

Service Quality and User Satisfaction of Makumbura Multimodal Transport Centre of Sri Lanka

A.G.M.S Kumari

*Department of Estate Management and Valuation
University of Sri Jayewardenepura,
madushikasandamali9@gmail.com*

T.G.U.P Perera

*Department of Estate Management and Valuation
University of Sri Jayewardenepura,
tgup@sjp.ac.lk*

Abstract

The study examines the perceived service quality of Makumbura Multimodal Transport Centre (MMC), Sri Lanka and how that relates with the overall MMC transit user satisfaction. Following Parasuraman, Zeithaml and Berry's work in 1988, the "service" here is recognised through five dimensions: tangibility, reliability, responsiveness, assurance, and empathy. 160 MMC transit users who responded through a questionnaire survey perceived that the 'quality' of all MMC service dimensions is higher than the average level. Among which, the highest-rated aspects were from the tangible dimension: MMC services being modern, comfortable, visually appealing, pleasing, immaculate facility with good service mix and a responsiveness dimension: users being well informed about the time and place of transit services. The lowest rated service quality was in the reliability dimension that the 'other services of MMC such as cafeteria, ATM etc. being delivered as promised. The study found that only tangibility, assurance and empathy dimensions of MMC services positively related to user satisfaction. Reliability and responsiveness dimensions of MMC service quality had no positive relationship with its user's overall satisfaction. Conversely, this information whilst become useful feedback for the improvement of MMC services. It certainly calls for further research

in understanding the complicated aspects of service quality and user satisfaction in the transport sector in Sri Lanka.

Keywords: Multimodal Transport Centers, User Satisfaction, Service Quality, Sri Lanka

1. Introduction

Multimodal transport centres are transport facilities that integrate different modes of transportation such as buses, train, subway, taxis, automobiles, ferries, and aero planes (Slack & Rodrigue, 2017; Yatskiv & Budilovich, 2017) to facilitate the movement of goods and passengers with convenience (Nes, 2002; Demse, 2018), transport quality (Zhang et al., 2020; Chauhan, Gupta & Parida, 2021), increased transport security (Litman, 2021), reduced transport cost (Zhang et al., 2020), downstream road congestion (Zahural, 2005; Ibraeva & Sousa, 2014) while reducing the environmental footprint of transport (Kramarz & Przybylska, 2021). The advent of multimodal transportation is commonly traced back to the mid-1960s in the USA, with large-capacity trans-container systems and later offered "door to door" intermodal road-rail services using these containers (Kos, Samija & Brcic, 2012). With the market economy, the establishment of Multimodal Transport Centers is seen as a way through to ponder the user-oriented transport services (Gao, Yu & Liang, 2016; Demse, 2018) that concerned about satisfying their choice, preference, and behaviour in fulfilling a transport need (Tybout, Hauser & Koppelman, 1978; Gao, Yu & Liang, 2016). As the transportation demands seemingly become complex and multifaceted, the contemporary multimodal centres tend to be planned with numerous value-adding solutions to mobility desires viz., eating, shopping, parking, sanitary, security, privacy, entertainment, etc.

In Sri Lanka, transportation-related issues such as service inferiorities and inconveniences, unclean and deteriorating facilities, road network snags, traffic congestion, high energy consumption and carbon emissions, parking obstructions have been agonizing the public over a long period (Indika, 2018; Kumarage, 2017; Japan International Cooperation Agency, 2014;

Kumarage & Jayaweera, 2005). In the light of these issues, the multimodal transport centre concept was welcomed as a part of Sri Lanka's national transport strategy with a view to increasing the transport service of Sri Lanka to new heights. Makumbura Multimodal Transport Centre (MMC) is the first and currently, the sole of its kind in Sri Lanka commenced in the year 2019 by the Ministry of Megapolis and Western Development as part of the Kottawa Interchange Township Development Project. MMC project implementation was prioritized over many other development projects investing LKR 1,308 million funded by the Government of Sri Lanka and Japan International Corporation Agency development assistance. More specifically, MMC aimed to integrate bus and Kelani Valley rail transportation services through intelligent and technology-based operation systems thereby lessening the traffic congestion towards Colombo whilst delivering a comfortable, convenient and safe transport experience to the public (MMC Kottawa, 2019). The Centre contains a range of value-added services viz., integrated bus terminal, railway station, taxi services with 'park and ride' services, restaurants and restrooms, digital banking, ATMs etc. With the implementation of MMC, a significant transit movement via bus and rail has been recorded. For instance, the rail station passengers via MMC have risen from 500 in March to 12,299 in April 2019 (Semasinghe & Megapolis Media Team, 2019).

As such projects of mega-investment are progressing, service level measures and user satisfaction in a feedback form are crucial to ensure its purposiveness. Accordingly, the paper aims to measure the perceived service quality of MMC transit users and see how those have been related to the overall user satisfaction. Following Parasuraman et al., (1988, 1985) the 'service' here is identified with five dimensions: responsiveness, assurance, tangibility, empathy and reliability. 'Quality' and 'satisfaction' of service are subjective notions (Angelova & Zekiri, 2011; Datta & Vardhan, 2017; Pakurar et al., 2019) bounded by time and the geographical context in which it is gauged (Bhagat, 2012; Pakurar et al., 2019). Therefore, despite some previous studies available that measure the service quality and user satisfaction of multimodal transport hubs (see, for example, Chauhan, Gupta & Parida, 2021; Kumar, Parida & Swami, 2013; Friedrich,

2016; Arentze & Molin, 2013; Adib & Rui, 2010; Diana, 2012) those are not of Sri Lanka but other developed and developing countries. When multimodal transport centres seeing as a future trajectory within transport planning in Sri Lanka, the understanding of service quality levels and user satisfaction of MMC is particularly useful for other Multimodal centres planned to be implemented in near future and for the institutions that focus on generating transport policies for Sri Lanka. The paper initially outlines the concepts of multimodal transportation, quality of services, user satisfaction and methods follow to study the inquiry. Thereafter, it moves to the analysis of user-perceived service quality of Makumbura Multimodal Transport Center and its relationship with user satisfaction. Finally, the paper discusses the policy implications and further research areas informed by this study.

2. Literature Review and Conceptualization

2.1 The Concept of Multimodal Transportation

The idea of multimodal transportation evolved with a general emphasis on integrating mobility facilities with any two or more public transport modes (Harper & Evers, 1993; Muller, 1995; Hayuth, 1987). The concept was later advanced with attributes such as transport efficiency (Jones, Cassady & Bowden, 2000; Lowe, 2005), door to door mobility (total forwarding service, with all appropriate formalities, from the moment the products are received from the seller to the moment they are sent to the receiver (Nierat, 1997; DeWitt & Clinger, 2000; Lowe, 2005), single contrast (United Nations, 1980; DeWitt & Clinger, 2000), the object of transport (people or goods) from one location to another using a vehicle, flight, or vessel (Nozick & Morlok, 1997; Panayides, 2002), sustainability (Harper & Evers, 1993; Nozick & Morlok, 1997; Lowe, 2005; Fan, 2013), demand variables (Under different scenarios, the amount of mobility and services that customers and companies will prefer such as time, price, entertainment etc.) (Tavasszy et al., 2010; Fan, 2013; Gao, Yu & Liang, 2016) and information and adaptation of real time operations (DeWitt & Clinger, 2000; Graffigna, Barello & Triberti, 2016; Fan, 2013; Riessen et al., 2013).

Consequently, to bring economic and social development at varying scales the contemporary multimodal centre development projects that operate in both developed and developing countries currently offer different value-adding services. Some of which are listed below.

- Transport service by connecting buses, rail and cycling (e.g., Arnhem: Netherlands, Oculus: New York City, Rotterdam Central Station, Vasteras Travel Center: Sweden, Ohio: USA, West Kowloon Station: Hong Kong, (ARTIC): USA, Multi-Modal Centre: Georgia, Transbay Transit Centre: San Francisco, Kaohsiung: Taiwan, Ülemiste Terminal: Tallinn)
- Financial services (e.g., Ohio: USA, Lucknow: India, Kaohsiung: Taiwan, TBS: Malaysia, Grand Central Terminal: New York, Ohio: USA, Lucknow: India)
- Retail spaces (e.g., Arnhem: Netherlands, Rotterdam Central Station, Vasteras Travel Center: Sweden, MMC: Georgia, Transbay Transit Centre: San Francisco)
- Administrative services with office plaza (e.g., Arnhem: Netherlands, Rotterdam Central Station), conference halls (e.g., Arnhem: Netherlands)
- Entertainment services in terms of shopping (e.g., Arnhem: Netherlands, Oculus: New York City), cinema (e.g., Arnhem: Netherlands)
- Sports complex (e.g., Oculus: New York City, Transbay Transit Centre: San Francisco)
- Cultural centres (e.g., Transbay Transit Centre: San Francisco)
- Cafes and restaurants (e.g., Oculus: New York City, Rotterdam Central Station, Vasteras Travel Center: Sweden, Multi-Modal Centre: Georgia)
- Security and privacy services (e.g., Oculus: New York City, (ARTIC): USA)
- Information services (e.g., (ARTIC): USA, TBS: Malaysia)
- Parking services (e.g., Arnhem: Netherlands, Rotterdam Central Station, Vasteras Travel Center: Sweden, (ARTIC): USA) etc.

2.2 Service ‘quality’

A service is referred to any action or advantage that one party can provide to another that is largely intangible and does not result in ownership of anything (Alzaydi et al., 2018). “Quality” denotes how well a product or service fulfils the user's needs while in use (Hoyle, 2007). A complete user review of a specific service and the amount to which it fulfils their expectations and offers satisfaction is therefore referred to as ‘quality’ of service (Pakurár et al., 2019; Yoo & Park, 2007; Prakash & Mohanty, 2012; Teshnizi et al., 2018). Hence service quality is linked to a user's feelings and contentment on a particular consumption. Consequently, service quality is a subjective concept (Angelova & Zekiri, 2011; Datta and Vardhan, 2017; Pakurar et al., 2019) bounded by time and the geography in which it is measured (Bhagat, 2012; Pakurar et al., 2019). Therefore, a service once qualified to become a ‘quality service’ is subjected to change over time.

As per Parasuraman et al., (1988) – one of the most influential studies on service quality identifies that the quality of service relevant to any business can have five different facets. According to these works those dimensions can be identified as;

- **Tangibility:** physical facilities, equipment and the appearance of personnel and communication materials.
- **Reliability:** the ability to perform the promised service consistently, on schedule, and in a trustworthy manner.
- **Responsiveness:** the desire to fix problems quickly, works successfully with consumer complaints, and be able to assist consumers as well as satisfy their needs.
- **Assurance:** the knowledge and courtesy of employees and their ability to convey trust and confidence.
- **Empathy:** the provision of caring, individualized attention to customers

The relevance of these dimensions to study the service quality of multimodal centres has been validated by previous transport related studies such as Sokchan (2018) and Mushi (2014). Sokchan (2018) to measure

service quality of bus service from Phnom Penh to Poipet in Cambodia used 25 indicators: *environment of bus is clean and hygienic, cleanliness of facilities and equipment, spacious and comfort seats for the passenger, ample legroom and foot space* from tangibility dimension, *accuracy of ticketing and billing services, buses departure and arrives at the punctual time, safe and security service, buses are never break down on the road, for the user problems bus companies show a sincere interest to solving* from reliability dimension, *bus companies provide specific time and efficient service, bus companies always inform what is available or prohibit services, communication with staffs is clear and helpful, staffs are always willing to serve and staffs are never too busy to respond to your request* from responsiveness dimension, *feel safe in journey, staffs are consistently courteous with the passenger, driver and conductor are consistently polite, driver have sufficient and driving skill and staffs are friendly and polite* from Assurance dimension, *bus companies give a convenient operating , staffs understand your specific needs, bus companies have passenger inters at heart, customer loyalty program and promotion and bus companies give special care for women, children, handicap and vulnerable peoples* from Empathy dimension. Mushi (2014) to measure service quality in Ubungu, Tanzania used 22 indicators which include: *modern equipment/vehicles, visually appealing facilities, employees who have a neat professional appearance and visually appealing materials associated with the service* from tangibles dimension, *providing services as promised, dependability in handling customers' service problems, performing services right the first time, providing services at the promised time and maintaining error-free records* from reliability dimension, *keeping customers informed about when services will be performed, prompt service to customers, willingness to help customers and readiness to respond to customers' requests* from responsiveness dimension, *employees who instill confidence in customers, making customers feel safe in their transactions, employees who are consistently courteous and employees who have the knowledge to answer customer questions* from assurance dimension and *giving customers individual attention, employees who deal with customers in a caring fashion, having the customers' best interests at heart, employees who understand the needs of their customers and convenient business hours*

from assurance dimension. The recognition of the service quality through these facets can provide relatively rich information for service providers to understand which dimensions of a particular service that the users perceived to be 'good' or 'bad' accordingly improve the respective service in future (Qadeer, 2013).

2.3 User Satisfaction

A feeling of pleasure and ecstasy experienced after purchasing or using a product or service is known as user satisfaction (Angelova & Zekiri, 2011). Users have certain expectations regarding the performance of products and services before making a purchase (Friman & Felleson, 2009). People are pleased and delighted if the items fulfil or surpass their expectations (Gao, Yu & Liang, 2016). User satisfaction is a key determinant of the success and longevity of any form of business. The literature on service management refers to several important points related to users' satisfaction on service quality attributes (Bergman & Bengt, 2003). Conspicuously, user satisfaction on service quality, in particular, have been connected to consumer purchase, loyalty intents, desire to spread positive word of mouth and complaint behaviour (Olsen 2002; Kang, Nobuyuki & Herbert, 2004; Soderlund & Ohman, 2005). According to Dunkel & Taylor, (2003) both user satisfaction and service quality is a consequence of the users' aspirations, perception and desires. According to Qadeer, (2013) user satisfaction is a function of i) requirements for a product or service, ii) brand and image and iii) previous experiences with a service that the user had received. In a generic sense, higher service quality seen as an antecedent of higher user satisfaction (Brady et al, 2002). However, the interaction between performance dimensions used in service quality and those utilized in satisfaction evaluations, as well as the variations between encounter-specific and overall satisfaction can make the connection between service quality and user satisfaction complicated (Daniel & Berinyuy, 2010).

2.4 Measuring Service Quality of Multimodal Transport Centers

Transit users' perspectives per se are the ingredient to measure the service quality and user satisfaction of multimodal transport centres (Fu & Xin,

2007, Silvestro, 2005). However, as far as understanding their behaviour, choice, preferences, expectations, service quality etc. are concerned scholars have adapted a wider variety of methods. For instance, Arentze & Molin (2013); Adib & Rui (2010) have employed the stated choice method to understand the level of services of MTHs. Also, Kumar, Parida & Swami (2013) has employed numerous ratios and indicators such as travel time ratio, level of service indicator, interconnectivity ratio, the passenger waiting index and running index to understand the service quality attributes in Delhi multimodal transport hub. Diana (2012) has used correlations and correspondence measures to analyze the service quality attributes of service frequency, punctuality, possibility of finding sitting places, speed of the service, cleanliness of the vehicles, comfort while waiting at bus stops, connectivity with other municipalities, convenience of the schedules, cost of the ticket in Italy multimodal transport hubs. Friedrich (2016) has employed the OD-Pairs method to measure service quality in German urban and suburb multimodal transport hubs. Therefore, the choice of method to measure service quality and user satisfaction of multimodal centres can depend on its appropriateness to the inquiry of the study.

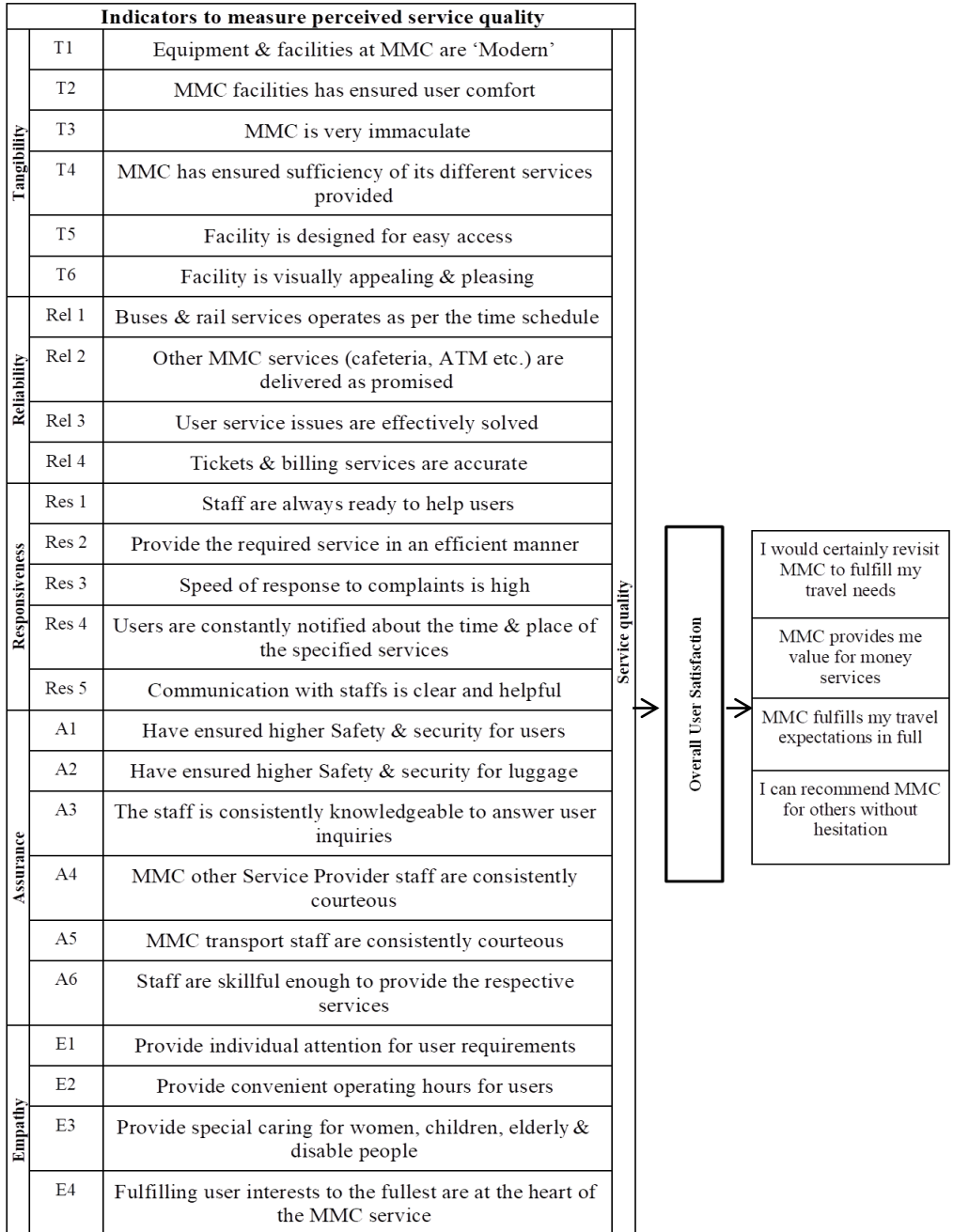
2.5 Makumbura Multimodal Transport Centre of Sri Lanka and its Services

MMC is the first and the sole multimodal transport hub in Sri Lanka as of year 2020 constructed with a project cost of LKR 1,308 million in 2019. Relative to all other transport infrastructure facilities established in Sri Lanka, MMC has been built in an architecturally appealing manner (Figure 2). It locates adjoining Colombo- Batticaloa Highway (A4 High Level Road), around 300m proximity to ¹Southern Expressway and ²Outer Circular Expressway and, 21Km from the central parts of Colombo city (Figure 3). MMC is easily accessible to Maharagama – a prominent affordable buying suburban shopping centre in Colombo, administrative district and several public and private universities.

MMC integrates eight long distances bus routes, twelve short distances bus routes, shuttle services, park and rides services, and Kelani Valley railway line – often a commuter train connecting central Colombo with its East suburbs. Besides, the MMC provides passengers with its mobility related other services viz. bus bays, air-conditioned waiting rooms with comfortable seating, enclosed corridors to move between transit bays, information service counters and LCD system to provide on-time information, cafeteria, and restrooms, free drinking water, sanitary services, banking, ATM, convenience stores, elevators, escalators, stairways with differently abled access and security and surveillance.

Being a state-owned infrastructure facility, the MMC was facilitated and managed by the Project Management Unit established under the Ministry of Transport. The respective bus and rail transport services were provided by national and provisional level transport agencies. The rest of the services such as security, cleaning, banking, ATM, shopping, cafeteria, etc. were provided through various outsourced private sector service providers.

Figure 1: Conceptual Model



Source: Author Constructed, 2021

Figure 2: Makumbura Multimodal Centre



(Source: Google image, 2021)

Figure 3: Location of the Study Site



Source: (Google Map 2021)

¹Southern Expressway connects Western and Southern regions of Sri Lanka

²Outer Circular Highway connects Southern Expressway to central region highways and CMB Airport Expressway

³National Transport Commission, Western Province passenger transport authority, Sri Lanka Transport Board, Ceylon Government Railway

Subsuming the literature presented the study deploys a point of departure that Parasuraman, et al., (1988) service quality dimensions are suitable to recognize different facets of MMC services to be evaluated. The study measures these service dimensions through 25 service indicators (Figure 1). These indicators were adapted from few previous studies of similar nature such as Sokchan (2018) and Mushi (2014) and researchers' observation on MMC services. The four indicators to measure user satisfaction (Figure 1) were drawn through service management literature Olsen, 2002; Kang, Nobuyuki & Herbert, 2004; Soderlund & Ohman, 2005 as discussed in the study. Following the generic understanding that higher service quality would lead to higher user satisfaction it develops following hypothesis.

H1-There is a significant positive relationship between perceived tangibility dimension of MMC service quality and overall transit user satisfaction.

H2- There is a significant positive relationship between perceived reliability dimension of MMC service quality and overall transit user satisfaction.

H3- There is a significant positive relationship between perceived responsiveness dimension of MMC service quality and overall transit user satisfaction.

H4- There is a significant positive relationship between perceived assurance dimension of MMC service quality and overall transit user satisfaction.

H5- There is a significant positive relationship between perceived empathy dimension of MMC service quality and overall transit user satisfaction.

3. Methodology

3.1 Survey Instrument

The inquiry of the study (Figure 1) requires user perception data on MMC's service quality and their overall satisfaction. Accordingly, MMC transit users were surveyed with a questionnaire. The questionnaire was in three parts consisted of forty questions. Part I covered the respondent's profile information. Part II consisted of 25 Likert scale questions (Figure 1) that inquired the respondent's assessment of MMC's service quality. There the 5 points of the Likert scale was defined as 1= very poor, 2= poor, 3= average, 4= good and 5= very good. Part III comprehended with Likert scale

questions related to confirmation of user satisfaction. Here, the 5 points of the Likert scale was defined as 1= strongly disagreed, 2= disagreed, 3= neutral, 4= agreed and 5= strongly agreed.

3.2 Sampling and Data Collection

The population of the research was the transit users of Makumbura Multimodal Centre who visit the place to fulfil their commuting needs. Accordingly, the study adapted the convenience sampling method (the most prevalent type of non-probabilistic sampling, which involves obtaining samples from around an area that are conveniently available; (Edgar & Manz, 2017), the questionnaire was opened to all service transit users of MMC between the period of June and July 2020 covering weekdays, weekends and public holidays. The number of responses received accordingly was 160.

3.3 Data analysis procedure

The gathered data were tabulated and analysed using IBM, Statistical Package for the Social Science (SPSS) version 20.0. User perception of service quality and overall user satisfaction was measured with mean scores and standard deviation. Multi-linear regression analysis was performed to understand the relationship between the user perception of service quality on overall user satisfaction.

3.4 Reliability of Data

Cronbach Alpha for service quality dimension measures and user satisfaction scored higher than 0.7; the minimum acceptable level to ensure the internal consistency of the data set (Nunnally, 1978). Respectively the tangibility dimension scored 0.905, reliability dimension scored 0.906, responsiveness dimension scored 0.891, assurance dimension scored 0.895, empathy dimension scored 0.899 and the user satisfaction scored 0.913. In addition, the standard deviation for all measured indicators is less than 1 (one) thus very closely situated with all mean values calculated.

3.5 Discriminant validity

Discriminant validity can measure the validity of one test with another test of the study (Blau, 2001); in this case, it is the user perception of service quality of MMC with their overall satisfaction on MMC services. The values of diagonal elements should be greater than off-diagonal elements in the respective rows and columns (Mello & Collins, 2001). The discriminant validity for tangibility, responsiveness, assurance, and empathy dimensions were 0.581, 0.626, 0.629, and 0.655 respectively. In practice, a value higher than 0.5 suggests the discriminant validity likely to exist between two scales thus tend to be suitable for further analysis (Blau, 2001). The discriminant validity for reliability dimension is 0.472 nonetheless closer to 0.5 thresholds, thus has been taken forward for the regression analysis (Verma & Prasad, 2017).

Table 1: Discriminant validity

	Tangibility	Reliability	Responsiveness	Assurance	Empathy	Satisfaction
Tangibles	1					
Reliability	.671**	1				
Responsiveness	.664**	.766**	1			
Assurance	.688**	.701**	.789**	1		
Empathy	.622**	.629**	.786**	.685**	1	
Satisfaction	.581**	.472**	.626**	.629**	.655**	1

Source: Survey Data 2021

3.6 Profile of the respondents

Table 2 presented the respondents' profile of the study. The majority (i.e., 21.3%) of MMC users who responded have been travelling within the Colombo district, which is 21.3% of the sample whilst a significant proportion of respondents were also from Southern (Matara and Galle Districts) and Central regions of Sri Lanka (Kandy and Gampaha Districts). This is obviated as MMC has been primarily connected to the Southern Expressway and Outer Circular Highway bus routes. The respondents included both male and female passengers accounting for 57.5 % and 47% respectively. Majority of respondents fell into the below 40 age categories having 51% of the respondents aged between 20-29 years old and 32% aged

between 30-39 years. The occupations of the respondents are concerned, 23% represented private sector employees and 45% represented the student category. With respect to the mobility intent, 40% of them were using MMC to return home during weekends. 36% of them were using MMC to fulfil their mobility need on going holiday and 11% to fulfill their mobility needs related to their businesses. The respondents who use MMC on daily basis were amounted to be 5.6%. The majority of respondents (i.e., 88.7%) were using MMC occasionally; once a week, twice a week or rarely. In addition, 73% of the respondents were using public transport mode to access MMC.

Table 2: Profile of the respondents

District travelled from or to	%	Gender	%
Badulla	1.3	female	42.5
Colombo	21.3	Male	57.5
Galle	15.6	Age	%
Gampaha	14.4	< 19	6.3
Hambanthota	4.4	20-29	51.2
Kandy	11.9	30-39	31.9
Kurunegala	3.1	> 40	10.6
Matale	1.3	Occupation	%
Matara	18.8	Student	45.6
Monaragala	1.9	Private sector employee	23.8
Mullaitivu	1.3	Government employee	16.3
Rathnapura	5.0	Self employed	10.6
		Unemployed	3.1
		Retired	0.6
Travel need that utilizes MMC service	%	Frequency of MMC use	%
To go on a holiday	35.6	Daily	5.6
To go home at the weekend	40.0	Few days per a week	5.6
Daily Commuting	9.4	Once a week	23.1
For Business	11.3	Twice per week	23.1
Other	3.8	Rarely	42.5
Days of utilizing MMC facility	%	Transport mode used to access MMC	%
Public holidays	23.8	Private transport	8.8
Weekend	53.8	Public transport	73.1

Working days	22.5	Taxi service	18.1
--------------	------	--------------	------

Source: Survey Data 2021

4. Results

4.1 Service Quality of MMC from User Perspective

User perception on five service quality dimensions is measured with mean values (Table 3- Table 7). Having a 5-scale measure, mean value greater than 3 indicates that the transit users perceive the ‘quality’ of respective service attribute they received was higher than average level.

As per table 3, tangibility dimensions of MMC recorded all mean values higher than 3.0; i) 4.22 for equipment and facilities at MMC are modern, ii) 4.09 for MMC facilities have ensured user comfort; iii) 4.06 for MMC is very immaculate; iv) 4.18 for MMC has ensured sufficiently of its different services provided (transport, café, banking, ATM etc.); v) 3.78 for Facility is designed for easy access and vi) 4.26 for Facility is visually appealing and pleasing. However, it is noteworthy that service quality indicator (T5); “Facility is designed for easy access” recorded comparatively lower mean value (i.e., 3.78) compared to the rest of the tangibility dimension service indicators which were higher than 4.0.

Table 3: User Perception Measures of Tangibility Dimensions

Indicator		Min	Max	Mean	Std. Deviation
T1	Equipment and facilities at MMC are ‘Modern’	1	5	4.22	.852
T2	MMC facilities have ensured user comfort	1	5	4.09	.788
T3	MMC is very immaculate	1	5	4.06	.863
T4	MMC has ensured sufficiently of its different services provided	1	5	4.18	.828
T5	Facility is designed for easy access	1	5	3.78	.984
T6	Facility is visually appealing and pleasing	1	5	4.26	.811

Source: Survey Data 2021

Table 4 presented the mean values for reliability dimension. Users rated all means values higher than 3.0 thus the reliability dimension of MMC service quality is higher than the average level. i) 3.86 for buses and rail services

operate as per the schedule, ii) 3.06 for other MMC services (cafeteria, ATM etc.) are delivered as promised, iii) 3.56 for transit user service issues being effectively solving and iv) 3.76 for tickets and billing services are accurately recorded. However, it is noteworthy that other services of MMC being delivered as promised scored lower mean score compared to all other attributes.

Table 4: User Perception Measures of Reliability Dimensions

Indicator		Min	Max	Mean	Std. Deviation
Rel1	Buses and rail services operates as per the time schedule	1	5	3.86	.789
Rel2	Other MMC services (cafeteria, ATM etc.) are delivered as promised	1	5	3.06	.793
Rel3	User service issues are effectively solved	1	5	3.56	.866
Rel4	Tickets and billing services are accurate	1	5	3.76	.879

Source: Survey Data 2021

Table 5 presented the user perception for responsiveness dimensions of MMC services. The mean values for i) staff are always ready to help transit users scored 3.72, ii) providing the required service in an efficient manner scored 3.90, iii) speed of response to complaints being high scored 3.74, iv) transit users were constantly notified about the time and place of the specified services scored 4.01 and v) communication with is clear and helpful scored 3.72. Therefore, all responsive attributes scored mean values higher than 3.0 whilst the “users are constantly notified about the time and place of the specified services” scored relatively higher mean value of 4.01.

Table 5: User Perception of Responsiveness Dimension of MMC service

Indicator		Min	Max	Mean	Std. Deviation
Res1	Staff are always ready to help transit users	1	5	3.72	.959
Res2	Provide the required service in an efficient manner	1	5	3.90	.737
Res3	Speed of response to complaints is high	1	5	3.74	.765
Res4	Users are constantly notified about the time and place of the specified services	1	5	4.01	.843
Res5	Communication with staffs is clear and helpful	1	5	3.72	.848

Source: Survey Data 2021

Table 6, presented the user perception on assurance dimension of MMC services. Accordingly, i) MMC having ensured higher safety and security for transit users scored mean value of 3.83, ii) MMC having ensured higher safety and security for luggage scored mean value of 3.66, iii) the staff being consistently knowledgeable to answer transit users inquiries scored 3.73, iv) MMC other service provider staff are consistently courteous scored 3.66, v) MMC transport staff are consistently courteous scored 3.61 and vi) staff are skillful enough to provide the respective services scored 3.66. Therefore, all mean values being higher than 3.0 denotes transit users rated the assurance dimension of MMC service quality “above the average”.

Table 6: User Perception of Assurance Dimension of MMC service

Indicator		Min	Max	Mean	Std. Deviation
A1	Have ensured higher safety and security for Users	1	5	3.83	.863
A2	Have ensured higher safety and security for luggage	1	5	3.66	.862
A3	The staff is consistently knowledgeable to answer user inquiries	1	5	3.73	.868
A4	MMC other service provider staff are consistently courteous	1	5	3.66	.838
A5	MMC transport staff are consistently courteous	1	5	3.61	.926
A6	Staff are skillful enough to provide the respective services	1	5	3.66	.853

Source: Survey Data 2021

Table 7 presents the user perception on the empathy dimension of MMC service quality. The mean values for each attribute scored higher than 3.0 demonstrating that users rated the empathy dimension of MMC service quality being at an “above average” scale. More specifically the mean values for i) staff providing individual attention for transit user requirements were 3.60, ii) MMC providing convenient operating hours for transit user scored 3.88, iii) MMC providing special caring for women, children, elderly and disable people scored 3.89 and iv) MMC’s fulfilling user interests to the fullest is at the heart of the MMC services scored 3.82.

Table 7: User Perception of Empathy Dimension of MMC service

Indicator		Min	Max	Mean	Std. Deviation
E1	Provide individual attention for user requirements	1	5	3.60	.870
E2	Provide convenient operating hours for users	1	5	3.88	.842
E3	Provide special caring for women, children, elderly and disable people	1	5	3.89	.975
E4	Fulfilling user interests to the fullest is at the heart of the MMC service	1	5	3.82	.896

Source: Survey Data 2021

4.2 The Overall User Satisfaction for MMC Services

Table 8 presents the overall user satisfaction on MMC services. All the mean values of each satisfaction attributes scored higher than 3.0: i) “certainly revisiting MMC to fulfil my travel needs” scored 4.18, ii) “MMC providing value for money services” scored 4.06, iii) “MMC fulfills travel expectations in full” scored 4.15 and 4) “recommending MMC for others” scored 4.01.

Table 8: Customer Overall Satisfaction on MMC Services

Indicator		Min	Max	Mean	Std. Deviation
S1	I would certainly revisit MMC to fulfill my travel needs	1	5	4.18	.868
S2	MMC provides me value for money services	1	5	4.06	.852

S3	MMC fulfills my travel expectations in full	1	5	4.15	.861
S4	I can recommend MMC for others without hesitation	1	5	4.01	.842

Source: Survey Data 2021

4.3 Relationship between Transit User Perception of Service Quality and Overall User Satisfaction for MMC

4.3.1 Regression Analysis & Hypothesis Testing

As per table 9, the results indicated that the transit user perception on tangibility, assurance and empathy service quality dimensions have a significant positive relationship with the overall user satisfaction for MMC. Therefore, the results of this study supported H1, H4, and H5. The transit user perception on reliability and responsive service quality dimensions do not show significant relationship with the user satisfaction for MMC. For those the resulted in P-values are higher than 0.05 and T statistic are less than the threshold value of 1.96. Therefore, the result of the study does not support H2 and H3 ((R2= 0.518)).

Table 9: Results of Path Coefficient and Hypothesis Testing

Hypo:	Path	Unstandardized Coefficients		Standardized Coefficients	t	P value	Result (Accepted/ Rejected)
		B	Std. Error	Beta			
H1	Tangibility → overall satisfaction	.284	.112	.214	2.531	.012	Accepted
H2	Reliability → satisfaction	-.243	.124	-.183	1.951	.052	Rejected
H3	Responsiveness → satisfaction	.207	.158	.156	1.311	.192	Rejected
H4	Assurance → satisfaction	.316	.124	.253	2.554	.012	Accepted
H5	Empathy → satisfaction	.390	.106	.341	3.667	.000	Accepted

Source: Survey Data 2021

Conclusion

Multimodal transport centre is a facility that provides varying transit-related services to its users in a market-responsive manner (Gao, Yu & Liang, 2016; Demse, 2018) Makumbura Multimodal Center (MMC) is the first and by the time of the study the only such facility that operates within Sri Lanka. The government prioritized the MMC investment over other developments to provide quality, convenience comfortable and safe transit service to passengers whilst remedying the traffic congestion and other transport issues in Colombo. Integrating bus services (long distance, short distance and shuttle services) with the Kelani Valley rail line, MMC offers multiple services to its passengers viz., ‘park and ride’ services, cafeteria and restrooms, digital banking, ATMs etc. Accordingly, this paper aims to examine the transit user-perceived service quality of MMC and to see how that relate to the overall user satisfaction.

The 160 MMC transit users who participated in the study were primarily students and private sector employees below 40 years of age, travelling within the Colombo district and from Southern and Central regions of the country. In most cases, the respondents were occasional users of MMC having the travel need of going back home during weekends, on holiday or business purposes.

As per these respondents, the tangibility dimension of MMC services (being modern, comfortable, visually appealing, pleasing, immaculate facility with good service mix and comfortable facility) perceived to be at the highest ‘quality’ level relative to all other service quality dimensions - four out of five indicators scored mean values higher than 4.0. This implies that the transit users liked and welcomed the visibility aspect of the MMC development. Similarly, the users being constantly notified about the time and place of the specified MMC services as a part of the responsive dimension also scored a mean value of 4.01. These are service quality indicators that users rated either ‘good’ or ‘very good’, thus MMC need to retain and further strengthen them over time.

Out of all, “other MMC services such as cafeteria, ATM etc. being delivered as promised” as a part of the reliability dimension of MMC service was the lowest-rated for its ‘quality – it is marginally above the average quality level (i.e., mean score of 3.06). This teases out that MMC still have not reached

the contemporary ways of providing value-adding services for mobility needs to the fullest potential. Also, it is noteworthy that MMC being located and designed for easy access as a part of the tangibility dimension scored only 3.78 which is lower than the rest of the tangibility dimension indicators. Moreover, in four out of five indicators of responsive dimension and all indicators of reliability and assurance dimension, the perceived service quality level was between average and good. Therefore, when MMC's becoming a significant strategy in improving the transport sector in Sri Lanka MMC should certainly take measures to improve those areas further.

On the whole, the respondents were satisfied with the MMC services. In other words, MMC has offered an overall service level higher than what these transit users were expecting. Interestingly, as results indicated this 'satisfaction' has been dependent on the perceived service quality levels for tangibility, assurance and empathy dimensions. Reliability and responsiveness dimensions of MMC's service quality do not seem to have been significantly relating to the overall satisfaction of transit users at the time. It shows the connection between service quality and user satisfaction can become complicated (Daniel & Berinyuy,2010) and not always simply relate to each other positively. By the time this research was conducted MMC is the first and sole of its kind with modern, visually appealing and pleasing, immaculate and comfortable transit facility compared to all other forms of transport facilities in Sri Lanka which are often unattractive and unclean conditions. These would have probably impacted the transit users to be satisfied with the MMC facility irrespective of the service quality conditions for responsive and reliability service dimensions. Therefore, the study calls for further research that looks into deeper insights on transit user perceptions and behaviours in Sri Lanka.

Acknowledgment

Centre for Real Estate Studies (CRES), Department of Estate Management and Valuation, University of Sri Jayewardenepura.

References

- a) Alzaydi, Z, Al-Hajla, A, Nguyen, B & Jayawardhena, C 2018, A review of service quality and service delivery. *Business Process Management Journal*, 24(1), pp.295-328.
- b) Angelova, B & Zekiri, J 2011, Measuring Customer Satisfaction with Service Quality Using American Customer Satisfaction Model (ACSI Model). *International Journal of Academic Research in Business and Social Sciences*.
- c) Arentze, A & Molin, J. E 2013, Travelers' preferences in multimodal networks: Design and results of a comprehensive series of choice experiments. *Transport Research Part A: Policy and Practices*, pp. 15-28.
- d) Badri, M. A, Al-Madani, A & Abdulla, M 2005, Information technology center service quality: Assessment and application of SERVQUAL. *International Journal of Quality & Reliability Management*.
- e) Bhagat, P 2012, Effect of Service Quality & Customer Satisfaction on Customer Loyalty of Cellular Service Providers in Ahmedabad. *Paripex - Indian Journal of Research*, 3(8), pp.191-194.
- f) Chauhan, V, Gupta, A & Parida, M 2021, Demystifying service quality of Multimodal Transportation Hub (MMTH) through measuring users' satisfaction of public transport. *Transport Policy*, 102, pp.47-60.
- g) Daniel, C.N & Berinyuy, L 2010, Using the SERVQUAL Model to assess service Quality and Customer Satisfaction: Umeå School of Business
- h) Demse, H 2018, Challenges of Multimodal Transport Services: The Case of Ethiopian Shipping and Logistics Service Enterprise.
- i) DeWitt, W & Clinger, J 2000, Intermodal Freight Transportation. *Traffic and Transport Planning*;
- j) Fan, Y 2013, The Design of a Synchronodal Freight Transport System. *The Delft University of Technology*.
- k) Friedrich, M 2016, Evaluating the Service Quality in Multi-modal Transport Networks. *Transportation Research Procedia*, 15, pp.100-112.
- l) Friman, M & Fellesson, M 2009, Service Supply and Customer Satisfaction in Public Transportation: The Quality Paradox. *Journal of Public Transportation*, 12(4).
- m) Gao, L, Yu, Y, & Liang, W 2016, Public Transit Customer Satisfaction Dimensions Discovery from Online Reviews. *Urban Rail Transit*, 3-4(2), 146-152.

- n) *Graffigna, G, Barello, S & Triberti, S 2016. Patient Engagement A Consumer-Centered Model to Innovate Healthcare. Poland: De Gruyter Open.*
- o) *Harper, D, & Evers, P 1993, Competitive issues in intermodal railroad-truck service. Transport, 32, 31-45.*
- p) *Hayuth, Y 1987, Intermodality: Concept and Practice: Structural Changes in the Ocean Freight Transport Industry. Lloyd's of London. Retrieved from <http://books.google.com/books?id=3qYgAQAAMAA>*
- q) *Hoyle, D 2007, Quality management Essentials. UK: Elsevier Limited.*
- r) *Ibraeva, A & Figueira de Sousa, J 2014, customer oriented transport in the fields Information Provision. Procedia - Social and Behavioral Sciences, 121-128.*
- s) *Indika, W. S 2018, Development of Appropriate Investment Models for Multimodal Transport Terminals in Sri Lanka. Department of Transport and Logistics Management, University of Moratuwa.*
- t) *Japan International Cooperation Agency 2014, Urban Transport System Development Project for Colombo Metropolitan Region and Suburbs Final Report. Ministry of Transport Sri Lanka.*
- u) *Jones, W. B, Cassady, R & Bowden, R 2000, Development of a Standard Definition of Intermodal Transportation. Mississippi State.: University of Denver College of Law.*
- v) *Kanafani, A & Wang, R 2010, Measuring Multimodal Transport Level of Service, s.l.: University of California, Berkeley.*
- w) *Kos, S, Samija, S & Brcic, D 2012, Multimodal Transport in the Function of the Port System Containerization Development. 15. international Conference on Transport Science.*
- x) *Kramarz, M & Przybylska, E 2021, Multimodal Transport in the Context of Sustainable Development of a City. Sustainability, 13(4), p.2239.*
- y) *Kumara, P. P, Parida, M & Swami, M 2013, Performance Evaluation of Multimodal Transportation Systems. Social and Behavioral Sciences, pp. 795-804.*
- z) *Kumarage, A. S 2017, Why Transport in Sri Lanka Continues to Go from Bad to Worse. Sri Lanka Journal of Transport, 5, 97-102.*
- aa) *Kumarage, A. S & Jayaweera, D. S 2005, Developing Public Transport in Sri Lanka.*

- bb) *Litman, T 2021, Evaluating Accessibility for Transport Planning. Victoria Transport Policy Institute.*
- cc) *Lowe, D 2005, Intermodal Freight Transport. Elsevier Ltd.*
- dd) *MMC Kottawa 2019. [online] Available from <http://www.mmck.lk/index-en.html>. [Accessed 10 June 2019].*
- ee) *MMC, 2019, MMC Kottawa. Retrieved from <http://www.mmck.lk/index-en.html>*
- ff) *Muller, G 1995, Intermodal Freight Transportation. Intermodal Association of North America.*
- gg) *Mushi, W 2014, Service Quality and Customer Satisfaction in Transport Service Industry in Tanzania. Mzumbe University.*
- hh) *Nes, R. V 2002, Design of multimodal transport networks A hierarchical approach. MG Delft, Netherland: DUP Science.*
- ii) *Nierat, P 1997, Market area of rail-truck terminals: Pertinence of the spatial theory. Transportation Research Part A: Policy and Practice, 31(2), 109-127.*
- jj) *Nozick, L. K & Morlok, E. K 1997, A model for medium-term operations planning in an intermodal rail-truck service. Transportation Research Part A: Policy and Practice, 31(2), 91-107.*
- kk) *Pakurár, M, Haddad, H, Nagy, J, Popp, J & Oláh, J, 2019, The Service Quality Dimensions that Affect Customer Satisfaction in the Jordanian Banking Sector. Sustainability, 11(4), p.1113.*
- ll) *Panayides, P. M. 2002, Economic Organization of Intermodal Transport. Transport Review, 22(4), 401-414.*
- mm) *Parasuraman, A, Zeithaml, V & Berry, L 1988, SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing, 64, 12-40.*
- nn) *Prakash, A. & Mohanty, R 2012, Understanding service quality. Production Planning & Control, 24(12), pp.1050-1065.*
- oo) *Qadeer, S 2013, Service Quality & Customer Satisfaction A case study in Banking Sector: Faculty of Education and Economic Studies.*
- pp) *Riessen, V, Negenborn, R. R, Dekker, R, & Lodewijks, G 2013, Service Network Design for an Intermodal Container Network with Flexible Due Dates/Times and the Possibility of Using Subcontracted Transport. Report/Econometric Institute, Erasmus University Rotterdam.*

- qq) *Semasinghe, S. & Megapolis Media Team , 2019. Great move-in transport sector, s.l.: Daily News: <https://www.dailynews.lk/2019/07/30/features/192525/great-move-transport-sector>*
- rr) *Slack, A & Rodrigue, J 2017, The Function of Transport Terminals.*
- ss) *Tavasszy, L. A, Janssen, R, Van der Lugt, I & Hagdom, L 2010, Verkenning Synchromodaal Transport system. Netherlands.: TNO, Connekt and Dinalog, Delft,*
- tt) *Teshnizi, S. H, Aghamolaei, T, Kahnouji, K, Teshnizi, S. M & Ghani, J 2018, Assessing quality of health services with the SERVQUAL model in Iran. A systematic review and meta-analysis. International Journal for Quality in Health Care, 82-89.*
- uu) *Tybout, A. M, Hauser, J. R & Koppelman, F. S 1978, Consumer Oriented Transportation Planning: An Integrated Methodology for Modeling Consumer Perceptions, Preference and Behavior. Advances in Consumer Research, 5, 426-434.*
- vv) *United Nations 1980, United Nations Conference on a Convention on International Multimodal Transport. United Nations Conference on Trade and Development.*
- ww) *Yatskiv, I & Budilovich, E 2017, A comprehensive analysis of the planned multimodal public transportation HUB. Transportation Research Procedia, 24, 50-57.*
- xx) *Zahural, D. M 2005 International Freight Transport Multimodal Development in Developing Countries: The Case of Bangladesh. International Shipping and Logistics Group Plymouth Business School.*
- yy) *Zhang, X, Liu, H, Xu, M, Mao, C, Shi, J, Meng, G & Wu, J. 2020, Evaluation of passenger satisfaction of urban multi-mode public transport. PLoS ONE, 15(10).*