

Logistics management and internal customer satisfaction in a mining educational institution in Lima, 2025

Gestión logística y satisfacción del cliente interno en una institución educativa minera en Lima, 2025

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ABSTRACT

Objective. The present research search to determine the relationship between logistics management and internal customer satisfaction within a mining educational institution, covering also the importance of this sector within the country. **Method.** The research apply a methodology of correlational scope, non-experimental and cross-sectional design. The study population was formed of 183 employees, with a representative sample of 125. For data collection, the survey technique was used, and each question was measured through a Likert scale. **Results.** The findings obtained evidenced that exists a strong correlation between logistics management and customer satisfaction through on Spearman's rho test ($p = 0.891$; $p < 0.001$). This indicates that as logistics management improves, also increase the level of satisfaction of the internal customers of the organization. **Conclusions.** The study concluded that it must do improvements in sourcing logistics dimension, because it is which sourcing the materials that form part of the educational quality with which teachers and staff provide services to students.

Keywords: logistics; supply chain; procurement; warehousing; customer satisfaction; education; mining.

RESUMEN

Objetivo. La presente investigación busca determinar la relación entre la gestión logística y la satisfacción del cliente interno dentro de una institución educativa minera, abarcando también la importancia que tiene este sector dentro del país. **Método.** La investigación aplica una metodología de alcance correlacional, diseño no experimental y corte transversal. La población en estudio estuvo conformada por 183 colaboradores, siendo la muestra representativa de 125. Para la recolección de datos, se usó la técnica de la encuesta, y cada pregunta fue medida a través de una escala de Likert. **Resultados.** Los resultados obtenidos evidenciaron que existe una fuerte correlación entre la gestión logística y la satisfacción del cliente a través de la prueba de rho de Spearman realizada ($p = 0.891$; $p < 0.001$). Esto indica que, a medida que mejora la gestión logística, también aumenta el nivel de satisfacción de los usuarios internos de la organización. **Conclusiones.** El estudio concluyó que deben hacerse mejoras en la dimensión logística de abastecimiento, ya que es la que suministra los materiales que forman parte de la calidad educativa con que profesores y encargados brindan el servicio al alumno.

Palabras clave: logística; cadena de suministro; abastecimiento; almacenes; satisfacción del cliente; educación; minería.

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INTRODUCTION

Mining as an economic activity has generated significant income for countries engaged in mineral extraction. It contributes to industrialization and job creation, particularly in related sectors such as textiles, metallurgy, construction, *catering*, among others. Therefore, it requires trained personnel (McMahon & Moreira, 2014).

Countries such as Chile take this into account and seek to develop the mining sector through educational approaches that allow for improved collaboration between universities offering programs related to the sector and industries (Minería Chilena, 2023).

Peru is no exception to this situation, and during the first decades of the 21st century, it has generated public-private partnerships that allow it to grow within the sector, having generated 227,679 jobs in 2023 (Ministerio de Energía y Minas, 2023). However, the Peruvian mining sector is currently facing a major crisis, since out of a total of 193,000 workers, only 8% are young people aged 18–29, while the number of people approaching retirement is higher. The aforementioned data make it necessary to implement actions that increase young people's interest in the mining sector and provide them with the necessary competencies in terms of teamwork, safety, 4.0 skills, etc. (Guardia Quispe, 2019).

Within this context, where immediacy has become an important characteristic that determines customer satisfaction and a company's permanence in the market, logistics plays a key role (García, 2020).

Problematic

Taking this into account, in a mining educational institution, internal user satisfaction with logistics management is not the most satisfactory. This is partly because the materials and services provided do not arrive according to the requested specifications. On the other hand, the requests submitted do not contain the correct specifications that would allow for prompt attention. Likewise, there are delays in deliveries and dispatches, which affect the internal user and the student, who is the end customer. Therefore, this study aims to determine the relationship between logistics management and internal customer satisfaction in a mining educational institution, with the purpose of presenting proposals for improvement.

Theoretical framework

Logistics

Logistics has evolved from focusing on the transportation and storage of goods in agricultural economies to becoming a strategic activity. After World War II, it gained importance in the business environment, and during the 1960s it evolved toward integrated logistics with a customer-oriented approach. By the 1970s, it assumed a key role in internal coordination and in relationships with suppliers and customers (Servera-

Francés, 2010). According to the Council of Supply Chain Management Professionals (n.d.), logistics is a part of the supply chain that is responsible for efficiently and effectively planning, implementing, and controlling the flow of materials and information from the point of origin to the point of consumption. Likewise, it is a fundamental part of a company's competitive advantage. For this purpose, it is necessary to consider that an organization has two types of activities: primary and secondary. Logistics should focus on managing costs and delivery times, which are part of the primary activities and are an important component of customer satisfaction (Gómez Aparicio, 2013). According to the research conducted, the dimensions of logistics are similar to one another. For Casas Llaguento (2023), logistics consists of procurement, inventory, and distribution. Vera Villanueva (2020) suggests that it consists of the purchasing process, storage, and dispatch. Finally, according to Trigo Vergaray et al. (2023), procurement, production, and distribution are important dimensions of logistics.

Internal customer and customer satisfaction

According to Simancas Trujillo (2012), the internal customer is made up of the organization's employees, who should be considered a strategic element for achieving institutional objectives. In this regard, the organization should motivate, train, and engage them through training, communication, and learning programs, with the purpose of strengthening the organizational culture, improving service quality, and contributing to compliance with the company's quality standards. On the other hand, Campos (2010) states that the internal customer is capable of improving consumer satisfaction through the tools provided by the organization.

Regarding satisfaction, it is defined as a comparison between the expectations that the customer has before obtaining a service and those they have after acquiring it (Boechler et al., 2002). This satisfaction is also related to the characteristics of the product, which is defined by the customer (Bustamante et al., 2019). Finally, according to Zeithaml et al. (2009), customer satisfaction occurs through the evaluation that a consumer provides regarding an acquired product or service.

Castañeda-Santillan and Sánchez-Macías (2022) state that one component that enables organizational development is the employee's human talent, and it is important to know their level of satisfaction to prevent burnout. This is related to the security provided by the company, opportunities for growth, and the availability of equipment and infrastructure for their work. Margalef et al. (2011) further add that satisfying employees contributes to better performance toward the internal customer, greater commitment to the organization, lower absenteeism, and greater final customer satisfaction through their efforts. Consequently, as Caruana and Calleya (1998) mention, the employee should be viewed as a customer within the organization and their work as an internal product that should be attractive and motivating, which, if the employee is convinced of its

value, will generate satisfaction. It should also be taken into account that senior management, together with middle management, contributes to maintaining quality and the degree of satisfaction within the organization. If they are satisfied with these aspects, they will be able to convey this satisfaction to other employees (Noda Hernández et al., 2020).

International background

García (2020) states that logistics is a strategic component within the supply chain and the organization, responsible for the acquisition, storage, and control of materials. Therefore, it should be viewed as a global rather than an isolated process that generates value for the customer and optimizes organizational outcomes. For this purpose, Nguyen & Vo (2024) highlight how the application of technology within logistics processes can improve the effectiveness, efficiency, and quality of companies' logistics services. In addition, through technology applied to logistics, it is possible to improve the quality of contact with personnel, order delivery, and social responsibility, which makes it possible to provide customer service and influences the satisfaction and perception that customers have of companies. Guerrero et al. (2024) point out the importance of having an integrated logistics system (ILS), which consists of digital tools that facilitate decision-making and control in logistics management processes. These systems also make it possible to organize distribution and production processes, thereby generating appropriate ways of working within the organization. According to Flores Bastidas (2021), the ILS also makes it possible to improve customer satisfaction among companies providing logistics services in Guayaquil. The research conducted, whose objective was to determine the relationship between an ILS and customer satisfaction, showed that there is a relationship between these variables and that an ILS contributes to customer satisfaction through dimensions such as customer service, storage, transportation and distribution, and production. The author also highlights that an ILS contributes to the internationalization of a company.

National background

Other contributions, such as that of Casas Llagueto (2023), who based his research on a higher education institution, showed that logistics is strongly related to the dimensions of administrative management, such as planning, organization, direction, and control, which are a key element in the institutionalization of higher education. Good administrative management has an impact on essential aspects of logistics, such as procurement, inventory, and distribution. Following the line of research in higher education institutions, authors such as Villegas Casaverde (2023), who conducted his research in a public institution, point out that it is important to keep logistics personnel trained in technical matters related to requirements and government procurement regulations, which are highly dynamic. In this way, deficiencies in supply processes and internal customer dissatisfaction

can be avoided, as evidenced and strengthened by Spearman's rho of 0.811. García Rumisoncco (2019), on the other hand, who also based his research on a public institution such as UGEL 301 in Cangallo (Ayacucho), found that internal customer satisfaction is affected when aspects of supply logistics, such as procurement planning, procurement management, and procurement control, are not properly managed. This affects the internal customer when equipment is delivered in brands other than those requested, when there is software incompatibility, or when there are discrepancies between the documentation and the product delivered, which requires better logistics control. Cotrina Gil (2022), who also sought to determine the relationship between logistics and internal customer satisfaction, states that logistics contributes to internal customer satisfaction through procurement, storage, and distribution. Each of these dimensions contributes in different ways to internal user satisfaction. For example, good procurement improves the quality of work and deliveries; good warehouse management ensures proper administration and quality of the goods and services provided; finally, good distribution ensures that equipment and supplies are available at the appropriate time. Authors such as Sánchez de la Piedra et al. (2024) emphasize that, for logistics to perform properly, it must address aspects such as coordination and communication, storage, planning and control, and picking and packaging.

METHOD

Study design

The present research is quantitative in nature, has a non-experimental design, and is cross-sectional, since the variables will be studied in their natural context (Hernández Sampieri and Mendoza Torres, 2018).

Population and sample

The initial population for this research consisted of 183 employees from different areas, of whom 125 were considered the study sample. The following formula was applied to calculate the sample:

$$n = \frac{N * Z_{\alpha}^2 * p * q}{e^2 * (N - 1) + Z_{\alpha}^2 * p * q}$$

Where:

n = Sample size (125 professionals)

N = Population size (183 professionals)

Z = Z-value according to the confidence level (96% = 2.05)

p = Probability of success = 50% (0.50)

q = Probability of failure = 50% (0.50)

e = Maximum allowable error (5%)

Data collection instrument

For data collection, the SERVQUAL model was used as a basis, which, although it is oriented toward understanding the external customer, evaluates universal aspects of service quality. In the context of the research, the internal user of an organization becomes a customer when requesting various material or service requirements from the logistics area, which plays a supplier role within the institution in order to ensure the continuity of operations. Following this explanation, the present instrument was adapted to determine the perceptions of the internal customer of a mining educational institution based on five dimensions: reliability, responsiveness, assurance, empathy, and tangible elements. The reliability dimension evaluated the timely and correct fulfillment of requirements; responsiveness evaluated the speed in handling requests; assurance evaluated the technical knowledge and confidence conveyed by logistics personnel; empathy evaluated personalized attention and understanding of the internal user's needs; while tangible elements considered the condition of the materials, equipment, and infrastructure used during the provision of the logistics service. This instrument (the survey) also used the Likert scale to determine the level of agreement and disagreement of the study population regarding each of the five dimensions indicated.

Data analysis

For data processing, the SPSS 26 software was used, which helped obtain information such as Cronbach's alpha of 0.980, as well as perform the normality and correlation tests for the variables.

Ethical aspects

During the research process, the participants were informed about the use that would be made of their responses and that these would form part of this research. Aspects such as integrity, respect for participants, responsibility, plagiarism prevention, ethical evaluation, and dissemination and training were taken into consideration.

RESULTS

To verify the fulfillment of the general hypothesis, which states that logistics management positively influences internal customer satisfaction at the mining educational institution in Chosica in 2025, the survey was administered to the selected sample.

Once the survey had been conducted and the results obtained, the respective normality test was performed. Based on the sample size (more than 50 elements) and the significance level (< 0.005), the Kolmogorov-Smirnov and Spearman's rho correlation tests were applied, respectively.

Table 1

Normality tests between variables

	Normality Tests					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	gl	Sig.	Statistic	gl	Sig.
Variable logistics management	,091	125	,014	,958	125	,001
Variable satisfaction customer	,137	125	,000	,949	125	,000

Note. ^a Lilliefors significance correction.

The correlation analysis performed yielded a correlation of $p = 0.891$. This indicates that there is a correlation between the variables under study and, furthermore, that as logistics management improves, the level of satisfaction among the organization's internal users also increases.

Table 2

Correlation between logistics management and internal customer satisfaction

Correlations			
		Variable logistics management	Variable satisfaction customer
Variable logistic management	Correlation coefficient	1.000	,891**
	Sig. (2-tailed)	.	,000
	N	125	125
Rho de Spearman	Correlation coefficient	,891**	1.000
	Sig. (2-tailed)	,000	.
	N	125	125

Note. ** The correlation is significant at the 0.01 level (2-tailed).

To verify the correlation between the other dimensions of logistics and internal customer satisfaction, the Spearman's rho correlation test was also applied, and the results shown in Table 2 were obtained.

Mean, standard deviation, and variance

Regarding the mean, the results showed that both logistics management and internal customer satisfaction presented levels of 3.508 and 3.507, respectively. However, this is a score close to the medium level, so it could be considered moderately high. Likewise, the standard deviations (0.94 and 0.86, respectively) indicate moderate dispersion, reflecting some variability in the opinions.

Table 3
Mean, standard deviation, and variance

Descriptive Statistics				
	N	Mean	Standard deviation	Variance
prom_logistic	125	3.5080	,94396	,891
prom_satisfaction	125	3.5074	,86297	,745
Valid N (listwise)	125			

The variance obtained for both variables indicates moderate dispersion of the responses, which means that, although there is a general trend in the perceptions, there are also differences among the respondents.

Correlation between purchasing management and the internal customer

Table 4
Correlation between purchasing management and internal customer satisfaction

Correlations				
		D1 purchasing management	Variable customer satisfaction	
Spearman's rho	D1 Purchasing Management	Correlation coefficient	1.000	,859**
		Sig. (2-tailed)	.	,000
		N	125	125
	Variable customer satisfaction	Correlation coefficient	,859**	1.000
		Sig. (2-tailed)	,000	.
		N	125	125

Note. **The correlation is significant at the 0.01 level (2-tailed).

In the case of the correlation of the specific hypothesis, concerning the relationship between purchasing management and internal customer satisfaction, the results show that there is a correlation between them ($p = 0.859$). Good purchasing management contributes to internal customer satisfaction.

Correlation between warehouse management and the internal customer

Table 5
Correlation between warehouse management and internal customer satisfaction

Correlations				
		D1 Warehouse Management	Variable customer satisfaction	
Spearman's rho	D1 Warehouse Management	Correlation coefficient	1.000	,826**
		Sig. (2-tailed)	.	,000
		N	125	125
	Variable customer satisfaction	Correlation coefficient	,826**	1.000
		Sig. (2-tailed)	,000	.
		N	125	125

Note. **The correlation is significant at the 0.01 level (2-tailed).

Regarding the correlation between warehouse management and internal customer satisfaction, the correlation between them ($p = 0.826$) is also strong, which shows that good warehouse management contributes to internal customer satisfaction.

Correlation between distribution management and the internal customer

Table 6
Correlation between distribution management and internal customer satisfaction

Correlations				
		D1 Distribution Management	Variable customer satisfaction	
Spearman's rho	D1 Distribution Management	Correlation coefficient	1.000	,837**
		Sig. (2-tailed)	.	,000
		N	125	125
	Variable customer satisfaction	Correlation coefficient	,837**	1.000
		Sig. (2-tailed)	,000	.
		N	125	125

Note. ** The correlation is significant at the 0.01 level (2-tailed).

Regarding distribution management and internal customer satisfaction, there is also a strong correlation of 0.837.

DISCUSSION

The statistical results show that the instrument used has high reliability and adequate structural validity. A positive and significant relationship was identified between logistics management and internal customer satisfaction. This suggests that efficiency in logistics processes, resource availability, and the responsiveness of the logistics area directly influence users' perception of satisfaction within the organization.

The correlation (0.891) obtained also shows that, within a mining educational institution, the impact of logistics management on internal customer satisfaction is significant.

Regarding the results for dimensions such as purchasing, warehousing, and distribution, which also showed high correlations, it is demonstrated that there is a better structure of logistics processes in the organization studied compared with those examined in studies such as Cotrina Gil (2022), where procurement presented a low correlation (0.296), warehousing a moderate correlation (0.452), and distribution a low correlation (0.281) with respect to internal customer satisfaction.

The results obtained in this research ($p = 0.891$), together with those of Villegas Casaverde (2023), who obtained a Spearman's rho coefficient of 0.811, also

show that, in an educational institution, the impact of logistics plays an important role in customer satisfaction.

The results obtained ($p = 0.891$; $p < 0.001$) are also consistent with the findings obtained by Casas Llaguento (2023), who identified a significant relationship between administrative management and logistics management in a higher educational institution, highlighting that adequate planning, organization, direction, and control strengthen logistics processes such as procurement, inventory, and distribution. Although the study by Casas Llaguento (2023) did not evaluate internal customer satisfaction, the findings of this research expand this evidence by demonstrating that logistics processes, once strengthened, are significantly associated with higher levels of satisfaction among internal users. In particular, the dimensions of purchasing management ($p = 0.859$), warehouse management ($p = 0.826$), and distribution management ($p = 0.837$) presented strong associations with internal customer satisfaction, confirming the importance of each of these stages within institutional logistics performance.

Comparing the results with international studies and taking Flores Bastidas (2021) as a reference, although this author reported a moderate correlation with customer satisfaction ($p = 0.345$; $p < 0.05$), the result obtained in this research, which is higher ($p = 0.891$; $p < 0.001$), demonstrates that, in an educational institution, the relationship between logistics and the internal customer is strong, not only because it ensures the delivery of goods and services, but also because it ensures the continuity of a student within the educational institution where the student remains, as the student receives the necessary materials and educational quality from their institution.

CONCLUSIONS

As a general conclusion, logistics management does directly impact internal customer satisfaction and is a key factor in the performance of any organization seeking to stand out within the market in which it operates. Activities such as purchasing, warehousing, and distribution management play an important role in achieving logistics performance and its impact on internal customer satisfaction.

The results show that it is important to raise awareness among those responsible for the purchasing, warehousing, and dispatch areas regarding the importance of their role within the educational institution. This can improve the organization's performance, as well as the perception of it both internally and externally.

The research also allows us to recognize that poor internal customer service could hinder the performance of internal customers when interacting with students, affecting the organization's corporate image and making it difficult to attract new prospective students, who base their decision about where to study on the comments made about an institution.

Likewise, it is possible to propose an organizational value chain for educational institutions. As a starting point, adequate administrative management strengthens logistics management through proper planning, organization, and control of resources, as supported by Casas Llaguento (2023). Subsequently, according to the research, efficient logistics management generates higher levels of internal customer satisfaction by ensuring the timely availability of materials and services necessary for the development of academic and administrative activities. This relationship makes it possible to propose an explanatory model in which administrative management constitutes the organizational support for logistics, while logistics represents the operational mechanism of administration, which contributes to improving internal customer satisfaction and, indirectly, the quality of educational services.

Finally, the research shows that, in an educational institution specialized in mining, logistics plays a fundamental role beyond mere supply, being a strategic factor that will enable internal customer satisfaction, which in turn impacts the quality of student training and their future professional development, as demanded by the mining sector. This research contributes to the existing body of knowledge by addressing an interesting and understudied topic involving logistics, the education sector, and mining.

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Conflict of interest statement

The author declares that there are no conflicts of interest.

Data availability

Not applicable, as no data were used.

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APPENDICES

Survey on logistics management and internal user satisfaction in an educational institution in the mining sector in Chosica, Lima, 2025.

N.º	ITEMS	N (Never)	CN (Hardly ever)	AV (Sometimes)	CS (Almost always)	S (Always)
1	The requirements are requested, ensuring aspects such as correct description and technical terms.					
2	The quotation process is carried out according to the established procedures.					
3	Purchase and service orders are issued, ensuring aspects such as unit of measurement, price, and description.					
4	Commercial terms with suppliers, such as advance payment, cash on delivery, payment terms, or guarantees, are taken into consideration.					
5	The total delivery of services or supplies is carried out according to what was requested.					
6	Materials are delivered by the warehouse to the requested locations.					
7	Upon receiving the merchandise, the delivered units and the accuracy of the requested item are checked, and the respective unloading is carried out.					
8	Storage is carried out at the correct sites and locations, taking into consideration risk and order aspects.					
9	Timely information is provided on the materials available in stock when requested.					
10	Materials are received and selected and stored according to their use and need.					
11	Materials are properly wrapped and packaged, taking into consideration aspects such as weight, volume, and labeling for the requested dispatch.					
12	When merchandise is dispatched outside the institution, this is done by issuing the delivery note, packing list, and respective receipt confirmations.					
13	The delivery of merchandise or services is completed within the time agreed upon or established in the logistics procedures.					
14	Materials are delivered in the quantities requested according to what was agreed upon.					
15	The performance of the logistics area in resolving questions or complaints is good.					
16	Logistics personnel provide timely information regarding any questions or inconveniences raised by the internal user.					
17	Logistics personnel are willing to address problems or urgent matters according to their priority and the established procedures.					
18	Internal user inquiries are addressed within a timely manner.					
19	The logistics area has a minimum level of knowledge regarding the materials requested.					
20	The user is informed of the status of their requirements.					
21	The internal user is provided with information such as costs they may incur, technical specifications, and service status, generating credibility in the work performed.					
22	Logistics personnel take the time to address the individualized questions of each user through various means.					
23	Logistics personnel comply with the organization's dress code or PPE requirements, as applicable.					
24	Personnel properly care for the organization's equipment.					
25	Personnel have the appropriate work equipment to perform their duties.					
26	Personnel properly maintain their workplace.					