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SERVQUAL Model to Analysis the Bus service: A Case Study of Haryana Roadways State Transport

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ABSTRACT

India's vast urban and rural population necessitates a highly efficient public transit system to alleviate traffic congestion and reduce reliance on private vehicles. Understanding the factors that influence user satisfaction and loyalty in public transit is crucial for devising effective retention strategies. This research aimed to assess consumer perceptions of the quality of state-run roadways in Haryana, specifically focusing on the bus transport services provided by Haryana Roadways. SERVQUAL model by utilizing 11 parameters categorized into five determinants: Reliability, Assurance, Tangibility, Empathy, and Responsiveness, used to evaluate the service quality of Haryana Roadways. Data collected through a questionnaire-based survey administered to 180 regular commuters of Haryana Roadway through rigorous techniques such as Ordinary linear regression, correlation, and ordered logistic regression. It is observed that two parameters *viz.,* frequency and staff behaviour, emerged as the most critical factors contributing to overall customer satisfaction with Haryana Roadways. Additionally, all determinants demonstrated a significant influence on overall satisfaction. Consequently, it is recommended that policy interventions aimed at improving the quality of parameters such as frequency, staff behaviour, and safety would be effective strategies to enhance commuters' satisfaction with public bus transportation in Haryana.

Key Words : Haryana roadways, Servicequality, Parameters, Customersatisfaction
JEL Classification: R41, D12, L15

INTRODUCTION

India, an economic powerhouse with rapid growth, relies heavily on its public transportation system, which plays a pivotal role in driving its economy forward. The roots of public bus service can be traced back to 1662 when Blaise Pascal introduced the first-ever public bus service in France. Derived from the Latin word "Omnibus," meaning "for all," the term "bus" emerged as a shortened version of the original adjectival term "Voiture Omnibus" in French. A bus, a substantial wheeled vehicle engineered to transport numerous passengers along with the driver, serves as a vital component of shuttle services that complement other modes of public transportation in both bustling cities and serene towns, villages, and rural areas.

India boasts an extensive and well-developed public transportation network that seamlessly connects various regions of the country, even the most remote and secluded ones. Moving from one place to another within the nation is not a daunting task due to the effectiveness of the public transportation system. The three primary modes of public transportation in India include railways, roadways, and aviation. Furthermore, the country benefits from a robust river transportation system that caters to both people and cargo transport needs. Buses, in particular, reign supreme as the most popular and practical form of transit in metropolitan areas. With over 1.6 million authorized buses in India, of which 170,000 are operated by municipal transport agencies, approximately 70 million passengers rely on buses for their daily commutes (Jose, 2021). Not only are buses comparatively affordable, but

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they also provide essential interstate connectivity, enabling the smooth movement of people and goods across states. Night transportation services are available to connect different regions, offering both air-conditioned and non-air-conditioned vehicles. By offering top-notch amenities such as sleeping accommodations, potable water, and restrooms, buses aim to ensure passenger satisfaction and create a loyal customer base. Recognizing the evolving demands of travelers, service providers continually make enhancements to their buses. This emphasis on understanding customer expectations and delivering exceptional services is crucial. As a result, the ultimate outcome is customer satisfaction derived from the provision of superior services that consistently surpass their expectations. These efforts not only contribute to a positive travel experience but also foster a strong bond between passengers and the bus service, reinforcing the connectivity and reliability of the transportation system.

Haryana Roadways:

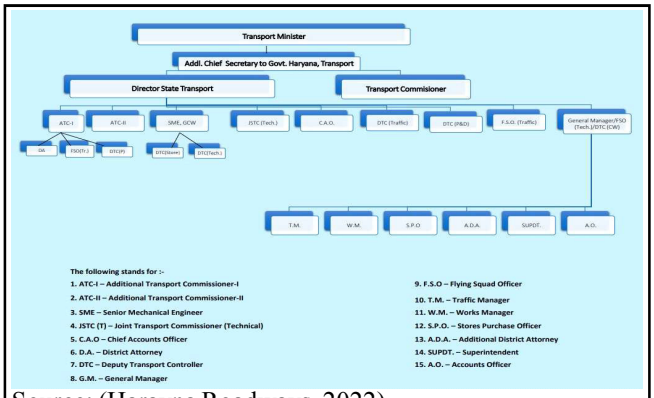
A significant component of the Haryana transit Department is Haryana Roadways, a departmental public transit enterprise of the state government. Using contemporary techniques, it has developed into a useful, dependable, secure, affordable, and environmentally friendly transit service. As the state's top service supplier, it has about 3844 vehicles that are run by 24 depots and 13 sub-depots that serve both the state and its neighboring states (Table 1).

Table 1 : Present Status of Haryana Roadways State Transport

Sr. No	Category	Strength
1.	Buses	2581
2.	Staff	18367
3.	Depot	24
4.	Sub-depot	13
5.	Bus Stands	110
6.	Passengers carried per day	7 (in lakhs)
7.	Kilometers Operated per day	7.62 km (in lakhs)
8.	Departmental driver training schools	22
9.	Central workshop	3
10.	Body building workshop	1
11.	Annual turnover	2041 crore

Source: (Harayna Roadways, 2022)

A total of 1.24 million persons travels every day, covering over 1.2 million kilometers. Over the years, Haryana Roadways has expanded tremendously and established itself as a top-tier service provider (Harayna Roadways, 2022). The introduction of Volvo Ac buses (Saarthi) with the convenience of internet reservations, which link local and international airports, made the service more attractive and customer friendly. Additionally, Haryana Roadways offers buses with deluxe amenities at standard rates, making the trip pleasant and easy. This not only reduced smog levels but also allowed Haryana Roadways to launch the 'Haryana Uday' CNG transport service in National Capital Region. City bus service has been launched in the cities like Faridabad, Gurgaon, and Panchkula. To make travel a pleasant experience, passengers' facilities have been upgraded from time to time. With all of this, it has established a reputation for excellence (Fig. 1).



Source: (Harayna Roadways, 2022)

Fig. 1 : Organisational Structure of HRSTC

Customer Satisfaction and Service Quality:

Customer satisfaction is the measure of how well products and services meet or exceed customer expectations (Yussoff and Nayan, 2020). Put simply, dissatisfied customers often return products or file complaints regarding services they received. Customer satisfaction is closely tied to service quality, as customer complaints are indicative of service failures (Hamzah & Shamsudin, 2020). Customer satisfaction, which may be measured through surveys and ratings to understand their requirements and make modifications, when necessary, is essentially how pleased the consumers are with the services offered (Machirori and Fatoki, 2011). The primary goal of all businesses, including charitable organizations, government agencies, and service providers, is to please consumers (Moges Belay *et al.,* 2014).

Customer happiness is frequently discussed and

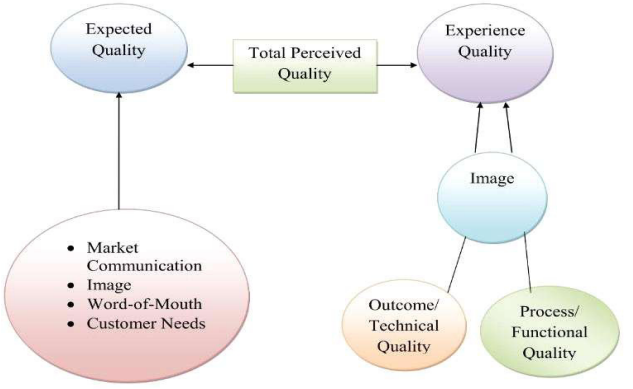
examined in literature (Ramachandran and Chidambaram, 2012). Customer happiness and service quality are inherently intertwined, with a clear positive correlation between the two (Baker and Crompton, 2000) Consequently, numerous studies, both cumulative and transaction-oriented, have consistently confirmed that service quality plays a significant role in shaping customer satisfaction (Cronin and Taylor, 1992). However, it is crucial to acknowledge that customer happiness encompasses a broader scope than merely focusing on specific aspects. It extends beyond service quality to include factors such as overall experience, emotional well-being, and the fulfillment of individual needs and desires (Wilson, 2008). Liberalization and globalization have profound effects on both emerging and established economies. As a result, customer demands are evolving, compelling firms to swiftly adapt in order to maintain a competitive edge (Bian and Forsythe, 2012). Organizations must develop comprehensive strategies to ensure customer satisfaction if they aim to achieve and sustain market share in the long run (Rand, 2006). Extensive studies have revealed that consumer discontent and negative opinions can have significant adverse effects on earnings and overall business performance.

Quality in a service or product is what the consumer experiences as a result of using it, not just the features one adds to it (Mohamad *et al.,* 2020). Customer happiness and customer retention are closely related, making it one of the most important factors to take into account when trying to both retain existing customers and draw in new ones (Vilakazi and Govender, 2014). Understanding the value of excellent customer service is crucial for both providing high-quality services and measuring those services (Yarimoglu, 2014). Service providers must use marketing techniques like customer satisfaction to expand their offerings and raise their overall quality. Service quality is a mindset created by a detailed, long-term assessment of a company's performance. Based on the client's involvement with the service as they have experienced it, service quality is an attribute that is externally recognized. Evaluations of service quality are based on assessments of interaction, result, and physical environment quality. One of the crucial factors that go into the consumer's satisfaction assessments is service quality.

Numerous research and papers have been written about consumer perception and satisfaction, but very few of them have specifically addressed public transit in India. Being close to the nation's capital helps Haryana's economy grow more quickly, but it might be challenging to identify the issues in state's public transportation system. Being a fastest growing state, it is necessary that to have a sustainable and well efficient public transportation system. This paved way for to set up a study on satisfaction perceived by the commuters and quality of service provided by the Haryana roadways. It also concentrated on identifying the elements crucial or necessary for the development of the transportation network that may have a favourable impact on the socio-economic climate of the state.

Research Frame Work:

Research on the elements of service quality and how they relate to customer satisfaction served as the foundation for this study. Public transit should be incorporated into future sustainable transportation plans. However, public transportation must offer exceptional service standards to meet and fulfil a wider range of diverse consumer demands in order to retain and draw in more customers. According to A. Parasuraman (1998), quality is defined as "adherence to customer specifications," which sought to meet those needs. Whether a programme or facility meets expectations for quality has an influence on whether users are satisfied with them or not (Fig. 2).



Source: (Gronroos,1993)

Fig. 2 : Gronroos Perceived Service Quality model

A customer's perspective of the quality of a service is established by contrasting their expectations with their actual experiences, according to the perceived service quality model. If "experienced quality" is higher than "anticipated quality," the perceived quality is generally

positive. When performance or actual experience fall short of expectations, the value is poorly appraised.

SERVQUAL Model:

The Servqual model, commonly referred to as the gap model, was developed by A. Parasuraman, Valarie A. Zeithaml, and Len Berry. Fig. 3 represents the visual depiction of this model. It identifies key aspects of service quality and has undergone revisions. The initial model in 1995 comprised 10 components, while the revised version in 1998 focused on 5 determinants: responsiveness, reliability, assurance, tangibility, and empathy. Customers have expectations about the service level, which are influenced by word of mouth, specific needs, and past experiences. The model emphasizes how customers form an overall evaluation of service quality based on their perception of these factors during service delivery.

Reliability:

Reliability refers to the extent to which a service can be trusted to deliver the intended result or outcome consistently at any given moment. It measures the consistency with which an organization delivers its services. If an organization consistently provides services without deviations or failures, it can be considered highly dependable.

Assurance :

The amount of assurance a client has in the caliber of the service is referred to as assurance.

Tangibility:

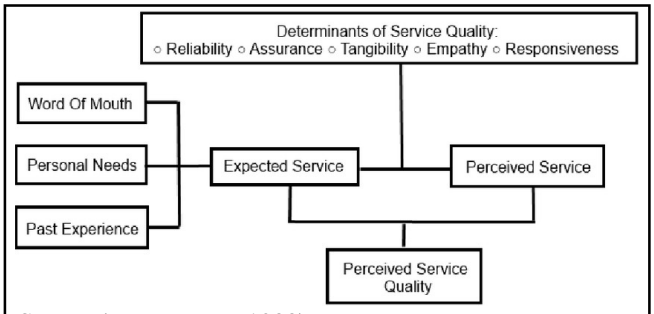
The term "tangibility" refers to the observable physical appearance of a company's product or service. It encompasses aspects such as orderliness, attractiveness, cleanliness, and other visible attributes that customers can perceive and assess.

Empathy:

Empathy is the ability of a company to understand the needs and desires of its customers.

Responsiveness:

Responsiveness refers to the speed and efficiency with which a service provider addresses and meets the needs of its customers. It reflects how promptly a service responds to clients' requirements and takes action to fulfill their requests or resolve their concerns (Fig. 3).



Source: (Parasuraman,1988)

Fig. 3 : Determinants of service quality

Additionally, the factors that affect service quality have been split into several metrics based on the public bus transit system. Customers' satisfaction with transport services is influenced by a few unique factors that may not apply to other services and goods. The description of the various parameters and the determinants used in this study are provided in the Table 2.

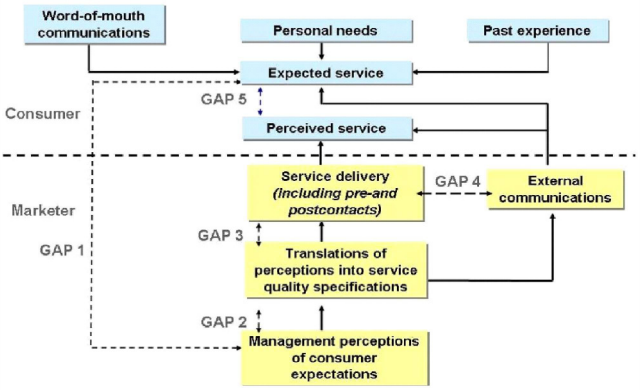
Table 2 : Describes the parameters taken for the study on the basis of determinants of SERVQUAL

Sr. No.	Determinants	Parameters	Description
1.	Reliability	Frequency	How often the assistance is offered?
		Punctuality	How timely is the arrival of the service
		Travel Time	The time required to get from one location to another
2.	Assurance	Price	Fee of service
		Comfort	Comfort level during service
		Safety	The defense of people and property
3.	Tangibility	Cleanliness	Level of cleanliness
		Seat Availability	Availability of seats in bus
		Station Service	Service offered to commuters at station
4.	Empathy	Information	Information level while connecting with service at various places
5.	Responsiveness	Staff Behavior	administration and staff' behavior

Source: (Parasuraman,1988)

Service Quality Gaps:

Companies must strive to understand and meet their customers' expectations in order to provide exceptional services. The SERVQUAL model highlights five distinct gaps that can exist between an organization's service offerings and its customers' expectations (Higgs, 2017). The SERVQUAL model captures the anticipation pattern by identifying gaps between customer expectations and actual service outcomes. When perceptions fall short of expectations, it indicates a lower quality of service, and *vice versa*. The model identifies five gaps that highlight disparities across various elements (Fig. 4).



Source: (Gronroos,1993)

Fig. 4 : Simplified Model of Service Quality

The first gap in the SERVQUAL model is between the perceptions of management and the expectations of customers. Sometimes, businesses may lack a clear understanding of what is required to achieve a high level of customer satisfaction. This gap arises when a service provider fails to meet the expectations of customers.

The second gap in the SERVQUAL model is between management's expectations and the specifications for service quality. This gap occurs when there is a disconnect between the service standards set by management and the actual delivery of those standards.

Organization's may occasionally comprehend what customers want but still be unable to provide the service to a given standard due to market conditions, management passivity, or resource restrictions (Lapaas, 2019). The third gap in the SERVQUAL model is between the specifications for service quality and the actual service delivery. Even though companies may have well-defined customer service guidelines, there can be a gap in achieving high-quality performance. This gap highlights the challenge of translating service specifications into actual service delivery that meets or exceeds customer expectations.

The fourth gap in the SERVQUAL model is between the service provision and external communications. This gap recognizes the influence of public perception and consumer expectations, shaped through interactions with company representatives and marketing efforts. Sometimes, companies may neglect to communicate transparently with customers, failing to inform them about manipulative tactics or attempts to sway their opinions. This gap emphasizes the importance of aligning service delivery with honest and accurate external communications.

The fifth gap in the SERVQUAL model is the disparity between expected and perceived service. Bridging this gap is crucial for ensuring service quality, as organizations need to provide services that either exceed or at least align with customer expectations. However, without addressing any underlying issues from the previous gaps, closing this gap promptly becomes challenging.

A theoretical framework is used to describe the links between the numerous components that have an impact on the given situation. Based on customer satisfaction with public transport services, this framework was created to explain correlations between factors. In this study, there is one dependent variable (DV) and five independent variables (IV). Customer satisfaction is a dependent variable, where as independent factors include reliability, assurance, tangibility, empathy, and responsiveness.

Considering above research scenario, Researcher firmly believe that the presented hypothesized model is essential since it makes an effort to ensure that the taken service quality parameters are critical or significant with customer satisfaction. The model's hypotheses are as follows:

Hypothesis 1:

H0: There is no significant relationship between determinant reliability and commuter's satisfaction.

H1: There is a significant relationship between determinant reliability and customer satisfaction.

Hypothesis 2:

H0: There is no significant relationship between

determinant assurance and commuter's satisfaction.

H1: There is a significant relationship between determinant assurance and commuter's satisfaction.

Hypothesis 3:

H0: There is no significant relationship between determinant tangibility and commuter's satisfaction.

H1: There is a significant relationship between determinant tangibility and commuter's satisfaction.

Hypothesis 4:

H0: There is no significant relationship between determinant empathy and commuter's satisfaction.

H1: There is a significant relationship between determinant empathy and commuter's satisfaction.

Hypothesis 5:

H0: There is no significant relationship between determinant responsiveness and commuter's satisfaction.

H1: There is a significant relationship between determinant responsiveness and commuter's satisfaction.

METHODOLOGY

A study of commuters using Haryana Roadways from Mahendragrah was conducted from the month of April and May 2023. Mahendragerh district was chosen for the research because it is one of Haryana's undeveloped areas but is located in the national capital region and has a greater potential for rapid growth in the coming years. A survey with closed-ended questions was developed. On a scale of 1 to 5, with 1 denoting Very Poor and 5 denoting Excellent, commuters were asked to score 11 factors. The questionnaire's first portion outlines the demographics of the sample, while the second piece uses the list of 11 attributes to gauge customer happiness. Using a random sample, 180 persons were surveyed. Central University of Haryana and the neighborhood received the majority of the responses. The SERVQUAL Model's five determinants were used to arrange the parameters for analytical purposes. Following the collection of the data, regression, correlation, and ordered logistic regression were performed on it using the SPSS and STATA software.

RESULTS AND DISCUSSION

It has been observed that 55% of respondents were belonged to male gender and 45 % were females. Among the 180 respondents more than 70% were in the age group between 18-29 and 30-39. Majority of study participants were young people.62 % of the respondents uses the service for studies and reaming percentage of population uses the service for tourism, business, job, shopping etc. Majority of the participants were from young age groups so that studies occupied greater portion of commuter purpose of traveling. 56% of the respondents has the educational background of post-graduation. Followed by 28 % of respondents with graduation and remaining percentage comprises with elementary and secondary education. The majority of respondents have great educational background, which will enable us to gather more accurate information about the study region. When we come to the monthly income of respondents 55% of respondents were belonged to the income level below 10000. Followed by 24% of participants were belonged to the level of 10000-30000 and remaining respondents has been lied in higher level of income. Due to its accessibility and affordability, public transportation is primarily used by low-income groups.

Testing of Research Hypothesis:

The study's primary goal was to determine the relationship between service quality and customer satisfaction. In order to test the hypothesis related to the relationship between each of the 5 service qualities reliability, assurance, tangibility, empathy and responsiveness with satisfaction. researcher used multiple liner regression analysis (Table 3). Overall, all R square appeared to be 0.561 which means that 56% of variation in the dependent variable are explained by the 5 explanatory variables. Result of hypothesis testing reveals

Table 3 : Hypothesis testing result

Relationship	Coefficient	T statistics	p-value	Decision
Reliability → Satisfaction	0.593	9.832	P<0.05	Supported
Assurance → Satisfaction	0.585	9.612	P<0.05	Supported
Tangibility → Satisfaction	0.534	8.425	P<0.05	Supported
Empathy → Satisfaction	0.468	7.668	P<0.05	Supported
Responsiveness → Satisfaction	0.512	7.668	P<0.05	Supported

Source: Author's own calculation

that all the 5 service qualities have been supported. Service quality determinant's reliability, assurance, tangibility, empathy and responsiveness directly affect customer satisfaction.

Reliability seems to be the key factor affecting satisfaction ($\beta = 0.593$) and it is significant at level $P<0.05$.so in the first hypothesis, null hypothesis is rejected and alternative hypothesis is accepted. Assurance has also appeared as an important factor that affect the satisfaction ($\beta = 0.585$) and significant at level $P<0.05$. Thus, in the second hypothesis, null hypothesis is rejected and alternative hypothesis is accepted. Remaining service quality determinants tangibility, empathy and responsiveness also showed its significance with satisfaction at 5% level of significance. All the null hypothesis of three determinates was rejected therefore alternative hypothesis was accepted. Thus, all service quality determinants taken for the study effects customer satisfaction (Table 4).

Table 4 : Attributes and Notation

Attributes (Variables for Measurement)	Notation
Frequency	V1
Punctuality	V2
Travel Time	V3
Price	V4
Comfort	V5
Safety	V6
Cleanliness	V7
Seat Availability	V8
Station Service	V9
Information	V10
Staff Behavior	V11

Source: Author's own calculation

In order to determine the interrelationship between the parameters, correlation analysis was also carried out (Table 5). Few parameters, notably frequency, staff behaviour, and safety, appear to be tightly associated based on the correlation analysis of the parameters. No significant or ideal association between the parameters is shown by the analysis. But although the remaining parameters show a relatively low degree of connection, several of the parameters show a considerable level of correlation. When the correlation coefficients between these parameters are taken into consideration, certain parameters outperform others.

Frequency has the largest positive connection with punctuality of all of the indicators (0.576), showing that high levels of frequency increases punctuality. It implies that more frequent bus service is often connected to higher punctuality. As the frequency of the service rises, the bus service's timeliness usually improves. Passengers wait less time for buses since they run more often and with less intervals between them. With more alternatives, travellers are less likely to be delayed by missing buses which enhances timeliness.

A correlation value of 0.481 shows a relatively favourable link between employee behaviour and information. This means that if employee behaviour improves, the volume or quality of information often increases in a proportionate manner. This can boost customer pleasure and experience while also increasing the effectiveness of service delivery as a whole. The correlation value of 0. 479 shows a somewhat good association between cleanliness and safety. Prioritising and upholding cleanliness can also increase a person's sense of security. In addition to providing a sanitary and comfortable environment, a clean bus environment may make passengers feel safer. However, a focus on security may lead to regular cleaning and maintenance plans to ensure the comfort and enjoyment of passengers.

Table 5 : Correlation analysis table of the surveyed parameters

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
V1	1.00	.576	.404	.341	.280	.406	.334	.240	.364	0.416	0.289	0.578
V2	.576	1.000	.401	.199	.238	.415	.272	.192	.264	0.246	0.238	0.447
V3	.404	.401	1.000	.337	.254	.274	.315	.251	.249	0.272	0.294	0.394
V4	.341	.199	.337	1.000	.227	.259	.275	.125	.177	0.211	0.154	0.293
V5	.280	.238	.254	.227	1.00	.471	.288	.456	.257	0.215	0.191	0.471
V6	.406	.415	.274	.259	.471	1.00	.479	.260	.276	0.323	0.346	0.518
V7	.334	.272	.315	.275	.288	.479	1.00	.260	.425	0.373	0.473	0.424
V8	.240	.192	.251	.125	.456	.260	.260	1.00	.229	0.190	0.435	0.276
V9	.364	.264	.249	.177	.257	.276	.425	.229	1.00	0.481	0.381	0.467
V10	.416	.246	.272	.211	.215	.323	.373	.190	.481	1.00	0.379	0.468
V11	.289	.238	.294	.154	.191	.346	.473	.135	.381	0.379	1.00	0.512

Source: Author's own calculation

A some what positive association between safety and comfort is shown by a correlation value of 0.471. This suggests that there is a tendency for more comfort to be associated with greater safety. Safety measures promote self-assurance and mental tranquilly. When people are certain that their safety is taken seriously and efficiently addressed, they may relax and feel more at peace. With a 0.456 correlation coefficient, it can be seen that there is a tendency for increased seat availability to be associated with higher comfort levels. This link is not particularly strong, but it does suggest that as seat availability increases, passengers may feel more at ease. When there aren't enough seats, there could be pain or difficulties because of congestion. During the voyage, travellers may have to stand up or share seats, both of which might be physically uncomfortable

Before using Ordered Logit model, a multicollinearity test was performed. The results show that there is no significant multicollinearity between the independent variables because the variance inflation factor (VIF) of each independent variable is less than 5 (Table 6). The OL models were created to investigate the important factors connected to passengers' satisfaction.

Table 6 : Collinearity results of independent variables

Variables	VIF
Frequency	1.885
Punctuality	1.675
Travel Time	1.422
Price	1.245
Comfort	1.552
Safety	1.752
Cleanliness	1.689
Seat Availability	1.329
Station Service	1.520
Information	1.518
Staff Behavior	1.451

Source: Author's own calculation

Interpretation of OL Model :

As shown in Table 7, six variables in the OL model including frequency, comfort, safety, station service, information and staff behavior was found to be significant at 90% confidence level. The impact of major factors on the satisfaction of passengers with Haryana Roadways was quantified using ORs.

Commuter satisfaction was significantly related with frequency. The positive sign of frequency indicates that an increase in this parameter is associated with increase in commuter's satisfaction. The coefficient of 0.7881 indicates that the log-odds of the result that is commuter satisfaction rise by 0.7881 for every unit increase in the variable "Frequency." This suggests a favorable relation between commuter satisfaction and frequency. Odds ratio of frequency showing that the odds of an additional level of commuter's satisfaction would increase by 2.1992 times with the increase in frequency. The parameter also showed a high correlation compare to other parameters with customer satisfaction (0.578). Buses are available frequently when there is a high frequency of bus service, which reduces passenger waiting time. People can more easily rely on buses to meet their everyday transit demands due to this convenience. And also, Bus service that runs frequently gives users more freedom for organising their travel.

The parameter staff behavior found to have a positive effect on customer satisfaction with a coefficient value of 0.8713. And this relation was found to be significant with p value 0.000. Which indicated that more satisfied passengers are with staff behavior, the more satisfied they are with transport system. Additionally, it has a mean score of 3.05, one of the highest scores for any parameter, and a good correlation coefficient value of 0.512 with the commuter's satisfaction. According to the OR result, the odds of additional level of passengers satisfaction would increase by 2.3901 times for each additional level of staff behavior. Passengers seek out pleasant relationships with others since they are social beings, and the way how treats them has a big impact on how happy they are.

Table 7 : Estimation results of the OL model

Variables	Coef.	P value	Odd Ratio (OR)
Frequency	0.7881	0.000	2.1992
Punctuality	0.2736	0.184	1.3147
Travel Time	0.1505	0.440	1.1624
Price	0.1529	0.431	1.6524
Comfort	0.5809	0.002	1.7877
Safety	0.3973	0.040	1.4879
Cleanliness	-0.1247	0.517	0.8827
Seat Availability	-0.1566	0.932	0.9844
Station Service	0.3737	0.043	1.4531
Information	0.3143	0.100	1.3693
Staff Behavior	0.8713	0.000	2.3901

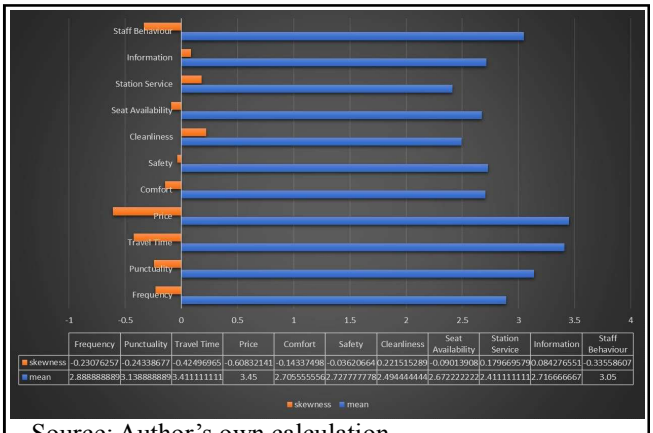
Source: Author's own calculation

Satisfaction among commuters is highly influenced by comfort. According to the OR results, the likelihood of a commuter reporting an additional level of happiness would rise by 78% for each additional level of comfort.

The physical well-being of passengers on the trip depends on having comfortable seating, enough legroom, and enough space to move around. When passengers are at ease, they are less likely to feel uncomfortable, tired which can enhance their travel experience and increase happiness.

Safety also depicts a positive relation on commuters' satisfaction. According to the OR results, there is a 48 per cent increase in likelihood for each extra level of safety for every level of passenger satisfaction. A positive coefficient shows that increasing safety measures can increase commuter satisfaction. It also shows a good correlation (.518) with customer satisfaction and having a mean score of 2.72 out of 5. Service providers can lower the chance of accidents, injuries, and other catastrophes by putting safety measures in place. This aids in preventing service interruptions, which eventually results in greater commuter satisfaction.

Station service is also seemed to be significant parameter in the satisfaction of Haryana roadways with a positive coefficient value of 0.3737. According to the OR findings, the likelihood of a higher level of passenger satisfaction would rise by 45 per cent for every level of station service that was added. The parameter also possessed a mean score of 2.4 which is merely average but positive skewness indicates that the distribution is moving towards higher satisfaction. The accessibility and convenience of a bus service can be improved by a well-run station service. A station's ability to provide facilities like lounging areas, bathrooms, and information boards can significantly enhance the entire customer experience. If a commuter experiences helpful and effective station service, they are more likely to be happy with the bus service (Fig. 5) .



	Frequency	Punctuality	Travel Time	Price	Comfort	Safety	Cleanliness	Seat Availability	Station Service	Information	Staff Behaviour
skewness	-0.23076257	-0.24338677	-0.42496965	-0.60832141	-0.14337498	-0.03620664	0.221515289	-0.09013908	0.179669579	0.084276551	-0.33558607
mean	2.888888889	3.138888889	3.411111111	3.45	2.705555556	2.727777778	2.494444444	2.672222222	2.411111111	2.716666667	3.05

Source: Author's own calculation

Fig. 5 : Mean and Skewness

The findings indicated that commuter happiness was positively impacted by the service's information. According to OR results, the likelihood of a higher level of commuter satisfaction would rise by 36% for every new tier of service information. It also revealed moderate correlation with overall satisfaction and occupied a decent mean score of 2.71 with positive skewness. Customer satisfaction in a bus service depends on providing clear and accurate information. It is easier for commuters to efficiently plan their trips when they have access to trustworthy information about bus routes, schedules, fares, and any changes or delays. Accurate information lowers misunderstanding, shortens wait times, and makes sure that customers can make right decisions, all of which increase customer happiness. Though the price and travel time occupied a good mean score on around 3.5 it was shown insignificant in OL regression analysis it may due the interaction effect. Price and other factors that affect consumer satisfaction could have complex interactions or linkages. Customers might be willing to pay more, for instance, if they believe the quality of the services is extraordinary. Price of ticket seems to be good but in commuters' perspective price is not the important factor that determine the overall satisfaction of the bus service.

Improvement Priorities for Haryana Roadways:

Based on customer satisfaction surveys, importance performance analysis (IPA) has been extensively employed to examine service improvement priorities.

The three-factor theory of IPA may be used to identify three variables, including basic factors, performance factors, and exciting elements (Cao, 2017). (1) Basic factor: When these parameters perform poorly, they lower consumer satisfaction; nevertheless, when they perform well, they do not raise customer happiness. (2) Performance factors: In the IPA, it is believed that performance factors have a linear and symmetric relationship with passenger satisfaction or have substantial effects when they perform both well and poorly. (3) Exciting elements: Customer satisfaction rises when these parameters are successfully exhibited. However, when they perform poorly, it has no negative effects on general satisfaction. The three-factor theory is applied in the following way in this article.

As an initial point, we reclassified the bus service into two dummy variables that represent "high performance" and "low performance" (Table 8).

Table 8 : Coding of parameters

Scales	High performance dummy variable	Low performance dummy variable
Excellent	1	0
Good	0	0
Average	0	1
Poor	0	1
Very Poor	0	1

Source: Author's own calculation

The classification of each service parameters based on performance is the second step. The Ordered Logit model was used in this study to regress 11 service element dummy variables on overall satisfaction. The results are shown in Table 9

Table 9 : Dummy variable's regression result

Parameter	Coef.	Std Err	t-value	P-value
Frequency (high)	2.89	1.70	1.70	0.08
Frequency (low)	1.79	.586	3.06	0.00
Punctuality (high)	-.517	1.78	-0.29	0.77
Punctuality (low)	.744	.485	1.53	0.12
Travel time (high)	1.29	1.06	1.22	0.22
Travel time (low)	-.205	.449	-0.46	0.64
Price (high)	1.65	1.08	1.52	0.12
Price (low)	-.609	.448	-1.36	0.17
Comfort (high)	-.715	2.28	-0.32	0.75
Comfort (low)	1.01	.528	1.93	0.05
Safety (high)	1.25	1.84	0.68	0.49
Safety (low)	1.44	.483	2.99	0.00
Cleanliness (high)	4.16	1.71	2.43	0.01
Cleanliness (low)	.251	.627	0.40	0.68
Seat availability (high)	2.41	2.16	1.12	0.26
Seat availability (low)	-.364	.651	-0.56	0.57
Station service (high)	4.50	1.78	2.52	0.012
Station service (low)	1.053	.621	1.70	0.09
Information (high)	2.36	1.48	1.59	0.112
Information (low)	.221	.525	0.42	0.67
Staff behavior (high)	-.756	1.72	-0.44	0.66
Staff behavior (low)	1.502	.475	3.16	0.00

Source: Author's own calculation

We categorize the service qualities in the third phase using the regression analysis' findings. These factors fall under the following categories: If a low-performance dummy variable is significant but a high-performance dummy variable is not, the factor might be classified as a basic factor. This factor can be categorized as an exciting factor if the high-performance dummy variable is significant but the low-performance dummy variable is not significant. If the coefficients of both the dummy variables are substantial, then a parameter is associated with the performance factor. If both of an attribute's dummy variables are insignificant, it belongs to the insignificant factor (Table 10).

Table 10 : IPA result

Top priorities—Basic factors

- Comfort
- Safety
- Staff behavior

Second priorities—Performance factors

- Frequency
- Station service

Third priorities —Exciting factors

- Cleanliness

Source: Author's own calculation

Finally, this study may provide a structure of bus service improvement priorities by classifying each service quality. The three-factor approach states that the basic factors that underperform have the highest adverse impact on passenger satisfaction and ought to be given priority. According to the IPA analysis, "comfort," "safety," and "staff behaviour" should be improved in that order of importance. The performance elements are identified as the second priority, with "frequency" and "station service" as the second priorities for improvement. As long as the performance factors are improved, passenger happiness will grow. When resources are available, fundamental elements like "cleanliness" might be enhanced to make using the bus convenient, simple, and peace.

Conclusion:

The world's fast rising motorization is to blame for traffic jams, high emissions, high non- renewable energy consumption, and a high rate of traffic accidents. Public bus transit ought to finally develop into a sustainable mode of transportation in order to combat these dangers. In addition to encouraging current users to keep using it to fulfil their travel needs, high-quality public transport also attracts new users. The study discovered that every factor used in assessing service quality is important in figuring out how satisfied Haryana roadways commuters are. The most important and significant elements that are likely to influence 'how satisfied a customer is with a bus service' are frequency, personnel behaviour, comfort, safety, station service, and information. Staff behaviour and frequency have also demonstrated a strong association

with all other parameters. In the Improvement performance analysis frequency, staff behaviour and safety should be given the top priority. There are a number of concerns that public transport officials need to focus on since customers are not totally content with the service provided by Haryana's roadways. It has been concluded that there are additional factors that affect the evaluation of customer satisfaction. In the future, it's crucial to look into these other variables.

The policies should be implemented in order to increase the satisfaction and sustain the public transport system effectively. Augmented scheduling of bus services should be introduced by analysing peak and off- peak hours to predict demand trends. Adjust the bus schedules to ensure that buses are more frequent during high-demand hours and less frequent during low-demand periods and this will help in tackling the issues faced in the frequency of bus services. Introduce a real-time monitoring system that allows passengers to check the position and expected arrival time of buses via a mobile app or web platform.

Systematic and periodic training of bus services staffs on technological aspects, commuter's service skills, personal behaviour, efficient communication and dispute resolution can deliver a high-quality working force. Implement a precise and consistent maintenance programme for buses to ensure they are in good functioning order. Mechanical failures and accidents can be reduced through periodic assessments, repairs, and sticking to safety standards.

Consider investing in safety technology such as surveillance equipment, GPS positioning systems, and collision mitigation technologies to monitor and improve bus operations. Design the bus terminals and stations in such a way that the stations have clear signs, simple layouts, resting places, and weather-resistant features and also consider the needs of various passengers, particularly those with special needs or impairments.

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