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Article

Moving towards smart mobility: Factors influencing the intention of consumers to adopt the bus rapid transit (BRT) system

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MARKETING | RESEARCH ARTICLE

Moving towards smart mobility: Factors influencing the intention of consumers to adopt the bus rapid transit (BRT) system

R. Matubatuba^{1*} and C.F. De Meyer-Heydenrych¹

Abstract: The objective of this study was to investigate factors determining the consumers' intention to adopt the Rea Vaya; a smart transport system in an emerging market setting of Johannesburg, South Africa. The study followed a quantitative research design which entailed the collection of data from 250 respondents, using a self-administered questionnaire. The conceptual model and hypotheses proposed for the study were tested through structural equation modelling (SEM). The findings revealed that attitude was the largest influencer of intention to adopt the Rea Vaya. The managerial implications of the findings of this study include building positive consumer attitudes towards the Rea Vaya. A "Rea Vaya stories" marketing campaign is recommended, where consumers will be encouraged to share their positive experiences of the Rea Vaya on social media and radio.

Subjects: Services Marketing; Consumer Behaviour; Marketing Management

Keywords: Consumer behaviour; technology acceptance model; BRT; Smart transport; urban transport

1. Introduction

It is estimated that more than two-thirds of the global population will reside in urban areas by 2050 (Fryszman et al., 2019). This urbanisation has led to a high concentration in medium-sized

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PUBLIC INTEREST STATEMENT

South Africa is faced with the challenge of an inadequate transport system, which is characterised as unsafe and unreliable. The Rea Vaya is a smart transport system that was introduced with the aim of improving sustainability, transport efficiencies and improving the safety and reliability of public transport in Johannesburg. However, the Rea Vaya has experienced low usage rates by commuters. This research provides an overview of the perception of consumers who do not use the Rea Vaya. The aim of the research is to highlight the factors that would determine the future use of the Rea Vaya by non-user consumers. Marketing managers of bus rapid transit systems can use these findings to develop marketing strategies to attract non-user consumers and improve patronage levels for the transport systems.

cities, such as those in Europe, Africa and Asia, which has broadened the range and complexity of the population's demands (Haase et al., 2018; Khatibi et al., 2021). Increased urbanisation has resulted in cities lacking infrastructure as well as other environmental challenges that threaten their sustainability. These include increased pressure on infrastructure and higher demand for transport, which subsequently results in mobility issues, including traffic congestion and pollution (Bibri, 2020). The provision and availability of technology-based initiatives such as the Bus Rapid Transit (BRT) system have been identified as effective strategies for maintaining urban areas and the development of smart cities (Bibri, 2020; Khatibi et al., 2021).

A smart city is described as “an urban centre that integrates a variety of innovative solutions to improve infrastructural performances to achieve sustainable urban development” (Shahidehpour et al., 2018). A smart city is characterised by six main components, namely, smart economy (Bokolo & Petersen, 2019; Kumar & Dahiya, 2017), smart people and smart governance (Loo & Tang, 2019), smart mobility and smart environment (Bokolo & Petersen, 2019; Loo & Tang, 2019) and smart living (Bokolo & Petersen, 2019). This study focuses on the concept of smart mobility. Smart mobility in the form of smart transportation is a constituent of the United Nation's sustainable development goal towards the development of sustainable smart cities (Olokesusi et al., 2019). Smart public transport solutions include automated fare collection, smart ticketing, smart GPS-based buses and bus stops and BRT systems (Vakula & Raviteja, 2017). Smart transportation integrates intelligent transport systems (ITS), telecommunications and automation technology. Smart transport aims to improve transport safety and efficiency in urban cities and reduce the subsequent environmental impact (Brčić et al., 2018).

Smart transport plays a pivotal role in urban and transportation planning globally, with various countries such as Brazil, India, Colombia, Croatia, the United Kingdom, Ghana, Kenya and South Africa implementing smart transport systems to ensure transport efficiency and sustainability (Fryszman et al., 2019; Klopp et al., 2019; Suresh et al., 2021).

In South Africa, Johannesburg is the economic hub of the country, with a population of about 5.9 million, which due to rapid urbanisation is forecasted to reach 7 million by 2030 (Stats, 2020). The city of Johannesburg accounts for the country's largest population and faces unique challenges in comparison to other African cities. These challenges include increased urbanisation, traffic congestion and pollution, which require strategic and sustainable solutions to be overcome (Bwalya, 2019). Such solutions include the development of the public transport system in Johannesburg through the application of ITS; one of which is the Rea Vaya—a BRT system (Abejide et al., 2018). BRT is described as a customer-oriented transport system that integrates ITS for efficient and effective transportation. The system is characterised by buses, automated fare collection, bus stations, dedicated bus lanes, which allow for its high-speed capability and has the capacity to carry large volumes of commuters, which translates to an efficient, reliable and safe public transport system (Venter et al., 2018). Abejide et al. (2018) state that the BRT system is expected to lead the much-needed transformation of public transport in the city and contribute towards its development. As Johannesburg aims to position itself as a world-class city, the inclination towards smart mobility and a smart city is one of the strategies that will help it in this endeavour (Bwalya, 2019). However, though the Rea Vaya has been implemented as one of Johannesburg's smart transport systems since 2010, the problem is that it is experiencing low usage rates and low consumer adoption, as most consumers continue to use unreliable modes of transport such as trains and minibuses (Mthimkulu, 2017; Van Rensburg, 2017). Khumalo and Ogra (2018) state that there are negative perceptions from individuals regarding the Rea Vaya and the municipality is failing to encourage consumers to use the smart transport system. This raises the concern that the Rea Vaya brand is not well understood by consumers and it is not used by the marketing managers to develop strategies that increase the adoption of the smart transport system by consumers who are currently not using it despite all the advantages that it offers (Deng & Nelson, 2013; Khumalo & Ogra, 2018).

Musakwa and Gumbo (2017) suggest that a continual adoption of the transport system will indicate a paradigm shift and transition towards smart mobility in Johannesburg. In order to achieve this, it is necessary for decision makers of the Rea Vaya to understand the factors that determine its adoption by consumers. As such, there is limited research on smart transport systems like the Rea Vaya, hence, Zolnik et al. (2018) argue that further research is required, particularly from a consumer marketing point of view. Current research on BRT systems is focused on countries in South America, with limited literature on African cities (Klopp et al., 2019). In this respect, the objective of this study is to investigate the factors that determine the intention of consumers to adopt a technology-based transport system; the Rea Vaya, based on the extended technology acceptance model (TAM). The TAM has been particularly chosen for this study as it is a widely used model in the investigation of consumer use and adoption of various technology systems (Ahmed et al., 2020) thereby making it a suitable model. In order to meet the objective of the study, research was conducted in Johannesburg, where the Rea Vaya operates. The survey was carried out among consumers who are above the age of 18 years and currently not using the Rea Vaya transport system, in order to determine their intention to adopt the smart transport system in the future.

The findings of this research will provide insights for managers of the city of Johannesburg and Rea Vaya marketing managers, to enable them to formulate effective marketing tactics that will promote the adoption of the Rea Vaya by consumers who are currently not using it. Thereby increasing the usage rate and satisfying their financial and sustainability goals. The BRT system has been implemented in other African cities such as Lagos and Dar es Salaam, and there are plans of implementation in Nairobi, Dakar, Accra and Cairo (Klopp et al., 2019). Therefore, from a theoretical perspective, these findings can be used in other emerging market countries that have implemented and are implementing the BRT system and seek to improve the uptake and adoption of thereof. The Rea Vaya is a technology-based transport system and therefore, the theory of TAM has been adopted in the study. The TAM has been adopted in this study as it has been widely used to understand the technology adoption behaviour of consumers (Ho et al., 2017). However, the TAM does not take into consideration social influence on the consumer's decision in their intention to adopt a technology system (Ho et al., 2017). Therefore, an additional construct; the subjective norm is incorporated into the inherent characteristics of TAM as it has a significant influence on the consumer's intention to adopt a technology system (Ho et al., 2017; Schepers & Wetzels, 2007).

The remainder of this paper is structured as follows; Section 2 provides the theoretical underpinning of the study and the theoretical constructs that make up the study. Section 3 presents the research methodology adopted for the study and Section 4 presents the research results. The discussion of the results is presented in Section 5 followed by the recommendations in Section 6. Lastly, the paper concludes by drawing the main findings, identifying limitations of the study and proposing opportunities for future research in Section 7.

2. Theoretical overview

The overarching theory used to support the conceptual model of this study was the extended TAM as it offers insight into acceptance and adoption of technology such as transport technology system that operates in a social context (Ahmed et al., 2020). Researchers have argued for the inclusion of subjective norms in TAM to further understand how technology acceptance is influenced by social impact (Marfo & Quansah, 2020; Ursavaş et al., 2019). Subjective norms have been reported to influence a consumer's intention to adopt a behaviour and consequently a key determinant in adoption intention (Ho et al., 2017; Schepers & Wetzels, 2007). In order to understand the consumers' intention towards adoption of smart transportation, researchers (Ahmed et al., 2020; Marfo & Quansah, 2020) have included subjective norms in the TAM as it is considered to have a significant effect on the implementation stages of a transport technology system.

The TAM was introduced by Davis (1986) to model user acceptance of technology systems, with the aim of explaining the determinants of technology acceptance across a range of computer-based technologies and user populations. Over time the TAM has been considered as robust and powerful in its ability to explain user acceptance of technology and behaviour (Scherer et al., 2019; Ursavaş et al., 2019). As such, the TAM has been found to possess predictive validity across a number of studies (Maduku, 2011; Sánchez-Prieto et al., 2019; Shroff et al., 2011; Teo, 2010; Teo et al., 2008). The TAM, therefore, postulates that user intentions towards technology systems such as the Rea Vaya can be predicted based on perceived ease of use and perceived usefulness. It further suggests the relationships between perceived ease of use, perceived usefulness and attitude. Lastly, the model proposes that there is a relationship between attitude and adoption intention to adopt, i.e., intention to adopt the Rea Vaya (Bauerová & Klepek, 2018; Choi & Song, 2020). The extension of the TAM which includes subjective norms proposes that there is a relationship between subjective norms and perceived usefulness as well as the relationship between subjective norms and intention to adopt (Marfo & Quansah, 2020). Intention to adopt is described as the user's willingness to use a technology system such as the Rea Vaya (Huang & Teo, 2021). These TAM constructs are discussed in the following sections.

2.1. Perceived ease of use and perceived usefulness

In the TAM, perceived ease of use refers to the extent to which an individual considers a technology system to be free of effort when using it (Huang & Teo, 2021). In the context of this study, an analogical assumption can be made that the consumers' confidence regarding the ease of using the Rea Vaya leads to intention to use the smart transport system. Perceived usefulness is defined as the extent to which an individual believes that a particular technology system would enhance their performance (Bauerová & Klepek, 2018). Within the context of using a smart transport system such as the Rea Vaya, it can analogically be assumed that consumers believe that using the Rea Vaya will be useful in their travels. In the TAM, Bauerová and Klepek (2018) state that perceived ease of use has a causal effect on perceived usefulness, indicating that if a user finds a technology system easy to use, they consider it to be useful in the performance of a given behaviour. Therefore, consumers who do not use the Rea Vaya may have a high likelihood of finding the transport system useful when they perceive it to be easy to use. This is confirmed by a number of studies (Davis, 1987; Gefen et al., 2003; Rauniar et al., 2014; Venkatesh & Davis, 2000), which found that perceived ease of use had a direct and significant effect on perceived usefulness.

The following hypothesis has been proposed, based on the two constructs discussed above:

H1: Consumer perceived ease of use has a significant positive effect on the perceived usefulness of the Rea Vaya.

2.2. Attitude

In technology adoption literature, attitude refers to an individual's positive or negative feelings towards the usage of a technology system such as the Rea Vaya (Ahmed et al., 2020). Yeo, Goh and Rezaei, (2017) suggest that attitude is a key factor in determining consumer intention to use a technology system. Therefore, it can be analogically assumed that if a consumer has a positive attitude towards the Rea Vaya, there is a high likelihood of their intention to adopt the smart transport system. This is confirmed by the Ahmed et al. (2020) study that suggests that in the transport sector, there is a significant relationship between attitude and intention to adopt a transport system. The authors go on to state that as consumers develop more positive feelings towards a transport technology system, the more inclination they have towards intention to adopt the service. Furthermore, it is proposed that perceived ease of use and perceived usefulness are antecedents of attitude and that they have a positive effect on attitude (Feng et al., 2019). Ahmed et al. (2020) support this by stating that both these constructs build favourable or unfavourable attitudes towards consumer intention to accept or reject a technology system. This is supported by

findings in various studies in the field of transportation (Chen et al., 2007; Feng et al., 2019; Irawan et al., 2016; Park et al., 2015) which found that perceived ease of use and perceived usefulness have a significant influence on attitude.

Based on the above literature, the following hypotheses have been formulated for this study:

H2: Consumer perceived ease of use has a significant positive effect on attitude towards the Rea Vaya.

H3: Consumer perceived usefulness has a significant positive effect on attitude towards the Rea Vaya.

H4: Consumer attitude towards the Rea Vaya has a significant positive effect on the intention to adopt the Rea Vaya.

2.3. Subjective norms

Subjective norms are broadly described as the perceived societal pressure to perform or not perform a given behaviour (Marfo & Quansah, 2020). The authors further suggest that subjective norms are a crucial determinant of adoption intention. TAM has been criticised for lacking a social component (Dečman, 2015) as subjective norms are developed based on information obtained from other people, such as friends and family, whose opinions are valued. The inclusion of subjective norms in the extension of TAM, therefore, addresses the influence of other people on the individual's perception about a given behaviour such as consumer intentions to use the Rea Vaya (Marfo & Quansah, 2020). A study by Bansal et al. (2016) found that 50 per cent of the respondents preferred their friends and family to use autonomous vehicles before they would consider adopting them, indicating that their intention to adopt was motivated by subjective norms (Bansal et al., 2016). In addition, scholars have established direct links between subjective norms and perceived usefulness (Huang & Teo, 2021) and between subjective norms and intention to adopt (Venkatesh & Davis, 2000).

The following hypotheses associated with subjective norms are therefore proposed for this study:

H5: Subjective norms have a significant positive effect on consumer perceived usefulness of the Rea Vaya.

H6: Subjective norms have a significant positive effect on the intention to adopt the Rea Vaya.

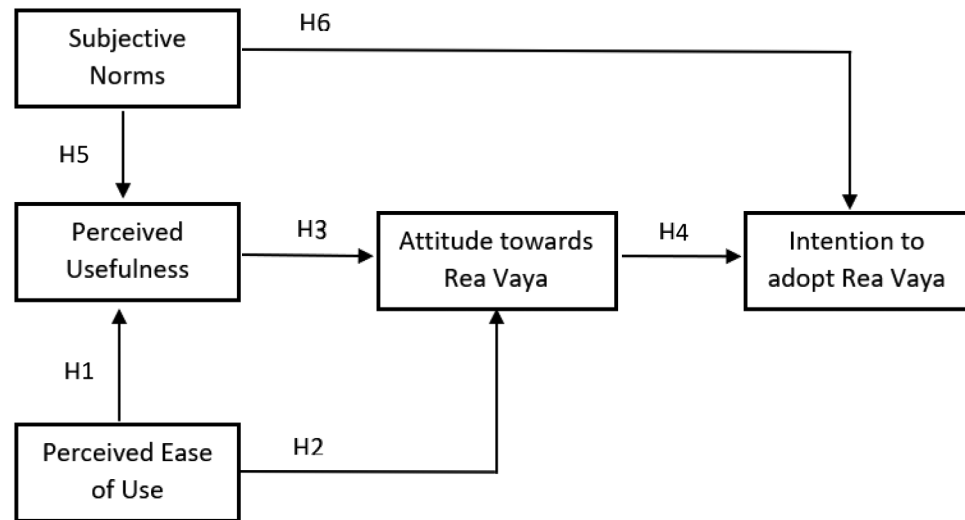
Based on the literature discussed above, a theoretical model has been developed to test and explain the hypothesised relationships for this study. Figure 1 presents the conceptual model, which is based on the extended TAM and shows the four constructs (perceived ease of use, perceived usefulness, attitude, and subjective norms) that predict consumer intention to adopt the Rea Vaya.

3. Methodology

3.1. Research method and design

A positivist research paradigm was selected for this study as it aims to provide generalisations regarding the population under study. The positivist research paradigm warrants the adoption of quantitative research methods (Saunders et al., 2019). This study adopts quantitative tests and statistical analysis to test hypotheses and proposed relationships in the model of the study.

Figure 1. Conceptual model of the study.



3.2. Data collection

A self-administered questionnaire was used as an appropriate measurement instrument for data collection when conducting the research. The measurement instrument used in this study was developed by modifying valid measurement scales from previous studies of Shroff et al. (2011) and Maduku (2011). The measurement scales are categorised into attitude, perceived ease of use and perceived usefulness, subjective norms and intention to adopt. The measurement scales were adapted from research conducted by Shroff et al. (2011); Francis et al. (2004). The attitude construct consisted of six scale items, perceived ease of use and intention to adopt had eight items respectively, perceived usefulness and subjective norms each had five items. The responses were provided on an unlabelled five-point Likert scale, where 1 = strongly disagree and 5 = strongly agree.

The questionnaire introduced respondents to the study and was divided into three parts; screening questions were posed to determine whether or not the respondents were users of the Rea Vaya and to determine their transport usage patterns. Respondents who indicated that they were not users of the Rea Vaya were instructed to continue completing the questionnaire. Section A included demographic questions; measured using nominal and ordinal scales. Section B of the questionnaire measured various constructs used in the study, namely attitude, perceived ease of use, perceived usefulness and intention to adopt, which were measured on the five-point Likert scale.

3.3. Sampling

Non-probability convenience sampling was used to select the respondents. The respondents were selected from various locations in Johannesburg, South Africa, Johannesburg’s central business district, Parktown, Soweto and Auckland Park. The Rea Vaya operates in these locations. The questionnaires were used to collect data from consumers who either use various forms of public transport, not including the Rea Vaya or use private transportation.

When determining a sample size, Aaker et al. (2013) suggest that a sample should be large enough for each group of respondents to have a minimum sample size of 100. The selected sample size for the study was 250 respondents; 227 usable questionnaires were included in the study. The recommended sample size ranges between 200 and 500 for multiple constructs such as those presented in this study (Hair et al., 2010; Luedtke et al., 2019).

3.4. Data analysis

The data collected for this study were cleaned, edited and analysed using multivariate statistical analyses on SPSS (Version 24). The statistical analysis procedure included descriptive statistics, data inspection for frequency distribution and examination of the questionnaire items for skewness and kurtosis to establish the normal distribution of data. Reliability testing, confirmatory factor analysis (CFA) and structural equation modelling (SEM) were conducted using AMOS (Version 24). The reliability of the measurement instrument was assessed using the Cronbach's Alpha test, while CFA and SEM were conducted respectively to examine the fitness of the model and test the hypothesised relationships between the constructs in the study.

4. Results

4.1. Demographic profile of respondents and transport usage patterns

The gender demographic profile of respondents was 53.3% and 46.7% for females and males, respectively. Also, the average age of 24 accounted for 62.6% of respondents. The employment status of respondents for full-time students and full-time workers was at 37.9% each i.e. evenly distributed. The educational qualification of respondents indicated 47.7% and 40.1% for undergraduate and Grade 12 certificate holders, respectively. Table 1 presents the transport usage patterns of the respondents. The frequency of transport mode can be categorised into public and private transport, with public transport accounting for 57.4%. This indicates a reliance on public transport, which could be attributed to economic cost and the socio-economic status of the transport users. The frequency of respondents on the purpose of transportation is educational and work accounting for 87.2%.

4.2. Reliability and validity of the measurement model

A CFA was conducted to determine the reliability and overall fitness of the model. The five constructs of the conceptual model were confirmed in the measurement model and the results are presented in Table 2, which indicates that the reliability and convergent validity were realised. Table 3 presents the discriminant validity, where the bolded values (the square root of the AVE) are required to be higher than the correlation values presented (Fornell & Larcker, 1981). The results presented in the tables indicate that the study met the criteria for reliability and validity.

Once the CFA was performed, SEM was conducted to test the measurement model. The model-fit indices indicated an acceptable fit, which is supported by the following data: normed chi-square ($\chi^2/df = 3.216$), the Tucker Lewis index ($TLI = 0.815$), the Comparative Fit index ($CFI = 0.830$) and the

Table 1. Transport usage patterns

Items	Description	Frequency	Percentage
Q1 What forms of transport do you most frequently use?	Taxi	90	34.9%
	Bus	42	16.3%
	Metro rail train	1	0.4%
	Gautrain	15	5.8%
	Private car	100	38.8%
	Other (not specified)	10	3.8%
	Total	258	100%
Q2 What do you mainly use these forms of transport for?	Travelling to work and back	106	46.7%
	Travelling to school and back	92	40.5%
	Other (not specified)	29	12.7%
	Total	227	100%

Table 2. CFA—Factor loadings, AVE, CR and Cronbach’s Alpha

Constructs/ Items	Factor loadings	AVE	CR	Cronbach’s α
Perceived usefulness (PU)				
I believe the Rea Vaya would be useful for my travel to work/school	0.799	0.616	0.887	0.922
I believe my travel to work/school would be faster when using Rea Vaya	0.769			
I believe my travel to work/school would be faster when using Rea Vaya	0.883			
I believe that using the Rea Vaya would improve my travel to work/school	0.875			
Using the Rea Vaya would save me time when travelling to work/school	0.553			
Perceived ease of use (PEU)				
It would be easy to use the Rea Vaya for my travels	0.688	0.512	0.880	0.785
I think the payment system of the Rea Vaya would be easy to understand	0.713			
It would be easy for me to get to the Rea Vaya station from home	0.729			
It would be easy for me to get to the Rea Vaya station from work/school	0.651			
It would take me a long time to reach the Rea Vaya station from home	0.746			
It would take me a long time to reach the Rea Vaya station from work/school	0.787			
It would be easy for me to learn how to use the Rea Vaya	0.687			

(Continued)

Constructs/ Items	Factor loadings	AVE	CR	Cronbach's α
Attitude (ATT)				
I believe using the Rea Vaya is a good idea	0.749	0.581	0.892	0.905
I have positive feelings towards using the Rea Vaya	0.790			
I prefer to use the Rea Vaya to travel	0.683			
I like the idea of travelling in the Rea Vaya	0.773			
I feel safe when travelling in the Rea Vaya	0.776			
I think using the Rea Vaya is worthwhile	0.797			
Social norms (SN)				
Most people who are important to me use the Rea Vaya	0.745	0.588	0.877	0.858
Most people who are important to me think I should use the Rea Vaya	0.735			
In general, I have been told by people I know that the Rea Vaya is reliable	0.781			
In general, I have been told by people I know that the Rea Vaya is safe	0.793			
In general, I have been told by people I know that the Rea Vaya is affordable	0.780			

(Continued)

Table 2. (Continued)

Constructs/ Items	Factor loadings	AVE	CR	Cronbach's α
Intention to Adopt (ITA)				
I intend to use the Rea Vaya	0.748	0.574	0.914	0.932
I will use the Rea Vaya more often	0.808			
I will recommend the Rea Vaya to my friends	0.849			
I will recommend the Rea Vaya to my family	0.825			
I would prefer to use the Rea Vaya rather than a taxi	0.767			
I would prefer to use the Rea Vaya rather than a bus	0.765			
I would prefer to use the Rea Vaya rather than a train	0.607			
I would prefer to use the Rea Vaya rather than a car	0,659			

Table 3. Component correlation matrix (discriminant validity)

	PU	PEU	ATT	SN	ITA
PU	0.785				
PEU	0.592	0.716			
ATT	0.606	0.607	0.762		
SN	0.478	0.513	0.544	0.767	
ITA	0.630	0.574	0.662	0.611	0.740

Table 4. Model fit summary of the structural equation model

Model-fit Indices	Result
CMIN/DF	2.583
CFI (comparative fit index)	0,880
TLI	0.868
RMSEA	0.083

Root Mean Square Error of Approximation (RMSEA = 0.098). These indices were within the limits recommended by Schermelleh-Engel et al. (2003).

4.3. Hypothesis testing of the structural model

SEM was conducted to determine the goodness-of-fit of the structural model. Table 4 presents the model-fit indices, which indicate acceptable model fit estimates as suggested by Schermelleh-Engel et al. (2003). Following this, the structural model of the study was assessed to validate the proposed hypotheses (H1–H6). The conceptual model (see, Figure 1) was assessed using SEM and

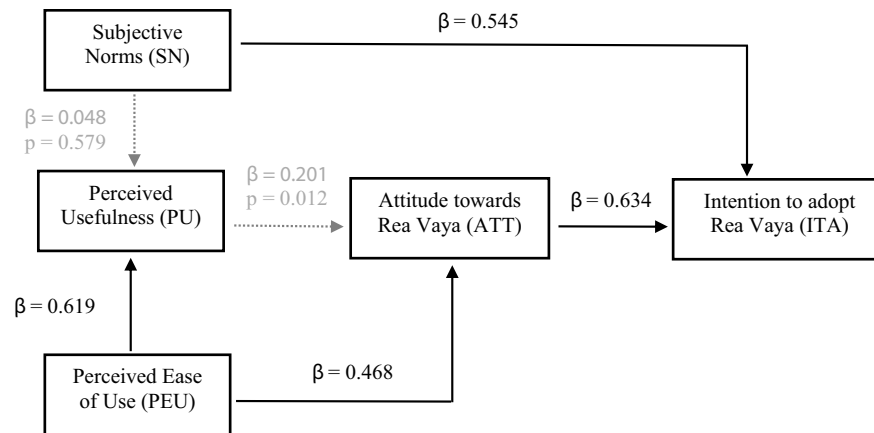
Table 5. Path coefficients

Hypotheses Testing and model fit results

Hypotheses	Paths	Direct path estimates (β)	Probability value (p)	S.E.	C.R.	Hypothesis result ($p < 0.05$)
H1	PEU→PU	0.619	0.000	0.096	6.437	Accepted
H2	PEU→ATT	0.468	0.000	0.085	5.476	Accepted
H3	PU→ATT	0.201	0.012	0.080	2.510	Rejected
H4	ATT→ITA	0.634	0.000	0.100	6.348	Accepted
H5	SN→PU	0.048	0.579	0.087	0.555	Rejected
H6	SN→ITA	0.545	0.000	0.104	5.247	Accepted

Figure 2. Structural model.

Note(s): Solid black lines indicate significant paths ($p = 0.000$); dotted grey lines indicate a non-significant path ($p < 0.01$)



included the assessment of path estimates through observing standardised beta (β) coefficients and p-values (p). A significance level of 5% is required of the path estimates to deem the hypotheses acceptable. The results of the analysis are provided in Table 5.

Table 5 and Figure 2 presents the results of the relationships between perceived ease of use, perceived usefulness, attitudes, subjective norms and intention to adopt. Besides H3 and H5, which were rejected, the results show that H1, H2, H4 and H6 can be accepted. The results also indicate that attitude is the largest predictor of intention to adopt the Rea Vaya ($\beta = 0.634$) and perceived ease of use is the largest predictor of perceived usefulness ($\beta = 0.619$).

5. Discussion

From the six hypothesis developed for this study, four were accepted. Firstly, for H1, a direct and significant relationship was predicted between perceived ease of use and perceived usefulness. The results provided in Table 5 indicate that the relationship between these constructs is statistically significant ($\beta = 0.619$, $p = 0.000$). This finding is consistent with previous studies of Gefen et al. (2003) and Rauniar et al. (2014), which established that perceived ease of use directly influences perceived usefulness. In relation to this study, these findings show that if consumers who do not use the Rea Vaya perceive it to be convenient and easy to use, they may find the transport system useful for their travels. The findings here are supported by the viewpoint that many people do not understand the advantages of the Rea Vaya as these are not clearly communicated. This will then influence their view on the usefulness of the system (Khumalo & Ogra, 2018).

Secondly, the results indicate that there is a direct and significant relationship between consumer perceived ease of use and attitude towards the Rea Vaya ($\beta = 0.468$, $p = 0.000$), thus supporting H2. This finding is corroborated by Ahmed et al. (2020) and Feng et al. (2019) who found that perceived ease of use has a direct and significant influence on attitude and suggest that it builds a favourable attitude towards a technology system. It is noteworthy that perceived ease of use is the largest predictor of attitude towards the Rea Vaya. In relation to this study, it can be inferred that if consumers who do not use the Rea Vaya find it easy to use and useful for their travels, they will develop a positive attitude towards the transport system.

Third, it was hypothesised that there is a direct and significant relationship between consumer attitude and intention to use the Rea Vaya. This hypothesis (H4) was supported ($\beta = 0.634$, $p = 0.000$), indicating a direct and significant relationship between attitude and intention to adopt the Rea Vaya. The importance of attitude as the main determinant of behavioural attributes in the form of intention and choices has been reported by Yeo et al. (2017) and Ahmed et al. (2020). In the case of technology adoption and acceptance, the positive relationship attributed to

consumer attitude and willingness to use the Rea Vaya confirms that it is necessary to develop positive attitude in consumers before they intend to use the system.

The final hypothesis accepted (H6) confirmed that there is a direct and significant relationship between subjective norms and intention to adopt the Rea Vaya ($\beta = 0.545$, $p = 0.000$). The results are confirmed by the studies of Huang et al. (2020) and Bansal et al. (2016). Based on these findings, it can therefore be inferred that friends and family of consumers who do not use the Rea Vaya can influence consumers' intention to use the smart transport system.

The two hypothesis that were rejected based on the findings of the study deal with perceived usefulness, attitudes and subjective norms of non-users. H3 posited that perceived usefulness has a significant relationship with attitude. Although many previous studies have found a significant relationship between these two constructs such as Feng et al. (2019), the findings in this study could be attributed to that perceived usefulness of the Rea Vaya is negated due to the sample. The majority of respondents in this study use their own private car (38.8%) or a taxi (34.9%) which could be seen as more useful as these modes of transportation will take the consumer directly to their destination. As Cheah et al. (2022) state, the usefulness of transportation to directly take the passenger to their final destination will positively impact attitudes. For this reason, the Rea Vaya may not be seen as useful and therefore no positive attitude could be formed regarding this type of technology. The study also did not find a relationship between subjective norms and perceived usefulness (H5). This finding could be attributed to others finding alternative transportation methods such as a private car and taxis as more useful. Therefore others may not share positive word of mouth about the Rea Vaya which may influenced the perceived usefulness of the system. Belanche et al. (2019) also suggest that recent studies have found subjective norms to be multi-dimensional in nature. This multi dimensionality was not tested for in this study which could provide reasons for the results.

6. Recommendations

Based on the findings of the study, the following recommendations are provided:

- It has been reported that the Rea Vaya brand is not well understood by consumers (Khumalo & Ogra, 2018). As the city of Johannesburg transitions towards being a smart city and transforming the public transport system through smart transportation, it is important for the Rea Vaya to position its brand in line with the city's objectives. Therefore, the first recommendation made is that the Rea Vaya marketing team should seek the services of an external organisation that specialises in marketing and marketing strategy to develop the brand and brand image of the smart transport service. This external organisation will assist the Rea Vaya in developing a marketing strategy that includes re-positioning the brand as a smart transport system and developing campaigns that will increase the awareness and equity of the brand. This includes updating their website and online platforms and marketing material such as branded schedules of the Rea Vaya services, which include routes, key stops and user-related information. Further recommendations regarding focused marketing campaigns have been provided below. Having a clear marketing strategy will assist the organisation to focus its efforts on creating opportunities to increase their low usage rates and increase consumer adoption of the smart transport system.

The findings indicated that attitude was the largest predictor of intention to adopt the Rea Vaya, followed by subjective norms. In relation to attitude, the findings also indicated that perceived ease of use positively influenced attitude. It is important that the Rea Vaya marketing manager focuses on marketing initiatives that will encourage the use and adoption of the Rea Vaya by consumers who are currently not using the transport system. Rea Vaya marketing should embark on campaigns that will focus on the ease of using the Rea Vaya and building positive attitudes towards the smart transport system.

- It is therefore recommended that a "Rea Vaya Stories" campaign be initiated on radio and social media. The campaign will aim to also influence consumers who do not use the Rea Vaya as they will be seeing and hearing about the Rea Vaya from their friends or family. This is a campaign in which

popular radio stations in Johannesburg will be used; the consumers who use the Rea Vaya will be encouraged to share their positive stories about using the Rea Vaya, highlighting what they like about the system. Likewise, on Facebook, Rea Vaya users will be encouraged to share their positive stories by posting and tagging (mentioning) Rea Vaya, which has a Facebook page, but mainly containing negative reviews. People who share their positive Rea Vaya stories will stand a chance to win a prize at the end of the campaign, sponsored by the City of Johannesburg municipality and Rea Vaya. The results indicated that a large number of the respondents (62%) were aged between 20 and 28 years, therefore radio stations targeting this age segment will be selected. Statista (2021) reported that the largest users of Facebook by age group were 25 to 34 years (33%) followed by 18 to 24 years (25%), therefore, this social media platform would be ideal for Rea Vaya to use for the campaign to reach a large audience.

- The respondents indicated disagreement with statements that measured perceived ease of use of the Rea Vaya. Khumalo and Ogra (2018) noted that consumers hold negative perceptions regarding the Rea Vaya, which affects their attitude towards it. With the Rea Vaya being a technology-based transport system, consumers who do not use it may perceive it to be difficult to use. It is therefore recommended that Rea Vaya embark on a marketing campaign to promote the Rea Vaya and how it works, to develop better understanding of the transport system for consumers who are not using it. A public relations campaign can be used, where a representative of the Rea Vaya can speak on major radio stations (such as Metro FM and Kaya FM) about the Rea Vaya, where it operates, how it works and the benefits that it provides for consumers. Activations around the areas in which the Rea Vaya operates should be implemented where promoters will be placed to encourage consumers to use the Rea Vaya and have giveaways of novelties and complimentary trips to induce trial. The campaign aims to change the negative perceptions towards the Rea Vaya and encourage its use and adoption, which would lead to increased usage rates of the smart transport system.

7. Conclusion, limitations and future research

The objective of this study was to investigate the factors that determine intention to adopt the Rea Vaya; a smart transport system, by consumers who currently do not use the transport system. Using the extended TAM, the results indicate that it is possible to determine the factors that influence intention to use the Rea Vaya (perceived ease of use, perceived usefulness, attitude and subjective norms). The study confirms the results of previous research by various scholars Bansal et al. (2016), Ahmed et al. (2020) and Yeo et al. (2017) who found that it is possible to predict the determinants of user intention to adoption in various settings. The results of the study have practical and theoretical contributions. Practically, as Johannesburg and other African countries transition towards being smart cities, this study will assist marketing managers of the Rea Vaya and other BRT systems being implemented in various countries, particularly those in emerging markets. A clear marketing strategy and marketing programmes will assist in encouraging the adoption of BRT services being implemented in order to realise the financial benefits for the organisation and sustainability goals of the city. Academically, from a marketing and consumer behaviour perspective, there is limited research regarding the Rea Vaya and other BRT systems. This study has shown the importance of consumer behaviour theory in understating and influencing the future actions of consumers. This theory has been predominantly applied in fields such as banking, e-commerce, education, health and transportation, however, not focusing on the adoption of public transport. Therefore, this study will make a significant contribution to public transport research and public transport marketing research.

The limitations of this study were that it was conducted in a single geographical location, Johannesburg, South Africa, even though the BRT has been implemented in other South African cities like Cape Town and Pretoria. A convenience sampling method was used meaning that consequentially, the results of the study cannot be generalised. Future research could therefore be conducted in the other South African cities as well as in other countries where the BRT has been implemented and is facing similar challenges to determine whether similar results will be realised. Furthermore, future studies regarding the actual adoption of a smart transport system such as the BRT should consider including the behavioural reasoning theory, which takes into account the

reasons for and reasons against the consumers' actions. Lastly, a qualitative study using focus groups and in-depth interviews could be conducted to gain deeper insights into the reasons consumers do not use the Rea Vaya.

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