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Artificial intelligence and decision-making in an international freight forwarding agency

Inteligencia artificial y toma de decisiones en una agencia de carga internacional

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Abstract

The purpose of this study is to evaluate the relationship between artificial intelligence (AI) and decision-making in an international freight forwarding agency. The method used was quantitative, correlational-causal, non-experimental, cross-sectional, and applied. The population and sample consisted of 76 key employees of the freight forwarding agency in Lima, Peru. A non-probability convenience census sampling method was employed. Two instruments with 16 items each were used, validated by three experts, with Cronbach's Alpha reliability indices of 0.877 and 0.985 respectively. Descriptive analysis results revealed a predominant perception of the intermediate level regarding AI (63.16%) and decision-making (65.79%). Inferential analysis showed a strong and significant correlation between both variables (Spearman's Rho = 0.693, $p < 0.005$), rejecting the null hypothesis. It is concluded that AI is significantly related to decision-making, validating its strategic role in business management within the logistics sector.

Keywords: artificial intelligence, decision making, automation

Resumen

El propósito del estudio es evaluar la relación entre la inteligencia artificial (IA) y la toma de decisiones en una agencia de carga internacional. El método empleado fue cuantitativo, correlacional causal, no experimental de corte transversal y tipo aplicado. La población y muestra fueron 76 trabajadores clave de la agencia de carga en Lima, Perú. Se empleó un muestreo censal no probabilístico por conveniencia. Se utilizaron dos instrumentos de 16 ítems cada uno, validados por tres expertos, con índices de fiabilidad Alfa de Cronbach de 0.877 y 0.985 respectivamente. Los resultados del análisis descriptivo evidenciaron una percepción predominante del nivel medio respecto a la IA (63.16%) y la toma de decisiones (65.79%). El análisis inferencial mostró una correlación fuerte y significativa entre ambas variables (Rho de Spearman = 0.693, $p < 0.005$), rechazando la hipótesis nula. Se concluye que la IA se relaciona significativamente con la toma de decisiones, validando su rol estratégico en la gestión empresarial del sector logístico.

Palabras clave: inteligencia artificial, toma de decisiones, automatización

Introduction

Artificial intelligence (AI) is reshaping numerous industries, logistics among them. Available applications focus primarily on route optimization, refined cost estimation, demand forecasting, and warehouse inventory management. Yet experience suggests that adopting AI within an international freight forwarding agency must extend beyond implementing these increasingly fragmented tasks. The real challenge lies in embedding AI responsibly throughout the chain of command so that decision-makers, armed with more precise and systematically organized data, can perform their work more efficiently and effectively.

Koliousis et al. (2024) contend that AI has become a cornerstone of transformation in logistics and business operations. The technology plays a vital role in decision-making by generating algorithms that enhance online operational efficiency, analyze loading and distribution procedures, and facilitate predictions about the most dynamic logistics sectors. According to Jaime (2025), logistics firms and cargo service providers stand to reap considerable benefits from AI implementation, including streamlined operational processes, improved traceability, and stronger information management regarding products and clients.

However, as Caldera (2025) points out, adoption of these technologies exhibits marked global disparities, with the United States and China maintaining clear advantages in implementation, innovation, and investment, leaving other nations struggling to harness AI's decision-making potential. This uneven technological infrastructure and investment gap, as Matoni et al. (2025) observe, constrains the ability of firms in developing countries to compete and adapt to an increasingly dynamic business environment.

Vanegas et al. (2020) note that within international logistics and freight forwarding, applying AI through process automation and predictive algorithms proves crucial for optimizing complex supply chains, reducing operational errors, and managing large data volumes with precision. Currently, AI adoption has become the benchmark for securing a decisive competitive edge in saturated markets (Aladro Vico, 2011), underscoring its relevance not merely as an operational efficiency tool but as a strategic driver that directly affects the quality, speed, and reliability of managerial decisions.

Despite AI's global significance, its implementation in developing economies such as those in Latin America has progressed more slowly and unevenly, characterized by a technological divide and a persistent reliance on traditional or partially integrated management systems (Thomas et al., 2025). In the Peruvian context, and specifically within the international freight forwarding sector, decision-making is frequently hindered by unreliable real-time data, high uncertainty in demand forecasting, and limited capacity to generate dynamic strategies (Wenting et al., 2024).

This situation poses a critical challenge to the competitiveness of local firms, which must modernize their processes to align with global efficiency standards, making it imperative to assess the extent to which AI is genuinely affecting decision-making structures within these organizations.

AI integration in Peruvian companies remains considerably low compared to other countries in the region, placing Peru 61st worldwide in the Global AI Index (Vanegas et al., 2020). Specifically, among freight forwarders based in Lima, the core problem lies in deficient technological integration and heavy reliance on traditional systems such as spreadsheets and ERP platforms for decision-making processes. This lack of modernization diminishes firms' competitiveness and hampers their capacity to respond to shifts in the business environment (Ibañez et al., 2022). The present study therefore finds its justification in seeking to validate, from a positivist perspective, how implementing intelligent systems can optimize data reliability, reduce uncertainty, and improve organizational strategy within the sector.

Belhadi et al. (2024), for instance, concluded that AI adoption in supply chains results in shorter delivery lead times and greater accuracy in demand projections. Similarly, studies on global supply networks indicate that AI strengthens resilience and performance by enhancing information-processing capabilities. Palomino et al. (2023) suggest that applying AI within a freight forwarding agency enables pattern identification and scenario anticipation.

This, in turn, facilitates more timely planning and more effective decisions that mitigate the effects of external factors such as market fluctuations or economic disruptions. Algorithms can predict patterns to improve route planning and anticipate potential transportation issues, thereby reinforcing organizational resilience.

This research addresses an empirical gap concerning the quantification of the relationship between AI and the strategic dimensions of decision-making in the Peruvian logistics sector, an area with scarce applied literature and a pronounced need for modernization. The study carries strong practical relevance, as it aims to equip freight agency managers with robust evidence on how intelligent systems can enhance information quality, reduce uncertainty, and drive continuous improvement and organizational strategy.

The primary objective, accordingly, is to determine the significant relationship between artificial intelligence and decision-making in a freight forwarding agency. Secondary objectives include analyzing the relationship of AI

with information quality, uncertainty reduction, continuous improvement, and international strategy. The main hypothesis posits that a significant relationship exists between artificial intelligence and decision-making in the agency under study.

Methodology

This research adopted a quantitative, applied approach, seeking to establish the link between artificial intelligence and decision-making within the real-world context of a freight forwarding agency. The research design was non-experimental and cross-sectional: the variables were observed in their natural environment without intentional manipulation, and data were collected at a single point in time.

The scope was correlational, oriented toward determining the relationship between AI and decision-making. The population and sample consisted of all 76 employees of the freight forwarding agency in Lima, selected because they occupy key roles in the decision-making process. A non-probability convenience census sampling strategy was employed, applying inclusion criteria such as a minimum of six months' experience and relevant job functions.

A survey served as the data collection technique, and the instrument was a Likert-type questionnaire with 16 items for each variable (AI and decision-making), scored on a 1-to-5 scale. The AI variable was assessed across four dimensions (process automation, predictive algorithms, resource optimization, and cybersecurity), while decision-making was evaluated across four corresponding dimensions (information quality, uncertainty reduction, continuous improvement, and organizational strategy).

Instrument validity was ensured through evaluation by three experts: Silvia Salazar Llerena, Fernando E. Escudero Vílchez, and Miguel Ángel Rodríguez Pérez, who confirmed item relevance and coherence. Reliability was analyzed using Cronbach's alpha coefficient, yielding values of 0.877 and 0.985, both of which are high and appropriate for polytomous scales. SPSS version 26 was used for data processing, with descriptive statistics employed to assess perceptions and inferential analysis to identify relationships between variables.

The study adhered to ethical principles of beneficence, non-maleficence, justice, and autonomy. Approval was obtained from the Research Ethics Committee of Universidad César Vallejo (Approval Code: CEI-UCV-2024-078). All participants were informed of the study's objectives and signed informed consent forms prior to participation, guaranteeing the confidentiality of their responses and anonymity in data processing. Collected data were used exclusively for academic and research purposes.

Results

The descriptive and inferential findings are presented below.

Table 1

Frequency of perceptions of the artificial intelligence variable

Level	Frequency	Percentage
Low	20	26.32%
Medium	48	63.16%
High	8	10.53%
Total	76	100.00%

Note. Descriptive results. Sample of 76 employees. SPSS version 26.

Table 1 shows a predominant intermediate-level perception of artificial intelligence, with 63.16% (48 employees) reporting a medium level. A low level was perceived by 26.32%, while only 10.53% considered AI usage to be high. These data reflect a still-moderate adoption of this technology in organizational processes.

Table 2

Frequency of perceptions of the decision-making variable

Level	Frequency	Percentage
Low	13	17.11%
Medium	50	65.79%

Level	Frequency	Percentage
High	13	17.11%
Total	76	100.00%

Note. Descriptive results. Sample of 76 employees. SPSS version 26.

Table 2 illustrates perceptions of decision-making. The medium level stands out at 65.79% (50 employees), indicating a tendency toward functional but not highly optimized decisions. Low and high levels are evenly distributed at 17.11% each, pointing to opportunities for strengthening decision-making effectiveness.

Table 3

Frequencies of artificial intelligence dimensions

Dimension	Low (%)	Medium (%)	High (%)
Process Automation	22.37	65.79	11.84
Predictive Algorithms	25.00	61.84	13.16
Resource Optimization	28.95	59.21	11.84
Cybersecurity	30.26	57.89	11.85

Note. Descriptive results. Sample of 76 employees. SPSS version 26.

As Table 3 indicates, the medium level predominates across all AI dimensions, reflecting moderate technology implementation. Process automation and predictive algorithms show somewhat higher adoption, while cybersecurity and resource optimization present opportunities for improvement.

Table 4

Frequencies of decision-making dimensions

Dimension	Low (%)	Medium (%)	High (%)
Information Quality	17.11	63.16	19.74
Uncertainty Reduction	23.68	53.95	22.37
Continuous Improvement	17.11	67.79	17.11
Organizational Strategy	21.05	61.84	17.11

Note. Descriptive results. Sample of 76 employees. SPSS version 26.

Table 4 shows that the medium level prevails across all decision-making dimensions, exceeding 50% of responses in each. Continuous improvement reaches the highest percentage at 67.79%, followed by organizational strategy at 61.84%.

Table 5

Correlation between artificial intelligence and decision-making

Variable 1	Variable 2	Correlation Coefficient (Rho)	Sig. (Two-tailed)
Artificial Intelligence	Decision-Making	0.693**	0.000

Note. *Correlation is significant at the 0.01 level (two-tailed). N = 76. SPSS version 26.

Table 5 reveals a positive, strong, and statistically significant correlation between artificial intelligence and decision-making (Rho = 0.693; $p < 0.001$), which allows rejection of the null hypothesis and acceptance of the research hypothesis.

Table 6
Correlation between artificial intelligence and decision-making dimensions

Dimension	Correlation Coefficient (Rho)	Sig. (Two-tailed)
Information Quality	0.630**	0.000
Uncertainty Reduction	0.587**	0.000
Continuous Improvement	0.616**	0.000
Organizational Strategy	0.590**	0.000

Note. *Correlation is significant at the 0.01 level (two-tailed). N = 76. SPSS version 26.

The findings in Table 6 indicate that AI correlates positively and significantly with all decision-making dimensions. A strong correlation emerged with information quality (Rho = 0.630) and continuous improvement (Rho = 0.616), while moderate correlations were observed with uncertainty reduction (Rho = 0.587) and organizational strategy (Rho = 0.590).

Discussion

With respect to the primary objective, the results confirm the general hypothesis, revealing a positive, strong, and highly significant relationship between artificial intelligence and decision-making. This finding underscores that, within the international freight forwarding context, AI implementation is not merely a technological trend but a strategic imperative that directly influences the quality and effectiveness of managerial decisions. This aligns with Chen et al. (2023), who in their analysis of administrative development emphasize that AI is fundamental for executing tasks that improve operability, which indirectly connects to better decision-making processes.

Implementing AI systems allows organizations to shift from intuition to evidence-based practice. Furthermore, this result concurs with Vera and Pico (2024), who stress the need to integrate AI into decision-making problems within an ethical and functional framework. By producing precise and predictive data, AI reduces human error and bias in final choices. Finally, this research indirectly supports competitiveness concerns by demonstrating that AI bears a significant relationship with decision-making, thereby justifying the urgency of its adoption to mitigate technological dependence and close the efficiency gap with more advanced economies (Feng et al., 2024).

Concerning the specific objectives, the inferential results demonstrated that AI maintains a positive and significant relationship with each dimension of decision-making. The positive and significant correlation with information quality and uncertainty reduction validates AI's role as a driver of data reliability and precision. In the freight sector, where time and accuracy are critical, AI's capacity to process large data volumes is essential. This aligns with Vera and Pico (2024), who note that AI not only executes tasks but also alleviates the burden of operational processes by progressively refining their performance. An improved operation is inevitably built on high-quality data.

Regarding uncertainty reduction, this finding is reinforced when considering the global context and technological gaps. White and Cesareo (2024) document that leading global AI powers (the U.S. and China) hold clear advantages in implementation and investment. The present study implies that by applying AI, the Lima-based freight agency can begin to mitigate the uncertainty inherent in global markets, using predictive algorithms to anticipate scenarios, a capability once exclusive to market leaders.

The positive and significant relationship between AI, continuous improvement, and organizational strategy demonstrates that AI's benefits transcend mere operations and extend into long-term planning. AI fosters continuous improvement by providing constant, automated insights into performance. This point is supported by Quispe et al. (2025), who define continuous improvement as a repetitive cycle wherein organizations learn from their experiences and refine their resource use, driving sustainable growth. AI operates as the engine of this cycle.

Despite the robustness of the correlational findings, this study has certain limitations that warrant consideration. First, the research adopted a non-experimental, cross-sectional design, meaning data were collected at a single point in time. Although a positive and significant correlation was established, this design does not allow for causal inferences or for tracking the temporal evolution of the interaction between AI and decision-making. Second, and crucially, the population and sample were limited to 76 key employees from a single international freight forwarding agency in Lima, using non-probability convenience sampling. Consequently, the

results are not directly generalizable to the entire Peruvian logistics sector nor to other organizations with different structures, sizes, or technological adoption cultures.

Conclusions

The study concludes that a positive, strong, and highly significant relationship exists between artificial intelligence and decision-making in the international freight forwarding agency in Lima, supported by a Spearman correlation coefficient of Rho = 0.693 ($p < 0.005$). This correlation is consistent across dimensions, demonstrating a strong significant link with information quality (Rho = 0.630) and continuous improvement (Rho = 0.616), and a moderate link with uncertainty reduction (Rho = 0.587) and organizational strategy (Rho = 0.590).

This finding constitutes the study's central contribution, empirically validating that AI transcends simple automation to become a strategic catalyst for business management, enabling more effective, timely, and data-grounded decisions. The practical implications suggest that logistics-sector managers should prioritize investment in predictive algorithms and intelligent dashboard systems to capitalize on improved information quality, strengthen responsiveness to unforeseen scenarios, and ensure alignment of daily operations with long-term vision.

Finally, to expand upon existing knowledge, future research should explore causality through longitudinal studies and compare these results across different geographic contexts or considering moderating variables such as firm size and level of digital maturity.

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