

Psychometric and Predictive Analysis of Logistic Service Performance on Consumer Satisfaction Among Peruvian Adults

Análisis psicométrico y predictivo del desempeño del servicio logístico sobre la satisfacción del consumidor en adultos peruanos

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Abstract

This study analyzed the influence of logistic service performance on consumer satisfaction among Peruvian adults using natural gas installation services. A quantitative, correlational, and predictive design was applied with a non-probabilistic sample of 180 consumers. Two validated measurement instruments were used—a Logistic Service Performance Perception Scale and a Consumer Satisfaction Scale—showing high internal reliability ($\alpha = .87$ and $\alpha = .92$, respectively). Psychometric analyses using the WLSMV estimator demonstrated satisfactory factorial validity and model fit indices. Linear regression results revealed that logistic service performance perception explains 56.4% of the variance in consumer satisfaction ($R^2 = .564$, $p < .001$), confirming its significant predictive capacity. At the dimensional level, logistic costs ($\beta = .142$, $p = .038$), resource utilization ($\beta = .397$, $p < .001$), and service quality ($\beta = .315$, $p < .001$) showed positive effects, with efficient resource management emerging as the strongest predictor. These findings support the Expectation Confirmation Theory and emphasize that optimizing logistic processes enhances not only operational efficiency but also perceived value among customers. The study concludes that effective and consumer-oriented logistic management strengthens satisfaction and loyalty, contributing to greater competitiveness in the Peruvian business context.

Keywords: logistic performance, consumer satisfaction, service quality, customer perception, resource management.

Resumen

El estudio analizó la influencia del desempeño logístico sobre la satisfacción del consumidor en adultos peruanos usuarios del servicio de instalación de gas natural. Se desarrolló un diseño cuantitativo, correlacional y predictivo con una muestra de 180 consumidores seleccionados por conveniencia. Se aplicaron dos instrumentos validados —una escala de percepción del desempeño logístico y otra de satisfacción del consumidor— con adecuados índices de fiabilidad ($\alpha = .87$ y $\alpha = .92$, respectivamente). Los análisis psicométricos mediante el estimador WLSMV evidenciaron un ajuste satisfactorio de los modelos factoriales. Los resultados de regresión lineal mostraron que la percepción del desempeño logístico explica el 56.4% de la variabilidad en la satisfacción del consumidor ($R^2 = .564$, $p < .001$), confirmando su capacidad predictiva significativa. A nivel dimensional, los costos logísticos ($\beta = .142$, $p = .038$), la utilización de recursos ($\beta = .397$, $p < .001$) y la calidad del servicio ($\beta = .315$, $p < .001$) demostraron efectos positivos, siendo la eficiencia en la gestión de recursos el factor más determinante. Estos hallazgos respaldan la Teoría de la Confirmación de Expectativas y destacan la importancia de optimizar los procesos logísticos, no solo desde la eficiencia operativa, sino desde la percepción de valor generada en el cliente. Se concluye que una gestión logística efectiva fortalece la satisfacción y fidelización del consumidor, consolidando la competitividad empresarial en el contexto peruano.

Palabras clave: desempeño logístico, satisfacción del consumidor, calidad del servicio, percepción del cliente, gestión de recursos.

INTRODUCTION

The business environment is constantly changing, driven by shifts in how consumers shop and interact with brands, as well as by digitalization, greater customer decision-making power, and the speed at which information circulates in digital media (Rasmus, 2023). Modern technologies have profoundly changed how people make purchasing decisions, so understanding their motivations and habits has become essential for marketers, directly impacting end-consumer satisfaction (Sambamoorthy et al., 2025).

The company's operations become more relevant in terms of logistics performance (LP) when technological investment is complemented by certified and trained personnel. This helps to streamline the provision of timely service (Bimboza et al., 2023). Technological advancement and the development of skills in processes are associated with variations in business performance and productivity (Sánchez and Reina, 2024). In this context, strategic cost management is proposed as a tool for adjusting expenditure levels, influencing service quality, modifying logistical efficiency, and redefining competitive position in the market, adapting to consumer needs (Camargo and Mosquera, 2021; Zapateiro-Altamiranda, 2020).

In this context, logistics becomes a key component for companies to maintain their competitiveness and ensure the smooth running of their operations. Having the right technological tools, constantly training staff, and managing security-related risks are necessary and fundamental processes (Ari et al., 2023; Arvis et al., 2023). The incorporation of technology not only improves logistics performance, but also transforms the way customers perceive and relate to the company (Rizzo, 2025). Likewise, by emphasizing service quality, distribution strategies are adapted to better meet the needs and expectations of customers (Pramudita and Guslan, 2025).

With constant specialization and logistics digitization, a deep understanding of consumer behavior is essential to adapt services to their expectations. Customer analysis allows us to identify demand patterns, levels of demand, and service evaluation criteria, which are expressed in specific needs and increasingly personalized expectations (Papanicolau et al.,

2022). Therefore, the design of customer service strategies and service plans must incorporate the value perceived by the consumer, anticipate their purchasing decisions, and continuously evaluate the adequacy of the service offered in relation to their actual expectations (Cavero et al., 2024). As demands and competition increase, it becomes essential to review the quality of care and adjust purchasing processes to strengthen customer perception and consolidate their loyalty behavior (Sagbay-Llivichuzhca et al., 2020).

That is why consumers' reaction to their shopping experience manifests itself in loyal behavior. In addition, the company is perceived as a capable organization that offers a service aligned with their expectations and needs within their processes and consumer demands (Ordoñez et al., 2023). The response of the business organization to relevant service is associated with factors such as quality, competence, and the ability to understand consumer requirements and expectations (Moreno, 2020). There is no doubt that in a highly specialized context, continuously updating processes contributes significantly to consumer loyalty. Therefore, there is a need for regular information about their experience in order to guide innovation and adjustment processes within the logistics service (Badajoz et al., 2023). In this sense, digital technology is used to collect data that allows service plans to be redefined according to consumer characteristics and needs (Santa Cruz et al., 2020).

Logistics management encompasses much more than the timely delivery of products; it involves efficiently coordinating the flow of goods, managing inventory, transportation, and warehousing, and ensuring that orders arrive at the right time and place to meet customer expectations (Ballou, 2004; Rushton et al., 2014). According to Mentzer (2001), logistics cost management is a key aspect, as it includes expenses related to activities such as warehousing, handling, and distribution, both operational and service-related, and linked to the quality and reliability of deliveries. Therefore, achieving a balance between efficiency, response times, service quality, and cost control not only improves resource utilization but also strengthens a company's competitiveness and adaptability in increasingly dynamic markets (Chopra and Meindl, 2016; Christopher, 2011).

Given this, it is essential to take advantage of the resources available in logistics processes,

which involves effectively managing the human, material, and technological resources available to maximize operational performance (Chase and Jacobs, 2014). Proper management of these resources is essential to ensure operational efficiency and productivity throughout the chain. This helps to reduce costs and improve logistics performance (Chopra and Meindl, 2013). It is also important to manage existing resources appropriately to ensure constant integration between the various figures involved in the supply chain, facilitating a quick and effective solution to any form of disruption or challenge within the service process (Lambert et al., 2001).

When referring to the quality of logistics services, we are referring to the company's desire to satisfy and meet consumer needs. This is achieved through various factors such as on-time delivery, product availability, and efficient customer service (Ballou, 2004). This quality is directly linked to the reliability of the logistics system, allowing for a timely response to variations in demand or unexpected events (Bowersox et al., 2007). In a highly competitive business environment, the quality-of-service provision is a fundamental part of competitiveness (Lambert et al., 2001).

Consistent with this, the level of consumer satisfaction (CS) reflects the degree to which the service received meets or exceeds their expectations, directly influencing their loyalty and positive assessment of the company. When users are satisfied with a service or product, they are sure to repeat the purchase and also recommend it, which is favorable for any company, as these are fundamental expectations (Kotler and Keller, 2012; Fernández and Bajac, 2010; Martínez-Tur et al., 2001; Rogers, 1981; Craven, 2003). These expectations serve as a point of reference that directly impacts consumer satisfaction, their intention to repurchase, and their loyalty to the brand. For this reason, organizations must manage them strategically, striving not only to meet them but also to exceed them, by studying consumer preferences (Kotler and Keller, 2012; Zeithaml, 2013; Fernández and Bajac, 2010). For this reason, maintaining a proactive approach to managing expectations is key to ensuring quality standards in line with a constantly changing market (Martínez-Tur et al., 2001). Every company seeks customer loyalty and constant purchasing intent based on trust, good experiences, and consistently positive evaluations of the service

received (Dick and Basu, 1994; Churchill and Halpern, 2001; Kotler and Keller, 2012). This loyalty not only results in repeat purchases, but also in recommendations of the brand and resistance to offers from other competitors. This reinforces the user's commitment and loyalty to the company.

The purpose of this study is to examine how the LD (Local Development) influences the SC (Supply Chain), considering the perceptions of Peruvian workers directly involved in the process. It seeks to identify how factors such as logistical costs, resource efficiency, and service quality affect users' evaluation of the service received. To this end, information was gathered from customers who have used the natural gas installation service, giving the analysis a practical and evidence-based approach. This approach allows us to observe how well-organized logistics management not only improves the efficiency of internal processes, but also impacts the consumer experience, ensuring on-time deliveries, adequate customer service, and fulfillment of expectations. To understand this phenomenon, it is necessary to be familiar with the Expectancy Confirmation Theory proposed by Oliver (1980), which is very useful for understanding how LD impacts SC. According to this theory, consumers come to the service with certain expectations, formed from previous experiences or from the information provided by the company, such as delivery times, product condition, or quality of service. Once they have received the service, they compare what they experienced with what they expected, generating positive confirmation if the result exceeds their expectations, or negative confirmation if these are not met (Shukla et al., 2025; Oliver, 1980). In the logistics context, this means that consumer satisfaction does not depend solely on the efficiency of processes, but also on the subjective perception they have when comparing what they received with what they expected. A reliable and well-executed service reinforces the perception of value and generates positive experiences, while delays, errors, or communication failures can lead to dissatisfaction and affect customer loyalty (Shukla et al., 2025). Previous studies are presented in a similar manner: Uvet (2020) analyzed the influence of logistics service quality on SC, highlighting the need to generate value in services to sustain business competitiveness. The results showed that these factors have a positive impact on SC, identifying the exchange of operational information as a determining

factor within the framework of logistics service quality. Gizaw et al. (2021) examined the influence of logistics service performance on SC in the public pharmaceutical system in Ethiopia. The results showed that robust and reliable logistics management contributes to higher SC. Lin et al. (2023) conducted in China showed that logistics service quality directly impacts SC and willingness to reuse the service. The study highlighted that aspects such as operational efficiency, clarity and accuracy of information, appropriate use of resources, and personalized service strengthen consumer perception. Finally, the overall purpose of the study is to determine the influence of LD on SC in an organization dedicated to the distribution and installation of natural gas. In line with this, the following hypothesis is proposed: The perception of logistics service performance has predictive power over consumer satisfaction among Peruvian adults.

METHOD

Type and design

This study adopted a quantitative approach and is basically descriptive at the second level, aimed at testing the hypothesis through data analysis and interpretation (Ñaupas et al., 2018). The study had a predictive correlational scope, analyzing the relationship of variables without modifying them (Baena, 2017). The hypothetical-deductive method was used, formulating and validating hypotheses with empirical reasoning (Hernández-Sampieri and Mendoza, 2018).

Sample

Data was collected through a survey of consumers who have natural gas service (Medina et al., 2023). The non-probability convenience sample consisted of 180 consumers (Baena, 2017).

Instruments

Instruments were constructed for each variable, each of which has three dimensions. The first is a *scale measuring perceptions of logistics performance*, which includes the dimensions of logistics costs, resource utilization, and service quality. The second is a *scale measuring consumer satisfaction*, which includes expectations, perceived performance, and loyalty. A five-point Likert scale was used to measure the items: 1 (Strongly disagree), 2 (Disagree), 3 (Neither

agree nor disagree), 4 (Agree), and 5 (Strongly agree). The questionnaire was then validated by experts, ensuring the reliability and validity of the instrument. Statistical reliability was calculated using Cronbach's alpha, resulting in a Scale on the perception of logistics performance ($\alpha = 0.87$) and a Scale on consumer satisfaction ($\alpha = 0.92$) for both questionnaires with an optimal level of reliability. Consumers with natural gas installed were surveyed, and those without natural gas installed in their homes were excluded.

Data analysis

SPSS V. 25 statistics was used for descriptive and inferential data analysis. Data analysis was performed using a quantitative and inferential approach in order to test the hypotheses and determine the predictive capacity of the variables included in the theoretical model. First, the database was cleaned up, eliminating atypical values and cases with more than 5% of missing data, applying the mean imputation method when the absence of values was random.

Prior to inferential analyses, an evaluation of the psychometric properties of the measurement instruments was performed using confirmatory factor analysis (CFA), employing the WLSMV estimator, which is suitable for ordinal constructs, as it does not assume multivariate normality and provides robust estimates of parameters and standard errors. In addition, this estimator improves accuracy in confirmatory factor models with moderate sample sizes and non-normal distributions. The results showed satisfactory fit indices for both scales, supporting the construct validity of the measures used.

In order to verify the associations between the constructs, Pearson correlation analyses and simple and multiple linear regressions were performed, evaluating the overall significance of the model using the F test and the contribution of each predictor using standardized α coefficients, their standard errors, t values, and significance levels (p). The 95% confidence intervals and coefficients of determination (R^2 and adjusted R^2) were also reported to estimate the proportion of variance explained.

Frequencies and percentages were also used to describe the research constructs through contingency tables.

Ethical aspects

From an ethical standpoint, the integrity and confidentiality of participants were protected, with their consent to participate and responsible

handling of the information collected, for the purpose of examining the link between logistics performance and consumer satisfaction.

RESULTS

Psychometric analysis

Table 1

Psychometric evidence of the measurement scales for the study variables (WLSMV estimator)

Instruments	X ² /gl	CFI	TLI	SRMR	RMSEA	Variable/Dimension	α
Logistics performance perception scale	1.81	.99	.99	.058	.06	General	.87
						Logistics costs	.70
						Use of resources	.72
						Quality of service	.74
Consumer satisfaction scale	3.21	.99	.99	.057	.09	General	.92
						Expectation	.84
						Perceived performance	.83
						Loyalty	.82

Table 1 and Figures 1 and 2 present the psychometric evidence for the scales used to measure the study variables. In relation to the Scale on the perception of logistics performance, the results of the confirmatory factor analysis (CFA) indicate an adequate fit of the model ($\chi^2/df = 1.81$, CFI = .99, TLI = .99, SRMR = .058, RMSEA = .06), which supports the structural validity of the scale. Likewise, the internal consistency coefficient ($\alpha = .87$) shows high reliability for the general dimension, while the dimensions of logistics costs ($\alpha = .70$), resource utilization

($\alpha = .72$), and service quality ($\alpha = .74$) present acceptable values that meet the minimum criteria recommended for applied studies. For its part, the Consumer Satisfaction Scale also shows optimal fit indicators ($\chi^2/df = 3.21$, CFI = .99, TLI = .99, SRMR = .057, RMSEA = .09), confirming the validity of its factor structure. The overall Cronbach's alpha coefficient ($\alpha = .92$) reveals excellent reliability of the instrument, while the dimensions of expectation ($\alpha = .84$), perceived performance ($\alpha = .83$), and loyalty ($\alpha = .82$) exhibit high and homogeneous internal consistencies.

Figure 1
Diagrama de senderos de la Escala sobre la percepción desempeño logístico (AFC)

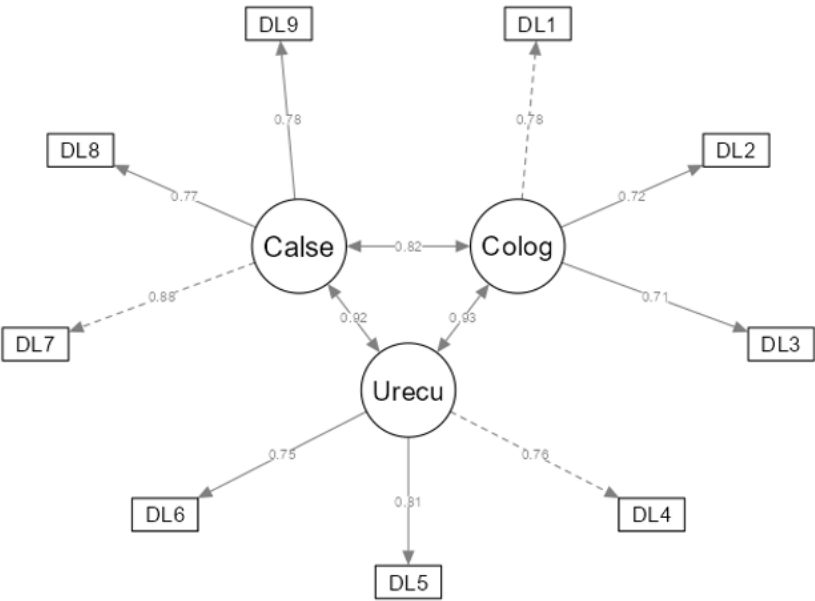
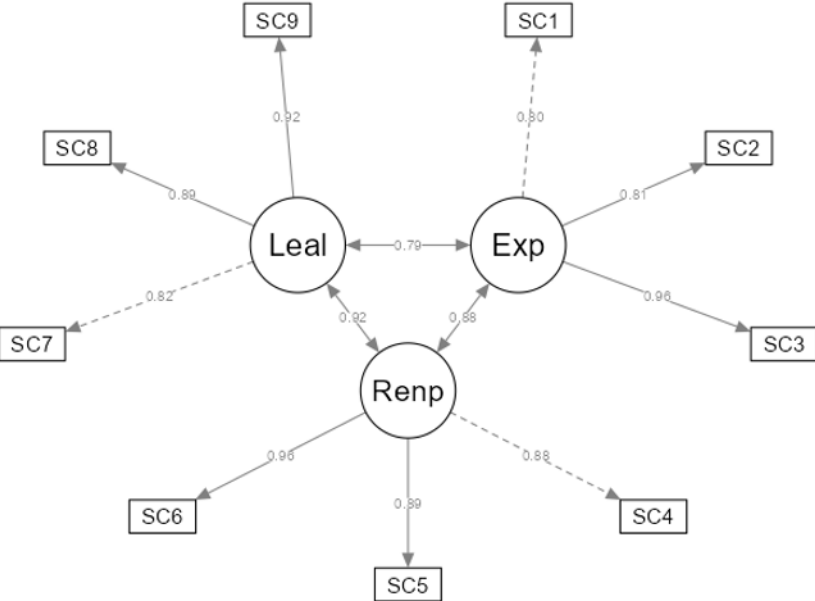


Figure 2
Path diagram of the Scale on Logistics Performance Perception (AFC)



Descriptive analysis

The following tables show descriptive data on logistics performance and consumer satisfaction. The purpose is to analyze how consumer

perceptions vary according to the variables and their dimensions of study.

Table 2*Logistics performance and consumer satisfaction*

			Consumer satisfaction			Total
			Low	Middle	High	
Logistics performance	Low	Percentage of the total	46	14	2	62
			25,56%	7,78%	1,11%	34,4%
	Medium		12	36	20	68
			6,67%	20%	11,11%	37,8%
	High		3	16	31	50
			1,67%	8,89%	17,22%	27,8%
Total			61	66	53	180
			33,9%	36,7%	29,4%	100,0%

Note: Results of the study variables

According to Table 2, it was found that 50 of them represent 27.8%, which indicates that logistics performance is high; on the other hand, 68 and 62 consumers, representing 37.8% and 34.4% respectively, indicate that performance is average

and low. In addition, consumer satisfaction is high with a percentage of 29.4%, representing 53 consumers, while 66 and 61 consumers indicate that it is between average and low with 36.7% and 33.9%.

Table 3*Dimensions of logistics performance and consumer satisfaction*

			Consumer satisfaction			Total
			Low	Middle	High	
Logistics costs	Low	Percentage of the total	41 22,78%	15 8,33%	6 3,33%	62 34,4%
	Medium		13 7,22%	42 23,33%	28 15,56%	83 46,11%
	High		7 3,89%	9 5,00%	19 10,56%	35 19,44%
	Total		61 33,89%	66 36,67%	53 29,44%	180 100,0%
Use of resources	Low	Percentage of the total	49 27,22%	18 10,0%	6 3,33%	73 40,56%
	Medium		8 4,44%	38 21,11%	18 10,0%	64 35,56%
	High		4 2,22%	10 5,56%	29 16,11%	43 23,89%
	Total		61 33,89%	66 36,67%	53 29,44%	180 100,0%
Quality of service	Low	Percentage of the total	52 28,89%	21 11,67%	8 4,44%	81 45,00%
	Medium		8 4,44%	30 16,67%	17 9,44%	55 30,56%
	High		1 0,56%	15 8,33%	28 15,56%	44 24,44%
	Total		61 33,89%	66 36,67%	53 29,44%	180 100,0%

Note: Results of the dimensions and study variable

Table 3 shows the relationship between the dimensions of DL and SC. First, 35 consumers, representing 19.4%, say that logistics costs are high, while 83 and 62 consumers, representing 46.1% and 34.4%, say they are medium and low, respectively. Secondly, in terms of resource utilization, 43 consumers (23.9%) state that resource utilization is high, while 64 and 73 customers (35.6% and 40.6%) say it is medium to low. With regard to the last dimension, 44 consumers, representing 24.4%, consider the quality of service to be high, while 55 and 81

consumers rate it as medium and low, with 30.6% and 45%, respectively. In terms of service quality, 53 consumers, representing 29.4%, express high quality, and 66 and 61, representing 36.7% and 33.9%, state that service quality is between medium and low.

Inferential analysis

Statistical analyses are presented. They allow us to define the predictive capacity of the perception of logistics service performance over consumer satisfaction.

Table 4

Predictive capacity of the perception of logistics service regarding customer satisfaction

Global Model Test				
R ² orrected	F	gl1	gl ²	p
.564	232	1	178	<.001
Model Coefficients - SCON				
Predictor	β	EE	t	p
Constant	8.315	2.02	4.12	<.001
DL	.752	.051	15.24	<.001

Note: DL = Perception of logistics service performance

Table 4 describes the statistics that evaluate the predictive capacity of the perception of logistics service on SC. First, the overall model test indicates a significant fit ($F(1,178) = 232$, $p < .001$), demonstrating that the predictor variable (LD) explains a considerable proportion of the variance in consumer satisfaction. The adjusted coefficient of determination ($R^2 = .564$) indicates that the model explains approximately 56.4% of the variability in consumer satisfaction.

Regarding the model coefficients, the value of the constant is 8.315 ($t = 4.12$, $p < .001$), which indicates the average level of satisfaction when the perception of the logistics service is zero or minimal. Meanwhile, the coefficient of the LD variable is .752 ($SE = .051$, $t = 15.24$, $p < .001$), which shows a positive and statistically significant relationship between the perception of logistics service performance and consumer satisfaction.

Table 5

Predictive capacity of the dimensions of logistics service perception on consumer satisfaction

Global Model Test				
R ² corrected	F	gl1	gl ²	p
.571	80.4	3	176	<.001
Model Coefficients - SCON				
Predictor	Estimador	EE	t	p
Constant	8.56	2.006	4.26	<.001
Logistics costs	.142	.186	2.1	.038
Use of resources	.397	.211	5.18	<.001
Quality of service	.315	.189	4.5	<.001

Note: DL = Perception of logistics service performance

Table 5 presents the results of the multiple regression analysis that evaluates the predictive capacity of the dimensions of logistics service perception on CS. The overall model shows a significant fit ($F(3,176) = 80.4$, $p < .001$) and an adjusted coefficient of determination ($R^2 = .571$), indicating that the three dimensions of logistics service together explain approximately 57.1% of the variability in consumer satisfaction, reflecting high predictive power. In terms of specific coefficients, the constant ($\beta = 8.56$, $p < .001$) represents the average level of satisfaction when the dimensions of logistics service take a value of zero. Among the predictors, logistics costs have a positive and significant effect ($\beta = .142$, $t = 2.10$, $p = .038$), indicating that lower perceived costs are associated with greater satisfaction. Resource utilization shows the strongest effect ($\beta = .397$, $t = 5.18$, $p < .001$), demonstrating that efficient management of logistics resources significantly increases customer satisfaction. Finally, service quality also has a significant positive influence ($\beta = .315$, $t = 4.50$, $p < .001$), confirming that a better perception of quality in logistics operations raises satisfaction levels.

DISCUSION

The results of the study confirm the hypothesis, showing that the perception of LD has a significant and positive influence on adult SC in the Peruvian context. In accordance with expectation confirmation theory (Oliver, 1980), the predictive model yielded an $R^2 = .564$, indicating that more than half of the variability in SC is explained by the perception of efficiency in logistics services. Both the theory and the results highlight that satisfaction occurs when the experience exceeds prior expectations; that is, a reliable, efficient, and user-oriented service reinforces this positive confirmation.

The dimensional analysis revealed that logistics costs, resource utilization, and service quality are factors that significantly predict the SC level, together explaining 57.1% of its variability. Between the two constructs, resource utilization proved to be the most decisive factor, indicating that the optimization of material, human, and technological resources within the logistics chain directly influences the customer's perception of efficiency. These findings are consistent with those reported by Lin et al. (2023),

who demonstrated that effective resource management and a high level of operational quality contribute significantly to strengthening both customer satisfaction and loyalty in the context of logistics services.

In terms of service quality, a significant impact on the user experience was identified. Elements such as punctuality in deliveries, meeting established deadlines, and personalized attention are decisive for customer perception, which coincides with the findings of Uvet (2020) and Gizaw et al. (2021), who highlight the importance of reliability and quality in logistics processes in the SC. Although logistics costs had a lesser effect as a predictor, their influence remains relevant, as the perception of fair prices and efficient economic management contribute to users' positive assessment of the service received.

Likewise, this study shows that LD is a solid predictor of SC and confirms the relevance of the theoretical model used (Oliver, 1980). It also highlights that well-structured, customer-oriented logistics management is an essential strategic element for improving competitiveness and fostering user loyalty in the Peruvian business context. Finally, the findings reflect that SC does not depend solely on technical compliance with the service, but also on the perception of value and efficiency that it generates (Oliver, 1980). In other words, companies engaged in the distribution and installation of natural gas must focus on ensuring efficient operations, maintaining cost transparency, and providing quality service as key strategies for strengthening customer relationships.

In addition, the academic community is provided with two measurement instruments with optimal adjustment indices for validity evidence based on internal structure (Escobedo et al., 2016, and Ruiz et al., 2010) and with adequate reliability indices (George & Mallery, 2003, and Nunnally, 1978).

Finally, one of the main limitations of the predictive study is that the data depends on the self-reported perceptions of the participants, which could introduce certain biases in the responses. In addition, the research focused exclusively on Peruvian adults linked to the logistics sector, which limits the possibility of generalizing the results to other contexts, industries, or populations with different characteristics.

CONCLUSIONS

It is concluded that higher investment in logistics costs, implementation of resources, and increased processes related to service quality establish a moderate and statistically significant positive relationship with consumer satisfaction. In addition, a review of logistics costs involves opting for differentiation strategies in quality that will be recognized by the customer with greater satisfaction, increasing their level of competitiveness in the market. This implies a greater increase in the use of resources that can plan, systematize, and automate good logistics performance. Generating reliable consumer satisfaction as a response to service value. This is accompanied by continuous learning and specialization of logistics performance processes to increase the level of service with greater satisfaction and loyalty to the business organization.

Finally, future research should take into account consumer satisfaction needs and incorporate technological solutions focused on information management and support for innovative decision-making within the criteria of the study into their logistics performance.

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