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Minibuses during rush hour and impact on Peruvian Andean university loyalty

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Abstract

This study analyzes the impact of the minibus service during peak hours on the loyalty of Andean university students in Peru, considering public transportation as an essential link between rural and urban communities. The aim is to understand how service quality influences student loyalty and to identify key areas for improvement. From a quantitative approach and with a cross-sectional design, data were collected from 255 university students in Huaraz using a questionnaire based on the SERVQUAL model and the Net Promoter Score (NPS), evaluating dimensions such as security, empathy, and tangible aspects through a Likert scale. For data analysis, the PLUM procedure (ordinal logistic regression - OLR) was employed, allowing the examination of the relationship between service quality and student loyalty. The results indicate that service quality has a significant impact on student loyalty, with safety being the most determining dimension. Deficiencies are identified in sensitivity towards cultural identity and inclusion in treatment, aspects that negatively affect the perception of the service. These areas of opportunity highlight the need for improvements in accessibility and safety to enhance the user experience. The study emphasizes the importance of implementing strategies that promote safer, more accessible, and inclusive public transportation. Safety emerges as a key factor for student loyalty, highlighting the urgency of policies that improve the perception and experience of the service. In practical terms, the findings suggest that collaboration between local governments, transportation companies, universities, and the police is essential to ensure the safety and accessibility of transportation during peak hours. Likewise, promoting an inclusive and quality service can contribute to student loyalty, strengthen social cohesion, and ensure equitable access to education in the Andean regions.

Keywords: Loyalty, Minibuses, Peruvian university students, Rush hour, Service quality.

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1. Introduction

The present study addresses the impact of minibus service during peak hours on the loyalty of Andean university students in Peru. In the Andean regions, public transportation is a vital artery that connects rural and urban communities, but it faces significant challenges such as vehicle overcrowding, inefficiency in frequency and routes, deterioration of vehicles, inadequate staff behavior, and safety issues. These deficiencies generate distrust and discontent among university students who rely on public transportation to access their educational institutions.

The research is explanatory in nature, addressing as its central problem the influence between the quality of minibus service during peak hours and the loyalty of Andean university students. In this sense, the research seeks to answer the following question: How does the perception of the quality of minibus service during peak hours impact the loyalty of Andean university students in Peru? For this purpose, three specific objectives are established. First, the aim is to evaluate the perception that Andean university students have about the quality of the minibus service during peak hours. Second, it aims to analyze the impact of this perception on their level of loyalty towards the service. Finally, the aim is to identify the dimensions of the SERVQUAL model that exert the greatest influence on user loyalty, with the purpose of explaining the determining factors in the relationship between service quality and student loyalty in the Andean context.

In the Andes, the geographical, cultural, and economic characteristics make a reliable and safe transportation service indispensable to overcome historical barriers to accessing higher education. The quality of public transportation directly impacts the well-being of students and the cohesion of Andean communities, where routes not only connect destinations but also dreams and opportunities. The importance of improving these services lies in their ability to increase the effectiveness, efficiency, and satisfaction of Andean university students, providing a deeper understanding of their experiences [1-3].

Effective service quality management creates significant value [4], and the SERVQUAL model adapts to changing market expectations, particularly in Andean local contexts [5]. This theoretical framework highlights the importance of integrating service quality into marketing strategies to ensure a sustainable competitive advantage [6]. Moreover, value co-creation and a holistic approach are essential for service excellence, according to Kotler and Keller [7].

Digitalization and artificial intelligence present challenges and opportunities to personalize and improve services in the Andean regions [8-10].

In the Andean regions, tangible aspects such as the appearance of the vehicles and the comfort of the facilities significantly influence the perception of the service, where users value details that resonate with their cultural and geographical realities [11, 12]. According to Morocho [13], reliability and responsiveness are essential to fostering trust, particularly in rural communities where transportation serves as the main factor of trust.

Safety and empathy, deeply rooted in Andean values of reciprocity and respect, play crucial roles in building trust and strengthening the connection with customers [14, 15]. Moreover, the diversity of public transportation and its adaptation to suburban needs significantly improve connectivity and accessibility [16-18]. The loyalty of Andean users is not built solely on functional services but on personalized strategies that integrate the cultural values and expectations of the communities. Exceeding customer expectations is key to promoting unconditional support and generating trust in transportation services [19, 20]. Evaluating the loyalty of university students is crucial for measuring service success, and tools like the Net Promoter Score (NPS) are effective for capturing satisfaction and willingness to recommend the service [21-23].

Studies conducted in other contexts highlight relevant lessons for Andean communities. In Colima, Mexico, factors such as gender and geographical location influenced the perception of public transportation quality [24]. In Hermosillo, Mexico, critical challenges in public transportation management were identified [25]. In Ecuador, the empathy of the staff was highlighted as a decisive factor for improving the perception of the service [26, 27]. According to Tatis, et al. [28] in Santa Marta, Colombia, the need to improve the frequency and customer service in public transportation was emphasized.

In Peru, previous research has highlighted the importance of addressing dimensions such as tangibility, empathy, and safety to meet user expectations [29]. The context of this research includes the evaluation of the gap between the quality expectations of university students and the reality of the minibus service in the Andean regions of Peru. Previous studies have revealed the need to improve key dimensions such as tangibility, reliability, and empathy [30, 31]. Aspects such as safety and cost also emerge as essential factors to strengthen user loyalty [32-37]. The objective of this study is to evaluate the impact of minibus service quality during peak hours on the loyalty of Andean Peruvian university students.

The structure of the study is organized into four main sections. First, the literature review presents the fundamental concepts related to transportation service quality and customer loyalty, integrating references to previous studies in various contexts. Subsequently, the methodology details the research design, the sample used, and the statistical tools applied for data analysis. The third section, results and discussion, presents the findings obtained and their interpretation in relation to the adopted theoretical framework. Finally, in conclusions and recommendations, the main findings of the study are synthesized, their implications for public transportation management are analyzed, and suggestions for future research are proposed.

2. Theoretical Review

2.1. Service Quality

Service quality refers to the effectiveness, efficiency, and customer satisfaction, and it has evolved from a focus on technical specifications to a broader understanding of the consumer experience. Parasuraman, et al. [5] emphasize the importance of including both tangible and intangible aspects to improve service quality. Grönroos [3] emphasizes that exceeding customer expectations is essential for business success. Fitzsimmons and Fitzsimmons [4] point out that service quality management is fundamental for creating value. Zeithaml, et al. [38] update the SERVQUAL model to reflect the changing market expectations. According to Lovelock and Wirtz [39], technological innovations can enhance the customer

experience. Heskett, et al. [6] consider customer lifetime value a key factor in evaluating service quality, suggesting that maximizing this value is crucial for a company's long-term success.

Kotler and Keller [7] highlight the need to integrate service quality into the company's overall marketing strategy to ensure a sustainable competitive advantage. Vargo and Lusch [8] propose an innovative value co-creation approach, where active customer participation improves service quality, emphasizing the importance of interaction and exchange. Gummesson [40] advocates for a holistic approach to service quality, integrating all organizational functions in delivering value to the customer to achieve service excellence. With the rise of digitalization, Bridges and Fowler [9] highlight the opportunities and challenges for service quality management. Harrigan, et al. [41] emphasize the complexity of service quality in network environments, while Oxide and Huang [10] indicate how artificial intelligence and automation are transforming service personalization and improvement. The evaluation of service quality focuses on understanding customer satisfaction, which Kotler and Keller [42] define based on how the perceived performance of a product compares with prior expectations.

The SERVQUAL model by Parasuraman [1] uses five key dimensions: tangible aspects, reliability, responsiveness, assurance, and empathy to evaluate service quality according to customer expectations and perceptions. In transportation [11], it is indicated that tangible aspects, such as the appearance of the vehicles and the comfort of the facilities, significantly influence the perception of the service. Taking care of these details is crucial for transportation companies that seek to exceed customer expectations, especially in a context where user experience is a priority. Soret and De Obesso [12] add that these tangible aspects, along with interaction with the staff, enrich the customer experience, exemplified in clean and orderly spaces that enhance the perception of professionalism and service excellence. Soret and De Obesso [12] describe reliability as the ability to offer safe and dependable services, fulfilling every promise with special care toward the customer's well-being.

This dimension is essential for establishing bonds of trust and security with customers, ensuring the brand's reputation and reliability. Morocho and Rodríguez [27] point out that reliability also involves building lasting relationships with customers through honesty, commitment to quality, and the ability to learn from mistakes. According to Morocho and Rodríguez [27]; Tatis, et al. [28]; Carbajal and Molla [29]; Valderrama and Plasencia [30]; Sambrano [31]; Tamayo [32]; León [33]; Soldevilla, et al. [34]; Huamaní and Béjar [35]; Del Carpio and Vargas [36]; Cavanaconza and Delgado [37] and Zeithaml, et al. [38], responsiveness involves being agile and willing to assist users, providing quick solutions to exceed their expectations. Soret and De Obesso [12] highlight the importance of responding effectively to customer needs and requests and proactively adapting to any situation.

Security, according to Matsumoto Nishizawa [14];Vilcayauri [15]; De los Cobos [16]; Gómez-Lobo and Briones [17]; Connolly [18]; Torres and Vaquero [19]; Cestau [20]; Sainz de Vicuña [21]; Alcaide and Diez [22]; Brunneta [23]; Pérez and Pinto [24]; Ibarra-Morales, et al. [25]; Zambrano and Caisa [26]; Morocho and Rodríguez [27]; Tatis, et al. [28]; Carbajal and Molla [29]; Valderrama and Plasencia [30]; Sambrano [31]; Tamayo [32]; León [33]; Soldevilla, et al. [34]; Huamaní and Béjar [35]; Del Carpio and Vargas [36]; Cavanaconza and Delgado [37] and Zeithaml, et al. [38] emphasize the importance of employee competence and deep knowledge in generating trust between clients and the company. Morocho [13] adds that security involves effectively solving problems and committing to credibility, integrity, and honesty to strengthen customer relationships. Soret and De Obesso [12] expand on this idea by highlighting that security also refers to the emotional protection of customers, ensuring they feel valued and worry-free during the service. Empathy, according to Vilcayauri [15]; De los Cobos [16]; Gómez-Lobo and Briones [17]; Connolly [18]; Torres and Vaquero [19]; Cestau [20]; Sainz de Vicuña [21]; Alcaide and Diez [22]; Brunneta [23]; Pérez and Pinto [24]; Ibarra-Morales, et al. [25]; Zambrano and Caisa [26]; Morocho and Rodríguez [27]; Tatis, et al. [28]; Carbajal and Molla [29]; Valderrama and Plasencia [30]; Sambrano [31]; Tamayo [32]; León [33]; Soldevilla, et al. [34]; Huamaní and Béjar [35]; Del Carpio and Vargas [36]; Cavanaconza and Delgado [37] and Zeithaml, et al. [38] is achieved through carefully formulated questions that demonstrate a true understanding of the customers' intentions and concerns. This approach has revolutionized the connection between service professionals and customers, offering an effective method to understand dissatisfactions and create a harmonious and understanding service environment. [12-16] highlights the diversity of public transportation through minibuses, ranging from private operations to those managed by government entities, showcasing a variety of models that affect the efficiency and safety of the service. Gómez-Lobo and Briones [17] highlight the importance of adapting operations to suburban needs. Connolly [18] emphasizes the need for policies that prioritize social inclusion and sustainable development in urban areas.

De los Cobos [16] highlights the diversity of public transportation through minibuses, ranging from private operations to those managed by government entities, showcasing a variety of models that affect the efficiency and safety of the service. Gómez-Lobo and Briones [17] emphasize the importance of adapting operations to suburban needs. Connolly [18] underscores the necessity for policies that prioritize social inclusion and sustainable development in suburban areas, where mobility differs from urban areas.

Torres and Vaquero [19] emphasize that winning customer loyalty, from the first contact to the establishment of genuine loyalty, requires careful planning and personalized strategies. López [43] highlights that loyalty involves a constant dedication to the brand, reflected in purchasing and recommending actions that strengthen its market position. Cestau [20] indicates that true loyalty is achieved when services or products consistently exceed expectations, promoting unconditional support for the brand. Sainz de Vicuña [21] observes that the challenge of loyalty intensifies in an environment where consumers have unprecedented access to information.

Effectively evaluating loyalty is crucial for measuring the company's success in meeting and exceeding its customers' expectations [20-44]. This supports the importance of fostering loyalty, not only to ensure consistent revenue but also to turn customers into brand ambassadors. Cestau [20] emphasizes that this loyalty is based on the perception of the value offered and how various tactics influence consumer satisfaction and loyalty. The Net Promoter Score (NPS), proposed by Fred Reichheld, is essential for evaluating customer satisfaction and their propensity to recommend the brand, as noted by Alcaide

and Diez [22]. The experiential facet of loyalty, explored by Brunneta [23], adds depth to the NPS by investigating the emotional bond of customers with the brand and their response to the unavailability of products or services.

In summary, customer loyalty is based on psychological factors, such as positive experiences, and technical aspects, such as the quality and differentiation of the product or service [45]. This highlights the importance of loyalty strategies that address both the emotional and practical needs of consumers, ensuring a lasting and beneficial relationship between the brand and its clientele.

2.2. Customer Loyalty

The statement by Torres and Vaquero [19] highlights the importance of customer loyalty as a comprehensive process that spans from the first contact to the building of a meaningful and lasting relationship. This approach aligns with key strategies of relational marketing and customer experience management (CEM), where personalization and a deep understanding of consumer needs play a central role. According to López [43], loyalty is not limited to a transactional relationship but involves a constant dedication to the brand, reflected in actions such as repeat purchases and recommendations. These actions, in addition to strengthening the brand's position in the market, contribute to the creation of a solid foundation.

True loyalty, according to Cestau [20], is achieved when products or services consistently exceed customer expectations. This level of performance not only ensures satisfaction but also fosters unconditional support that helps strengthen the relationship between the brand and the customer. In this sense, loyalty becomes a key indicator of the company's success, as it reflects its ability to understand and exceed consumer expectations. Evaluating this aspect, as mentioned in Sainz de Vicuña [21], is crucial in an environment where consumers have unprecedented access to information, allowing them to compare and choose among various options more effectively.

Access to information has transformed market dynamics, intensifying the challenge of customer loyalty. Today's consumers not only seek quality in products or services but also expect positive experiences that strengthen their emotional bond with brands. According to Gil [44], fostering loyalty not only ensures consistent revenue but also turns customers into brand ambassadors, multiplying their impact on the company's reputation.

This aspect is especially relevant in a competitive market, where perceptions of the value offered and loyalty tactics determine consumer satisfaction and loyalty [20]. In this context, tools like the Net Promoter Score (NPS), developed by Fred Reichheld, have become essential elements for measuring customer satisfaction and their willingness to recommend the brand [22]. The NPS allows companies to identify promoters, passives, and detractors, providing valuable information about the existing level of loyalty. However, measuring loyalty goes beyond the propensity to recommend. Brunneta [23] explores the experiential facet of loyalty, which adds a dimension.

Customer loyalty is based on two main pillars: psychological factors, such as positive experiences and emotional bonds, and technical aspects, such as quality, differentiation, and the performance of the product or service [45]. This duality highlights the need for comprehensive loyalty strategies that address both the practical and emotional needs of consumers.

For example, moreover, the current environment demands that companies constantly adapt to the changing expectations of consumers. Sainz de Vicuña [21] points out that the amount of available information has empowered consumers, making the task of maintaining loyalty more difficult than ever. This implies that loyalty strategies must be dynamic, based on a deep understanding of customer behavior and supported by reliable data. Tactics such as loyalty programs, personalized experiences, and effective communication are key tools for building lasting relationships with consumers.

In summary, winning and maintaining customer loyalty is not just a strategic task but a continuous commitment that involves the constant improvement of products, services, and experiences. This process, as highlighted by Cestau [20]; Sainz de Vicuña [21]; López [43] and Gil [44], requires a balance between the technical quality of the product and the strengthening of the emotional bond with the customer. By addressing both the practical and emotional needs of consumers, companies can build strong and lasting relationships that are beneficial.

3. Research Methods

3.1. Methodological Approach

The study employed a quantitative, non-experimental, and cross-sectional approach to examine the perceptions of 760 university passengers on five urban public transport lines in the district of Huaraz, Peru. Data collection was carried out at three key time periods: 7:00 AM, 12:30 PM, and 7:00 PM, ensuring a representative analysis of peak travel hours. Among the respondents, 418 were students from the National University of Santiago Antúnez de Mayolo, while 342 attended a private university.

To evaluate the impact of minibus service quality on student loyalty, the study used ordinal logistic regression (OLR), a statistical method particularly suitable for ordinal data, as it takes into account the inherent ranking of categorical variables, unlike multinomial regression. Following the methodological framework described in Silva and Barroso [46], a specific logit model was developed to evaluate the relationship between the dimensions of service quality and students' loyalty intentions, providing a structured and reliable assessment of the key factors influencing satisfaction with public transportation.

3.2. Sample Selection

A representative sample of 255 students was calculated using a sampling formula with a 95% confidence level and a 5% margin of error. This sample includes 140 students from the national university and 115 from the private university.

3.3. Assessment Instruments

SERVQUAL Model: The questionnaire was designed following the SERVQUAL model by Parasuraman, Zeithaml, and Berry, evaluating five key dimensions of service quality: tangible aspects, reliability, responsiveness, security, and empathy.

Ten indicators were used, and a five-point Likert scale was employed, where 1 = Strongly disagree and 5 = Strongly agree. Customer Loyalty: Using the Net Promoter Score (NPS) approach, proposed by Fred Reichheld, the behavioral intentions related to customer loyalty were evaluated. Based on the analysis of Zeithaml, et al. [38], three key indicators were defined: intention to continue using the service, recommending the service, and speaking positively about it. A five-point behavioral intention scale was applied, ranging from 1 = Definitely will not do it to 5 = Definitely will do it.

3.4. Demographic Characteristics of the Sample

The analysis of the 255 participants revealed a diverse profile in terms of age, gender, and preferences. Regarding the age distribution, 31% were 20 years old, 20% were under 19 years old, 18.4% were between 22 and 23 years old, and 16.5% were over 24 years old. Regarding gender, 61.2% were women and 38.8% were men. Regarding education, 79.6% had completed secondary education. Regarding occupation, 58.4% were exclusively students, while 41.6% combined studies with work. Regarding household preferences, 51.4% of participants reported cement as the main flooring material in their homes. Moreover, safety was identified as the most valued aspect of the service.

Table 1.
Descriptive cross-tabulation of service quality and loyalty.

			Loyalty of University Students					Total
			I definitely won't do it.	It's unlikely that I'll do it.	I am indecisive.	It's likely that I'll do it.	I will definitely do it.	
SERVICE QUALITY	Very much in disagreement		18	14	15	3	1	51
		Recount % of the total	7.1%	5.5%	5.9%	1.2%	0.4%	20.0%
	In disagreement		28	12	20	2	0	62
		Recount % of the total	11.0%	4.7%	7.8%	0.8%	0.0%	24.3%
	Neither agree nor disagree		12	10	11	6	7	46
		Recount % of the total	4.7%	3.9%	4.3%	2.4%	2.7%	18.0%
	Agreed		4	8	26	8	7	53
		Recount % of the total	1.6%	3.1%	10.2%	3.1%	2.7%	20.8%
	Very much agreed		3	3	12	7	18	43
		Recount % of the total	1.2%	1.2%	4.7%	2.7%	7.1%	16.9%
Total			65	47	84	26	33	255
		Recount % of the total	25.5%	18.4%	32.9%	10.2%	12.9%	100.0%

4. Analysis and Discussion

4.1. Analysis of Student Loyalty and Perception of Minibus Service

In Table 1, out of a total of 255 students, 25.5% would not use the service again, 18.4% consider it unlikely, 32.9% are undecided, 10.2% would probably use it, and 12.9% would definitely use it. These results reflect a close relationship between the perception of quality and loyalty, a particularly significant aspect among university students in the Andes of Peru, where the quality of services is evaluated not only in practical terms but also in alignment with community and cultural values.

Table 2.
Summary of logistic model evaluation.

Category	Model/Statistician	Logarithm of the likelihood -2	Chi-square	df (Degrees of freedom)	Significance (Sig.)	Nagelkerke
Model Fitting	Only intersection	153,802				
	Final	82,384	71,418**	4	0.000*	
Goodness of Fit	Pearson		14,175	12	0.290	
	Deviation		16,338	12	0.176	
Pseudo R squared						0.256*
Parallel lines test	Null hypothesis	82,384				
	General	66,046	16,338	12	0.176	

Note: *. The model improves significantly (Chi-square = 71,418; p = 0.000) and explains 25.6% of the variability (Nagelkerke R^2 = 0.256).

4.2. Impact of Minibus Service on University Student Loyalty

In Table 2, using the maximum likelihood method, significant improvements in model fit were observed, moving from a log-likelihood of 153,802 in a model with only an intercept to 82,384 in the final model, with a Chi-square value of 71,418 (4 degrees of freedom, Sig. of 0.000), demonstrating a substantially improved capacity of the final model to explain fidelity. The goodness of fit, demonstrated by Pearson and Deviance tests with Sig. values of 0.290 and 0.176 respectively, indicates an adequate fit of the model to the data.

The Pseudo R-squared coefficient, with a value of 0.256 for Nagelkerke, reflects a moderate capacity of the model to explain the impact of the minibus service during peak hours on university loyalty, which is 25%. The parallel lines test yielded a Chi-square of 16.338 (12 degrees of freedom, Sig. of 0.176), confirming the proportionality of odds, thus validating the appropriateness of applying an ordinal logistic regression model. A value less than 0.05 would have questioned the model's adequacy.

Table 3.
Parameter estimates of the impact of service quality on loyalty.

Parameter		B	Std. Error	95% Wald confidence interval		Hypothesis testing			Exp(B)
				Lower	Upper	Wald Chi-square	df	Sig.	
Threshold	[LOYALTY = I definitely won't do it]	-3.128	0.3516	-3.817	-2.439	79.150	1	0.000**	0.044**
	[LOYALTY = It's unlikely that I'll do it]	-2.158	0.3327	-2.810	-1.506	42.068	1	0.000**	0.116**
	[LOYALTY = I am indecisive]	-0.370	0.2987	-0.955	0.216	1.531	1	0.216**	0.691**
	[LOYALTY = It's likely that I'll do it]	0.478	0.2988	-0.108	1.063	2.556	1	0.110**	1.613**
[SERVICE QUALITY= Very much in disagreement]		-2.625	0.4114	-3.431	-1.818	40.705	1	0.000**	0.072**
[SERVICE QUALITY= In disagreement]		-2.915	0.4045	-3.708	-2.123	51.951	1	0.000**	0.054**
[SERVICE QUALITY= Neither agree nor disagree]		-1.819	0.4203	-2.643	-0.996	18.739	1	0.000**	0.162**
[SERVICE QUALITY= Agreed]		-1.127	0.3824	-1.876	-.377	8.682	1	0.003**	0.324**
[SERVICE QUALITY= Very much agreed]		0[a]	.	.	.	.	.	.	1
(Scale)		1[b]							

Note: **. A higher quality of service significantly increases student loyalty (p = 0.000), with odds ratios ranging from 0.044 to 1,613, indicating a strong positive impact.

4.3. Relationship between Service Quality during Peak Hours and University Student Loyalty

In Table 3, people who "Strongly disagree" with the quality of the service have a very low probability of being loyal (B = -2.625; Exp(B) = 0.072), which means their probability of loyalty is only 7.2% compared to those who "Strongly agree." Similarly, those who "Disagree" with the quality of the service have only a 5.4% probability of being loyal (B = -2.915; Exp(B) = 0.054). People who are "Neither agree nor disagree" with the quality of the service also show a low probability of being loyal (B = -1.819; Exp(B) = 0.162), which is only 16.2% of the probability of those who "Strongly agree." On the other hand, those who "Agree" with the quality of the service have a higher probability of loyalty, although it remains low compared to those who "Strongly agree" (B = -1.127; Exp(B) = 0.324), which is 32.4%.

Table 4.
Influence of service quality dimensions on university students' loyalty.

Dimensions of service quality	Logarithm of likelihood -2 (Start/End)	Chi-square	gl	Sig.	Pseudo R squared Nagelkerke
Tangible Aspects	90,058 / 66,543	23.514	3	0.000	0.092***
Reliability	124,686 / 80,273	44.413	4	0.000	0.168***
Response Capacity	121,477 / 75,308	46.169	4	0.000	0.174***
Security	145,214 / 86,213	59.001	4	0.000	0.217***
Empathy	102,388 / 71,613	30.775	3	0.000	0.119***

Note: ***. The dimensions of service quality significantly influence the loyalty of university students, with a Nagelkerke R^2 ranging from 0.092 to 0.217, p =0.000.

4.4. Impact of the Dimensions of the Minibus Service During Peak Hours on University Students' Loyalty

In Table 4, it concisely summarizes how each studied factor impacts loyalty. The results indicate that all factors have a significant impact on loyalty, given the Sig. value of .000 in all cases. Security is the aspect with the greatest influence on

loyalty, as indicated by the highest Chi-square and the highest Nagelkerke Pseudo R-squared (0.217). Reliability and responsiveness also show a notable impact, followed by empathy and tangible aspects. This suggests that, to improve customer loyalty, security should be prioritized, followed by enhancing reliability and responsiveness.

5. Discussion

5.1. Analysis of Student Loyalty and Perception of Minibus Service

The analysis of 255 students in the Andes of Peru shows low loyalty towards public transportation: 43.9% would not use it again or consider it unlikely, while only 23.1% demonstrate a positive intention. Similarly, the study by Sarmiento and Vinueza [47] in Ecuador highlights that the perception of quality in university services is deeply influenced by dimensions such as tangibility, reliability, and empathy, linked to cultural terms like "knowledge" and "comfort," which are essential in community contexts where human relationships play a central role.

On the other hand, the study by Pérez and Pinto [24] in Mexico identifies eight key constructs in the perceived quality of bus service, such as consistent schedules, affordable prices, trust in the staff, waiting time, and route planning. These factors vary significantly among social groups, showing that women have a more positive perception of the service compared to men, who are more demanding regarding the price-quality ratio. This finding reflects how perceptions are influenced by specific contexts and cultural roles.

In the Peruvian context, students value services that respect and reinforce community and cultural values, while in Colima, the perception of convenience and accessibility defines satisfaction. Both approaches emphasize the importance of integrating technical and emotional improvements in service design, recognizing the cultural particularities of each community.

In conclusion, perceived quality, linked to comfort, knowledge, empathy, and tangible factors such as prices and schedules, is crucial for student loyalty and satisfaction. Institutions in Peru, Ecuador, and Mexico must adapt their services to the technical and cultural needs of their users, promoting not only efficiency but also a deep respect for the values and traditions that characterize their communities.

Impact of Minibus Service on University Student Loyalty

The results show that the quality of public transportation service has a significant impact on university students, especially in contexts where loyalty and well-being are deeply intertwined with cultural and community values. The loyalty analysis reflects a moderate impact of 25%, highlighting the importance of operational and tangible factors of the service, which are essential for user perception.

On the other hand, the study conducted by Sarmiento and Vinueza [47] highlights an 11% impact of empathy on student well-being. Although its effect is smaller, this finding underscores the relevance of human factors in communities where empathy, respect, and emotional connection are valued for their link to social cohesion and a sense of belonging.

Both analyses agree that, to improve the perception of the service, operational improvements must be balanced with a human approach that respects and promotes the cultural particularities of the students. In Andean environments, empathy not only contributes to enhancing the user experience but also reinforces collective values, becoming a pillar of perceived quality.

In conclusion, in contexts with a strong cultural identity, such as the Andes, the quality of public transportation services must address both the technical and the emotional and cultural needs of students. Integrating operational strategies with empathetic human treatment not only enhances student loyalty and well-being but also strengthens community and cultural ties, which are fundamental for coexistence and social development.

5.2. Impact of Minibus Service on University Student Loyalty

The loyalty analysis in the Peruvian Andes shows a moderate 25% impact of public transportation service quality on student loyalty, highlighting the importance of operational and tangible factors in user perception. For their part, Zarzosa, et al. [48] identify an 11% impact of empathy on student well-being, emphasizing the relevance of human factors such as empathy, respect, and emotional connection, which are essential for social cohesion and a sense of belonging. These findings indicate that, to improve the perception of the service, it is necessary to balance operational improvements with a human approach that values the cultural particularities of the students.

In Andean communities, empathy not only enhances the user experience but also reinforces collective values, becoming a key pillar of perceived quality. This is especially relevant in contexts where public transportation services are concerned.

On the other hand, Ramírez, et al. [49] analyze public transportation in Nuevo León, Mexico, highlighting its critical impact on the student community. Although the urban transportation system operates throughout the state, students face the greatest challenges due to their dependence on the system. This analysis highlights factors such as schedules, accessibility, and reliability, identified as key elements in the perceived quality of the service. Moreover, it emphasizes that public transportation not only meets functional needs but also affects quality of life and educational opportunities.

In conclusion, the perceived quality of public transportation, linked to factors such as comfort, empathy, and operational improvements, is fundamental to fostering student loyalty and well-being. Institutions in strong cultural contexts must adapt their services to the technical, cultural, and emotional needs of their users. This will not only promote a greater degree of satisfaction and loyalty but also strengthen community bonds, which are essential for academic and social development.

5.3. Relationship between Service Quality during Peak Hours and University Student Loyalty

The results of Table 3 reflect that the perception of the quality of public transportation service is directly related to user loyalty. People who "strongly disagree" have an extremely low probability of being loyal (7.2%), while those who "strongly agree" show the highest probability (100%). These findings reinforce the importance of a positive perception in promoting

loyalty.

When compared with the study by Norabuena, et al. [50], a direct and significant relationship between perceived quality and loyalty is observed (d = 0.368, p = 0.000). Although the strength of this relationship is weak, it highlights that improvement in quality, even in informal services, positively impact loyalty. This approach is especially relevant in Andean communities, where the perception of quality is closely linked to cultural and trust values.

On the other hand, Zarzosa Marquez, et al. [51] highlight that factors such as responsibility (0.300, p = 0.000), empathy (0.285, p = 0.000), and security (0.238, p = 0.000) have a moderate impact on student well-being. This aligns with the need for a comprehensive approach that values both the operational and human aspects of the service, which is essential for strengthening the relationship between users and services in cultural contexts where trust and community are key.

In communities with a strong cultural identity, such as the Andean ones, the quality of public transportation service is related to both loyalty and student well-being. Improving key dimensions such as responsibility, empathy, and safety not only strengthens the perception of the service but also reinforces community ties, which are essential for a sustainable relationship between users and services.

5.4. Impact of the Dimensions of the Minibus Service During Peak Hours on University Students' Loyalty

The results of the sample show that all the studied factors have a significant impact on the loyalty of public transport users, as evidenced by a statistical significance value of 0.000 in all cases. Safety stands out as the aspect with the greatest influence, supported by the highest Chi-square and Nagelkerke's Pseudo R-squared (0.217). Other factors, such as reliability and responsiveness, also have a considerable impact, followed by empathy and tangible aspects. These findings suggest that to improve loyalty, strategies should prioritize safety, followed by improvements in reliability and responsiveness.

The analysis by Taramuel, et al. [52] reinforces these results by identifying safety as the most valued element for urban public transport users. Specific variables, such as gradual acceleration, gentle braking, and constant speed, stand out as key factors in the perception of a safe service. This finding aligns with the research of Zarzosa, et al. [48]], where the goodness-of-fit indices reflect the importance of safety, showing a moderate but significant impact on university well-being.

In addition to security, reliability and responsiveness proved to be significant factors. The users of Taramuel, et al. [52] valued the consistency of the service, while in the SERVQUAL model, these factors were also associated with a notable impact on loyalty. Although empathy has a lesser impact compared to security, all studies agree that its effect is significant. Taramuel, et al. [52] report a weak but present (11%) impact of empathy on student well-being, highlighting its importance as a complement in the perception of service quality.

However, there are differences in the relative weight of the factors and in the methodological approaches employed. While in Taramuel, et al. [52] security stands out as the most valued factor, in the SERVQUAL model, security shares relevance with reliability and responsiveness. Moreover, the analyses in Taramuel, et al. [52] adopt a non-experimental descriptive approach, while the other studies employ more detailed statistical models, such as logistic regression.

In conclusion, safety is the most important factor for improving loyalty and well-being in public transportation. Reliability, responsiveness, and, to a lesser extent, empathy also have a significant impact. The research conducted by Zarzosa, et al. [48] reinforces the importance of using adjusted models that evaluate both the overall impact and the variations in specific dimensions of the service. Improvement strategies should prioritize safety, complementing it with initiatives that strengthen reliability and human relationships in the service, always adapting to the cultural and contextual particularities of each region.

6. Conclusions and Recommendations

6.1. Conclusion 1: Impact of Service Quality on the Loyalty of Andean University Students

The quality of the minibus service during peak hours significantly influences student loyalty, highlighting the importance of safe, accessible, and culturally respectful transportation.

6.2. Conclusion 2: Negative Perception and Its Relationship with User Loyalty

The low fidelity to the minibus service reflects issues related to the lack of sensitivity toward the cultural identity of the students, presenting an opportunity to implement improvements in safety and inclusive treatment.

6.3. Conclusion 3: Critical Dimensions in Service Quality

All dimensions of service quality impact loyalty, with safety standing out as the most relevant aspect, highlighting the need for inclusive training that is sensitive to ethnic diversity.

6.4. Conclusion 4: Direct Relationship Between Service Quality and Loyalty

The promotion of safe, accessible, and respectful transportation for Indigenous cultures significantly increases student loyalty, strengthening their inclusion in an equitable and diverse environment.

6.5. Recommendation 1: Inter-Institutional Coordination to Ensure Security

Encourage collaboration among local governments, transportation companies, universities, and the police to implement effective security measures during peak hours.

6.6. Recommendation 2: Incorporation of Cultural Elements in the Service

Design initiatives that integrate Andean identity into the minibuses, such as decorations and messages in indigenous

languages, while respecting the cultural diversity of the students.

6.7. Recommendation 3: Optimization of Transportation Routes and Schedules

Establish joint work between universities and transportation companies to identify specific needs, monitor service quality, and reinforce security at critical points.

6.8. Recommendation 4: Participatory Design of Accessible Fares and Routes

Create dialogue forums led by universities, with the participation of local governments and transportation companies, to agree on fair rates and more inclusive services, fostering respect for the cultural identity of users.

6.9. Limitations

This study presents limitations that must be considered when interpreting its findings. First, the geographical scope restricted to the district of Huaraz prevents generalizing the results to other regions with different dynamics. Moreover, the cross-sectional design does not allow for the analysis of changes in the perception of service quality and loyalty over time.

6.10. Suggestions

For future research, it is suggested to expand the study's coverage to other cities or regions to make contextual comparisons. It would also be beneficial to employ longitudinal studies that analyze the evolution of loyalty and service perception over time. The combination of qualitative methods, such as interviews or focus groups, would allow for a better understanding of the user experience.

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