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Content Validity Evaluation of a Public Transport Service Assessment Tool Integrating Service Quality, Satisfaction, and Behavioral Intentions

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Abstract—Public transportation services are essential in supporting urban mobility and sustainability. However, valid and reliable measurement tools for assessing service quality, user satisfaction, attitudes, and behavioral intentions toward public transportation remain limited. This study aimed to evaluate the content validity of a newly developed assessment instrument designed to measure those constructs. A panel of eight experts representing academia, government, and public transport practitioners was engaged to review the relevance and representativeness of each item using established content validity procedures. Experts rated each item on a four-point scale of relevance. The analysis confirmed that most items demonstrated strong content validity, while a few required refinement. Based on expert feedback, two items were revised to enhance clarity and conceptual precision. The results indicate that the instrument is valid and representative for evaluating public transport service quality and user perceptions. Further testing is recommended to establish its construct validity and reliability for broader application in transport policy, service evaluation, and behavioral studies.

Keywords: Content validity, Service quality, Satisfaction and Behavioral intentions

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1. Introduction

Transportation is a crucial element of city life that impacts the well-being of individuals and communities [1]. The quality of life of urban residents depends largely on the availability and quality of public transport services. However, measuring the service quality of public transport is not a straightforward task, as it involves both objective and subjective factors. One of the subjective factors is behavioral intentions, which reflects the cognitive and affective evaluation of one's life [2],[3]. This paper explores the theoretical and empirical concept and assessment of behavioral intentions, service quality, and satisfaction in the context of urban public transport. It also discusses the implications and limitations of using behavioral intentions as a criterion for evaluating public transport policies and services.

Previous studies have explored service quality and user satisfaction, yet few have integrated these constructs into a coherent framework validated specifically for the public transport context. Most available instruments are adapted from general service industries and lack rigorous validation, leading to inconsistencies and reduced policy relevance. To address this gap, the present study proposes a systematic approach to assess the content validity of an instrument measuring behavioral intentions, service quality, and satisfaction in urban public transport. Expert evaluation was conducted using the Content Validity Ratio (CVR) and Content Validity Index (CVI) to determine the clarity, relevance, and representativeness of each item. A heterogeneous panel of experts from academia, government, and transport practice was engaged to ensure both conceptual rigor and contextual applicability. Establishing such a valid and reliable instrument is crucial to support evidence-based policymaking, enhance user-centered service evaluation, and promote sustainable urban mobility.

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2. Literature Review

Evaluating public transport performance has long been a subject of interest in urban studies, focusing primarily on operational efficiency, accessibility, and user satisfaction. Earlier frameworks such as SERVQUAL and its adaptations provided a foundation for measuring perceived service quality across various service industries [4],[5],[6],[7]. While these models effectively assess tangible and intangible aspects of service delivery, their direct application to public transport has been questioned due to contextual differences, including the collective nature of service use, policy influence, and infrastructure dependence. These studies represent a methodological strength in establishing multidimensional service quality constructs; however, their lack of contextual specificity limits their explanatory power in the public transport sector.

In addition to service quality, user satisfaction has often been treated as a separate construct, serving as an outcome rather than an integral part of behavioral modeling. Research by, de Oña et al. [8], and others emphasized that satisfaction mediates the relationship between perceived quality and continued service use [9]. However, most instruments developed in these studies were not subjected to systematic validation procedures such as content validity testing. Consequently, the robustness and transferability of their measurement tools remain uncertain.

The inclusion of behavioral intentions—such as the intention to reuse, recommend, or avoid a transport service—has been relatively recent in transport research. Studies incorporating this construct [4],[10] highlight its potential to predict long-term travel behavior and modal shifts. Nonetheless, these studies often relied on adapted scales from other domains (e.g., consumer behavior) without verifying their content validity within the transport context. This methodological weakness leads to conceptual ambiguity and measurement inconsistency across studies

From this review, two major research gaps emerge. First, there is no validated, context-specific instrument that simultaneously measures service quality, satisfaction, and behavioral intentions in urban public transport. Second, existing tools lack expert-based content validation to confirm the relevance, clarity, and representativeness of measurement items. Addressing these gaps is crucial to establish a reliable foundation for future construct and criterion validation, ensuring that public transport assessment frameworks are both empirically sound and contextually relevant [11],[12].

3. Method

This section describes the methodological framework applied to develop and validate an assessment tool for evaluating behavioral intentions, service quality, and satisfaction in the context of urban public transport. The study adopted a content validity approach, which emphasizes expert evaluation to determine the extent to which the items in an instrument accurately represent the theoretical constructs being measured. Following the methodological principles proposed by Lawshe (1975), Lynn (1986), and Polit and Beck (2006), the validation process was carried out in three structured stages: construct identification and item generation, expert judgment and content validity testing, and data analysis and interpretation. The research flow, illustrated in Figure 1, outlines the sequential stages beginning from the literature review and ending with the reliability and construct validation phases [13].

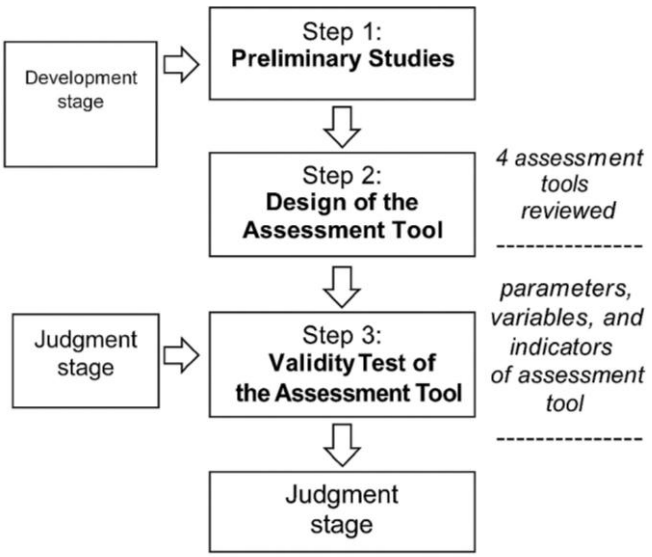

Figure 1. The flowchart of research methodology

The development of the assessment tool began with a comprehensive review of previous studies on service quality, user satisfaction, and behavioral intentions in urban transportation systems [14]. This review provided the conceptual basis for item generation and ensured theoretical alignment with established service evaluation models while addressing the contextual needs of public transport users. To ensure methodological rigor, a diverse panel of experts was carefully selected to evaluate the instrument's content validity. The expert group included professionals from academia, government transport agencies, and public transport practitioners, all possessing substantial academic qualifications, professional experience, and at least five years of work in the transportation sector. Their varied backgrounds and expertise provided balanced perspectives to ensure the instrument's conceptual depth and contextual relevance.

Data collection and validation were conducted in two iterative stages, involving both qualitative and quantitative evaluations. The experts first reviewed the clarity, relevance, and representativeness of each item, after which the Content Validity Ratio (CVR) and Content Validity Index (CVI) were calculated to quantify the degree of agreement. The CVR and CVI formulas used in this study are detailed in Section 3.2, alongside an explanation of data analysis procedures and indicator definitions. Additionally, to enhance methodological robustness, this study proposes complementary validity and reliability analyses—such as factor analysis and Cronbach's alpha testing—to ensure internal consistency and measurement stability in future applications.

3.1 Experts in the Validity study

Content validity ensures that the instrument fully represents the domain of the construct being measured and is typically conducted by involving a diverse panel of experts. In this study, eight national and local experts were purposively selected to evaluate the instrument measuring behavioral intentions, service quality, and satisfaction in the context of urban public transport. The expert group included five academicians, one government representative, and two experienced transportation users. Table 1 presents the composition of the expert panel.

Table 1. The distribution of experts in the study

No	Panel expert	Organization
1	Professor	Universitas Syiah Kuala
2	Professor	Universitas Syiah Kuala
3	Assistant Professor	Universitas Syiah Kuala

4	Associate Professor	Universitas Syiah Kuala
5	Associate Professor	Universitas Syiah Kuala
6	Government	Department of transportation
7	Transportation user	Mr/Ms
8	Transportation user	Mr/Ms

The experts were selected based on their educational background, professional expertise, and work experience in the transportation sector, consistent with the expert selection criteria outlined by Lynn (1986) and Polit et al. (2007). The academicians have more than 10 years of teaching and research experience in transportation planning, public transport systems, and sustainable mobility. The government expert has over 12 years of professional experience in transportation policy development and regulation, ensuring that the instrument aligns with current national and regional transport frameworks. The practitioners (transportation users) contribute valuable experiential insights from daily use and public perception, adding practical perspectives to the construct evaluation.

This heterogeneous composition—combining experts from academia, government, and practice—ensures both conceptual rigor and contextual validity. The inclusion of experts with extensive experience in transport infrastructure design, public policy implementation, and user experience strengthens the credibility of the validation process. Each expert reviewed the relevance, clarity, and comprehensiveness of every item using a four-point relevance scale, and their feedback informed subsequent revisions to improve the precision and applicability of the assessment tool. Content validity has been defined as the extent to which the instrument has a sample of items that are appropriate for the construct being measured [11]. Although related to the criteria and construct validity of the new instrument is considered very important, information about the Content Validity of the measure is also considered necessary in drawing conclusions about the quality of the scale.

3.2 Data validation

The Content validity studies combine qualitative and quantitative methods by conducting expert judgments. Each expert was given a list of evidence-based items (parameters and variables) selected by the researcher. Experts were asked to use the scoring method shown in Table 2 below to rate each item in the instrument.

Table 2. The scale used for rating items [15]

Score	Relevancy	Clarity
1	Not relevant	Not clear
2	Somewhat relevant	Need some revision
3	Relevant	Clear but need some minor revision
4	Very relevant	Very clear

To estimate the content validity of the assessment tool, Lawshe's Content Validity Ratio (CVR) and Content Validity Index (CVI) were applied. The CVR quantifies expert agreement on the essentiality of each item and is calculated using Equation (1):

$$\mathrm{CVR} = \frac{N_e - \frac{N}{2}}{\frac{N}{2}} \tag{1}$$

where *Ne* = the number of experts indicating "essential" ratings per item and *N* = total number of experts.

The Content Validity Index (CVI) evaluates the proportion of experts who agree that an item is relevant. It is computed at two levels: the Item-level CVI (I-CVI) and the Scale-level CVI (S-CVI). The I-CVI is determined by the number of experts rating an item as either 3 ("quite relevant") or 4 ("highly relevant") on a four-point relevance scale, as shown in Equation (2a):

$$\text{I-CVI} = \frac{n_a}{N} \tag{2a}$$

where n_a represents the number of experts assigning a rating of 3 or 4, and NNN is the total number of experts.

The Content Validity Index (CVI) evaluates the proportion of experts who agree that an item is relevant. It is computed at two levels: the Item-level CVI (I-CVI) and the Scale-level CVI (S-CVI). The I-CVI is determined by the number of experts rating an item as either 3 ("quite relevant") or 4 ("highly relevant") on a four-point relevance scale, as shown in Equation (2b):

$$\text{S-CVI/Ave} = \frac{\sum_{i=1}^{k} \text{I-CVI}_i}{k} \tag{2b}$$

The instrument will gain an excellent content validity if the SCVI /UA value ≥ 0.8 and the SCVI /Ave value ≥ 0.9. Lynn [50] suggested ICVIs no lower than 0.5 if there are 8 experts in total.

4. Result and Discussion

This section presents the results of the development and validation process of the assessment tool, along with a detailed discussion of their implications. The results are structured to explain (1) the design and development of the assessment tool, and (2) the findings from the content validity analysis using the Content Validity Ratio (CVR) and Content Validity Index (CVI).

The development of the assessment tool was informed by a comprehensive literature review of fifteen existing instruments related to service quality, satisfaction, and behavioral intentions in public transport. The review revealed that most existing tools were adapted from other service sectors, often without empirical validation specific to the public transport context. This limitation inspired the formulation of a new instrument designed to capture dimensions that are both operationally measurable and contextually meaningful. The instrument comprises three main constructs—service quality, satisfaction, and behavioral intentions—each operationalized through measurable indicators and parameters. These dimensions collectively aim to reflect the user experience and loyalty toward public transport systems.

The content validity analysis involved eight experts representing academia, government, and transport practitioners. The experts' evaluations indicated strong agreement regarding item relevance and clarity. The calculated CVR values exceeded 0.75, confirming that most items were essential to the constructs. Similarly, the I-CVI and S-CVI/Ave values were above 0.83 and 0.90, respectively, demonstrating excellent overall content validity. These results confirm that the instrument adequately represents the conceptual domains and is suitable for further empirical application. Items that did not meet the threshold were refined based on expert recommendations to enhance clarity and contextual relevance.

Beyond numerical validity, the experts' qualitative feedback provided deeper insights into the interconnections between user satisfaction and behavioral intentions. Several experts emphasized the significance of accessibility, reliability, and affordability as determinants of satisfaction and long-term user retention. This aligns with prior studies in transport behavior research, which suggest that

behavioral intention acts as a critical mediator between perceived service quality and continued public transport use. Therefore, the validated instrument not only measures service attributes but also captures behavioral patterns that can inform transport policy and management strategies.

The discussion also highlights the methodological rigor of the validation process. The use of both CVR and CVI ensures comprehensive evaluation of the instrument's content representativeness and expert consensus. Compared to previous studies that relied solely on factor analysis for validation, the inclusion of expert-based content validation in this study strengthens the construct's theoretical grounding before empirical testing. Furthermore, by engaging experts with substantial experience in transport planning and management, the process effectively bridged theoretical constructs with practical relevance, a methodological advantage that enhances the instrument's applicability to real-world public transport evaluation..

4.1 Design of the Assessment Tool

The table 3 shows the indicators of assessment tool for service quality attribute, which is one of the constructs used to measure the service quality of public transport based on attributes with the greatest influence on the service quality, as well as the relationships existing among the satisfaction and behavioral intentions1. The table has 13 dimensions, each with a number of items that represent the aspects of service quality that are relevant for public transport users.

Table 4 presents a framework for evaluating public transport satisfaction attributes. It includes four dimensions: General Satisfaction, Expectation, Needs, and Global Experience. Thus table 5 presents behavioral intention indicators for public transport. It includes: one-off trips and regular trips are planned for the coming week, future usage is expected to rise, and it's recommended to others.

Table 3. Indicators of Assessment Tool for service quality attrbute

Dimension	Item	Ref
Network Design	1. Number and location of stops 2. Availability of the station/stop near the destination 3. Availability of the station/stop near home 4. Number of interchange points outside the center 5. Connection services by shuttle bus to the main stations/stops	[16][17]
Frequency	1. Frequency of service on weekdays 2. Frequency of service on holidays 3. Regularity of trips (scheduling) 4. Time range of service 5. Planning of connections (waiting times for transfers) 6. Travel time	[16][18] [19][20] [21][22] [23][24]
Reliability	1. Respect of the schedule (punctuality) 2. Timeliness of intervention in emergencies	[16][25] [22] [23] [26]
Comfort at Stops	1. Availability of shelters and benches at the stations/stops 2. Cleanliness of the stations/stops 3. Lighting at the stations/stops	[16][17]
Comfort on board	1. Availability of seats on the vehicles 2. Comfort of the seats on the vehicles 3. Cleanliness of the interiors, seats, windows 4. Degree of crowding of the vehicles 5. Availability of handrails or bars on the vehicles 6. Degree of quietness of the vehicles and the system 7. Temperature on the vehicles 8. Absence of bad smells	[26][27] [28][29] [30][31] [24]

	9. Absence of annoying behaviors of other users	
Accessibility of cars/ vehicles	1. Ease of opening the doors of the vehicles 2. Accessibility of the disabled to the vehicles	[16][32]
Cost	1. Accessibility of the ticket cost 2. Availability of monthly discounts 3. Clarity/consistency of the tariff structure 4. Ease of purchase of tickets, tokens, prepaid cards, etc	[16][32] [2][33] [21]
Information	1. Availability of information on schedules by phone, mail, etc. 2. Availability of maps/timetables at the stations/stops 3. Clear and timely announcements at the stops 4. Clarifications and announcements of delays 5. Notices on the expected time for the next passage at the station/stop 6. Information/signals in different languages 7. Information on the route/direction on the vehicles 8. Visibility of the names of the stations/stops from the vehicles	[16][32] [34][17]
Security	1. Safety of the vehicle during the ride 2. Reliability of the vehicle 3. Professionalism of the staff 4. Security from thefts/harassments at the stations/stops 5. Security from thefts/harassments on board	[16][32] [28][29] [33][22] [33]
Interaction with staff	1. Relational skills and behavior of the staff 2. Possibility of making complaints	[16][2] [33]
Customer Protection	1. Management of complaints 2. Refunds and management of lost items 3. Compensation for civil liability	[33][18] [35]
Respect for the environment	1. Use of low environmental impact vehicles 2. Age of the vehicle fleet	[16][18]
Aesthetics	1. Physical conditions of the stations/stops 2. Physical conditions of the vehicles and the infrastructures 3. Quality of the furniture at the stops 4. Design of the vehicles 5. Exterior cleanliness of the vehicles 6. Absence of graffity	[16][18] [36][36] [24]

Table 4. Indicators of Assessment Tool for satisfaction attribute

Dimension	Item	Ref
General satisfaction	Generally, the public transport service meets satisfaction	
Expectation	Expectation align with the public transport service	[37][17][38]
Needs	Existing transport modes cover commuting need effectively	[39][40][2]
Global experience	Taking public transport leads to high satisfaction	[37][41][42]

Table 5. Indicators of Assessment Tool for behavioral intentions attribute

Dimension	Item	Ref
One-off trips	Public transport will be utilized for one-off trips	[23][43]

	in the coming week	
Regular trips	Public transport will be the choice for regular trips in the coming week	[23][43]
Increase use of public transportation	Public transport usage is certain to increase in the future	[43][44]
Recommend public transportation	Public transport recommended to friends and family	[45][46]

4.2 Content Validity test of the assessment tool

The results for the content validity had been summarized using Table 6.

Table 6. Summary of content validity

Construct	No. of Item	I-CVI (>=0.75)	S-CVI/Ave (>=0.85)
Network design	5	0.90	0.90
Frequency	6	0.91	0.91
Reliability	2	0.75	0.75
Comfort at stops	3	0.75	0.75
Comfort on Board	9	0.80	0.80
Accessibility of car/vehicle	2	0.75	0.75
Cost	4	0.68	0.68
Information	8	0.75	0.75
Security	5	1	1
Interaction with staff	2	1	1
Customer protection	3	0.91	0.91
Respect for the environment	2	1	1
Aesthetic	6	0.75	0.75
Satisfaction	4	1	1
Behavioral Intentions	4	1	1

I-CVI for 65 items of the 15 constructs ranged from 0.75 to 1. There was one construct is 0.68. The S-CVI (Average) for network design, frequency, reliability, comfort at stops, comfort on board, accessibility of cars, information, security, interaction with staff, customer protection, respect for the environment, aesthetics, Satisfaction and behavioral intentions was 0.90, 0.91, 0.75, 0.75, 0.80, 0.75, 0.68, 0.75, 1, 1, 0.91, 1, 0.75, 1, 1 respectively. The overall SCVI for the 8-item scale was 0.85 which indicated high content validity of the items for the construct of satisfaction and behavioral intentions in the context of urban public transport. But The overall SCVI for the 13 constructs of service quality for 57-item scale was 44 item indicated high content validity, and 13 constructs indicated need for revision.

5. Conclusion

A content validity is a necessary next component of research process in order to validate the research instrument. In this context, the instrument is questionnaire. Content validity the instrument is an important way to pinpoint problem areas, reduce measurement error, reduce respondent burden, determine whether or not respondents are interpreting questions correctly, and ensure that the order of questions is not influencing the way a respondent answers. Even it is almost impossible to design a perfect instrument; still there are a ton of considerations that need to be highlighted to develop a good instrument. Content validity of the assessment instrument for assessing the content validity of an instrument for measurements of behavioural intentions, service quality, and satisfaction in relation to urban public transport are done through instrument development that produced 65 items which combination of items used in previous research, responses from preliminary study and items developed specifically for this study which were adapted and derived from an existing questionnaire, and later eight domain experts were asked to rate the items on the basis of their relevance and necessity. In conclusion, 14 of the constructs were judged as having excellent content validity (I-CVI higher than 0.75). There was one construct with unacceptable I-CVI that need for revision. The construct that need revision have been modified according to the recommendations of the expert panel. The overall SCVI of the instrument was equal to 0.75 (S-CVI/Ave) and 0.875 (S-CVI/UA). Therefore, the future research can ensure checking the instrument for reliability and other forms of validity such as face, construct, and criterion validity for better applicability of the assessment instrument.

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