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THE IMPACT OF TRANSPORTATION SERVICE QUALITY ON CUSTOMER SATISFACTION ACCORDING TO FRENCH AND EUROPEAN STANDARD 13816. A FIELD STUDY OF A SAMPLE OF TRAVELERS FROM THE NATIONAL RAILWAY TRANSPORT COMPANY SNTF ANNABA, ALGERIA

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Abstract

In today's increasingly competitive environment, companies are striving to improve customer satisfaction by enhancing the quality of their services. This study examines the impact of transport service quality on customer satisfaction at the national rail transport company (SNTF) in Annaba. Focusing on a spectrum of indicators - ranging from service offering, accessibility and information provision to time efficiency, customer care, comfort, safety and environmental impact - we sought to quantify their influence on customer satisfaction. Using a quantitative approach, we circulated 277 questionnaires at random among SNTF Annaba train passengers, and analyzed the collected data using SPSS statistical software. The results confirm the existence of a positive correlation between transport service quality indicators and increased customer satisfaction. Significantly, there is a strong commitment to adhering to the AFNOR NF EN 13816 standard, with passengers showing a high level of satisfaction with the services provided. While confirming the company's sound approach to implementing a quality-focused policy, our analysis has identified areas for further improvement to enhance customer satisfaction. These findings underline the need for continued efforts to remedy existing shortcomings and enhance customer satisfaction.

Keywords: *transport service quality; the NF EN 13816 Standard; customer satisfaction; SNTF.*

JEL Codes : *L92, M31, O18, R41*

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Introduction

The transport sector has an important role to play in the economic development of countries, as it is the backbone of economic and social growth (Makhlouf, 2020). And yet, transport sector services are often insufficient to meet demand, and even when they are available, they are deficient (Amponsah, 2016). Although some forms of daily transport, such as buses and cars, are available, these modes of transportation are a source of disruption due to traffic congestion on the roads, extremely poor conditions within them and the lack of quality of services offered, if services exist at all. This leads to individual impatience and irritation (Amirouche, 2019). This is why most transport companies are making efforts to be more customer-oriented, and service quality is the customer's assessment of the overall superiority or excellence of the service. As a result, the quality of ground transportation services is the passengers' overall assessment of public transportation performance, the higher the performance of the transport service, the greater the positive passenger perception of that quality, and vice versa. This is what has led to the attempt to develop these means and provide quality services, in an attempt by the stakeholders to retain their clientele and achieve what they want (Getachew, 2019). The growing trend towards sustainability issues, particularly sustainable transport, has led to the rise of rail transport in many heavily populated cities due to its multiple advantages, such as the ability to handle large numbers of passengers at once, its safety and on-time performance, as well as its energy efficiency (Wang, Zhang, Zhu and Wang, 2020). Furthermore, it is worth pointing out that this is the only type of transport that has registered a reduction in harmful CO2 emissions (Tzvetkova, 2021).

For this reason, there is a fast-growing trend towards rail transport, especially in urban areas, in many countries around the world (Wang, Zhang, Zhu, & Wang, 2020). The best illustration of this is provided by the countries of the European Union, which have designated 2021 as the "European Year of Railways". This was based on the enormous potentials it offers, as well as on the stable growth of the pan-European transport system as a whole (Tzvetkova, 2021). The same is true in Algeria, which is experiencing a major transport crisis. Roads are congested, with heavy traffic chaos and a large number of road accidents due to drivers' over-speeding. This leads to delays in people's mobility. All these difficulties in getting people to their destination, combined with the vast geographical size of Algeria, has driven the Ministry of Transport to work towards the development of new modes of mass transit in urban areas, such as the Algiers metro and tramway projects in several walleyes (Sétif, Constantine, Oran, Sidi Bel Abbès and Ouargla). In addition, there are urban and semi-urban public transport companies in all the country's wilayas. (Mekhlouf, 2020) Not forgetting trains, to which the Algerian government devotes the

highest priority in order to improve services, due to their importance in the economic sphere, such as the transport of goods, as well as in the social sphere, such as the transportation of people (Amirouche, 2019). It was therefore necessary to find out whether government policy and expenditure on the public transport development program had effectively contributed to improving rail transport. The purpose of this study is to assess the quality of the transport service provided by the National Rail Transport Company (SNTF) in Annaba, Algeria and its impact on customer satisfaction, while also providing recommendations for improving the service on the basis of the study's findings.

1. Research Question:

The low quality of transport services and infrastructure inefficiencies are major factors fueling transport crises (Tzvetkova, 2020). In this field, the French standard NF EN 13816 on the quality of transport services, particularly public transport services, is considered to be the most important and comprehensive specification, since it focuses on customer needs and expectations and it represents one of the best options for assessing the quality of rail transport service as perceived by passengers and for detecting any shortcomings likely to affect the quality of this service (AFNOR, 2002), on the basis of the independent variable "quality of transport service" and the dependent variable "customer satisfaction", this study will attempt to answer the following question:

What are the main indicators of quality of transport service -according to the French standard AFNOR NF EN 13816- that influence customer satisfaction at SNTF Annaba?

Based on the results of research conducted by a group of researchers such as Bouanane (2007); Kechkoush (2018); Mekhlouf (2020); Shen, Wang, & Xiao (2016); Amponsah (2016) and Getachew (2019), we adopt the following hypothesis to answer this question:

Main hypothesis H1: There is a positive influence of the quality of transport service indicators provided by the national rail transport company SNTF in Annaba on customer satisfaction.

Secondary hypotheses:

- There is a positive effect of the "Service provided" indicator from SNTF in Annaba on customer satisfaction.
- There is a positive effect of the indicator "Easiness of access" to the services provided by SNTF in Annaba on customer satisfaction.
- The indicator "Availability of information" on the services provided by SNTF in Annaba has a positive effect on customer satisfaction.

- There is a positive effect of the indicator "Timing" of the services provided by SNTF in Annaba on customer satisfaction.
- There is a positive effect of the "Customer care" indicator for services provided by SNTF in Annaba on customer satisfaction.
- There is a positive effect of the "Comfort" indicator of the services provided by SNTF in Annaba on customer satisfaction.
- The "Safety" indicator for services provided by SNTF Annaba has a positive effect on customer satisfaction.
- There is a positive effect of the indicator "Environmental impact" of the services provided by SNTF in Annaba on customer satisfaction.

Literature Review

Among the reference studies adopted by researchers to determine the research trajectory are:

Amponsah's (2016) study, aimed at assessing the correlation between tangible and intangible dimensions of service quality and the level of customer satisfaction with transit operations in the British Columbia region. The author used an analytical method with a random sample of 205 urban residents. The SERVQUIL model was adapted to study this sample, revealing a statistically significant correlation between service quality and customer satisfaction, as well as a significant negative impact of service delays and fare paid on overall satisfaction.

Getachew's (2019) study, intended to measure the influence of transport service quality, in terms of reliability, safety, comfort, security and convenience, on the satisfaction of customers using vehicles such as tuk-tuks, commonly known as bajajs in Asian and Middle Eastern countries. A descriptive and conclusive methodology was used to analyze closed and open-ended questionnaires obtained from 320 participants. Regression analysis indicated that reliability, safety, comfort and security had a significant impact on customer satisfaction.

Amirouch (2019) studied the contribution of reforms implemented in the Algerian rail sector to the achievement of service quality, focusing on the National Rail Transport Company (SNTF) in Constantine. The theoretical part of the study used a descriptive-analytical approach, while the empirical part employed a survey method. The SPSS analysis of the results showed that the company studied lacks a clear and defined quality policy, requiring detailed and simplified programs to improve the quality of rail services.

The study by Wang, Zhang, Zhu, & Wang (2020) focused on evaluating the important dimensions of service quality and customer satisfaction for rail trips in order to

improve service, increase passenger numbers and achieve a sustainable transport policy. The researchers used a structural equation model (SEM) to design service quality, including functional quality, technical quality, comfort, cleanliness, service planning and reliability. This research used a descriptive-analytical methodology and cluster sampling to collect 220 complete questionnaires, showing that service quality has a positive impact on reuse intention through improved customer satisfaction.

Mekhlouf's (2020) paper measured user satisfaction with Annaba's public and semi-urban transport services, within the context of the government's efforts to improve the quality of public transport service. It used an inductive approach for the theoretical part and a survey and observation methodology with 314 respondents in the field. It adopted the ServPerf model, using AFNOR service quality indicators instead of the model's dimensions, revealing that people's journeys in the urban environment are bound by fixed schedules such as work and study, and that the quality of the public transport service offered by the ETUS company is acceptable but fails to fully meet users' expectations in all its aspects. Although user satisfaction rates are acceptable compared with those of private bus services, they are still insufficient.

Summarizing the main findings of the previous studies:

- Quality of transport service and customer satisfaction have attracted a great deal of interest both at local and global level.
- The majority of previous studies concentrated on the practical side, looking at samples of the industry as a whole.
- This present study stood out by tackling an important sector, rail transport, to investigate passenger satisfaction, unlike the study by Amirouch (2019) which targeted employees and their knowledge and implementation of quality policies in the same sector, whereas the other studies focused on various modes of ground transport.
- In addition, this study set itself apart by using eight specific dimensions of service quality for transportation, while most studies focus on general dimensions of service quality (reliability, responsiveness, assurance, tangibility and empathy).
- Our study joined Mekhlouf (2020) in adopting the ServPerf model to measure real service performance, and using AFNOR (2002) indicators instead of the dimensions specific to the model, but in a field study of the National Rail Transport Company.

Aim and Objectives of The Study

This study aims to measure the real performance of the quality of transport service provided by the National Rail Transport Company (SNTF) in Annaba, and its effect on passenger satisfaction. It relies on a set of indicators specific to public passenger transport,

issued by the French Association for Standardization (AFNOR) in collaboration with the national institute for transport and safety research (INRETS) in France. These indicators aim to help companies stay and prosper in the transport market by applying a quality approach to public transport, and by targeting customer needs and expectations (AFNOR, 2002).

The significance of this study resides in the fact that we went out into the field to assess customer satisfaction with the quality of services provided by SNTF in Annaba. Knowing what criteria passengers prioritize when assessing the quality of the transport service enables the company's management to develop its mode of service delivery in line with customer wishes, and thus achieve higher levels of satisfaction. Furthermore, the study helps to pinpoint the weak points in the quality indicators used by SNTF in Annaba, which lead to customer dissatisfaction and discontent.

The goals of the study can be formulated in accordance with the results that the researchers aim to achieve on a theoretical and practical level, as follows:

- To understand the theoretical concepts of service quality and customer satisfaction;
- To define the concept of transport service quality, associated indicators according to the French standard (NF EN 13816) and measurement models;
- To analyze the level of commitment in the application of the NF EN 13816 standard by the SNTF company in Annaba;
- To analyze the level of satisfaction with the quality of the transport service provided by SNTF in Annaba from the passengers' point of view;
- To understand and measure the impact of the quality indicators of the transport service provided by SNTF in Annaba on customer satisfaction, and to determine the most important indicators;
- To make recommendations on the basis of the results obtained from the study and the experimental model of the relationships of influence between variables, which might improve customer satisfaction.

The Methodology and The Area of Study

The quantitative method is the basis of this study, since it involves measuring, analyzing and testing the research hypotheses, and obtaining significant figures to support the research problem. The field of study consists of the following:

- **Spatial coverage:** The study was carried out at the National Rail Transport Company SNTF in Annaba;
- **The time frame:** It took some time to determine the study's target sample and to distribute the questionnaire, resulting in a 3-month period of fieldwork;

- **The human dimension:** The questionnaire was distributed to a random sample of 320 passengers travelling on SNTF trains in Annaba, of whom 277 were responded to.

2. The theoretical framework of quality of transport service and customer satisfaction

This includes the fundamental concepts of quality of transport service, customer satisfaction and measurement models for these two concepts.

2.1 Quality of transport service

There are many definitions of service quality, particularly those relating to public passenger transport. Before discussing these definitions, we will look at the definition and characteristics of public passenger transport service.

Public passenger transport: Public passenger transport is defined by article 2 of law no. 01/13 on the orientation and organization of land transport as "all transport carried out for remuneration and on behalf of third parties by an operator who transports people from one place to another by road, rail or any appropriate vehicle with a capacity of at least 9 seats" (Executive Decree no. 01/13 on the orientation and organization of land transport, no. 44, August 7, 2001, page 85).

Public passenger transport consists of services with the following characteristics:

- It is open to anyone, whether a single passenger or a group;
- It has a defined timetable or frequency, as well as operating periods;
- It operates according to itineraries and stops at defined points;
- The areas they serve are well defined and provided on a continuous basis, in addition to their fares being known to the general public (AFNOR, 2002, p. 5).

Quality of transport service: for some, the quality of public passenger transport service is defined as "safe travel", while for others, it means punctuality and regularity. Consequently, quality of transport service is a set of qualitative standards for which the service provider (transport company) is responsible, and is linked directly to the level of satisfaction expressed by the user of the public transport service. (Lahoul & Shahli, 2015, p. 192)

The way transport service quality is defined varies according to the parties involved in the service:

- For the beneficiary/customer: The quality of the transport service is the adaptation of this service to its uses and the satisfaction of its needs;

- For service providers/employees: who have direct customer contact, it is a reflection of a list of indicators and a work procedure that must be applied;
- For the transport company: it is the compliance of the transport service with pre-established standards (Amirouche, 2019).

Quality of transport service indicators: According to AFNOR (2002), the general quality of public passenger transport consists of a large number of standards representing the customer's point of view on the service provided. Transport service quality is divided into eight indicators according to this standard. The first two indicators outline the public passenger transport offer in more general terms, indicators 3 to 7 provide a more detailed description of service performance, whereas indicator 8 describes the environmental impact on society at large.

A summary of these indicators follows:

1. Service delivery: the delivery of the transport service is associated with a set of elements and measures that can improve the quality level of the transport service. These elements depend on the degree of modernity of the means of transport, the number of vehicles available, the routes they cover, compliance with journey start and end times, and vehicle capacity.
2. Accessibility: for transport, the flexibility of the itinerary and its route is even more important than the speed factor. This is also shown by the importance of convenient stations and their distribution in strategic areas that enable passengers to get there easily.
3. Information availability: the provision of information on departure and arrival times, and waiting times, not only contributes to service quality, but also makes it easier for passengers to find out the various timetables for their journeys. Such information is represented by trip prices, duration and destinations.
4. Timing: the amount of time spent can be a determining factor in customers' willingness to pay more for less time. For instance, if we take the use of urban transport as an example, we see that many customers would rather travel by cab to save time than by bus. Time also influences the customer's choice of a particular mode of transport.
5. Customer care: Attention to the customer is demonstrated by the impeccable and distinctive way in which service providers dress, as well as by the way in which they are treated, since they represent the company. This is achieved through good treatment, orientation and hospitality.
6. Comfort: Good condition of the means of transport contributes significantly to the customer's comfort and well-being, as does the cleanliness and condition of the seats.

7. Safety: Assessing safety is considered to be one of the most important psychological concerns for travelers when using the various means of transport and their basic facilities. Safety is expressed through safe driving, and the availability of safety equipment and resources in the car.

8. Environmental impact: Modern public transport has a positive impact on the environment, helping to keep the environment clean and the urban landscape appealing (AFNOR, 2002).

2.2 Customer satisfaction

Defining customer satisfaction: The literature demonstrates that customer satisfaction is an essential factor in long-term business success. Kotler defines it as "the customer's judgment of the consumption or use experience resulting from product expectations and perceived performance" (Maadani, 2010, p. 5).

Reed & Haal define it as "the customer's degree of awareness of the company's effectiveness in providing products that meet their needs and desires" (Al-Ta'i & Al-Abbadi, 2009, p. 220). According to Bouanane, "the customer values the service on the basis of his previous experience, and if this experience is lacking, he relies mainly on his expectations during the pre-purchase phase. His future expectations of the service are an indication of a current performance evaluation process, which means that the customer's orientation or attitude towards the service adapts to his expectations." (Bouanane, 2007, p. 77)

2.3 The relationship between quality of service and customer satisfaction

Opinions differ as to the interpretation of the connection between quality of service and customer satisfaction. Although a clear and certain relationship exists between the two, researchers are still unclear about the nature of this relationship and how service quality and customer satisfaction are connected.

Bateson made a distinction between quality of service and customer satisfaction, considering quality as an attitude that the customer forms in evaluating the service provided, whereas satisfaction represents the final decision as to his assessment of the exchange process in progress. Researchers argue that the difference between service quality and customer satisfaction revolves around the definition of expectations. Their research argues that the significance of expectation for satisfaction arises from the comparison of expected service performance with the perceived performance of the same service.

Customer satisfaction can be viewed through two lenses. The first concept focuses on specific transactions or a specific service, while the second concept is based on cumulative transactions, i.e. all the customer's purchasing or consumption experiences over

a given period of time. These transactions are seen as an indicator of actual performance in the past, present and future.

The stages to achieve satisfaction: Achieving customer satisfaction involves a series of phases to reach either satisfaction or dissatisfaction. It is vital for the service provider to stay connected to its customers in order to determine their needs and satisfy them at the right time and in the right place. Customer satisfaction crystallizes through three main stages:

1. Customer needs understanding: One of the most important steps in achieving and evaluating customer satisfaction. It involves monitoring the characteristics and elements that influence satisfaction, in order to avoid discrepancies between the expected and perceived quality of the services provided. Researchers have identified four elements that influence customer satisfaction: basic service elements expected of competitors, support services making service more efficient, systematic problem solving, exceptional services solving diverse problems for several customers.

2. Customer feedback: Here, the methods and techniques used by marketers to monitor customer opinions come into play, in order to find out how well their organizations are fulfilling their customers' expectations. This can be done through the response;

3. Continuous measurement: The final step in achieving satisfaction, consisting of the organization implementing a specific program to measure consumer satisfaction, such as a customer satisfaction matrix (CSM) system, in order to continuously monitor customer satisfaction (Meziane & Ben Salem, 2020).

2.4 Quality of service measurement models

Models for measuring service quality from the customer's point of view: A variety of models have been proposed for measuring service quality with the aim of improving the level of service provided to customers, including public services, based on the perception of consumer satisfaction (Msalleh, 2012). The Service Performance Model (ServPerf) is one of the most common and widely used models, as it measures service quality from the customer's point of view.

Also known as the trend model, it was developed by Steven Taylor & Joseph Cronin in 1992 following criticism of the service quality model. They both agreed that it was inappropriate to measure service quality based on the difference between customer perceptions and expectations, prompting them to propose an alternative model measuring actual service performance as a form of trending (Djebili, 2010). It can be expressed as follows:

Quality of service = Actual service performance

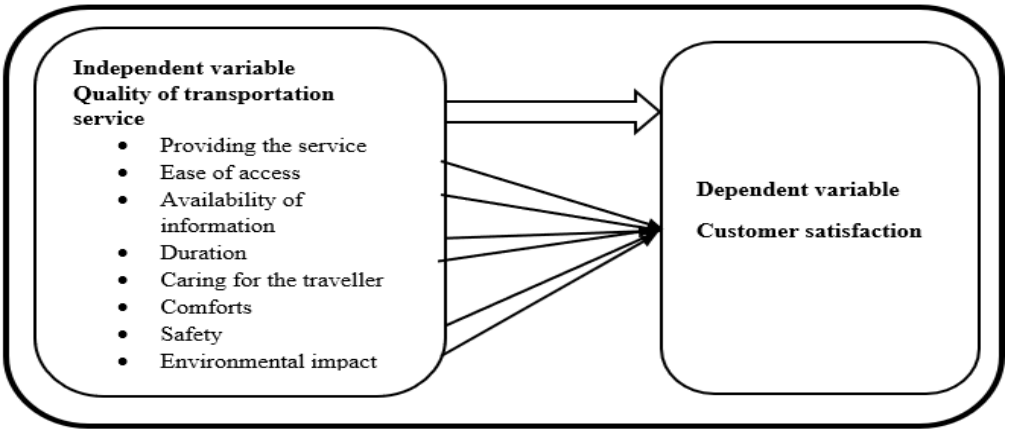
The trend model evaluates actual service performance and discards the idea of deviation when the customer assesses the quality of service. It concentrates solely on customer perceptions, as service quality is expressed as a form of trend. Under this model, satisfaction represents an intermediate factor between previous perceptions of service quality and current performance. In this context, researchers believe that the first orientation towards service is a function of the customer's earlier expectations, and that his future expectations of service are a function of his assessment of its current performance (Chirouf, 2010).

Field study model: Before explaining this model, we should note that theoretical references presume that satisfaction is a reaction of a customer consuming a product in line with his expectations, and its evaluation requires the measurement of multiple dimensions of service quality in order to give us a clear picture of overall customer satisfaction, which is crucial for the different parties involved.

Relying on previous studies, to measure the independent variable (transport service quality) and the dependent variable (customer satisfaction), we have adopted the same principles as the ServPerf trend model. However, we will not be using its specific service quality dimensions, but we will instead be using the indicators of standard NF EN 13816, which specializes in the quality of public transport services for passengers, as it is more exhaustive in defining the study's indicators.

In line with the above points, **Figure 1** illustrates the study model, highlighting the dependent variable and its indicators, along with the independent variable, as well as the relationships between them that will be tested.

Figure no. 1 Field study model



Source: Developed by the researchers based on a study by Lahoual and Chehli (2015) & Mekhlouf (2020)

3. The framework of the field study.

The methodological procedures of the study involve observation and data analysis methods. Observation of the study community: The survey targets train passengers travelling in and out of the city of Annaba, where the average daily number of passengers according to the institution's statistics is 1,934, distributed over three lines as follows:

- The line linking the city of Annaba to the municipality of Sidi Amar, designed for students;
- The line linking Annaba to the municipality of Chehana, extending to Tébessa via Souk Ahras;
- The line linking the city of Annaba to the municipality of Berrahal, reaching El Aga station in the city of Algiers.

Using Steven Thompson's equation (Thompson, 2012, p. 59), consistent with likely observations given that the objective of the study is to generalize, our sample size becomes 320 passengers according to the following formula:

The questionnaires were distributed in the stations and inside the train carriages. A

$$t = \frac{N \times p(1-p)}{(N-1)(a^2/z^2) + p(1-p)}$$

random sampling methodology was used, taken from the entire population, where the number of questionnaires collected amounted to 277 complete questionnaires.

Methods of data analysis: The SPSS statistical software was used to meet the study objective. The following statistical methods were employed:

- Cronbach's alpha coefficient: To assess the reliability of the questionnaire, Cronbach's alpha coefficient was calculated. This coefficient is one of the best estimates of internal consistency and is widely used by researchers.
- Kolmogorov-Smirnov, Skewness and Kurtosis test: This was performed to check the distribution of the data used.
- Frequencies, means and standard deviations: This provides a complete description of the characteristics of the sample studied and its degree of agreement.
- One-sample T-test: This was performed to test significance.
- Simple and multiple linear regression, using a stepwise method to analyze the relationship and impact between variables, test hypotheses and select the optimal model for the study.

Testing the reliability and suitability of the survey tool.

Appearance validity: The questionnaire was submitted to a panel of evaluators from the University of Souk Ahras and Oum El Bouaghi, specialized in the fields of Quality and Marketing. In addition, it was presented to a number of employees of the National Railway Company to assess the accuracy of the questions and their appropriateness to the objectives of the study. Some of the questionnaire questions were reviewed in the light of changes recommended by the evaluators.

Statistical reliability: To measure the accuracy of the questionnaire, Cronbach's Alpha equation was used to assess the consistency and correlation between questionnaire questions. This coefficient must exceed the statistically acceptable threshold, which is generally 70%. The following table shows the final results of the overall reliability coefficient for each study variable.

Table No. 1 - Testing the reliability of the questionnaire items for each variable using the Cronbach's alpha reliability coefficient

Statement	Number of paragraphs	Cronbach's alpha coefficient
Quality indicators for combined transport services	42	0.852
After satisfaction	6	0.828
Global questionnaire reliability coefficient	48	0.882

Source: Prepared by researchers based on SPSS outputs

From the table above, it can be seen that the alpha coefficient for questionnaire items exceeds (80%) for both dependent and independent variable items. This indicates correlation and consistency between questionnaire items. As the statistically acceptable threshold is (70%), this confirms the stability of the tool used in our study. Normal distribution test: It is necessary to check whether the data are normally distributed or close to a normal distribution, using the skewness and kurtosis indices.

Skewness is present when values fall outside the defined interval [1-, 1+], and the same applies to kurtosis when values fall outside the interval [1.5-, 1.5+]. The distribution is considered normal or close to normal if the values lie within the same intervals. The following table shows the degree to which the data match the normal distribution.

Table no. 2 - Results of the normal distribution test for the data using the skewness and kurtosis factors.

Respondents' data to questionnaire topics	Skewness coefficient		Kurtosis coefficient	
	Statistical value	Std. Error standard error of the coefficient	Statistical value	Std. Error standard error of the coefficient
Service provision	-0,062	0,146	-0,162	0,292
Ease of access	-0,062	0,146	0,059	0,292
Availability of information	0,224	0,146	-0,421	0,292
Timing	-0,628	0,146	-0,080	0,292
Customer care	0,140	0,146	0,431	0,292
Confort	-0,069	0,146	-0,490	0,292
Safety	-0,357	0,146	0,105	0,292
Environmental impact	-0,115	0,146	-0,169	0,292
The care for the customer	-0,778	0,146	1,094	0,292

Source: Prepared by researchers based on SPSS outputs

Based on the above table, we note that all statistical values fall within the defined intervals. Consequently, it seems that respondents' data on the questionnaire dimensions follow a normal distribution. This allows us to use parametric statistical tools to test and analyze the study hypotheses.

4. Presenting and analyzing the results of the study

Descriptive statistics regarding personal data: Appendix 1 shows that the majority of individuals in this sample are male, aged between 18 and 35, have a university education and work as employees or are students attending university. Their income peaks at 18,000 DA. They live mainly in the downtown area, travel by train daily or twice a week. In addition, they do not own a private car, meaning that the main means of public transport for them is the train. In particular, this situation illustrates employees' and students'

commitment to their jobs and studies, as well as the proximity between their work/study locations and the three rail lines.

Table no 3 Descriptive statistics for transportation service quality indicators

Indicators	Arithmetic mean	standard deviation	Coefficient of variation CV	Degree of approval
Service provision	3,3068	0,5623	17	Medium
Ease of access	3,5640	0,5806	16,29	Strong
Availability of information	2,9593	0,6758	22,88	Medium
Timing	3,4205	0,7937	23,20	Strong
Customer care	3,5972	0,5200	14,45	Strong
Confort	3,2657	0,5335	16,33	Medium
Safety	3,6093	0,5527	15,31	Strong
Environmental impact	3,0156	0,6013	19,94	Medium
Quality of transport services	3,3423	0,6025	17	Medium

Source: Prepared by researchers based on SPSS outputs

The table above reveals that the majority of travelers' responses lean towards a strong or moderate degree of agreement, with strong levels of approval for safety, customer care, ease of access and duration, with averages ranging from (3.6093) to (3.4205). There is moderate agreement for service, comfort, environmental impact and information availability, with means of (3.3068), (3.2657), (3.0156) and (2.9593) respectively.

As for standard deviations and coefficients of variation, no significant differences were recorded in travelers' responses, indicating a homogeneity of responses in terms of agreement. This is a strong point of the SNTF (National Rail Transport Company), which guarantees the presence of security agents on all its routes, as well as a special car for national gendarmerie agents on regional and long-distance trains. Police officers are also present in stations. The driving style and the presence of brakes also help to avoid traffic accidents.

The high degree of agreement for the customer care index reflects the importance the company attaches to its customers. It ensures this by training and upgrading employee skills, offering quality services, dealing with suggestions and complaints, offering competitive fares and attractive offers, as well as providing appropriate uniforms for employees to help guide passengers when needed.

The strong confirmation of ease of access and duration reflects the excellent infrastructure put in place by the relevant organization, covering most of the routes in the areas concerned. This also facilitates ticketing and wagon loading/unloading. What's more, the flexibility and organization of the timetable are taken care of by the company's customer service, as is the regular maintenance provided for wagons and tracks.

In contrast, moderate agreement on the other indicators shows a divergence of opinion among some passengers regarding the services offered. For example, the absence of late journeys, the lack of Wi-Fi connection in the station, the absence of toilets in the Sidi Amar trains. Although these services are available on other trains, the distance between departure and arrival determines their availability. And, finally, there is no clear communication policy at stations and on trains, enabling passengers to obtain information on timetables, waiting times at the station and on-board trains, as well as delays or trip cancellations.

Table no. 4 - Descriptive statistics for the customer satisfaction variable items

The expressions	Arithmetic mean	Standard deviation	Coefficient of variation Cv	Degree of approval
The National Rail Transport Company of Annaba meets our needs	3,4440	1,0221	29,67	Strong
A reliable rail travel experience	3,9927	0,7565	18,94	Strong
As a customer of the National Rail Transport Company of Annaba, we are known for our loyalty.	3,7942	0,9465		Strong
The service provided by SNTF Annaba meets our expectations.	3,2924	1,0654	24,94	Medium
Generally speaking, I'm satisfied with the	3,7472	0,9674		Strong

services provided by SNTF Annaba.				
I prefer to travel by train instead of other means of transport.	4,2274	1,2224	32,36	very strong
Orientation towards customer satisfaction	3,7496	0,6815		Strong

Source: Prepared by researchers based on SPSS outputs

The table above illustrates that the majority of travelers are satisfied with the quality of transport services provided by Annaba's SNTF (National Rail Transport Company), as evidenced by the high overall average score of 3.7496, indicating a high degree of agreement for phrases expressing customer satisfaction. Passengers prefer train travel to other means of transport, with an average of 4.2274, expressing an extremely high level of satisfaction.

Furthermore, the averages of the first five sentences indicate a high degree of agreement, reflecting passengers' acceptance of the following elements: the satisfaction of their needs by SNTF d'Annaba, the reliability of their train travel experience, their loyalty to SNTF d'Annaba, the conformity of the services provided with their expectations, and finally, their overall satisfaction with the services provided by SNTF d'Annaba.

These findings indicate a high level of customer satisfaction with service quality, with most indicators at a high or at least moderate level of satisfaction. With regard to coefficients of variation and standard deviations, no values indicate significant differences or dispersion in responses.

Hypothesis testing and study design: In this section, we will attempt to test the previously stated hypotheses in order to validate or refute them, as well as proposing the best study design using a stepwise test.

Testing the main hypothesis: Using simple linear regression analysis, the main hypothesis will be tested to determine the impact of transport service quality indicators as an independent variable on the dependent variable, i.e., customer satisfaction.

Main hypothesis H1: There is a positive impact of the quality of transport service provided by the National Railway Transport Company (SNTF) of Annaba on customer satisfaction.

The following table shows the most important results of the simple linear regression analysis between the independent variable “quality of transportation service” and the dependent variable “customer satisfaction” with the services provided by SNTF Annaba:

Table no. 5 - Analysis of variance of the effect of transportation service quality on customer satisfaction.

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
Between groups	48,959	1	48,959	169,905	0,000
Within groups	79,243	275	0,288	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,618)	R^2= (0,382)

Source: Prepared by researchers based on SPSS outputs

Further to the linear regression analysis as indicated in table number 5 above, we find that the results of the analysis of variance are as follows: the calculated value of F is (169.905) with degrees of freedom of (1 and 275), and a significance level (Sig) of (0.00), below (0.05), the threshold of significance retained in the study. This requires rejection of the null hypothesis and acceptance of the alternative hypothesis, which asserts the existence of a positive impact of transport service quality on customer satisfaction at the company studied.

Moreover, the coefficient of determination R2 is (0.382), which means that 38.2% of the variations observed in customer satisfaction (the dependent variable) are due to variations in transport service quality (the independent variable).

Testing the sub-hypotheses

First sub-hypothesis: There is a positive impact of the "Service delivery" indicator from SNTF Annaba on customer satisfaction.

Table no. 6 - One-way analysis of variance (ANOVA) of the sample members' answers between the service delivery index and customer satisfaction

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
Between groups	16,383	1	16,383	40,292	0,000
Within groups	111,817	275	0,406	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,357)	R^2= (0,127)

Source: Prepared by researchers based on SPSS outputs

Table 6 shows that the calculated F value is (40.292) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to rejection of the null hypothesis and acceptance of the alternative hypothesis, which suggests the existence of a weak relationship between service provision and customer satisfaction. The weak relationship is confirmed by the estimated correlation coefficient of (0.357) and the coefficient of determination of (0.127), indicating that only (12.7%) of the effect on the dependent variable is attributable to the independent variable "Service provision".

Second hypothesis: There is a positive impact of the indicator "Ease of access" to services provided by SNTF Annaba on customer satisfaction.

Table no. 7 - One-way analysis of variance (ANOVA) of the sample members' answers between the ease of access index and customer satisfaction.

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
Between groups	824,78	1	824,78	65,917	0,000
Within groups	103,413	275	0,376	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,440)	R^2= (0,193)

Source: Prepared by researchers based on SPSS outputs

Table 7 above reveals that the calculated F value is (65.917) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This entails rejection of the null hypothesis and acceptance of the alternative hypothesis, which suggests the existence of an average relationship between ease of access and customer satisfaction. This relationship is confirmed by the estimated correlation coefficient of (0.440) and the coefficient of determination of (0.193), indicating that only (19.3%) of the variations observed in the dependent variable are attributable to the independent variable "Ease of access".

Third hypothesis: There is a positive impact of the indicator "Availability of information" on the services provided by SNTF Annaba on customer satisfaction.

Table no. 8 - One-way analysis of variance (ANOVA) of the sample members' answers between the information availability index and customer satisfaction.

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
Between groups	14,423	1	14,423	34,86	0,000
Within groups	113,778	275	0,413	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,335)	R^2= (0,113)

Source: Prepared by researchers based on SPSS outputs

Table 8 above shows that the calculated F-value is (34.86) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of a weak relationship between information availability and customer satisfaction. The weakness of this relationship is confirmed by the estimated correlation coefficient of (0.335) and the coefficient of determination of (0.113), indicating that only (11.3%) of the impact on customer satisfaction is attributable to the independent variable "Information availability".

Fourth hypothesis: The "Duration" indicator of services provided by SNTF Annaba has a positive impact on customer satisfaction.

Table no. 9 - One-way analysis of variance (ANOVA) of the sample members' answers between the duration index and customer satisfaction.

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
Between groups	24,107	1	24,107	63,687	0,000
Within groups	104,094	275	0,378	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,433)	R^2= (0,188)

Source: Prepared by researchers based on SPSS outputs

The table above illustrates that the calculated F value is (63.687) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of an average relationship between the

duration indicator and customer satisfaction. This moderate relationship is confirmed by the estimated correlation coefficient of (0.433) and the coefficient of determination of (0.188), indicating that only (18.8%) of the impact on customer satisfaction is attributable to the independent variable "Duration".

Fifth hypothesis: The "Customer care" indicator of services provided by SNTF Annaba has a positive impact on customer satisfaction.

Table no. 10 - One-way analysis of variance (ANOVA) of the sample members' answers between the customer interest index and customer satisfaction.

Statement	***Sum of squares***	***Degree of freedom***	***Mean squares***	***(F) arithmetic value***	***P-Value Sig***
Between groups	34,821	1	34,821	102,547	0,000
Within groups	93,380	275	0,34	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,521)	R^2= (0,272)

Source: Prepared by researchers based on SPSS outputs.

In the table above, the calculated F value is (102.547) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of an intermediate relationship between the customer care indicator and customer satisfaction. Confirming this moderate relationship is the estimated correlation coefficient of (0.521) and the coefficient of determination of (20.27%), indicating that only (20.27%) of the impact on customer satisfaction is attributable to the independent variable "Customer care".

Sixth hypothesis: The "Comfort" indicator of SNTF Annaba services has a positive impact on customer satisfaction.

Table no. 11 One-way analysis of variance (ANOVA) of the sample members' answers between the comfort index and customer satisfaction.

Statement	**Sum of squares**	**Degree of freedom**	**Mean squares**	**(F) arithmetic value**	**P-Value Sig**
Between groups	14,632	1	14,632	35,432	
Within groups	113,568	275	0,412	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,338)	R^2= (0,114)

Source: Prepared by researchers based on SPSS outputs.

According to the table above, the calculated F value is (35.432) with degrees of freedom of (1 and 275) and a level of significance (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of a weak relationship between the comfort indicator and customer satisfaction. This weak relationship is confirmed by the estimated correlation coefficient of (0.338) and the coefficient of determination of (0.114), indicating that only (4.11%) of the impact on customer satisfaction is attributable to the independent variable "Comfort".

Seventh hypothesis: there is a positive impact of the "Safety" indicator of the services provided by SNTF Annaba on customer satisfaction.

Table no. 12 - One-way analysis of variance of the sample members' answers between the security index and customer satisfaction

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
Between groups	12,538	1	12,538	29,81	0,000
Within groups	115,664	275	0,421	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,312)	R^2= (0,098)

Source: Prepared by researchers based on SPSS outputs.

From the table above, we can see that the calculated F-value is (29.81), with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This implies rejection of the null hypothesis and acceptance of the alternative hypothesis, pointing to a weak relationship between the safety indicator and customer satisfaction. This low relationship is confirmed by the estimated correlation coefficient of (0.312) and the coefficient of determination of (0.098), indicating that only (8.9%) of the impact on customer satisfaction is attributable to the independent variable "Safety".

Eighth hypothesis: The "Environmental impact" indicator of services provided by SNTF Annaba has a positive impact on customer satisfaction.

Table no. 13 - One-way analysis of variance (ANOVA) of the sample members' answers between the environmental impact index and customer satisfaction.

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
Between groups	6,472	1	6,472	14,622	0,000
Within groups	121,729	275	0,44	At the significance level: Alpha = 0.05	
Total contrast	128,201	276		R= (0,225)	R^2= (0,050)

Source: Prepared by researchers based on SPSS outputs.

The table above reveals that the calculated F value is (14.622) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the chosen threshold for this study. This implies rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of a weak relationship between the environmental impact indicator and customer satisfaction. This weak relationship is confirmed by the estimated correlation coefficient of (0.225) and the coefficient of determination of (0.050), indicating that only (5%) of the impact on customer satisfaction is attributable to the independent variable "Environmental impact".

In order to build the best model representing the impact of transport quality on customer satisfaction: multiple regression analysis uses a statistical test to identify which independent variables have the greatest influence on the dependent variable. Various methods are available to assess this influence.

Regarding the linear regression equation between the dependent variable (customer satisfaction) and the independent variable (quality of transport service), this equation explains which sub-indicators or specific variables of transport service quality (service provision, accessibility, availability of information, duration, customer care, comfort, safety and environmental impact) have the greatest impact on customer satisfaction.

We conducted a stepwise test, considered one of the best compared to the conservative method (Enter). Each of the independent variables linked to transport service quality is introduced sequentially, and its contribution to the dependent variable is assessed. If it makes a significant contribution to the model, it is retained; otherwise, if it makes no significant contribution, it is deleted. This method results in the smallest selection of variables with a contribution to the model.

Table no. 14 - Results of the multiple regression analysis of the impact of transport service quality indicators on customer satisfaction

The model		Unstandardized coefficients		Standard coefficients	T	P-value	F	P-value
		B	Std. Error	BETA				
1	**(Constant)**	1,293	0,245		5,273	0,000	102,547	0,000
	X5	0,683	0,067	0,521	10,127	0,000		
2	**(Constant)**	0,832	0,261		3,184	0,002	63,591	0,000
	X5	0,528	0,075	0,403	7,044	0,000		
	X2	0,286	0,067	0,244	4,268	0,000		
3	**(Constant)**	0,318	0,294		1,084	0,279	48,428	0,000
	X5	0,524	0,073	0,399	7,137	0,000		
	X2	0,266	0,066	0,227	4,041	0,000		
	X8	0,198	0,056	0,175	3,561	0,000		
4	**(Constant)**	-0,128	0,312		-0,410	0,682	41,394	0,000
	X5	0,449	0,075	0,343	6,024	0,000		
	X2	0,236	0,065	0,201	3,639	0,000		
	X8	0,217	0,055	0,192	3,969	0,000		
	X1	0,231	0,063	0,191	3,686	0,000		
5	**(Constant)**	-0,120	0,307		-0,392	0,696	35,874	0,000
	X5	0,364	0,079	0,278	4,629	0,000		
	X2	0,197	0,065	0,168	3,006	0,003		
	X8	0,209	0,054	0,184	3,865	0,000		
	X1	0,223	0,062	0,184	3,604	0,000		
	X4	0,144	0,048	0,167	2,992	0,003		
6	**(Constant)**	-0,412	0,329		-1,251	0,212	31,296	0,000
	X5	0,343	0,079	0,261	4,356	0,000		
	X2	0,157	0,067	0,134	2,339	0,020		
	X8	0,215	0,054	0,190	4,014	0,000		
	X1	0,209	0,062	0,173	3,393	0,001		
	X4	0,145	0,048	0,169	3,055	0,002		
	X7	0,147	0,063	0,119	2,336	0,020		

Source: Prepared by researchers based on SPSS outputs.

In Table 14, there are six (6) significant models, as indicated by the F-test with a significance (sig=0.000) below the study's significance threshold (0.05). It is also observed that the value of the constant is not statistically significant in the last four models, as it is above the study significance threshold. Furthermore, the values of (t) for all impact coefficients are acceptable, as reflected by (sig), being below the study's significance threshold, making them statistically significant. Here are some details on these models:

First model:

The first model explains that if the independent variable (care for the customer) changes by one unit, then the dependent variable (customer satisfaction) changes by (0.683).

$$Y = 1{,}293 + 0{,}683.X5$$

The second model:

The stepwise test adds, in the second step, the second independent variable based on the degree of correlation, which is ease of access, in addition to the stability of the first independent variable (customer interest).

The second model explains that if the first independent variable (customer interest) changes by one, the dependent variable (customer satisfaction) changes by (0.528), and if

$$Y = 0{,}832 + 0{,}528.X5 + 0{,}286.X2$$

the second independent variable (ease of access) changes by one, the dependent variable changes by (0.286).

The sixth model:

The stepwise test will continue to add independent variables according to the degree of correlation until it reaches the optimal model, neglecting variables with low or insignificant correlation. The optimal model in our study was obtained after the gradual addition of four further variables in the following order: (environmental impact, service provision, duration and safety), represented by the following regression equation:

$$Y = -0{,}412 + 0{,}343.X5 + 0{,}157.X2 + 0{,}215.X8 + 0{,}209.X1 + 0{,}145.X4 + 0{,}174.X7$$

The optimality of this model can be confirmed by comparing the intensity of the correlation as follows:

Table no. 14 - *Correlation coefficients for the different multiple regression models of the study.*

The model	Correlation coefficient. R	R Square	Adjusted R Square	Std. Error of the Estimate
First model	0,521[a]	0,272	0,269	0,5827
The second model	0,563[b]	0,317	0,312	0,5653
Third model	0,589[c]	0,347	0,340	0,5536
Fourth model	0,615[d]	0,378	0,369	0,5412
Fifth model	0,631[e]	0,398	0,387	0,5335

Source: Prepared by researchers based on SPSS outputs

According to table number 14, we can confirm that the sixth model is the best model due to the strength of the correlation estimated at (64%), indicating that the model is of high quality, and the coefficient of determination explains (41%) of the total variations of the multiple linear regression model. It can also be seen that the (Stepwise) model automatically suppressed models seven and eight linked respectively to variables three and six (information provision and comfort) due to their statistical non-significance.

5. The discussion

According to the findings, the customer interest index is the most influential element in customer satisfaction. The reason for this can be attributed to the nature of the individuals in the sample, who are particularly focused on details, notably those related to prices and appropriate offers for the service: 900 DZD / $6.63 for the Algiers train (627 km), 480 DZD / $3.54 for the Tébessa train (231 km) ..., which is less expensive than other means of transport. The same applies to service providers' handling of customer complaints.

The accessibility index comes second in terms of its influence on customer satisfaction. In fact, the more routes are adapted to passengers' movements, and the easier it is for them to buy tickets, the greater their satisfaction with services.

In terms of influence on customer satisfaction, the environmental impact index ranks third. Travellers place importance on the speed of their journeys, and complain about traffic jams and high noise levels, both of which affect their satisfaction.

Ranking fourth is the service delivery index. The availability of transport throughout the day with an adequate number of journeys enables passengers to travel comfortably in modern, uncongested carriages.

Then the duration index confirms that the more the duration is adapted and respected, the greater passengers' appreciation of the transport service, whether in terms of the advertised journey time or even the waiting time at the station.

Last but not least, the safety index comes sixth in terms of its impact on satisfaction. Passengers prefer to travel with a company that guarantees them protection against assaults and theft, thus guaranteeing their safety compared to other institutions where no safety is guaranteed.

As for information availability and comfort indices, they did have a positive impact on customer satisfaction in the National Rail Transport Company (SNTF) in Annaba, but this was not statistically significant, making them unable to predict customer satisfaction.

All in all, these findings revealed a positive impact of quality of transport service indexes on customer satisfaction. Nevertheless, differences from previous studies regarding these results can be synthesized as follows:

A strong commitment to most of the quality-of-service indicators was observed at Annaba's National Rail Transport Company (SNTF), whereas this commitment was weaker in the city of Annaba's public urban and semi-urban transport company, as Mekhlouf's (2020) study reported.

The Getachew (2019) study results indicated that stations were not safeguarded against criminal activity, which was particularly dissatisfying to passengers at night, unlike our results where security was at its highest, along with satisfaction.

The study results also confirmed that Annaba has a defined quality policy, reflected by the presence of a team dedicated to its application. This completely differs from the study by Amirouch (2019), which concluded that SNTF Constantine did not have a clear, defined quality policy, which all staff understood and applied.

Regarding the cumulative impact of transport service quality indicators on customer satisfaction, the results of Mekhlouf's (2020) study confirmed the acceptance of the main hypothesis concerning indicators such as accessibility, duration, customer interest, comfort and safety. These factors do indeed have a positive impact on the dependent variable. By contrast, the study rejected this hypothesis for cues such as service provision, information availability and environmental impact, showing a positive but statistically insignificant impact, thereby confirming our results. Yet the difference lies in the statistically significant positive impact of the service provision index and environmental impact, while the comfort index had no statistically significant impact.

Conclusion and Recommendations

In recent years, the SNTF (National Rail Transport Company) has undertaken a restructuring process to improve the quality of the services provided, in line with the needs

and desires of its customers. To this end, we conducted this study of customer satisfaction in Annaba with the quality of services provided by SNTF. The aim was also to identify the indicators influencing this satisfaction, in order to assist the company's management in improving service delivery to meet customer expectations, and to highlight areas of dissatisfaction and dissatisfaction. Here are the main results obtained:

1. Findings concerning SNTF Annaba's commitment to applying the AFNOR NF EN 13816 standard:

- The safety index was ranked first in terms of commitment to its application, setting the company aside from other means of land transport.
- The company's commitment to customer care, with the exception of the possibility of electronic payment for ticket purchases, was rated low due to its lack of service.
- The majority of passengers agreed on the ease of access to services, demonstrating a strong commitment to applying them.
- Overall agreement was high on the commitment to apply the duration index.
- Conversely, the service provision, comfort, environmental impact and information availability indicators showed the least commitment to applying them, in particular due to the lack of night flights, the absence of Wi-Fi in stations, train noise and the lack of an information policy.
- SNTF Annaba's commitment to applying the AFNOR NF EN 13816 quality of transport service standard is considered to be relatively high compared with previous years. This was reflected in the overall degree of approval on the independent variable represented by all the indicators, which tended towards strong approval.

2. The results of an analysis of the level of satisfaction with the quality of SNTF's transport service in Annaba:

- The majority of survey respondents' answers tended towards strong approval on all statements reflecting their satisfaction with the services provided to them. This indicates that satisfaction with the quality of the transport service is at its highest level.
- Most of our study participants prefer to travel by train rather than by other modes of transportation.

3. Results of testing the study hypotheses

The results were as follows:

- There is a positive impact of the quality of the transport service offered by SNTF Annaba on customer satisfaction.
- There is a positive impact of SNTF Annaba's "service delivery" index on customer satisfaction.

- There is a positive impact of the "ease of access" to SNTF Annaba services index on customer satisfaction.
- The "availability of information" index for SNTF Annaba services has a positive impact on customer satisfaction.
- The "duration" index of SNTF Annaba services has a positive impact on customer satisfaction.
- There is a positive impact of the "customer consideration" index of SNTF Annaba services on customer satisfaction.
- The "comfort" index of SNTF Annaba services has a positive impact on customer satisfaction.
- The "safety" index of SNTF Annaba services has a positive impact on customer satisfaction.
- The "environmental impact" index of SNTF Annaba services has a positive impact on customer satisfaction.

Regarding acceptance of the overall model, it emerged that the impact of comfort and information availability on customer satisfaction was not significant, which led to rejection of the model for these two indexes and acceptance for the others. This is explained by the fact that, despite the absence of an information policy and the unavailability of certain points concerning comfort, respondents were satisfied with the services provided, such as the absence of Wi-Fi in stations, toilets on trains and, finally, the absence of luggage areas.

Recommendations:

Building on the results of this field study, several recommendations can be made to enhance the quality of services provided by the company in question, maximizing customer satisfaction. These recommendations cover:

- The necessity of renewing tracks that do not allow trains to run at high speed, thus affecting set timetables, in addition to the use of modern trains used in other regions.
- The need to provide evening late flights, particularly for suburban trains and short-distance regional trains.
- The need to ensure early morning flights to Algiers, rather than just one train per day.
- The requirement to provide a clear information policy to communicate day-to-day details to passengers, such as train destinations, waiting times at terminals, delays or cancellations, and to provide this information via their online platforms.

- The urgency of offering an online ticket sales service, as the "SNTF" application offers this functionality but is not yet activated.
- Toilets need to be opened for trains equipped with toilets, but which are not available.
- Attempt to create new rail links between Annaba downtown and its suburbs, in particular the densely populated new town of "Zarâa Errich", as well as the commune of "El Kalaïtoussa", not far from the commune of Berrahal, to attract new customers.
- To maintain the "Sidi Amar" suburban trains, which only operate during the academic year and cease to operate during the vacations and on public holidays.
- Reinforce the safety and security measures and make sure they are maintained, as they constitute the missing element in other forms of ground transport."

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APPENDICES

Appendix 01: Personal Data Tables

Statistics

		Sex	Age	Education level	Employment	Monthly income	Residency	How often do you use the train?	Private car availability
N°	Valid	277	277	277	277	277	277	277	277
	Missing	0	0	0	0	0	0	0	0

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	*Male*	163	58,8	58,8	58,8
	Female	114	41,2	41,2	100,0
	Total	277	100,0	100,0	

Age

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	From 18 to 35	170	61,4	61,4	61,4
	From 36 to 53	64	23,1	23,1	84,5
	Older than 53	43	15,5	15,5	100,0
	Total	277	100,0	100,0	

Education level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Middle school	18	6,5	6,5	6,5
	Highschool	48	17,3	17,3	23,8
	University	178	64,3	64,3	88,1
	Postgraduate	33	11,9	11,9	100,0
	Total	277	100,0	100,0	

Employment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**University student**	107	38,6	38,6	38,6
	Employee	110	39,7	39,7	78,3
	Retied	15	5,4	5,4	83,8
	Freelancer	21	7,6	7,6	91,3
	Unemployed	24	8,7	8,7	100,0
	Total	277	100,0	100,0	

Monthly income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Less than 18,000 DZD**	138	49,8	49,8	49,8
	From 18,000 DZD to 36,000 DZD	29	10,5	10,5	60,3
	From 36,000 DZD to 54,000 DZD	63	22,7	22,7	83,0
	From 54,000 DZD to 72,000 DZD	23	8,3	8,3	91,3
	Greater than 72,000 DZD	24	8,7	8,7	100,0
	Total	277	100,0	100,0	

Residency

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	***Downtown***	128	46,2	46,2	46,2
	Suburbs	100	36,1	36,1	82,3
	Outskirt the city	49	17,7	17,7	100,0
	Total	277	100,0	100,0	

How often do you use the train?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Everyday**	79	28,5	28,5	28,5
	At least twice a week	88	31,8	31,8	60,3
	Once a week	39	14,1	14,1	74,4
	Less than that	71	25,6	25,6	100,0
	Total	277	100,0	100,0	

Private car availability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Yes, I have my own car**	68	24,5	24,5	24,5
	I don't have a private car	209	75,5	75,5	100,0
	Total	277	100,0	100,0	