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AN EMPIRICAL ASSESSMENT OF SERVICESCAPE QUALITY AND ITS IMPACT ON PASSENGER EXPERIENCE IN RAIL TRANSPORT

S. BAAK[1] E. N. UNTARU[2]

Abstract: *This study evaluates passengers' expectations and perceptions regarding the physical environment quality of Braşov Railway Station. Using the SERVQUAL model, this study investigates the gap between perceived and expected performance for specific attributes of the physical environment. Additionally, an Importance–Performance Matrix has been employed to identify and prioritize areas requiring improvement. The results show that passengers consider safety, cleanliness, and ergonomic furniture to be critical aspects in need of urgent attention. These findings provide practical insights for enhancing the overall travel experience and the perceived quality of the physical environment in the context of a railway station.*

Key words: *Passenger satisfaction, service quality, SERVQUAL, railway station servicescape*

1. Introduction

Service quality is "the most powerful competitive weapon" that services organisations strive to possess (Shiratina et al., 2021). For customers, the highest level of quality is achieved when their needs and desires are understood, and their expectations are met within a short period of time. By paying attention to customer requirements, service organisations build and maintain relationships with their clients, adding value to the actual service provided. The physical environment plays a crucial role in the field of services, often referred to as the "packaging" of the service itself (Wirtz, 2018). It is considered the first aspect noticed by consumers, representing the totality of tangible elements that an organisation can control. Due to the intangible nature of services, consumers rely on the physical environment to assess the quality of the services offered. Consequently, the physical environment becomes a key component of the services marketing mix (Untaru and Ispas, 2018). Physical facilities allow consumers to evaluate service quality even before the actual consumption takes place. A well-designed physical environment can elicit specific emotional and behavioural responses, influencing

[1] Transilvania University of Braşov, Sabina.baak@student.unitbv.ro
[2] Transilvania University of Braşov, elena.untaru@unitbv.ro, ORCID ID: 0000-0003-4419-6933

purchase intentions and customer loyalty (Dube, 2021).

In the context of a railway station, the interior design should combine functionality with aesthetics in order to create a positive experience. For example, stairways should be well-lit and wide enough to ensure passenger safety (Heo et al., 2022). Decorative elements such as plants and artwork can enhance the aesthetic value and create a pleasant atmosphere (Klingemann et al., 2018). Additionally, biophilic design, which fosters a connection between people and nature, can improve passenger comfort and overall well-being (Downton et al., 2017). Safety, cleanliness, and speed are also essential aspects in passengers' perception of a railway station. The absence of security checks can intensify the feeling of insecurity and negatively affect the travel experience (Fan et al., 2016). Appropriate lighting, surveillance cameras, and the presence of security personnel contribute to passengers' psychological comfort (Hughes et al., 2020). Visible cleanliness and the use of modern cleaning equipment increase trust in the maintenance of the space (Vos et al.,2019). Speed is supported through technologies such as Bluetooth, QR codes, and automated ticketing and validation machines (Abbas el al., 2020). Climate control systems (Wang el el., 2017), digital display panels, and sound systems further enhance the functionality of the station.

The exterior design of the railway station includes essential elements that enhance access, comfort, and the overall functionality of the building. Therefore, the platform design is fundamental for passengers boarding the train at that station, as well as for those in transit. Seating areas on the platform should be numerous and evenly distributed, as studies have shown that passengers who are not seated while waiting tend to rush when boarding and are more prone to accidents (Dube, 2021). Additionally, shops can be replaced with vending machines distributed along the entire length of the platform, allowing travellers and those in transit to quickly purchase products. Moreover, it is very important that the platform is covered, to protect passengers while they wait. Parking at the station is essential for travellers. The parking area should be spacious enough to accommodate the flow of passengers arriving by car.

International railway stations offer best practice examples in terms of physical environment. For instance, Ankara station has implemented luggage storage facilities, leisure areas, and hotels for short-stay travellers. Berlin station makes use of natural light to support spatial orientation and features a luggage room monitored with X-ray technology for enhanced security. In Beijing, the station monitors air quality and uses solar panels to generate energy, demonstrating a commitment to sustainability (Atak, 2015).

As a historical building rebuilt after each of the two World Wars, Brașov Railway Station represents the second most important railway hub in Romania. It continuously suffers from visible degradation, causing disappointment among its passengers. Consequently, the choice of railway transport remains low among passengers' preferences. Therefore, this research aims to identify and evaluate the issues concerning the quality of Brașov Railway Station's physical environment that prevent passengers from choosing rail transport as their primary option. Consequently, the objectives of this study are as follows: 1) to determine and evaluate the quality of the physical environment of Brașov Railway Station using the SERVQUAL method; 2) to investigate

the attributes of the physical environment that require quality improvement based on the use of Importance–Performance Analysis; 3) to identify possible strategies for improving the quality of the physical environment at Brașov Railway Station.

2. Method

The study seeks to investigate the perceived problems regarding the physical environment from the passengers' point of view. A survey-based investigation was conducted using a structured questionnaire. The SERVQUAL method, specifically designed for assessing service quality, was applied to measure the differences between respondents' expectations (A) and perceptions (P) regarding the evaluated attributes. Customer expectations—understood as performance standards—were compared with their perceptions of the services received.

Section I of the questionnaire includes two filter questions, structured as nominal scale items with single-choice options. The first question assesses whether respondents are over 18 years of age, in order to obtain their consent for the collection of personal data. The second question identifies respondents who have travelled by train at least once, which is relevant to the objectives of the research. This section also includes two additional questions aimed at measuring respondents' behaviour, attitudes, and preferences related to passenger rail transport—specifically, the frequency of train travel and the reasons behind this choice.

Section II of the questionnaire comprises 24 items identified through a review of the literature and reflects passengers' expectations regarding the quality of the physical environment of railway stations. These items are rated by respondents using a five-point Likert scale with equal intervals, where 1 indicates the lowest level of importance and 5 the highest.

Section III also contains 24 items; however, these are designed to capture passengers' perceptions of the physical environment at Brașov Railway Station. In this section, respondents evaluate how they perceive the actual quality of the station's physical facilities. Ratings are provided on a five-point Likert scale, where 1 indicates strong disagreement with the evaluated attribute and 5 indicates strong agreement.

The final section of the questionnaire includes four demographic questions, each using a nominal scale with single-choice answers. These questions cover gender, age, education level, and income. The responses provided in this section form the demographic profile of the respondents.

The research targeted individual train passengers, focusing exclusively on the Romanian citizens from Brașov aged over 18 who use the internet. A non-probability sampling method was employed, including the snowball sampling, where respondents were encouraged to share the questionnaire further.

Demographically, the participants were classified by gender, age, education level, and income. Out of 206 respondents, approximately half were male. Over 60.7% were aged between 21 and 29 years. The majority of participants (56.8%) had completed high school, and 37.9% reported an income below 2500 lei. Thus, Generation Z (aged 21–29) forms the dominant group among train passengers in Brașov.

The data collected via the questionnaire were processed using IBM SPSS Statistics, focusing on the average values of expectations and perceptions, and the gap between them.

3. Results Analysis

All evaluated expectation variables scored above 4, confirming the high importance passengers place on the station's physical environment. Cleanliness was rated as the most important attribute (mean = 4.71), while the number of shops and kiosks received the lowest importance score (mean = 4.12). Key concerns included safety, crowd management, and ticket machine functionality, whereas the aesthetic design of the waiting area and the number of shops were deemed less critical.

Perceptions were consistently lower than expectations. The highest perception score was 2.83 (car park signage), while the lowest was 2.00 (toilet cleanliness), indicating an urgent need for improvement. None of the attributes scored above 3. This significant discrepancy highlights passengers' dissatisfaction and their perception of low quality at Brașov Railway Station.

Subsequently, the difference between the mean values of perceptions and expectations was calculated using IBM SPSS Statistics, along with the significance of these differences through the "Compare Means – Paired Samples t-test" function. This test is used to assess whether the differences between perceptions and expectations are statistically significantly different from zero. The greater the test statistic, the lower the significance level of that value becomes, indicating a larger deviation from zero ($p < 0.05$, where p is the two-tailed significance level). Based on these results, it becomes possible to identify which attributes require intervention from the company's decision-makers in order to develop the most effective strategy for improving the quality of the station's physical environment.

The results suggest the need for substantial investment to address the most critical areas: toilet hygiene, overall cleanliness, and passengers' sense of safety. These issues recorded the largest negative gaps and must be prioritised in future improvement strategies.

T-Test value Table 1

Gap (Perception - Expectation)	Mean P	Mean A	t-test value		Significance level (p-value)
The station's parking area should be/is sufficiently large.	2,55	4,54	P1-A1	-1,99	-22,936**
The parking area should be/is well signposted.	2,83	4,28	P2-A2	-1,45	-12,944**
The exterior of the station and its surroundings should be/are attractive (buildings, facades, green spaces, shops, stops).	2,49	4,34	P3-A3	-1,85	-13,067**
There should be/are enough seats on the platforms.	2,22	4,42	P4-A4	-2,2	-17,632**

Gap (Perception - Expectation)	Mean P	Mean A	t-test value		Significance level (p-value)
The number of kiosks/food shops inside the station should be/is sufficient.	2,70	4,12	P5-A5	-1,42	-11,698**
The kiosks/food shops inside the station should be/are open at all times.	2,41	4,26	P6-A6	-1,85	-16,694**
The platforms should be/are well signposted.	2,74	4,50	P7-A7	-1,76	-15,000**
Train schedule information should be/is clearly visible on the platform.	2,64	4,34	P8-A8	-1,7	-11,757**
The waiting room should include/includes attractive design elements to reduce boredom.	2,31	4,14	P9-A9	-1,83	-15,883**
The furniture in the waiting room should be/is comfortable.	2,20	4,41	P10-A10	-2,21	-19,182**
The level of cleanliness in the station should be/is high.	2,32	4,71	P11-A11	-2,39	-22,467**
The station should convey/conveys a sense of safety to passengers.	2,34	4,66	P12-A12	-2,32	-23,919**
The station should use/uses security equipment (surveillance cameras, alarm systems).	2,60	4,68	P13-A13	-2,08	-21,250**
The food shops/fast-food restaurants/cafés in the station should be/are visually appealing.	2,60	4,29	P14-A14	-1,69	-15,811**
The ticket machines should be/are operational at all times.	2,78	4,68	P15-A15	-1,9	-19,264**
The station should be/is properly lit.	2,73	4,61	P16-A16	-1,88	-19,964**
The smell in the station's interior spaces should be/is pleasant.	2,48	4,63	P17-A17	-2,15	-18,869**
The temperature inside the station should be/is appropriate regardless of season.	2,55	4,49	P18-A18	-1,94	-16,939**
Facilities (information desk, ticket machines or counters, amenities for people with disabilities, waiting area, emergency exits, platforms, toilets) should be/are well signposted.	2,75	4,47	P19-A19	-1,72	-21,520**
Train schedule information should be/is clearly announced by the station dispatcher.	2,75	4,54	P20-A20	-1,79	-18,917**
Ticket counters and machines should be/are well signposted.	2,75	4,63	P21-A21	-1,88	-20,520**
The station's toilets should be/are clean.	2	4,63	P22-A22	-2,63	-28,419**
The crowd in the station should be/is well managed to ensure passenger flow.	2,72	4,66	P23-A23	-1,94	-18,202**
Queues at the ticket counters should be/are efficient to allow quick ticket purchasing.	2,41	4,58	P24-A24	-2,17	-22,435**

Note: **signifies that p<0.01

According to Table 1, the results of the t-test indicate that the difference between perceptions and expectations is significantly different from zero for all attributes, with p-values lower than 0.01. Consequently, these findings must be brought to the attention of decision-makers in order to develop the most effective strategies for improving the factors causing dissatisfaction among passengers.

Furthermore, the company should focus on the variables registering the highest gaps between perceptions and expectations, such as: toilet cleanliness, followed by overall cleanliness in the station and the safety conveyed by the station to travellers. These variables should be prioritised in strategic decision-making processes, as they generate the highest dissatisfaction among passengers.

Conversely, the variables with the smallest differences between perceptions and expectations include: sufficient number of kiosks/shops/food outlets in the station, clearly signposted parking areas, attractive appearance of shops/fast-food restaurants/cafés and the visibility of train schedule information on platforms. Although these variables represent weaknesses that still require improvement by decision-makers, they do not cause major dissatisfaction among travellers.

The Importance–Performance Matrix was subsequently used to assess the importance and performance of each variable. Expectations represent the importance axis and perceptions represent the performance axis. This matrix includes four quadrants, each with a specific meaning: Quadrant I – Concentrate here (high importance, low performance), Quadrant II – Keep up the good work (high importance, high performance), Quadrant III – Low priority (low importance, low performance), and Quadrant IV – Possible overkill (low importance, high performance). All the analysed variables were incorporated into this matrix according to their corresponding importance (expectation) and performance (perception) scores, previously computed, and positioned at the intersection of these two dimensions.

As a result of applying this method, all variables evaluated in this study are positioned in Quadrant I of the matrix. This quadrant indicates a high level of importance, but low performance. This placement highlights the urgent need for CFR to implement effective strategies to meet passengers' expectations and to improve the physical environment of Brașov Railway Station across all assessed aspects.

The study reveals that cleanliness is the most important attribute for passengers, receiving an average expectation score of 4.71. This highlights the need for rigorous hygiene measures at Brașov Railway Station. Although the estimated annual cleaning budget is 420,000 lei, the low perception score indicates passengers' dissatisfaction with the current cleanliness level. The next most important attribute is related to safety, which received an expectation score of 4.68. The use of security equipment such as CCTV systems and alarm devices is essential for passengers, as it may reduce the fear of theft or aggression and improve their perception of the station. Equally important, with a score of 4.68, referring to the continuous operation of ticket machines. These machines are essential not only for ticket purchasing, but also for providing real-time train information, helping manage passenger flow, and reducing congestion at ticket counters.

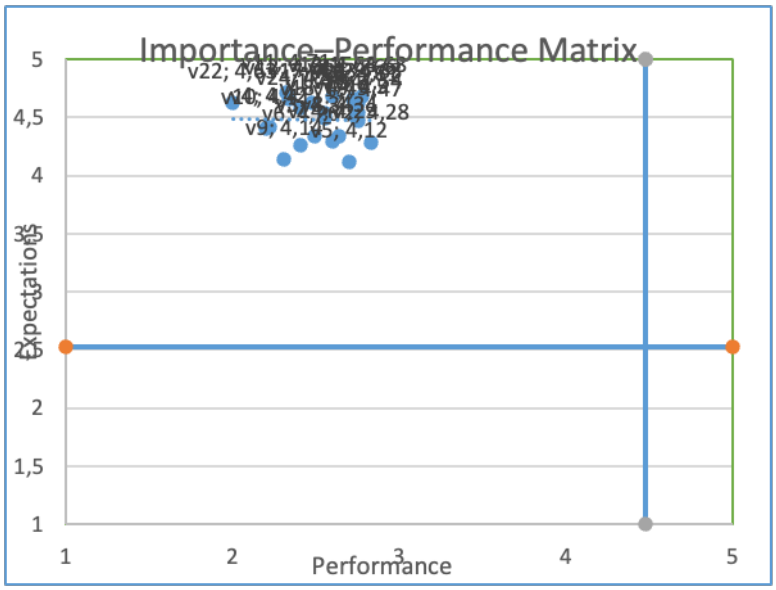

Fig. 1. *Importance-Performance Matrix*

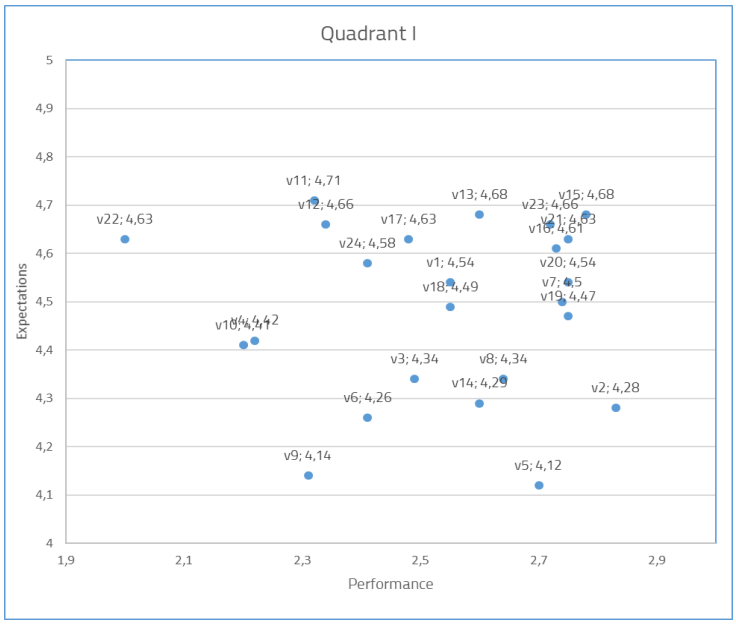

Fig. 2. *Quadrant I of the matrix*

The average score of passengers' expectations was 4.48, suggesting relatively high standards regarding the physical environment. In contrast, the average perception score was 2.53, resulting in a negative quality gap of -1.94.

4. Discussion and Managerial Implications

A railway station with appropriate internal facilities is considered ideal and achieves high performance in the eyes of travellers. The time spent by passengers from the moment they enter the station until their train arrives can represent an entire experience, encouraging them to continue using rail transport, which provides several benefits, such as reduced traffic congestion, lower costs, less pollution, and increased travel safety.

According to the results obtained in the present research, increasing passenger satisfaction requires immediate intervention concerning cleanliness, safety, the operating hours and appearance of shops, waiting-room comfort, the size and signage of the parking area, ambient conditions, ticket purchasing processes, and the strategic placement of train schedule information. By properly addressing these aspects, station operators can transform passenger feedback into tangible improvement opportunities, thus enhancing satisfaction and strengthening the image of Brașov's railway infrastructure.

The physical environment's characteristics influencing passenger well-being are numerous, with travellers generally pragmatic regarding the facilities offered by railway companies. Passengers expect information within the station to be easily accessible; thus, real-time updates on train arrivals and departures displayed on boards are essential. Additionally, announcements broadcast through loudspeakers significantly contribute to passenger awareness, although the volume should be moderate to prevent discomfort. Furthermore, signs and loudspeakers must be strategically placed to ensure information reaches every passenger. In cases where travellers struggle to find adequate information, strategically located information desks should be available for assistance. Another crucial aspect concerns stairways, which should be well-lit, equipped with handrails, have non-slip surfaces, and facilitate efficient passenger flow. Safety also represents a key factor in railway stations, being a top priority for passengers. Consequently, suitable conditions and the fulfilment of passengers' essential needs must be ensured, as these strongly influence the end-user's perceptions.

The major issue identified through this research, which requires urgent resolution, is the lack of a perceived sense of safety among passengers within Brașov railway station. Therefore, a complete revision of the security system and increased presence of security personnel is essential. Investments in advanced technology, along with close collaboration with local authorities, could help transform the station into a safer and more secure space.

Given that the end user's perception is strongly influenced by the feeling of safety, comfort, and overall experience, a marketing programme has been developed that proposes the implementation of a waiting room with restricted access, based on ticket scanning. Each train ticket would include a printed code that allows ticket inspectors to verify its validity and simultaneously grant access to the designated waiting area. This solution would enhance passengers' sense of security by clearly distinguishing CFR clients from other individuals who are present in the station and who may contribute to a feeling of discomfort. This proposal is feasible, as CFR has the necessary resources to

support such a change, which would ultimately lead to increased customer satisfaction and potential revenue growth.

Figures 1 and 2 present a graphical representation of this proposal to implement a controlled-access waiting room, which represents a key step toward improving the passenger experience. By introducing a ticket-scanning system at the entrance, a secure and comfortable environment can be created for passengers, allowing them to relax and feel confident that they are protected while waiting for their train.

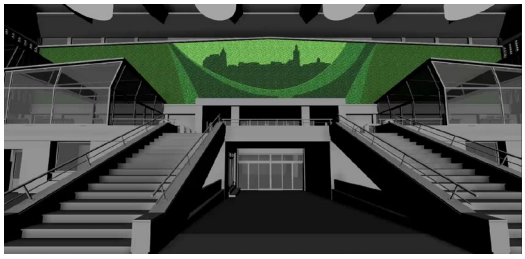

Fig. 3. *Brașov Railway Station, following the changes implemented based on the research findings*

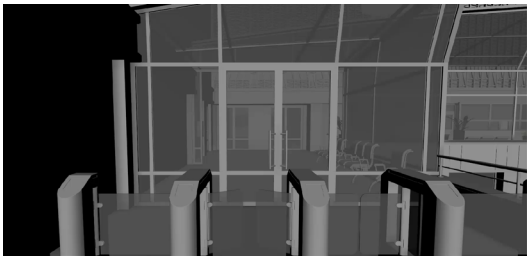

Fig. 4. *Access to the suggested waiting area*

5. Conclusion

The physical environment of a railway station plays a crucial role in shaping first impressions and influencing passenger behaviour. Elements such as cleanliness, safety, comfort, signage, ambient conditions, and accessibility significantly contribute to the perceived quality of the service. Although Brașov Railway Station is an important transport hub and a building of historical value, it is currently affected by degradation and a negative image among passengers, which reduces the attractiveness of rail transport. In this context, assessing the physical environment becomes a vital tool for identifying problem areas and guiding improvement strategies. The research findings revealed significant differences between passengers' expectations and their actual perceptions, with all variables positioned in the quadrant indicating high importance, but low performance. The most criticised attributes were the cleanliness of the toilets, overall station cleanliness, and the lack of a perceived sense of safety. These results highlight the urgent need for intervention by CFR and local authorities to modernise Brașov Railway Station and increase passenger satisfaction with railway services.

6. Methodological Limitations and Directions for Future Research

The current quantitative marketing research presents several limitations. The use of a non-probabilistic sampling method prevents the generalisation of findings to the broader population, and the small sample size does not accurately reflect the demographic structure of Brașov. The SERVQUAL-based questionnaire was lengthy, which may have led to confusion between expectations and perceptions due to the

similarity of items and limited respondent attention. Additionally, the use of a 1-to-5 rating scale may have caused interpretation errors, as its values can be perceived differently by each respondent. Finally, the SERVQUAL items were not grouped according to the five service quality dimensions—reliability, empathy, tangibility, assurance, and responsiveness—limiting the depth of analysis and structuring of results.

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