BEST-WORST SCALING APPROACH TO MEASURE PUBLIC TRANSPORT USER QUALITY PERCEPTIONS AND PREFERENCES IN CAPE TOWN

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ABSTRACT

Public transport plays an important role in human society. Even more so in the context of developing countries where a large share of trip makers are captive users of public transport trying to gain access to economic activities, schools and other social and cultural activities. User quality and user perceptions are essential indicators for service providers to understand their service offering better, also in a context of captivity. One needs to understand which external factors are essential and which ones are sufficient and the extent to which they are. Understanding the order and magnitude of the importance of these external factors is of great importance to service providers when wanting to improve user experiences, for planning purposes, for marketing purposes as well as for fare setting. Considering this, the primary focus of this research is to provide empirical evidence on the existence of a hierarchy in transportation needs. Such evidence is provided in this research by investigating the existence of a user quality pyramid on public transport modes as claimed in literature. We do this for the City of Cape Town using the Best-Worst Scaling (BWS) method, which measures consumer priorities in a manner that is robust and transparent, by compelling respondents to make trade-offs among items user experience and satisfaction. BWS is a survey technique of measuring individuals' priorities as it identifies the extremes in a given list as best as well as worst items and is used in other disciplines where prioritisation of items is required to guide decisions. In this study, a total of 282 public transport users rank the best and the worst quality attributes in a given set. The research findings indicate that travel time followed by affordability are the most important quality attributes in regional public transport modes. Equally, in- vehicle security followed by service transfers are the least important public transport quality attributes. We use this to construct and critique the user quality pyramid.

Keywords: Best-worst scaling, Public Transport, user quality perceptions and preferences, quality attributes.

1.   INTRODUCTION

Public transportation has a growing significance in developing nations where many individuals rely solely on it for their economic, social, and cultural pursuits. While technical aspects of public transport have been widely studied, little attention has been given to the customer's viewpoint (Mouwen, 2015). Recognizing this gap, Eboli and Mazzulla (2011) began measuring the technical quality of public transport in combination with user quality perception. It is important to note that users who are unfamiliar with public transportation

may have biased perceptions. Thus, individuals who regularly use public transport are in a better position to evaluate its services. In public transport, quality characteristics include accessibility, security, convenience, direct service, comfort, ticket price, travel time, and other factors that cater to different types of consumer needs.

Olivková (2015) states that prior to 1998, there were no verified methods for measuring transportation customer satisfaction and no studies dealing with the status or the nature of public transport and its customers – which resulted from a lack of attention paid to this issue. Until then, most studies of public transport had mainly focused on Parasuraman's five service dimensions for assessing service quality (Hussein & Hapsari, 2015). The SERVQUAL instrument for measuring service quality has been subjected to some criticism. Most researchers do not support the five-factor structure of the SERVQUAL method suggested by Parasuraman et al. (1991). Franceschini & Mastrogiacomo (2018) identified five service dimensions for assessing the quality of service: 1) tangibles: the appearance of physical facilities, equipment, personnel, and communication materials; 2) reliability: the ability to perform the promised service dependably and accurately; 3) responsiveness: the willingness to help customers and to provide prompt service; 4) assurance: the knowledge and courtesy of employees and their ability to convey trust and confidence; 5) empathy: the provision of caring, individualized attention to customers. In response, some researchers have suggested additional factors that influence the quality of service in public transportation. For example, Govender (2015) proposed to use RECSA model in his study to measure service quality in the mini bus taxi service in South Africa.

Customer perception of service quality have been studied by many scholars and researchers who have shown that they are positively related to satisfaction and brand image (Barber, et al., 2011; Marinkovic, et al., 2014; Truong, et al., 2017). According to Barber et al. (2011) perception is a user's assessment of a service after utilizing it and comparing it to what was expected and experienced previously. People pick, organize, and interpret information to construct a meaningful image of the world through perception

Recent studies on service quality have proposed hierarchical models as more comprehensive than traditional ones (Hussein & Hapsari, 2015). Some studies have used these models to measure service quality, such as Van Hagen (2003) and Perone et al. (2005), as shown in Figure 1 below.
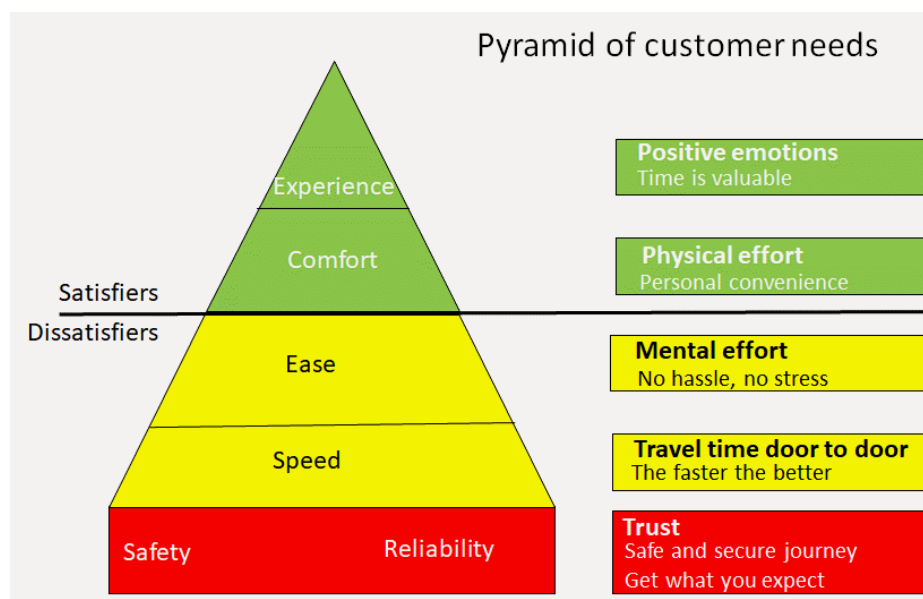

Figure 1: Quality dimensions in order of importance (Van Hagen, 2003)

However, these have not been applied in the context of developing countries like South Africa, nor have they attempted to quantify the hierarchy in terms of a service quality rating. Furthermore, no choice modelling, particularly best-worst scaling, has been applied to measure user quality preferences and perceptions.

According to Dell'Olio et al. (2011), the quality of service provided by public transportation contributes significantly to changing people's daily transportation habits. The higher the quality of public transportation, the more satisfied commuters will be, and therefore perception will be improved. According to marketing theory, satisfied customers are more loyal than unsatisfied ones (Hussein & Hapsari, 2015), which is why public transport providers should provide high-quality services. However, in order to manage such user quality satisfaction in public transport, one needs to understand which external factors contribute to user quality satisfaction and how much. This would allow us to distinguish necessary and sufficient user quality factors and use these for marketing, for service planning and for fare setting purposes, factors which are all essential for public transport planning (Polat, 2012). Van Hagen (2003) and Perone et al. (2005) presented this hierarchy of user quality needs as a pyramid.

This study aims to prove that public transportation quality needs follow a hierarchical structure, represented by a pyramid. To determine the attributes with the most impact on user choices, data was collected through Best Worst Scaling (BWS) method. The findings can help Cape Town and South African service providers improve their offerings to attract more riders and increase market share. The study builds upon existing literature which highlights the importance of providing high-quality public transportation services to increase user satisfaction and loyalty.

2.   LITERATURE REVIEW

2.1   Service Quality Attributes

Understanding the quality of a product from the perspective of customers is essential to understanding what they expect from it. A product's quality can be measured by how satisfied or delighted users are with the product (Mkpojiogu & Hashim, 2016). Typically, customers have specific expectations with regard to the quality of products they receive, especially when compared to competitors. This, in turn, makes quality improvements necessary (Mkpojiogu & Hashim, 2016).

Several service quality attributes have been developed and used worldwide in different ways. However, a process to determine the most appropriate performance measures for public transport users is not widely addressed. Transit Cooperative Research Program (2003) indicates that several performance measures used in transportation, especially those collected for the national public transport database, reflect the business side of running a transit agency. Transportation engineers and planners for roadway design and planning use the performance measures. The Highway Capacity Manual also noted these, reflecting conditions experienced by vehicles using the roadway but not necessarily the conditions experienced by users, especially when the vehicles are public transport vehicles carrying passengers. According to (Transportation Research Board, 2003), traditional service efficiency and cost-effective indicators are not always pinned to customer and community issues. The Transportation Research Board further states that there is a need to develop a process to prepare a performance-measurement program that includes customer-oriented and community issues.

Parasuraman, Zeithaml & Berry (1985) define quality as a judgement of expectations and performance. Among the well-known characteristics of quality are intangibility, heterogeneity, and inseparability, which define it as a mechanism for measuring the effectiveness of services delivered to customers. SERVQUAL has been utilized by several scholars to measure quality (Hussein & Hapsari, 2015). A number of quality attributes have been identified and studied in public transportation modes to evaluate service quality. These attributes are grouped into smaller dimensions and are assumed to be hierarchical or multilevel constructs. A list of service quality attributes is non-exhaustive but the following attributes in Table 1 were selected for the purpose of this study.

Table 1: Categories of public transport user quality attributes

Basic or Functional Attributes	Protection Attributes	Hedonic Attributes
These are attributes that must reach minimum compliance for the user to be satisfied	This refer to attributes that provide security and protection either waiting or in the vehicle	These attributes refer to accessory aspects of the mode
Affordability/ Ticket price/ fare – refers to the ability to make necessary journeys to work, school, health and other social services **Direct service –** direct services of public transport assume that passengers are transported from appoint A to a main-line corridor **Travel time –** travel time refers to the length of trip time and includes adherence to schedules in the form of punctuality or regularity **Station proximity –** proximity of station influence transport decisions and this proximity may refer to proximity to shopping centre/town centre, and/or proximity to public transport system **Service frequency –** it is the number of departures per time period and the time between departures in addition to the overall length of the service day **Reliability –** reliability of a public transport service means the consistency of a vehicle's punctuality and travel time according to scheduled departures and arrivals	they include the perception of security against traffic accidents as well as assaults, the perception of safety in the event of service disruption **Security –** security is the likelihood that one will become a victim of crime while using public transport **Safety –** measures the likelihood that passengers will be involved in an accident	**Flexibility to travel –** flexible public transport is used to refer to services, which include elements of fixed-route or demand-responsive models **Easy to Use –** is it easy to find about routes and easy to change from one mode to the other? **Service Transfers –** service transfers refers to the number of times that a passenger has to change from one vehicle to another in a single trip. **Information –** information in public transport modes is used to assist the planning and execution of trips **Vehicle cleanliness –** a clean vehicle as having no dirt on the bus; no sticky or oily residue on the bus; no graffiti on the bus; no dirt, stickers, residue, or graffiti on the windshields or window glass of the bus; clean mirrors; no soap streaking on the body or exterior glass of the vehicle; and painted wheels. **Comfort –** comfort covers a range of quality features such as station facilities, crowding, noise and ride comfort

According to the literature review, the following attributes are considered to be indicative of transport quality:

1) **Basic or Functional attributes:** These are attributes that must reach minimum compliance for the user to be satisfied. They include accessibility, frequency, reliability, speed, safety and security. They are basic attributes as they provide the most essential service in a mode.

2) **Protection attributes:** This refer to attributes that provide security and protection either waiting or in the vehicle. They include the perception of security against traffic accidents as well as assaults, the perception of safety in the event of service disruption.

3) **Excitement and delight attributes:** These attributes refer to accessory aspects of the mode. The category includes ease of use, vehicle comfort, availability of seats, vehicle cleanliness, information, air conditioning, connectivity to the Wi-Fi, driver's behaviour, noise, convenience, etc.

2.2   The ERG Theory and Hierarchy of Needs

Maslow proposed a hierarchy of human needs in 1943. The hierarchy consists of five levels of basic needs. The needs he identified included physiological needs, safety needs, needs for love, affection, and belonging, needs for esteem, and needs for self-actualization.

Observing that Maslow's hierarchy was not easily applicable to the real world, Clayton Alderfer modified it in 1973 to make it more useful. He developed a new theory and perspective called the Existence, Relatedness, and Growth Theory (Alderfer & Schneider, 1973), see Figure 2 below.

Figure 2: The ERG theory versus Maslow's Hierarchy (Bharti, ND)

In Alderfer's view, the existence, relatedness, and growth categories are more appropriate to describe human behavior than Maslow's hierarchy levels. According to the theory, concentrating entirely on one need at a time will not be effective in motivating behaviour change. Alderfer's research does not support Maslow's hierarchy, which states that humans will prioritize physiological needs over safety needs. For instance, one will not choose water over shelter during a thunderstorm. Furthermore, Alderfer had effectively reduced the number of hierarchy levels from five to three, simplifying the structure of any comparisons between hierarchy levels.

3.   METHODOLOGY

3.1   Research Design

The study adopted a non-experimental research design to assess factors that influence public transport mode perceptions. This approach was chosen to investigate the existence of a user quality pyramid across public transport modes in Cape Town, Bellville Khayelitsha and Mitchells Plain and quantify quality attributes that are most important to public transport mode users

The study was descriptive in nature and integrated both qualitative and quantitative approaches. Public transport quality attributes in this study were selected to include existence needs, relatedness needs and growth needs. Existence needs include safety and materials. Relatedness needs on the other hand refer to people's desire to maintain interpersonal relationships, such as sharing and interacting with others. Lastly, this study also outlined the quality attributes needed for growth. Generally, growth needs refer to the desire for self-actualization, such as the ability to grow and to publicize one's achievements.

3.1.1 Best-Worst Scaling (BWS) Approach
The BWS approach measures preferences based on multiple attributes. The method was used to collect primary data and has been extensively used in recent studies and literature across the globe for various studies. The technique is commonly used in healthcare centres to assess a patient's preference for treatment (Wittenberg, Bharel, Bridges, Ward & Weinreb, 2016). This method involves direct communication with respondents in one form or another or through personal interviews and forces the user to make trade-offs between items by separating the best quality attribute and the worst in a set of given options (Brian, 2016).

The method is becoming increasingly popular across a variety of fields as a means of assessing human preferences. In marketing, best-worst scaling is also known as maximum difference scaling (MaxDiff) (Finn & Louviere, 1992; Louviere et al., 2015). The MaxDiff method has many subtypes today, and in many studies, it is used in a different ways from a classical MaxDiff approach. In many academic fields, BWS is more widely known than MaxDiff, which originated from the authors of MaxDiff (Louviere et al., 2015). In this study, we have also used the term BWS to refer to MaxDiff.

The aim of this technique is to analyze preferences regarding a set of attributes, their levels or alternatives. According to Flynn & Marley (2014), "Best-Worst Scaling (BWS) is a data collection method and a theory of how respondents rank items from a given list by providing the top and bottom positions." This technique is typically used as a survey and analysis tool for rating and ranking attributes (Teffo, Earl & Zuidgeest, 2019).

By using best-worst scaling, many rating scale problems can be avoided, and it offers a solution to those who would like to measure subjective quantities with measurements that are well understood and easy to apply. This method is used to record the best and worst cases from a set of alternatives for example, brands, products, or services (Münnich, Karsai & Nagy, 2022). By changing the choices presented to the respondents so that the questions are repeated at different points in the survey, the preferences of respondents are identified.

In practice, there are three basic types of BWS: the object case (case 1), the profile case (case 2), and the multi-profile case (case 3). In these cases, respondents are asked to express their preferences by picking the best and worst options from a list of alternatives, but the complexity of the alternatives differs between cases (Louviere, Flynn & Marley, 2015).

In the BWS method, participants are asked to choose between two extremes, best and worst, based on their own judgment. In contrast to rating scales, this method creates different ratings between choices, circumventing the issue of differing degrees of emphasis. Furthermore, it is easier for respondents to complete the BWS than the choice experiment (Münnich et al., 2022).

3.1.2 Data Collection and Analysis

Data was collected from Cape Town public transport facility (70 users were interviewed), Bellville station (67 users were interviewed), Mitchells Plain (78 users were interviewed), and Khayelitsha public transport facility (67 users were interviewed), through structured research questionnaires and closed ended interviews. The study sites were chosen based on their popularity in terms of passenger volumes and location along major trunk routes. According to the Comprehensive Integrated Transport Plan (CITP, 2018), these four areas are the busiest public transport interchanges and facilities in Cape Town. Data was collected from 282 daily public transport users from Monday to Thursday in the week of February 15th through 18th, 2021, and the survey was conducted during the AM peak and PM peak periods each day.

Following data collection, the next step was to convert it into digital format and excel 2016 was used in this case.MS-excel offers convenient method for data entry and data analysis. To analyse data excel was used to categorize and calculate frequency distributions and best worse score. A summary of user profile is depicted in Table 2 below.

According to research questionnaires, majority of commuters are minibus taxi users (49%) followed by Golden arrow bus users (34%). The table above further indicates that in the mini bus taxi mode, 27% of these users are female aged 25 to 44 (32%). They mainly travel for work purpose (24%) and Shopping or business purposes (13%). Based on the data presented in the table above, it seems that the percentage of men and women who use public transportation for commuting daily is relatively similar. According to Marianne et al. (2019), the reason mode choice is not significantly different between females and males is assumed to be because of financial reasons.

Table 2: Public transport user profile

Sample Characteristics		Golden Arrow bus	Minibus taxi	Train	My Citi	Total
Commuters		34%	49%	11%	6%	100%
Gender	Male	18%	22%	7%	3%	50%
	Female	16%	27%	4%	3%	50%
Age	18 - 24 years	4%	7%	1%	0%	13%
	25 - 34 years	12%	15%	6%	4%	37%
	35 - 44 years	10%	17%	3%	0%	29%
	45 - 54 years	8%	9%	1%	0%	18%
	55 - 64 years	0%	1%	0%	1%	2%
Trip Purpose	Work	20%	24%	7%	4%	55 %
	School	6%	4%	3%	2%	15%
	Leisure	2%	4%	0%	0%	6%
	Shopping Business	4%	13%	1%	0%	18%
	Other	2%	4%	0%	0%	6%
Suburban Area	Cape Town	6%	6%	6%	6%	25%
	Bellville	7%	12%	4%	0%	24%
	Khayelitsha	10%	13%	0%	0%	24%
	Mitchells Plain	11%	17%	0%	0%	28%

4.   RESULTS

To determine overall patterns in the data, we computed best and worst scores based on personal preferences. Participants were prompted to select their most and least preferred options from a set of choices, leading to two opposite ends being chosen. Overall findings reveal that travel duration was perceived as the most essential quality characteristic by individuals who use public transportation; conversely, security received low importance ratings (i.e., deemed least valuable). Table 3 below, illustrates best-worst scores per region for each attribute across modes such as buses, minibuses, and trains. The table further indicates that, the most important quality attributes in public transport modes are travel time, fares, and direct services.

In Figure 3 below, quality attributes are ranked according to hierarchy of importance, with positive scores indicating the most important and negative scores indicating the least important (or valued) as rated by users.

This ranking can provide useful insights for improving the overall quality of the system. Overall, this ranking of quality attributes can be a valuable tool for system developers and designers to enhance the user experience and satisfaction.

Table 3: Most Important and least attractive quality attribute frequencies per area

Suburban area / Attributes	Bellville		Cape Town		Khayelitsha		Mitchells Plain	
	Most important	Least important	Most important	Least important	Most important	Least important	Most important	Least important
Affordability/ Ticket price/ fare	187	67	171	78	186	60	164	102
Station proximity	27	58	38	55	72	73	49	55
Comfort	41	98	40	77	24	85	39	118
Service frequency	13	51	17	54	16	57	14	51
Direct service	133	51	160	38	127	25	162	40
Service Transfers	6	68	15	86	4	69	1	81
Easy to Use	161	30	100	78	128	62	123	68
Information	32	138	37	126	46	122	34	164
Vehicle cleanliness	18	107	74	43	28	89	15	121
Flexibility to travel	50	33	51	43	48	39	41	33
Travel time	165	29	136	54	133	29	228	8
Security	10	129	28	143	16	112	9	131
Safety	44	57	47	50	30	83	50	67
Reliability	45	43	75	52	86	33	82	52

Field data 2021
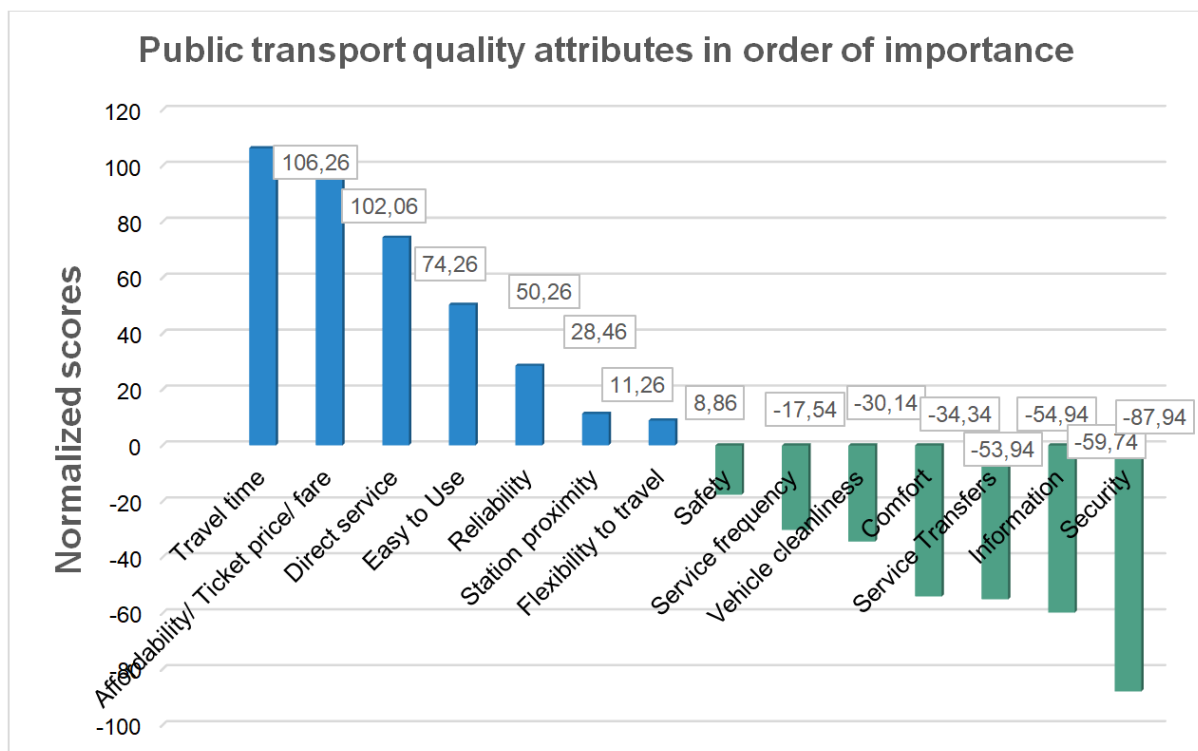
Figure 3: Public transport quality attributes in order of importance

5. DISCUSSION

The research findings indicate that travel time followed by affordability are the most important quality attributes in public transport modes. Equally, security followed by service transfers are the least important public transport quality attributes.

According to Sinha & Modi (2019) when service quality is poor, users tend to pay more attention to basic attributes such as access-egress times, wait times, time spent in vehicles, as well as cost. After service quality improves and basic attribute performance meets user expectations, users begin to value higher order attributes such as safety, cleanliness, and customer service.

Hansson et al. (2019) conducted multiple studies on regional public transport and found that frequency, comfort, reliability, travel time, and network coverage were identified as the most important quality attributes. Similarly, Behrens et al. (2018) noted that users were satisfied with trip times, which is also a critical attribute (keep up the good work). According to Salokhe & Haldar (2022), the main factors that contribute to a higher degree of satisfaction are frequency, pricing, punctuality, and trip time.

The feelings of insecurity prevent people from using public transportation and related areas such as subways, bus stops, in urban areas (Deniz, 2019). According to Alford (1996), a fear of crime is correlated with environmental and social factors, and crimes are committed by people who also have opportunities to break the law regularly. So the in-vehicle security is less of a problem compared to environment and stop security since every user in the vehicle is assumed to have the same motive of travelling to point B.

Imaz, Habib, Shalaby & Idris (2015) found that trips involving two or more transfers negatively affect customer loyalty. Ideally, public transport agencies should reduce the number of trips involving multiple transfers, or make efforts to minimize the waiting times associated with these trips by increasing service frequency or synchronizing transfers.

6. CONCLUSIONS AND RECOMMENDATIONS

The study found that public transportation commuters prioritize travel time, fares, and direct services as the most important quality attributes. Least important feature does not necessarily imply that it is not required in the use of public transportation, but may simply indicate that in this case, in-vehicle security is effectively handled in public transportation modes, and therefore is not a source of concern compared to other attributes, and users are satisfied with the current state.

To validate these findings, future studies should use the BWS approach in other parts of the world and compare results with this study's findings. The generalizability of these results can be determined by expanding to include major metropolitan areas in South Africa. The study found that public transportation is predominantly used by the working-age population for commuting purposes, and perceived saving in travel time was identified as the most important quality attribute.

Further work could include enhancing this quantitative research method with qualitative research methods by using empathy mapping tools, and other qualitative research methods for example design thinking methods and tools for Innovation, etc.

7. REFERENCES

Bharti, NL. (n.d.). *Administrative Thinkers.*

Brian, M. (Director). 2016. *An introduction to Max Diff.* [Motion Picture].

Chasanidou, D, Gasparini, AA & Lee, E. 2015. Design Thinking Methods and Tools for Innovation. 12-23. doi: 10.1007/978-3-319-20886-2_2.

dell'Olio, L, Ibeas, A & Cecin, P. 2011. The quality of service desired by public transport users. Transport Policy, 8, 217-227. doi: 10.1016/j.tranpol.2010.08.005.

Eboli, L & Mazzulla, G. 2011. A methodology for evaluating transit service quality based on subjective and objective measures from the passenger's point of view, Transport Policy, 18:172-181. Available at: https://doi.org/doi:10.1016/j.tranpol.2010.07.007.

Flynn TN & Marley AAJ. 2014. "Best-worst scaling: theory and methods," Chapters in: Stephane Hess & Andrew Daly (ed.). Handbook of Choice Modelling, chapter 8, pages 178-201, Edward Elgar Publishing.

Franceschini, F & Mastrogiacomo, L. 2018. Service gap deployment: a framework to link quality gaps to service activities. *International Journal of Services and Operations Management*, 29(1):85-99.

Govender, KK. 2015. Exploring public transport service quality: the case of mini-bus taxi service in South Africa. *Eurasia Business and Economics Society*, 101-116.

Hagen, M. 2011. *Waiting experience at train stations*. Eburon Uitgeverij BV.

Hagen, MV. 2015. Effect of Station Improvement Measures on Customer Satisfaction. Journ*al of Traffic and Transportation Engineering,* 3:7-18.

Hussein, AS & Hapsari, R. 2015. How quality, value and satisfaction create passenger loyalty: An empirical study on indonesia bus rapid transit passenger. *The International Journal of Accounting and Business Society*, 22(2):95-115. Available at: https://ijabs.ub.ac.id/index.php/ijabs/article/view/262

Louviere, J, Lings, I, Islam, T, Gudergan, S & Flynn, T. 2013. An introduction to the application of (case 1) best-worst scaling in marketing research. (PC Verhoef, Ed.) *Intern. J. of Research in Marketing*, 292-303.

Manual, HC. 2000. Highway capacity manual. Washington, DC, 2(1).

Mouwen, A. 2015. Drivers of customer satisfaction with public transport services, *Transportation Research Part A*, (78):1-20. Available at: https://doi.org/http://dx.doi.org/10.1016/j.tra.2015.05.005.

Mkpojiogu, EO & Hashim, NL. 2016. Understanding the relationship between Kano model's customer satisfaction scores and self-stated requirements importance. *SpringerPlus a Springer Open Journal,* 5(197):1-22. doi: 10.1186/s40064-016-1860-y.

Münnich, Á, Karsai, EV & Nagy, J. 2022. A real-time network-based approach for analysing best-worst data types. *Business and Economics*, 1-24.

Olivková, I. 2016. Evaluation of quality public transport criteria in terms of passenger satisfaction. *Transport and Telecommunication*, 17(1):18-27. doi: 10.1515/ttj-2016-0003.

Parasuraman, A, Zeithaml, VA & Berry, LL. 1985. A Conceptual Modal of service Quality and Its Implications for Future Research, *Journal of Marketing*, 49:41-50.

Parasuraman, A, Berry, LL & Zeithaml, VA. 1991. Understanding Customer Expectations of Service, 32(3):39-48.

Perone, JS, Winters, PL, Read, M & Sankah, I. 2005. Assessing Hierarchy of Needs in Levels of Service. Final Report, Tallahassee.

Polat, C. 2012. The Demand Determinants for Urban Public Transport Services: A Review of the Literature. *Journal of Applied Sciences*, 12(12):1211-1231. doi:10.3923/jas.2012.1211.1231

Salokhe, VS & Haldar, P. 2022. Passenger perception and satisfaction towards public transport: Study on literature review. *IJCRT*, 218-222.

Schneider, B & Alderfer, CP. 1973. Three studies of measures of need satisfaction in organizations. Administrative Science Quarterly, 18(4):489-505. Available at: https://doi.org/10.2307/2392201

Sinha, S, Swamy, S & Modi, K. 2019. "User perceptions of public transport service quality" World Conference on Transport Research – WCTR 2019, (48):3310-3323.

Teffo, M, Earl, A & Zuidgeest, MHP. 2019. Understanding public transport needs in Cape Town's informal settlements: A Best-Worst-Scaling approach. *Journal of the South African Institution of Civil Engineering*, 61(2):39-50. Available at: https://dx.doi.org/10.17159/2309-8775/2019/v61n2a4.

Transportation Research Board. 2003. A summary of tcrp report 88: A guidebook for developing a transit performance-measurement system. Transportation Research Board, Washington, DC United States. Available at: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rrd_56.pdf

Truong, N, Nisar, T, Knox, D & Prabhakar, G. 2017. The influences of cleanliness and employee attributes on perceived service quality in restaurants in a developing country. *International Journal of Culture, Tourism and Hospitality Research*.

Walaza, SP, Zuidgeest, M & Onderwater, P. 2021. Public Transport Modes: Measuring user quality perceptions and preferences in Cape Town (Master of Science in Civil Engineering). University of Cape Town.

Wittenberg, E, Bharel, M, Bridges, JF, Ward, Z & Weinreb, L. Using Best-Worst Scaling to Understand Patient Priorities: A Case Example of Papanicolaou Tests for Homeless Women. Ann Fam Med. 2016 Jul; 14(4):359-64. doi: 10.1370/afm.1937. PMID: 27401425; PMCID: PMC4940467.