost-focused logistics model to one centered on sustainability, highlighting eco-efficiency, life-cycle assessment, modal shifts to lower-emission transportation, green packaging, and closed-loop supply chains [1]. Empirical studies indicate that the implementation of green logistics practices, including route optimization, intermodal transport, and alternative fuel usage, enhances both environmental performance and long-term competitive advantage, as well as corporate reputation [1], [11], [12]. Additionally, increasing regulatory pressures and stakeholder expectations have prompted firms to integrate sustainability metrics into logistics decision-making processes, aligning economic, environmental, and social objectives within a triple bottom line framework.

B. Intention to Adopt Green Logistic

The intention to adopt green logistics indicates an individual's planned plan or readiness to support and utilize environmentally sustainable logistics services, including low-emission delivery methods, eco-friendly packaging, and reverse logistics systems [13], [14], [15]. In behavioral research, intention is acknowledged as a key predictor of actual behavior, especially within the Theory of Planned Behavior framework. This theory asserts that attitudes, subjective norms, and perceived behavioral control collectively shape behavioral intention [9]. Recent studies on sustainability apply this theoretical framework to the adoption of green services, showing that positive environmental attitudes, perceived consumer effectiveness, and trust in green claims significantly increase individuals' intentions to make environmentally responsible logistics choices [16]. From this viewpoint, intention serves as a cognitive precursor that converts environmental awareness into favorable consumption choices.

In the context of green logistics, the intention to adopt is influenced by perceived value trade-offs, encompassing cost, convenience, delivery speed, and environmental benefits. Recent empirical studies indicate that consumers exhibit a greater propensity to adopt sustainable delivery services when they recognize a significant reduction in environmental impact and when green alternatives do not significantly detract from service quality [17], [18]. In emerging economies, price sensitivity, limited environmental literacy, and skepticism regarding corporate sustainability claims may influence this intention. Examining the intention to adopt green logistics is essential for understanding market readiness and identifying behavioral drivers that support the broader implementation of sustainable supply chain practices.

III. HYPOTHESES DEVELOPMENT

Knowledge is widely recognized as a critical cognitive antecedent in shaping pro-environmental attitude and behavioral intention. Multiple research investigations indicate that consumer knowledge positively affects the intention to adopt green products [19]. Previous study proved that knowledge and environmental awareness significantly influence intention to adopt environmentally technologies, serving as mediating variables between environmental factors and behavioural outcomes [3]. In the context of green logistics, green logistics knowledge refers to an individual’s understanding of environmentally friendly transportation systems, carbon emission reduction strategies, reverse logistics, eco-efficient packaging, and sustainable distribution practices. Therefore, greater green logistics knowledge is expected to positively influence attitudes toward adopting green logistics.

H1: Green logistics knowledge has a positive effect on attitude toward adopting green logistics.

Environmental concern reflects the degree to which individuals are aware of environmental problems and support effort to solve them. Prior study found that environmental concern significantly influences purchase intention of green products. It

highlights its role as a motivational driver of pro-environmental behavior [19], [20]. From an attitudinal perspective, environmental concern shape value-based evaluations, which subsequently influence behavioral attitudes. Individuals with higher environmental concern tend to perceive sustainable practices as morally desirable and socially responsible. In the green logistics context, individuals who are highly concerned about environmental are more likely to develop favorable attitudes toward sustainable logistics systems.

H2: Environmental concern has a positive effect on attitude toward adopting green logistics.

Public opinion plays a critical role in shaping subjective norms [19]. Subjective norms are influenced by the expectations of salient referent groups such as peers, regulators, industry stakeholders, and society at large [9]. Empirical evidence indicates that public opinion significantly affects behavioral intention toward environmentally friendly technologies, suggesting that favorable societal discourse strengthens perceived normative pressure. In the context of green logistics, public endorsement of environmental sustainability and low-carbon distribution practices increases the likelihood that individuals and organizational decision-makers will perceive expectations from significant others to support or adopt these initiatives.

H3: Public opinion has a positive effect on subjective norm towards adopting green logistics.

Attitude, subjective norm, and perceived behavioral control serve as key determinants of behavioral intention in the Theory of Planned Behavior framework [9]. Attitude represents an individual's assessment of green logistics, with positive beliefs about environmental advantages, efficiency, and corporate responsibility likely enhancing the intention to adopt such practices [3]. Subjective norm denotes the perceived social pressure from significant referent groups—such as customers, business partners, regulators, and society—to adopt environmentally responsible logistics practices; increased normative support is expected to positively influence adoption intention. Perceived behavioral control denotes the perceived ease or difficulty associated with the implementation of green logistics, encompassing access to resources, infrastructure, knowledge, and financial capability [19]. An elevated sense of control enhances confidence in the feasibility of adoption, thereby reinforcing intention.

H4: Attitude has a positive effect on intention towards adopting green logistics

H5: Subjective norm has a positive effect on intention towards adopting green logistics

H6: Perceived behavioral control has a positive effect on intention towards adopting green logistics

IV. RESEARCH METHODS

A quantitative research design was employed to systematically examine the proposed relationships among variables and to test the hypothesized model. Primary data were collected through an online survey using a purposive sampling technique, targeting respondents who were familiar with logistics services and environmental issues to ensure relevance to the research objectives. The measurement instrument was adapted from established prior studies, with the majority of questionnaire indicators derived from sources [19] and [3] to ensure content validity and construct reliability. The structured questionnaire consisted of 38 self-administered items, encompassing 5 items measuring green logistics knowledge and public opinion, and 6 items assessing environmental concern. In line with the Theory of Planned Behavior framework, attitude and intention to adopt green logistics were each measured using 6 items, while subjective norm and perceived behavioral control were measured using 5 items respectively. All items were evaluated using a six-point Likert scale ranging from strongly disagree to strongly agree, intentionally omitting a neutral midpoint to encourage more definitive responses. The online questionnaire was distributed via social media platforms, including WhatsApp, Instagram, X, and TikTok, over a four-month period from October 2025 to January 2026. A total of 233 valid responses were collected and deemed suitable for analysis. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), which is appropriate for predictive modeling and theory development, to assess both the measurement model and the structural relationships in examining consumers' intention to adopt green logistics services in accordance with the proposed framework [21] as depicted in Figure 1.

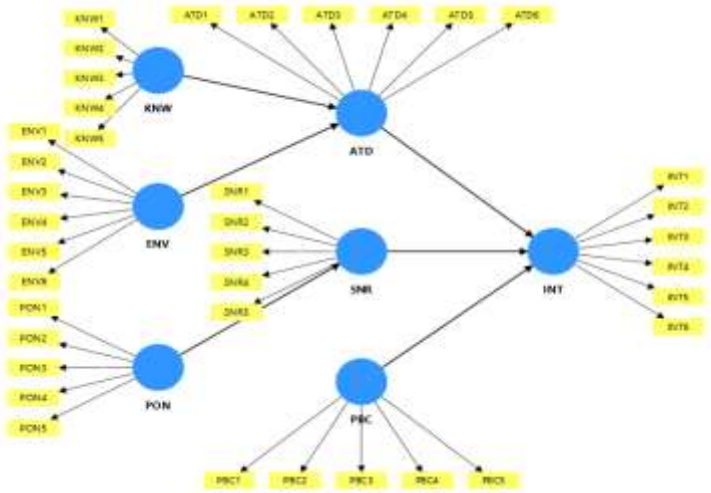


Figure 1 The Proposed Model

V. RESULTS AND DISCUSSION

The demographic data of the 233 respondents (Table 1) indicates that 59% were female (137 respondents) and 41% were male (96 respondents). The sample predominantly consists of young adults, with 76% aged 21–30 years, followed by 12% aged 31–40 years, 9% aged 18–20 years, and 4% aged over 40 years. Respondents were distributed throughout the Greater Jakarta area, with Jakarta and Depok each representing 25%, followed by Bogor at 22%, Bekasi at 16%, and Tangerang at 11%. The majority of respondents were employees (40%), followed by entrepreneurs (23%) and students (20%). Civil servants constituted 9%, others accounted for 6%, and housewives represented 2% of the sample. The frequency of logistics service usage reveals that 41% of respondents utilize these services frequently (3–5 times per month), 32% do so occasionally (1–2 times per month), 17% very often (>5 times per month), and 10% rarely (once every few months). This data indicates that a significant majority of respondents are active users of logistics services, thereby offering pertinent insights into the intention to adopt green logistics practices.

Table 1. Demographic Profile

Demographic Profile		**Total**	**Percentage**
Gender	Male	96	41%
	Female	137	59%
Age Range	18-20	21	9%
	21-30	176	76%
	31-40	27	12%
	>40	9	4%
Domicile	Jakarta	59	25%
	Bogor	51	22%
	Depok	59	25%
	Bekasi	38	16%
	Tangerang	26	11%
Occupation	Student	47	20%
	Employee	93	40%
	Civil Servant	20	9%
	Housewife	4	2%
	Entrepreneur	54	23%
	Others	15	6%
Frequency of using Logistic Services	Rarely (once every few months)	24	10%
	Occasionally (1-2 times per month)	74	32%
	Frequently (3-5 times per month)	95	41%
	Very Often (>5 times per month)	40	17%

The first assessment in PLS-SEM was outer model test. This test aims to check the reliability and validity of each construct on the proposed model. The minimum score of outer loading is 0.6, while cronbach's alpha and composite reliability are 0.7 [21]. Due to the outer loading value of two indicators of environmental concern (ENV1 and ENV6) were below of 0.6 and one indicator of public opinion (PON5) was under 0.6, those indicators were dropped from the analysis to maintain the consistency of each construct. Based on Table 2, the reliability of indicators is deemed acceptable, as the majority of outer loadings surpass the recommended threshold of 0.70. Several indicators, such as ENV2, ENV5, and PBC3, fall slightly below 0.70 but remain above 0.60, justifying their retention due to the overall adequacy of construct reliability. Internal consistency reliability is established through Cronbach's Alpha and Composite Reliability values, all surpassing the minimum threshold of 0.70. The values are as follows: Green Logistics Knowledge (α = 0.879; CR = 0.912), Environmental Concern (α = 0.700; CR = 0.812), Public Opinion (α = 0.717; CR = 0.826), Attitude (α = 0.825; CR = 0.872), Subjective Norm (α = 0.818; CR = 0.873), Perceived Behavioral Control (α = 0.773; CR = 0.846), and Intention (α = 0.860; CR = 0.896), indicating strong internal consistency across all measures. Additionally, convergent validity is confirmed as all Average Variance Extracted (AVE) values surpass 0.50, with a range from 0.521 to 0.674, demonstrating that each construct accounts for more than half of the variance of its indicators. The measurement model adheres to Hair's PLS-SEM standards, thereby confirming the reliability and validity of the constructs for further structural model analysis.

Table 2. Outer Model Test Results

Variable	Indicators	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Green Logistic Knowledge (KNW)	KNW1	0.824	0.879	0.912	0.674
	KNW2	0.875			
	KNW3	0.796			
	KNW4	0.833			
	KNW5	0.774			
Environmental Concern (ENV)	ENV2	0.766	0.700	0.812	0.521
	ENV3	0.640			
	ENV4	0.818			
	ENV5	0.648			
Public Opinion (PON)	PON1	0.674	0.717	0.826	0.543
	PON2	0.701			
	PON3	0.821			
	PON4	0.745			
Attitude (ATD)	ATD1	0.734	0.825	0.872	0.533
	ATD2	0.721			
	ATD3	0.719			
	ATD4	0.796			
	ATD5	0.707			
	ATD6	0.700			
Subjective Norm (SNR)	SNR1	0.833	0.818	0.873	0.580
	SNR2	0.718			
	SNR3	0.779			
	SNR4	0.750			
	SNR5	0.721			
Perceived Behavioral Control (PBC)	PBC1	0.762	0.773	0.846	0.523
	PBC2	0.762			
	PBC3	0.665			
	PBC4	0.706			
	PBC5	0.719			
Intention (INT)	INT1	0.849	0.860	0.896	0.590
	INT2	0.691			

	INT3	0.804			
	INT4	0.761			
	INT5	0.739			
	INT6	0.757			

The assessment of discriminant validity via the Fornell–Larcker criterion demonstrates that all constructs meet the established threshold requirements [21]. Based on Table 3, Attitude (0.730), Environmental Concern (0.722), Intention (0.768), Green Logistics Knowledge (0.821), Perceived Behavioral Control (0.737), Public Opinion (0.737), and Subjective Norm (0.761) possess diagonal values that surpass their respective inter-construct correlations. For instance, the correlation of Green Logistics Knowledge (0.821) surpasses that of Attitude (0.696), Intention (0.635), and other variables. Additionally, Intention (0.768) is greater than its highest correlation with Perceived Behavioral Control (0.718) and Attitude (0.715). The findings demonstrate that each construct exhibits greater variance with its respective indicators than with other constructs, thereby confirming adequate discriminant validity and reinforcing the distinctiveness of the latent variables in the structural model.

Table 3. Fornell Lacker Test Results

	ATD	**ENV**	**INT**	**KNW**	**PBC**	**PON**	**SNR**
ATD	0.730						
ENV	0.597	0.722					
INT	0.715	0.584	0.768				
KNW	0.696	0.519	0.635	0.821			
PBC	0.723	0.461	0.718	0.636	0.737		
PON	0.669	0.556	0.596	0.581	0.516	0.737	
SNR	0.744	0.443	0.678	0.564	0.739	0.576	0.761

The inner model evaluation was conducted to examine the structural relationships among the latent variables in the proposed model. As presented in Table 4, all hypothesized paths are statistically significant and supported. Green Logistics Knowledge has a significant positive effect on Attitude ($\beta = 0.528$, $t = 6.884$, $p < 0.001$), while Environmental Concern also positively influences Attitude ($\beta = 0.323$, $t = 3.842$, $p < 0.001$). Public Opinion significantly affects Subjective Norm ($\beta = 0.576$, $t = 11.722$, $p < 0.001$). Furthermore, Attitude ($\beta = 0.328$, $t = 3.970$, $p < 0.001$), Subjective Norm ($\beta = 0.180$, $t = 2.449$, $p = 0.014$), and Perceived Behavioral Control ($\beta = 0.343$, $t = 4.557$, $p < 0.001$) all demonstrate significant positive effects on Intention to adopt green logistics services. Since all t-statistics exceed the critical value of 1.96 and all p-values are below 0.05, H1 through H6 are accepted. Additionally, the R^2 value for Intention is 0.589, indicating that 58.9% of the variance in intention to adopt green logistics services is explained by Attitude, Subjective Norm, and Perceived Behavioral Control. According to PLS-SEM guidelines, this R^2 value can be considered moderate to substantial, suggesting that the model has strong explanatory power in predicting consumers' intention to adopt green logistics services.

Table 4. Hypotheses Test Results

Hypotheses	**Original Samples**	**T-Statistic**	**P-Values**	**Decisions**
H1: KNW → ATD	0.528	6.884	0.000	Accepted
H2: ENV → ATD	0.323	3.842	0.000	Accepted
H3: PON → SNR	0.576	11.722	0.000	Accepted
H4: ATD → INT	0.328	3.970	0.000	Accepted
H5: SNR → INT	0.180	2.449	0.014	Accepted
H6: PBC → INT	0.343	4.557	0.000	Accepted

The findings demonstrate that Green Logistics Knowledge and Environmental Concern significantly influence Attitude toward adopting green logistics, indicating that cognitive understanding and ecological values are critical precursors to favorable evaluations. The strong effect of knowledge on attitude ($\beta = 0.528$) suggests that individuals who understand the environmental and operational benefits of green logistics are more likely to form positive perceptions toward its adoption. This result aligns with prior research on sustainable technology adoption, particularly studies on electric vehicle acceptance, which found that

environmental knowledge and awareness significantly shape pro-environmental attitudes and behavioral intention [19]. Similarly, the significant role of Environmental Concern supports earlier findings that ecological values and environmental responsibility positively drive sustainable consumption decisions [20]. Thus, the present study confirms that both cognitive (knowledge-based) and affective (concern-based) factors are foundational in shaping attitudes toward green logistics.

Furthermore, the results reveal that Public Opinion significantly affects Subjective Norm (β = 0.576), highlighting the importance of social influence in the adoption process. This finding is consistent with the Theory of Planned Behavior, which posits that perceived social pressure influences behavioral intention through subjective norms. Prior studies on sustainable transportation adoption also emphasize that public opinion, social endorsement, and normative expectations significantly shape individuals' perceived social obligations to adopt environmentally friendly innovations [19]. The strong path coefficient observed in this study suggests that green logistics adoption is not merely an individual decision but is embedded within a broader social and institutional context, where societal discourse and collective environmental awareness reinforce normative beliefs.

Finally, the structural model indicates that Attitude, Subjective Norm, and Perceived Behavioral Control significantly influence Intention to adopt green logistics, with Perceived Behavioral Control (β = 0.343) and Attitude (β = 0.328) demonstrating stronger effects than Subjective Norm (β = 0.180). These findings are consistent with numerous empirical applications of the Theory of Planned Behavior, where attitude and perceived behavioral control often emerge as dominant predictors of intention. The relatively weaker effect of subjective norm suggests that while social influence matters, personal evaluation and perceived feasibility play more decisive roles in forming adoption intention. This pattern is comparable to previous studies on electric vehicle adoption, which reported that perceived control factors—such as resource availability and infrastructure readiness—substantially strengthen intention [3], [19]. Overall, the results reinforce the robustness of the TPB framework in explaining green logistics adoption and extend prior literature by confirming its applicability within the logistics service context.

CONCLUSIONS

This study confirms the applicability of the Theory of Planned Behavior in explaining intention to adopt green logistics services. The findings indicate that Green Logistics Knowledge and Environmental Concern significantly shape Attitude, while Public Opinion significantly influences Subjective Norm. Furthermore, Attitude, Subjective Norm, and Perceived Behavioral Control all positively affect Intention to adopt green logistics, with Perceived Behavioral Control and Attitude emerging as the strongest predictors. The model demonstrates substantial explanatory power (R^2 = 0.589), indicating that behavioral intention toward green logistics is largely determined by cognitive understanding, environmental values, social influence, and perceived feasibility. These results highlight the importance of strengthening public knowledge, environmental awareness, and enabling conditions to accelerate the adoption of sustainable logistics practices.

This study has several limitations, despite its contributions. The application of purposive sampling and focus on the Greater Jakarta area may restrict the generalizability of the findings to wider populations or alternative regional contexts. The cross-sectional design limits the capacity to infer causal relationships across temporal dimensions. The study primarily examines psychological determinants within the TPB framework, excluding external factors such as economic incentives, regulatory mechanisms, or technological infrastructure. Future research should utilize probability sampling methods and broaden the geographical scope to improve representativeness. Longitudinal studies are recommended to investigate changes in intention and actual adoption behavior over time. Furthermore, incorporating additional theoretical frameworks—such as innovation diffusion theory or institutional theory—and considering moderating variables (e.g., price sensitivity, environmental literacy, or government support) could enhance the understanding of green logistics adoption.

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