Article

National economic benefits through high-speed train services: The role of service quality and quality pursuer on client satisfaction

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Abstract: The connectivity and dependency between various connected locations has become stronger as the rate of urbanization and economic expansion has accelerated. Transport has played a critical role in promoting the flow of economic benefits and growth across linked geographical areas since its origin. Therefore, the purpose of this paper was to provide deeper insights into the relationship between service quality and client satisfaction by exploring the mediating and moderating role of service quality and quality pursuer on client satisfaction. The research used quantitative approaches and employed a non-probability sampling technique. The 240 samples were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings show that there is a positive relationship between, assurance, responsiveness, convenience, and service quality. Conversely, findings show an insignificant relationship between empathy and service quality. Findings specify that service quality mediate the association between assurance, responsiveness, convenience, and client satisfaction. Nevertheless, the study observed an insignificant mediation effect of service quality on the linkage between empathy and customer satisfaction. The findings specify that quality pursuers have a significant moderating effect on the relationship between service quality and client satisfaction. As a result, the findings of this present research give useful information for improving client satisfaction and the role of long-term viability of the high-speed rail business in the national economy. This research offers valuable insights for transportation agencies by examining the link between service quality attributes and passengers' intentions to reuse services, aiming to enhance the provided service, boost ridership, and support the implementation of sustainable transportation policies. The study recognizes certain limitations, such as the restricted sample size and the diverse characteristics of high-speed rail passengers, which may skew the understanding of how service quality affects customer satisfaction and subsequent behaviors. Our results suggest that satisfaction levels among passengers could differ based on the specific routes taken and the types of seating arrangements offered. Consequently, authorities should priorities service quality and its four important characteristics.

Keywords: empathy; assurance; responsiveness; convenience high-speed-train; client satisfaction; service quality; quality pursuer

1. Background and introduction

According to the UIC (Union International des Chemins der fer) definition, high-speed rail refers to a rail system containing lines with speeds above 200 km/h that have been modified from the original by linearization and standardization of new high-

speed line-like orbital gauges specifically built for speeds above 250 km/h. The first Shinkansen is the Japanese Shinkansen, which officially entered service in 1964. After that, France, Italy, and Germany built high-speed railways one after another. France built the Southeast TGV (Train à Grande Vitesse) and the Atlantic TGV. Italy built a high-speed train from Rome to Florence (Canming and Jianjun, 2011).

In 2008, China ample its first high-speed rail, the Beijing-Tianjin intercity high-speed rail, with a speed of over 300 kilometers (Takagi and review, 2011). Meanwhile, in 2009, China built the world's longest and fastest railway, the Wuhan-Guangzhou Special Passenger Railway. By November 2010, China will have high-speed rail from Nanchang to Beijing-Tianjin, Shijiazhuang-Taiyuan, Wenzhou-Fuzhou, Wuhan-Guangzhou, Zhengzhou-Xian, Fuzhou-Xiamen, Chengdu-Dujiang Dam, and Shanghai-Nanjing. Constructed the route. To Jiujiang, from Shanghai to Hangzhou. China has a high-speed rail system, the fastest in overall technology, strong integration capacity, the longest distance, and the largest construction scale (Wu et al., 2014). In recent decades, railways have played an important role in medium and long-distance passenger transport in China due to their comparatively low prices, large capacity, and high safety (Cheng and Chen, 2021). To meet the needs of a rapidly growing society, traditional railways had to be transformed. After years of technological research, finally, the first self-developed high-speed train (HSR) was put into operation in 2008 (Chen, Wang et al., 2021). High-speed rail has quickly become the main mode of intercity transport in the country because it is fast, environmentally friendly, and on time. Numerous transportation methods, including roads and fast trains, are growing as a result of the society and economy's rapid expansion (Neumann, 2021).

For high-speed train operators to achieve sustainable development, service quality is also becoming more and more important for boosting business identity and competitiveness (Nguyen-Phuoc et al., 2021). The key to raising earnings and ensuring sustainable development of high-speed railway operator firms in a fiercely competitive market with many modes of transportation is to improve passenger happiness and drive revenue growth (Zhang, Deng et al., 2021).

Customer satisfaction has a significant impact on their decision (Bae and Chi, 2022). Prior studies have demonstrated that high-quality services may raise consumer satisfaction and therefore motivate them to purchase or consume again Nowadays, businesses across all sectors understand how important passengers are and view them as their most valuable asset (Chin et al., 2019). The worldwide market is dominated by service providers, and the need for services in the global economy is rising (Rita et al, 2019).

Today, with the improvement of the economy and living standards, the increase in travel frequency not only increases the travel demand but also increases the actual demand for cycling. Passengers strongly demand comfort. At the same time, service quality is becoming more important for building corporate image and competitiveness, which is crucial for high-speed rail operators to achieve sustainable development (Chin et al., 2019). In a fiercely competitive market with multiple modes of transportation, the key to increasing profits and achieving sustainable development of high-speed railway operation enterprises is to boost passenger satisfaction and increase market share (Cheng and Deng, 2019). Passenger satisfaction refers to the pleasure experienced by passengers after meeting their needs (Tsafarakis, Kokotas and

Pantouvakis, 2018). It is a comparison of actual feelings after riding and expectations of service quality (Parasuraman, Zeithaml and Berry, 1988).

Passenger satisfaction is an important factor affecting their choice. Previous research has shown that high-quality services can increase satisfaction and then encourage customers to buy or consume again (Hu, Kandampully and Juwaheer, 2009). (Parasuraman, Zeithaml and Berry, 1988) proposed the conceptual model to assess service quality. The model divided the main influencing factors into five categories, namely tangible, reliable, responsive, guaranteed, and compassionate. (Nadiri et al., 2008) found that tangible factors are critical to passenger satisfaction in air transport. (Suki, 2014) research shows that the physical factors and empathy of airport terminals and aircraft have a significant impact on passenger satisfaction. It also states that increasing passenger satisfaction can effectively improve word of mouth. Research conducted by Sa (2010), van Lierop, Badami and El-Geneidy (2018) has proved that the safety of urban public transport, the cleanliness and comfort of the environment, information services, and additional services can increase passenger satisfaction, thereby further affecting their behavioral intentions. There are many ways to study the interrelationships between service quality, passenger satisfaction, and behavioral intent. For example, some researchers have applied selection behavior models, such as Logit or Probit models (Eboli and Mazzulla, 2008; Jiang and Zhang, 2016). Today, companies in all industries recognize the importance of passengers and regard them as the most valuable asset on which company survival depends (Chin et al., 2019). Service companies have a major share of the global market, and demand for services in the world economy is growing (Glattfelder and Battiston, 2019).

The success characteristics of high-speed rail businesses are more challenging in a highly competitive industry (N. Zhang et al., 2021). The worldwide market is dominated by service providers, and the need for services in the global economy is rising (Rui and Bruyaka, 2021). One of the most crucial research questions in the realm of large-scale services is service quality, which previous studies have found to be a significant predictor of consumer pleasure (Brahmana and Rohayati, 2022). Managers may find it helpful if they have a general understanding of how customers feel about the caliber of their services. Additionally, when the clientele increases, the accountable authority views customer pleasure as a crucial factor (Balinado et al., 2021). Yet, a little work looked at the viewpoints of various passenger groups. Additionally, there hasn't been much study done in China on the relationship between high-speed rail client satisfaction, service quality, and quality pursuer (Peng et al., 2021; Zeybek and Management, 2018; Zhang, Wan, and Yang, 2019).

Based on the literature research, there is a significant gap in our understanding of how service quality, client satisfaction, and the relations of empathy, assurance, responsiveness, and convenience are interconnected. The complex role of quality pursuers as moderators in this connection has not been thoroughly investigated. Therefore, this study aims to address two essential concerns in order to fill these gaps. How do empathy, assurance, responsiveness, and convenience together impact service quality and thus affect client satisfaction? How does the need for excellence influence the connection between service quality and client satisfaction, and how does service quality influences as a mediator on the relationship between empathy, assurance, responsiveness, and convenience and client satisfaction? This research aims to

elucidate how quality mediation and moderation mechanisms enhance the positive impact of service quality on customer satisfaction by a comprehensive investigation of these processes. As a result, this study aims to fill in knowledge gaps and advances knowledge of how to draw in and retain such passengers in the rail industry, notably high-speed trains in China. To assess the relationship between cleent satisfaction and the four areas of service quality, the present study looked at empathy, assurance, responsiveness, and convenience). It also examines how quality pursuer have a moderating role in the relationship between customer satisfaction and service quality. The following are the parts of the study: a review of the literature, an analysis of the methodologies and findings, a discussion, a conclusion, research implications, limitations, and future research directions.

The Importance of High-Speed Rail Services in Attaining the United Nations Sustainable Development Goals. Transportation's importance in sustainable development was first recognised during the 1992 United Nations Earth Summit and further emphasised in its accompanying conclusion document, Agenda 21. The UN General Assembly's nineteenth Special Session in 1997 reviewed Agenda 21's implementation and identified transport as the main factor expected to drive up global energy consumption in the next twenty years. As predicted, transport has become the primary energy user in rich nations and is growing quickly in many emerging ones (Messerli et al., 2019). The 2002 World Summit on Sustainable Development emphasised the importance of mobility, resulting in the Johannesburg Plan of Implementation (JPOI). The JPOI detailed key elements to support sustainable mobility, such as infrastructure development, improving public transport systems, optimising goods delivery networks, and ensuring transport services are affordable, efficient, and convenient. The article also discussed the significance of enhancing urban air quality and health, as well as the need of reducing greenhouse gas emissions (Korcheva, 2023).

Rail transport is essential for accomplishing the Sustainable Development Goals (SDGs) in urban transportation, influencing them both directly and indirectly. It is crucial to change from pondering the fundamental nature of rail to valuing its purpose. Rail transit is crucial for economic progress, providing a route to sustainable consumption and a circular economy in the face of increasing urbanization and population growth. It improves access to job possibilities, promoting a more inclusive and fair society. Rail transport enhances worker diversity and skills by connecting communities and increasing educational opportunities, promoting cultural interactions essential for social cohesion. Rail is a crucial component on our path towards a sustainable future. The rail industry's commitment to the Sustainable Development Goals (SDGs) is essential for developing safer, more resilient, and sustainable train networks (Kapur, Das, and Nandineni, 2021).

The 2030 Agenda for Sustainable Development integrates sustainable transport across various Sustainable Development Goals (SDGs) and targets, particularly those concerning food security, health, energy, economic growth, infrastructure, and urban development. Furthermore, the transport sector's critical role in climate action is acknowledged under the United Nations Framework Convention on Climate Change (UNFCCC). With nearly a quarter of all energy-related global greenhouse gas emissions originating from the transport sector, and projections indicating significant

increases in these emissions, the sector is deemed vital for the success of the Paris Agreement. This emphasizes the need for sustainable transport solutions to mitigate climate change and achieve broader sustainability goals (Weiland, Hickmann, Lederer, Marquardt, and Schwindenhammer, 2021).

2. Formulation of hypotheses based on literature review

2.1. Expectation disconfirmation theory

This study is based on the theory of the expectation disconfirmation theory. This theory is given by Oliver, and the model of a theory is constructed in a series of two research papers (Oliver, 1977, 1980). The model of theory exhibited that satisfaction is the result of expectation, perceived performance, and disconfirmation of beliefs. The theory states that "satisfaction/dissatisfaction results from a customer's comparison of performance (of a product or service) with predetermined standards of performance" (Swamidass, 2000). It is "a cognitive theory which seeks to explain post-purchase or post-adoption satisfaction as a function of expectations, perceived performance, and disconfirmation of beliefs" (Revolvy, 2019). The predetermined criteria are the customer's prognostic beliefs. Prior studies proved that service quality is one of the standards which entails the satisfaction/dissatisfaction of the customers (Chou et al., 2011; Kuo and Tang, 2013; Cheng et al., 2018). Hence, keeping in view the high-speed-train in China (Chan and Yuan, 2017). We argued that, a quality seeker who has greater knowledge about the quality of the services they received assess the better outcome of the qualities of services they received.

Three probable results are expected. Positive disconfirmation encounter when perceived performance greater than the predetermined beliefs/expectation. The result of it comes up with delighted customers. Zilch disconfirmation encounters perceived performance equal to predetermined expectations. The result of it involves just satisfied customers. Negative disconfirmation this incident encounter; when perceived performance less than predetermined expectations. The result of this incident results in dissatisfied customers.

2.2. Service quality and economic sustainability in the railway sector

A detailed review of the existing state of the rail transport system involves facilities, rail systems, operational efficiencies, connectivity, and routing, dominated by degraded infrastructure, outdated technology, scattered and old databases, scarcely usable investments, reduced safety and performance services, and restricted accessibility (Bayane, Yanjun and Bekhzad, 2020). Diverse corporate, operational and other concerns in the public transport sector have been reported. Sustainable transport and infrastructure of passengers by rail need creative transport chain management elements. Practical incorporation of the recommendations should strengthen the cooperation and scheduling of rail transport and eventually enhance quality, appeal, and a greater public perception of travel (Dedík, Čechovič and Gašparík, 2020). Service quality is the deciding element that can be used by railway undertakings in liberalized markets to establish disparities and gain competitive advantages. The quality of service perceived by the customer is important for rail freight transport, with

major service quality discrepancies clearly explained that must be addressed in the market liberalization process. The study is based on survey results conducted by evaluating railway shareholders to fully understand their views of the quality of rail services. One of the important operational efficiency deficits is transit time (Zeybek, 2019). There is a significant need to change people's travel mode from personal cars to public rail because rail transport is a more environmentally friendly travel mode (Jomnonkwao, Champahom and Ratanavaraha, 2020). It is also necessary to set the order of access to services in railway stations (Jomnonkwao, Champahom and Ratanavaraha, 2020). Due to the relatively low ratio between energy consumption and transport power, metro rail systems play a key role in urban growth. As sustainable development has become an international concern over the past decade, public authorities and the community have shown interest in more sustainable methods of providing metro rail services, and the efficacy and quality of the system are connected to the sustainable level of the transport system. Emerging technologies provide opportunities, through intelligent operation and maintenance, to encourage such activity (Zhang et al., 2020).

2.3. Service quality in high-speed train systems

For the various stakeholders involved in high-speed rail (HSR) developments, service quality in relation to frequency, affordability, and accessibility is an important issue. The definition of connectivity offers the means to establish relevant metrics that are likely to assess the quality of service in transportation supply and demand analyses (Chen, Souche Le Corvec and Bonnafous, 2019). Extensive research has been conducted on currency evaluation for transit service characteristics such as fares, frequency, and input and output time. On the contrary, five types of elements have not been properly assessed in terms of tangible, comfort, convenience, customer service, and safety and protection. A significant role here is played by user heterogeneity (Chang and Jung, 2017). Train companies would concentrate more on enhancing customer satisfaction by type of train, type of train station, route, and consumer class (Monsuur et al., 2017).

With the accelerated growth of high-speed trains, new wireless railway communication networks are required for better connectivity services. The most exciting is the Metropolitan Global Market Transformation, which will provide high-mobility clients with broadband connectivity, rapid changeover, and efficient communication (Yuzhe and Bo, 2014). High-speed train atmosphere is clean, convenient, comfortable, and saves time while offering high-quality service without train delays (Jiang, Chen and Zhong, 2010; Chiu et al., 2012).

Stochastic fluctuations in commuter demand at stations and traffic patterns on service routes are frequently caused by interrupted transit operations, increasing passenger wait times and thereby preventing riders from using the transit system. In order to preserve serious progress predictability and reduce the negative consequences of service interruption, effective, real-time operational monitoring is essential. In a sophisticated public transportation system environment, such as an automated train control system and an automatic vehicle position system, a real-time headway control model is appropriate to preserve desired headways for pairs of successive vehicles by

minimizing overall headway variance for all stations (Ding and Chien, 2001).

2.4. Assurance

Parmelli et al. (2021) Advance in technology have begun to directly improve quality assurance, a crucial component of any system that demands time savings (Baharun, Mundiri, Zamroni et al., 2021). Therefore, service quality assurance in the transportation sector and measuring service quality aspects such as empathy, knowledge reliability, baggage insurance, responsiveness, reliability, etc. Reliability of service time and external and intangible relationships are important to create relationship effects to overall passenger satisfaction with technology mediation (Arabelen, Kaya, and Trade, 2021). Employee skills and abilities are referred to as assurance. Do clients have confidence in these individuals' skills and abilities? Customers are more likely to return and conduct further business with a firm if they feel comfortable with the workers (Aoun, 2021). Assurances include traits like competence, politics, good communication, and an overall attitude that successfully and efficiently serve the consumer. Assurance refers to the skills and abilities of employees, and do these skills and abilities gain the trust and confidence of customers? If customers are comfortable with the employees of the company, it indicates that the customers will return to do further business with the company. Assurances include the following characteristics such as competence, politics, effective communication, and general attitude that serve the customer effectively and efficiently. Employee behavior gives customers confidence in the company which makes the customers feel safe as long as the employees are respectful and always have the necessary knowledge to answer the customers' questions. Besides, the assurance dimension of SERVQUAL has the capability of the organization, courtesy extending to its customers and operational security. The ability is the knowledge and skills of the organization in the performance of its service. Their knowledge and way of interacting with the customer inspire confidence in the organization (Parasuraman, Zeithaml and Berry, 1988; Eisingerich and Bell, 2008; Alhkami and Alarussi, 2016). The following formulation of the first hypothesis may be made using the material mentioned above.

H1: There is a positive relationship between assurance and service quality.

2.5. Empathy

Knowing the demands of consumers and their behaviour is also crucial in today's worldwide world (Anshu, Gaur, Singh, et al., 2022). Service delivery and corporate responsibility are the most important and least significant aspects (Bambale, Ghani, Ado, and Management, 2020). These also enable international officials to track, control, and enhance their operations (Attiany, Husain, and Al-kharabsheh, 2021). It may also be used as an evaluation approach to compare railway performance to passenger expectations (Weisz, Ong, Carlson, et al., 2021). Evaluating service quality and subsequent management is critical for every organization to be competitive and effective in business. Passenger services confront such rivalry (Heng, Hamid, and Business, 2021). Customer satisfaction is generally what keeps railroads in business, and it can only be attained by integrating services that are crucial indicators of overall service quality with the demands of train passengers. Empathy implies the way the

company cares and pays personal attention to its customers, making customers feel extra valuable and special. This includes access, communication, and understanding customer needs. It is concerned with caring and personal attention for the client. In this dimension, the organization considers customers' problems and results in their favor, as well as customers with significant personal attention. Employee organizations do not touch on what they do as customers of their organization. As such, empathetic organizations understand the needs of their customers and make their services accessible to them (Parasuraman, Zeithaml and Berry, 1985). Empathy is defined as the care and personal attention a firm provides to its customers. This includes giving personal attention to customers and employees who understand the needs of their customers and facilitate business hours. The findings of Boubker and Naoui (2022), indicate that physical attributes of airlines and terminals, as well as empathy and the airline's reputation, are significant factors influencing the perceived service quality. Their research shows that the perceived service quality has a beneficial effect on passenger satisfaction. Satisfied passengers are more likely to build a strong attachment to the brand, leading to increased loyalty. Hence, the second hypothesis can be developed as under: Therefore, the following hypothesis may be formed:

H2: There is a positive relationship between empathy and service quality.

2.6. Responsiveness

Prompt response, operations, and availability are critical in rail systems for customer satisfaction (Sanny, Angelina, Christian, et al., 2021). The provision of high-quality service is critical to the success or failure of many retailers (McGorry et al., 2022). Having said that, it is still unclear how qualities like empathy and responsiveness function to assess customer expectations for service quality despite rejected warnings to do so in various service scenarios (Ndzinisa, Dlamini, and Development, 2022). To minimise disinvestment, industries must be sensitive and willing to consider future changes while making strategic decisions (Egli, Schärer, and Steffen, 2022). The responsiveness refers to the company's willingness to benefit its customers by providing good, quality, and fast service to them. This is also a very important aspect, as all customers feel more valued when they get the best quality of service. It also means that the employees of the service organization are willing to help the customer and respond to their requests as well as notify the customer when they provide the service, and then provide the service promptly. Without the service, the ability to return quickly and professionally can lead to a good sense of quality (Hernon and Nitecki, 2001). This dimension emphasizes caution and promptness in dealing with customer questions, requests, problems, and complaints (Lee and Johnson, 1997; Zeithaml, Bitner and Gremler, 2018). Customers are made aware of the responsiveness of how long they have to pay for assistance, answers to questions, or problems. (Zeithaml, Bitner and Gremler, 2018).

H3: There is a positive relationship between responsiveness and service quality.

2.7. Convenience

Facilitating access to travel information that enhances station access in many areas of the rail network would support the growth and modernization of the rail

network's services and probably make it more economical to boost train usage (Luo and Zhao, 2021). The majority of these network segments are situated in outlying areas with low levels of current train service (Liu, Liu, Mo, et al., 2020). For the rise of high-speed rail transportation, quality service is crucial (HST) (Deng, Gan, Perl, et al. 2020). Each HST journey consists of the following segments: HST station entry, waiting, route, and HST points. The perspective of HST commuters is impacted by quality across all segments. Travel awareness and time travel are significant ways to meet HST criteria (Agustien and Haryono, 2021) To enhance the HST experience, it is vital to integrate the HST with the urban transportation infrastructure (Wang, Zhan, Peng, et al., 2021). The convenient purchasing of passes and the facilities for online reservations with the application on the mobile attracts and persuades everyone to undertake the decision-making phase and guarantee satisfaction and loyalty (Sahney, Ghosh and Shrivastava, 2014). As travelers age, they place greater demands on convenience, such as walking distance, transfer facility, and waiting time (Kim et al., 2018). Since all these aspects are important for elderly passengers, they were chosen to evaluate the transit service facility

H4. There is a positive relationship between convenience and service quality.

2.8. Service quality and client satisfaction

Currently, every type of business and size has proved that companies make money when their clients are happy (Sulu, Arasli, and Saydam, 2022). It's a cognitive concept that describes the subjective emotional state that arises as a result of evaluating a series of events. As a result, customer satisfaction includes specific types of sensations that indicate whether the product/service quality meets expectations (Ferdous, Islam, Rahman et al., 2022). Recent academic research has examined a variety of topics and characteristics, including consumer loyalty, experiential value, quality, performance, and experience (Van Lierop, Badami, and El-Geneidy, 2018). Most clients believe that customer satisfaction and service quality are intertwined, which is often incorrect (Bogale and Gizat). According to Zubkov and Sirina (2022), It represents the cause of discrepancies between expectations and competence along the key quality dimensions, claim Zubkov and Sirina (2022). Li, Ma, and Services (2022) conducted a study to analyze the discrepancy between customers' expectations and the services delivered. Besides, Yilmaz, Ari, and Oğuz (2021), draw the conclusion that service quality is a tool that aids in the delivery of excellent service.

In general, most customers have a wrong conception about customer satisfaction and service quality, the belief that both are closely related items. According to (Rajeswari and Santa Kumari, 2014), it is "rationale of differences between expectation and competence along the important quality dimensions" (De Oña et al., 2016), stated that it was administered to compare among "customers' expectations and performed services" Additionally, (Mudenda and Guga, 2017), conclude that, service quality is a tool which provides helps in the provision of good service. Moreover, it is a judgment of "expectations with the performance" (Buluma, 2012), employed eight dimensions of the service quality to analyze its effects on passenger satisfaction in the railway of Kenya. This variable is considered one of the most important elements in service marketing and to predict or measure customer satisfaction (Kim et al., 2019)

(Zaato et al., 2023).

According to Lei et al. (2017), there should be an integrated system to advance the quality of service of high-speed-train, the walking distance should be decreased, so that customer satisfaction should be achieved. (Farajpour, Bazeghi Kisomi and Bagheri, 2017), administered SERVQUAL and KANO approaches to examine the key factors that influence "service quality and passenger satisfaction". The findings demonstrated that the quick process of issuing a ticket, more advanced equipment used on stations, staff, and management willingness are significant to advance the quality of service and achieve customer satisfaction. Several studies supported the relationship between service quality and customer satisfaction (Hill and Alexander, 2017; Yilmaz and Ari, 2017; Itani, Kassar and Loureiro, 2019; Jiang et al., 2019).

Thus, it is suggested that:

H5: Service quality significantly mediates the association between assurance and client satisfaction.

H6: Service quality significantly mediates the association between empathy and client satisfaction.

H7: Service quality significantly mediates the association between responsiveness and client satisfaction.

H8: Service quality significantly mediates the association between convenience and client satisfaction.

2.9. Quality seeker (moderator)

Quality pursuer, according to (Khudhair, Jusoh, Mardani, et al., 2019), are "individuals who seek information about a service or a product and utilize it to make judgments." Before practicing or asking for help from other sources, such as newspapers, television, the internet, social media, family, friends, etc., they start the process of finding knowledge by utilizing their skills and expertise. Depending on their degree of money, quality searchers fall into one of three categories: three income levels: high, middle, and poor (G. Cheng et al., 2021). Those with higher resources don't think about price, while those with average resources are moderate, and those with low enlistment are concerned with price. As resources dwindle, quality pursuer ends up compromising quality with price. Customers who regularly belong to the group of quality pursuer have similar characteristics all over the world (Afful-Dadzie and Afful-Dadzie, 2021). Khudhair et al. (2019) the aviation sector employed search quality as a moderating factor. The findings apply to individuals who have serious quality issues since customer happiness is more strongly influenced by service quality. For a consumer of lower caliber, however, the connection between services (Bae et al., 2022). Consequently, the following hypothesis is put forward

H9: There is a significant moderation in the relationship between service quality and client satisfaction.

3. Methodology

In this research, we developed a conceptual model comprising seven variables, as depicted in **Figure 1**. The model categorizes these variables, with three designated as independent, one as a mediator, one as a moderator, and one as a dependent variable.

To reach our goals in this study, we relied on quantitative techniques. The current study employed a non-probable sampling strategy. This strategy is popular among academics. In the fields of tourism, transportation, and consumer behavior, this is regarded as a standard methodology (Stratton and Medicine, 2021). The information was gathered between April and June of this 2023. Using a self-administered questionnaire, information was collected. At the Nanjing and Suzhou stations, potential responders were accosted while they waited for a train. Two highly qualified researchers and four surveyors performed the survey. In contrast to systematic contact, these respondents were selected randomly. The questionnaire was given to the respondents after a brief explanation of the study's objectives, and the researchers assisted them in filling it out. According to respondents, participation would be completely optional, private, and anonymous.
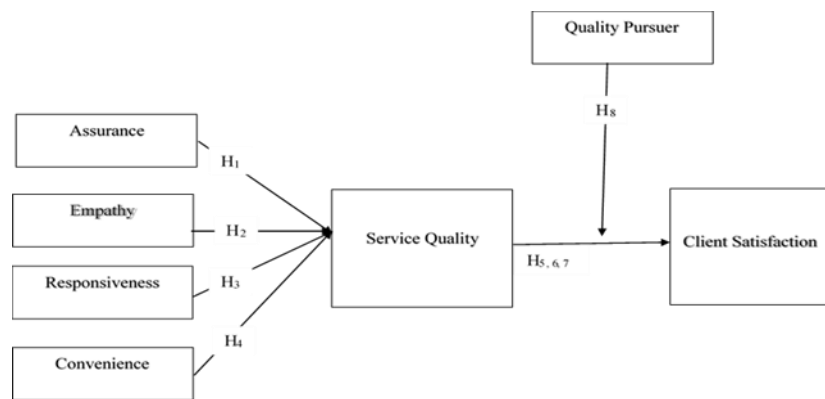

Figure 1. Conceptual model of client satisfaction.

To ensure a greater response rate and availability, the questionnaire was completed and returned on-site. An instrument was administered in both Chinese and English to ensure the accuracy of the hypothesized structure. The cause concerns both domestic and international travelers from China (many of them were scholars, travelers, businesspeople, or anyone with another reason for visiting China). The two-pilot research, performed in Nanjing and Suzhou, each with 50 passengers, was done with 50 passengers. An independent samples t-test was used to ensure non-response bias, as per Armstrong and Overton (1977) suggestion. Questionnaires were completed and returned on-site to guarantee a high response rate. 280 questionnaires in total were sent, and 240 replies from respondents—after removing all the blanks and missing data were utilised to analyses the data. The study's accuracy and validity rate were 90.7%. However, analysis was performed through Partial least square structural equation modelling (PLS-SEM).

3.1. Respondents' information

According to the **Table 1**, 59.2% of respondents were men and 39.8% were women. The majority of the passengers (39.1%) were students. They were followed by tourists =26.5%, business = 21.1%, and others = 10.7% on their way home. In response to the frequency of utilising high-speed trains, nearly (47.17%) suggest twice a month, 21.82% three times a month, and the remaining 31.2% once a month. In terms of age, 36.02% fall between the ages of 18 and 25, 22.97% fall between the ages of 26

and 35, which is 31.71% fall between the ages 36 and 45, and the remaining 10% fall between the ages of 46 and 55. Out of 240 respondents, about (12.2%) only had elementary education (13.15%) were secondary, (33.52%) passed university, and (41.66%) were postgraduate.

Table 1. Statistics of the respondents.

Total Samples: 240			Percentage (%)
Sex	Male	142	59.2%
	Female	98	39.8%
Profession	Student	94	39.1%
	Tourists	63	26.5%
	Business	58	21.1%
	Others	25	10.7%
Using High Speed Train	Two times in a month	113	47.17%
	Three times in a month	52	21.82%
	One time in a month	75	31.2%
Age	18–25	86	36.02%
	26–35	54	22.97%
	36–45	76	31.71%
	46–55	24	10%
Education	Elementary education	29	12.2%
	Secondary education	31	13.15%
	Bachelor	80	33.52%
	Postgraduate	100	41.66%

3.2. Measurement scale/items

To measure service quality, assurance, empathy, responsiveness and conveniences fifteen items were used (Ferreira et al., 2021). To measure client satisfaction three-item were adopted and modified from earlier (Chou, Ongkowijoyo, Ngo et al., 2020). To measure quality seeker three items scale, adapted from previous research conducted by Khudhair et al. (2019), Thus, for quality pursuer, three items were employed (Khudhair et al., 2019), "I don't mind the price rise provided the quality is good," respondents were asked. "Low quality compels me to abandon the high-speed train." "The major reason in pursuing the firm is high quality." "The more I see exceptional quality growth in the system, the more convinced I am." "I chose the high-speed train because of the great quality of the food and beverages." The scale was graded on a five-point Likert scale, with 1 being severely disagreed, 2 being disagreed, 3 being neutral, 4 agreeing, and 5 highly agreeing

4. Results analysis

4.1. Evaluation of partial least squares-structural equation modeling (PLS-SEM) results

PLS-SEM is a statistical modelling approach that is quickly developing.

Numerous introductory papers on this approach and reviews of its use by academics from other disciplines have been published over the past few decades. Researchers have also begun investigating the knowledge infrastructure of methodological research on PLS-SEM by examining the structures of authors, nations, and co-citation networks in light of the growing maturity of the field (Joseph F Hair Jr et al., 2021; Ringle, Sarstedt, Mitchell, et al., 2020). Several tests were run, particularly to evaluate the data's reliability, validity, and path coefficients as well as to ensure that there was no multicollinearity or any bias connected to the data (Ali, Rasoolimanesh, Sarstedt, et al. 2018). Hence, we used a systematic two-way method namely: Measurement model and structural model, approach to assessing the results (Hair et al., 2010).

The Variance Inflation Factor (VIF) is used to detect multicollinearity in **Table 2**. Variance inflation factor (VIF). regression analysis by measuring how correlations between independent variables might affect the results of a multiple regression model. Multicollinearity, resulting from correlations across variables, may negatively affect the accuracy of regression outcomes. VIF offers an estimate of how much the variance of an estimated regression coefficient increases because of interdependencies (Kyriazos and Poga, 2023).

Naimi, Hamm, Groen, Skidmore, and Toxopeus (2014) states that a VIF value of 1 indicates no connection among predictors, values between 1 and 5 show moderate correlation, while values higher than 5 indicate substantial association. The rise in VIF values indicates a higher probability of multicollinearity, necessitating further examination. If the VIF is over 10, it indicates significant multicollinearity that has to be addressed (Kyriazos and Poga, 2023). A single value of 1 indicates no association with other factors. The dataset showed no signs of multicollinearity or bias, as seen in **Table 2**.

Table 2. Variance inflation factor (VIF).

Constructs	VIF
ASR - SQ	3.470
CVN - SQ	3.679
EMP - SQ	2.012
RPN - SQ	2.267
QP x SQ - CS	1.070

According to Henseler, Ringle, and Sinkovics (2009) to analyses the model of research, academics must assess "individual item reliability, internal consistency, content validity, convergent validity, and discriminant validity".

4.2. Reliability of individual item

Measured by taking the outer loadings of things associated with a specific dimension into consideration (Hair, Ringle, and Sarstedt, 2012). Joe F Hair Jr, Sarstedt, Matthews, and Ringle (2016) suggested that it be kept between 0.40 and 0.70. As a result, as shown in **Table 3**, all of the values were satisfactorily fulfilled and met the criteria, with item values ranging between 0.558 and 0.902. The value of Cronbach's Alpha should be more than 0.7 (Nunnaly, 1978), As shown in **Table 3**, the values of

CA vary from 0.737 to 0.903; hence, it is determined that the current study sufficiently fulfills the criteria of measuring reliability.

Table 3. Model for testing reliability and validity.

Construct	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
ASR	0.703	0.709	0.77
CS	0.916	0.916	0.856
CVN	0.808	0.816	0.725
EMP	0.878	0.883	0.803
QP	0.717	0.738	0.639
RPN	0.903	0.904	0.838
SQ	0.837	0.840	0.755

4.3. Internal consistency reliability

According to the rule of thumb, the value of composite dependability should be equal to or better than 0.7. **Table 3** displays the coefficient value of CR of the constructs, which falls within the range of 0.703 to 0.916, indicating good reliability of the measurements (Bagozzi and Yi, 1988).

4.4. C.V (Convergent validity)

The degree to which one test is connected to others that assess the same (or related) constructs is known as convergent validity (Cunningham, Preacher, and Banaji, 2001). Based on Homburg and Rudolph (2001) An AVE of at least 0.50 is strongly advised as a general guideline and for sufficient convergence. A smaller than 0.50 AVE indicates that items account for more mistakes than the variation in constructs. An AVE must be determined for each construct in any measurement model and must be at least 0.50. As a result, convergent validity for the constructs used in this study are significant and greater than the values as suggested above (greater than 0.5) (Bagozzi and Yi, 1988).

4.5. Measurement of discriminant validity using Fornell-Larcker criterion and htmt method

Discriminant validity demonstrates how accurately a test captures the idea it was intended to capture. In particular, discriminant validity assesses the reality of relationships between variables that, on paper, shouldn't be connected (Stöber, 2001). However, this study adopted 2 approaches to assess the variables' "discriminant validity." 1) It was made certain that the cross-loadings of indicators were higher than those of any other opposing structures (Hair et al., 2012). 2) Based on (Fornell and Larcker, 1981) the Fronell-Larcker criteria is a prominent approach for testing the discriminant validity of measurement model. He further suggested that the square root of the AVE by a construct must be higher than the correlation between the construct and any other construct. As a result, as shown in **Table 4**, procedures assured the satisfaction and validity of the results.

Table 4. Discriminant validity (Fornell-Larcker criterion).

Construct	ASR	CS	CVN	EMP	QP	RPN	SQ
ASR	0.878						
CS	0.682	0.925					
CVN	0.843	0.726	0.851				
EMP	0.279	0.275	0.345	0.896			
QP	0.543	0.776	0.579	0.296	0.799		
RPN	0.415	0.343	0.466	0.707	0.32	0.915	
SQ	0.671	0.582	0.688	0.34	0.444	0.473	0.869

Henseler, Ringle, and Sarstedt (2015) proposed a unique method for testing discriminant validity: the heterotrait-monotrait correlation ratio (HTMT). The HTMT is a measure of latent variable similarity. According to Joseph F Hair, Risher, Sarstedt, and Ringle (2019) a construct's heterotrait-monotrait (HTMT) ratio must be smaller than 0.9. Thus **Table 5** shows that the values were within acceptable limits and significant.

Table 5. Discriminant validity (HTMT).

Construct	ASR	CS	CVN	EMP	QP	RPN	SQ
ASR							
CS	0.846						
CVN	0818	0.841					
EMP	0.35	0.306	0.408				
QP	0.742	0.744	0.746	0.365			
RPN	0.516	0.377	0.544	0.793	0.388		
SQ	0.874	0.663	0.837	0.393	0.558	0.542	

4.6. Measuring structural model

The coefficient of determination (R^2), the blindfolding-based cross verified redundancy measure Q^2, and the statistical significance and relevance of the path coefficients are all standard assessment criteria that should be addressed (Shmueli et al., 2016). This study used PLS bootstrapping with 2000 bootstraps to shed light on the route coefficients and their relevance (Henseler et al., 2015). **Table 6** and **Figure 2** show a complete portrayal of structural model assessments as well as statistics linked to the moderating function of quality pursuer.
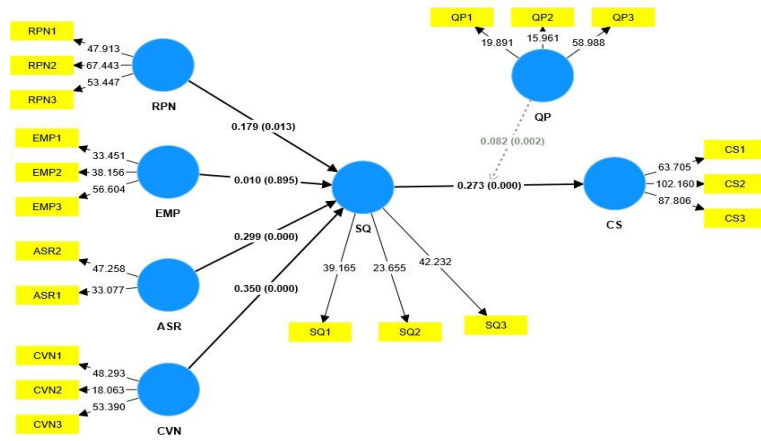
Figure 2. Structural equation model.

Table 6. *R*-Square and *Q*-square predictive relevance.

	R-square	Q^2 **predict**
CS	0.673	0.684
SQ	0.529	0.507

PLS-SEM advises measuring the *R*-square coefficient, also known as the coefficient of determination, to assess the variance of the measurements (Hair, Ringle, Sarstedt, et al., 2011). According to Cohen (1998), *R*-square values of 0.60, 0.33, and 0.19 are set as a rule of thumb, and these values are regarded as considerable, moderate, and weak, respectively. Joseph F Hair, Celsi, Ortinau, and Bush (2010), the *R*-square coefficient is dependent on the context in which a certain study is done. However, Falk and Miller (1992), suggest that *R*-square coefficients of 0.10 are likewise acceptable. Meanwhile, as shown in **Table 6**, the current study *R*-square ranged between 0.529 and 0.673. *Q*-square is predictive relevance; it determines if a model is predictive or not (>0 is excellent). Q^2 also demonstrates the endogenous components' predictive significance. *Q*-square values greater than zero suggest that your values have been adequately rebuilt and that the model is predictive. However, Q^2 with the values of 0.002, 0.15 and 0.35 considered as weak, moderate and strong degree of predictive relevance of each effect (Joseph F Hair, Ringle, and Sarstedt, 2013). **Table 6** confirms that predictive relevance for each construct was greater than 0, hence, excellent predictive relevance is established.

The difference between the observed correlation and the model-implied correlation matrix is known as the SRMR. As a result, it enables evaluation of the (model) fit criteria using the average size of the differences between observed and anticipated correlations. In a more cautious form, a value of 0.08 is regarded as a satisfactory match. The NFI is therefore defined as 1 minus the suggested model's Chi2 value divided by the null model's Chi2 value. As a result, the NFI produces values ranging from 0 to 1(Hu and Bentler, 1999). The greater the NFI, the better the fit. NFI values greater than 0.9 generally indicate a good match. However, the NFI values are under the range of 0 to 1(Lohmöller, 1989) (see **Table 7**).

Table 7. Model fit indices used in structural equation.

	Saturated model	Estimated model
SRMR	0.062	0.065
Chi-square	779.642	755.897
NFI	0.788	0.794

In the current study, product indicator approaches based on PLS-SEM were used to test hypothesis and to measure direct effects, mediating and the moderating effect. Results reveal that the direct effect of ASR, CVN, RPN and SQ on CS was significant and supported as shown in **Table 8**. However, **Table 8** shows that the effect of EMP on SQ was insignificant and not supported. This current study used a product indicator technique (Paulssen and Sommerfeld, 2006). Moreover, (Cohen, 1998) guidelines were employed to evaluate the moderating effects. According to H9, QP significantly moderated the linkage between service quality and client pursuer. However, moderation analysis shows that beta values = 0.082, standard deviation = 0.027, *t*-values = 3.081 and *p*-values = 0.002) appear to be significant (see **Figure 2** and **Table 9**). Thus, H9 is supported.

Table 8. Path coefficient based on SD, *t*-values and *p*-values.

Hypotheses	Beta-Values	Standard deviation	*t* statistics	*p* values
ASR - SQ	0.299	0.081	3.702	0.000
CVN - SQ	0.350	0.085	4.127	0.000
EMP -SQ	0.010	0.072	0.132	0.895
RPN -SQ	0.179	0.072	2.484	0.013
SQ -CS	0.273	0.043	6.279	0.000
QP x SQ -CS	0.082	0.027	3.081	0.002

Table 9. Specific indirect effect (Mediation Test).

Hypotheses	Original sample	Standard deviation	T statistics	*p* values
CVN - SQ - CS	0.096	0.03	3.162	0.002
EMP - SQ - CS	0.003	0.02	0.131	0.896
RPN - SQ - CS	0.049	0.021	2.363	0.018
ASR - SQ - CS	0.082	0.025	3.277	0.001

4.7. Mediation analysis

Mediation analysis was performed to measure mediating effect of SQ on the association between CVN, EMP, RPN, ASR and CS. However, results indicate that the indirect effect of CVN on CS was significant and positively mediated by SQ, beta values = 0.96, standard deviation = 0.03 *t*-statistics = 3.162 and *p*-values = 0.002. However, the mediating effect of SQ on the linkage between EMP and CS was insignificant, beta values = 0.003 standard deviation = 0.02 *t*-statistics = 1.31 and *p*-values = 0.896. Results also show that the indirect effect of RPN on CS was significant and positively mediated by SQ, beta values = 0.049 standard deviation= 0.021 t-statistics = 2.363 and *p*-values=0.018. Moreover, SQ significantly mediated the

association between ASR and CS, beta values = 0.082 standard deviation = 0.025 *t*-statistics = 3.277 and *p*-values = 0.001 (see **Table 9**).

5. Discussion

This study aimed to examine a model that incorporates mediation and moderation in the context of service quality and quality pursuer effects on client satisfaction in the high-speed train services in China. The majority of passengers exhibited unanimous agreement regarding the significance of various service quality attributes, with empathy, assurance, responsiveness, convenience ranked in descending order of importance. Notably, according to the component analysis, tangibles emerged as the most critical aspect of service quality; explaining 67.3% of the variance in service quality (refer to **Table 4**).

Our study confirms a strong and positive connection between assurance and the service quality implies receiving, assessing and swiftly replying to customer requests, feedback, questions and issues. A study by Huda, Beureukat, Melati, and Digdowiseiso (2023), found that consumers who perceive greater levels of service assurance are more satisfied with the service provider. Our findings emphasize the need of providing confidence in order to achieve outstanding customer service. Establishing a quality assurance framework for customer service allows for the recognition of recurring issues in customer interactions and provides service agents with the tools needed to improve service quality. Findings of the study show a significant and positive relationship between responsiveness and service quality, supporting previous studies by Bungatang et al. (2021). However, this study argues that understanding the advantages of responsiveness in customer service is crucial. It not only improves customer satisfaction but also strengthens customer relationships, increases customer loyalty, and generates positive word-of-mouth referrals. (Amanullah et al., 2021; Lin, 2021).

Furthermore, the analysis reveals that one of the most essential factors for client satisfaction is the convenience" component of service excellence. These service quality criteria are mostly connected to an individual's enactment, by attention to facility relations. Whereas, Itani, Kassar, and Loureiro (2019) believe that convenience has a stronger capacity to provide customers with a significant impression of the perceived quality of the services. Our results and the studies show that convenience raises client satisfaction. A study by Benoit, Klose, and Ettinger (2017) found that consumers prefer service procedures that can reduce the amount of time and effort needed to obtain the goods and services they want. As a result, convenience has a positive effect on consumers' experiences of goods and services that encourage increased customer satisfaction (Bae et al., 2022).

The findings also indicate that there is no significant correlation found between empathy and service excellence.

The analysis demonstrates that service quality significantly mediates the association between assurance, responsiveness, convenience, and customer satisfaction. This evidence implies that high-speed rail operators should prioritize assurance, responsiveness, convenience, and the overall quality of service to enhance customer satisfaction levels. Satisfaction among high-speed train patrons tends to rise

when employees maintain a professional appearance, swiftly offer information, ensure cleanliness in ticketing areas and lounges, offer comfortable seating, adhere to schedules, and efficiently address inquiries (Chyi and Hee, 2022). Based on a study conducted by Hohenberg and Taylor (2022) when a service is of great quality, customers are delighted. Conversely, when a service is of low quality, customers are dissatisfied and may quit using another service.

These findings indicate that higher service quality will lead to higher customer satisfaction. This outcome specifies that if high-speed-train companies pay special attention to service quality at large, passengers will become more satisfied and prefer to travel again. More widely, the appearance of staff, timely information, cleaning at the ticket office, cleanliness at waiting areas, comfortable seats, on time traveling, answer to their queries, supportive staff are all backbone of service quality which enlarges the customer satisfaction of high-speed-train passengers. These findings are consistent with the previous studies (Buluma, 2012; Lei, Niu and Zhang, 2017; Yilmaz and Ari, 2017; Xia, Wang and Zhang, 2018; Zhen, Cao and Tang, 2019). In the line of previous research, it was found that when the quality of service is high, customer satisfaction is also high and when the quality of service is low, customer satisfaction is also low, and customers can leave to seek another service.

Our findings also show that the association between service quality and client satisfaction is significantly moderate by quality pursuer and these findings are congruent with those of the prior study Khudhair, Jusoh, Nor, Mardani, and Management (2021). Findings also indicate that customers of all income brackets are concerned about the quality of the services they receive and that high-income customers who value quality are often willing to pay any price to receive it. As a result, results that have service aspects and their characteristics have a stronger impact on client satisfaction. According to Kurniawan and Alversia (2021) quality pursuer are clients who are unmoved by price. They instead put a lot of focus on the quality of the products and services they provide. They research all of the possibilities but ultimately choose the one that most closely matches their standards for quality (Khudhair et al., 2021).

6. Conclusion

The rise in personal automobile use compared to public transport, in the context of a rapidly expanding worldwide population, has resulted in a significant growth in traffic congestion. The increase in traffic not only worsens congestion but also increases road safety concerns and accelerates the depletion of scarce resources due to the privatization of roads. Therefore, this study aims to investigate the relationship between empathy, assurance, responsiveness, convenience, and overall service quality. It also explores the mediating role of service quality and the moderating role of quality pursuers on client satisfaction.

The research demonstrates a strong, positive relationship between assurance, responsiveness, convenience, and the service quality. However, it indicates an insignificant connection between empathy and service excellence. Findings indicate that while service quality does not considerably mediate the link between empathy and service quality. However, service quality does enhance client satisfaction by

improving assurance, responsiveness, and convenience. The analysis also reveals that quality-pursuers have significant moderating effect on the relationship between service quality and client satisfaction. These observations imply that providing excellent service quality is essential for ensuring customer satisfaction and, therefore, for enhancing a company's competitive advantage. Identifying problems with service delivery, developing standards for judging service effectiveness and results, and gauging customer happiness are all necessary to achieve high service quality. This emphasizes the importance of high service quality in enhancing client satisfaction and strengthening a business's position in the market. To achieve high service quality, it is important to identify service delivery problems, establish standards for service performance and results, and evaluate customer satisfaction.

The study's constructs accurately represent the service quality in the high-speed railway industry, where assurance, responsiveness, and convenience have a positive and significant indirect impact on client satisfaction. Differences in passenger satisfaction reflect the varied expectations and experiences of various groups. The empirical data obtained offers high-speed railway operators a theoretical and practical framework to increase train occupancy rates and enhance their service offerings, emphasizing the need of concentrating on these aspects to greatly enhance client satisfaction.

For policymakers and managers, it is imperative to adapt resource allocation strategies to the specific context of the cities they operate in, as this can enhance overall service quality. These four factors are pivotal in elevating overall service quality, ultimately bolstering customer happiness and loyalty. Additionally, regular monitoring of internal operations and service quality is essential. The research underscores that service quality is the primary driver influencing quality pursuers. The ability of the high-speed rail industry to deliver exceptional services hinges on the dedication of quality pursuers. Customers are more likely to choose high-speed rail services when they are assured of top-notch service that caters to their needs.

7. Research implications

The current research presents several hypotheses and managerial implications. First, developing customer happiness depends on visitors' perceptions of the quality of the services they get. They enhance the frequency with which they use high-speed train services based on their happiness. High-speed rail service operators to improve the connections may apply the market segmentation theory. In terms of the characteristics of service quality, students were the primary service recipients, followed by travelers and businesspeople. Even while businesspeople and tourists typically choose high-quality goods and services, the student ratio over the holiday season was larger than that of other users. As a result, they will be visiting us more frequently shortly. Additionally, they can tell others about the fast train. Whereas other researchers have looked at the connection between service quality and customer satisfaction, this study focuses primarily on the factors that influence service quality and is therefore well-suited to further research. Third, the individual dimensional relationship of service quality features is still unknown, despite the majority of earlier research in the transportation industry claiming that service quality influences

customer happiness. For instance, while examining the impact of service quality on client satisfaction, the authors only included four aspects of service quality.

For decision-makers and administrators, tailoring resource distribution tactics to the unique urban environments in which they function is crucial for improving service excellence. Emphasizing these four key elements can significantly uplift the quality of service, thereby enhancing customer satisfaction and fostering loyalty. Furthermore, it's vital to continually assess and refine internal processes and the quality of services offered. This study highlights the central role of service quality as a decisive factor for attracting quality-focused customers. The success of the high-speed rail sector in providing superior services relies heavily on the commitment to meet customer expectations. High-speed rail becomes a preferred choice for travelers when they are confident of receiving premium services that address their specific requirements.

The findings are important for policymakers aiming to develop urban rail transit systems and for researchers studying the relationship between service quality and client satisfaction in the context of high-speed train services. Due to the strong appeal of private automobiles compared to public transit, governments need to prioritise empathy, certainty, responsiveness, convenience, and service quality. The significance of service quality and quality-conscious customers is shown by our results. We support the creation of well-planned infrastructure that improves the experience of walking and increases accessibility to metro stations. This method is crucial for promoting the utilisation of public transportation. Efforts should be focused on reducing wait times for passengers to enhance the appeal and effectiveness of public transportation systems.

Based on the insights from this research, it is recommended that management prioritize enhancing certain aspects of service quality. To achieve this, decision-makers could categorize their clientele or passengers according to their service quality experiences. Such segmentation would empower high-speed rail operators to dedicate additional resources towards those customers requiring extra assistance, thereby elevating overall passenger contentment. Moreover, it's vital that these companies maintain a rigorous evaluation of service standards and operational procedures. The scale introduced in this study serves as an effective instrument for pinpointing precise areas needing enhancement and recognizing distinct facets of service quality in high-speed rail that demand attention. Furthermore, it's crucial for these companies to perpetually measure service quality to foster a distinctive reputation among consumers and secure a strategic edge in the industry. This study's outcomes also provide valuable guidance for high-speed rail services in China and other emerging economies, aiming to enhance customer service in the future, thereby growing their customer base—a key component for long-term success and organizational efficacy.

8. Limitations and suggestions for future study

Although this work has made significant theoretical and practical advances, it also has limitations. The study has mostly focused on data obtained over a specific time period. Future research should collect data from other time periods to enhance the study and provide a more thorough comprehension of changes across time.

Furthermore, each city has a distinct combination of cultural, geographical, and economic traits that impact the use of public transportation. To improve the strength

of research results, it is important to include a wider range of real-life case studies and to supplement quantitative data with qualitative perspectives gathered from interviews. This method will greatly enhance the accuracy of the study results. Future research should investigate the effects of characteristics including dependability, safety, service frequency, and the timely presentation of essential information, especially in diverse cultural and regional settings. First, this study is limited to China. Therefore, employing the high-speed train system, this study may be used in other nations. To analyse the major effects on service quality and customer satisfaction, the third dimension of service quality can be added. For illustration (service delivery, service products, price, and social responsibility). Finally, while traditional railway networks, buses, airplanes, and intercity bus transit need to be examined, this study focuses on the dimensional implications of service quality in high-speed trains.

This analysis sets the stage for more academic research. We emphasised the significant impact of quality-focused customers on the relationship between service quality aspects and customer happiness in our research. Future research might expand its focus to include other moderating elements. These factors may include demographic characteristics like age, income level, professional experience, family size, and educational background, as well as organisational factors such as trust, fairness, and external disruptions. They are studied to determine how they could influence the effect of service quality on customer satisfaction. A broader sample including the southern, northern, western, and central areas of the Indian Railways might reveal any regional discrepancies in service quality. China's complex cultural environment, with unique cultures in the northern, southern, eastern, and western areas, might provide useful insights into regional service quality differences. Future study should investigate the use of passenger time on board and their satisfaction with lounge services. Viewed as a cost, improving travel efficiency to enhance productivity might greatly boost total trip enjoyment.

The study recognizes certain limitations, such as the restricted sample size and the diverse characteristics of high-speed rail passengers, which may skew the understanding of how service quality affects customer satisfaction and subsequent behaviors. This suggests that satisfaction levels among passengers could differ based on the specific routes taken and the types of seating arrangements offered.

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