

**-RESEARCH ARTICLE**

**MOTORISTS ATTITUDES TOWARDS IMPLEMENTATION OF E-TOLLS IN GAUTENG PROVINCE, SOUTH AFRICA**

**K Mosala**

Vaal University of Technology, South Africa

E-mail: klamosala@gmail.com

Orcid ID: <https://orcid.org/0000-0002-3924-565X>

**Dr E Chinomona**

Vaal University of Technology, South Africa

E-mail: elizabethc@vut.ac.za

Orcid ID: <https://orcid.org/0000-0003-3334-8268>

**—Abstract —**

Transport plays a crucial role in the growth of South Africa. Transportation is responsible for the movement of goods and services as well as people from one point to the other, however, for an effective transport system, there should be good road infrastructure or a good road system to connect all places around the country effectively. This article focuses on the e-toll roads in the Gauteng area. The article aims to determine the attitudes of motorists towards implementation of e-tolls in Gauteng Province. This article considers the following variables, namely e-toll charges, attitude towards e-tolling, e-toll compliance, consumer trust of e-tolls and e-toll use continuation. A quantitative approach was adopted in which a survey questionnaire was used to collect data from 350 road users in the Gauteng Province. Data were analysed with the aid of two software packages, namely the Statistical Package for the Social Sciences (SPSS), version 24.0, and the Analysis of Moment Structures (AMOS), version 24.0. The results of this article provide useful information on the funding of the roads in Gauteng Province of South

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Africa. This article also contributes to the limited body of literature on e-tolls; government or policy makers could benefit from the information in this article regarding e-toll charges, attitude towards e-tolling, e-toll compliance, consumer trust of e-tolls and e-toll use continuation.

**Key Words:** *E-toll charges, Attitude towards e-tolling, E-toll compliance, Consumer trust of e-tolls, E-toll use continuation*

**JEL Classification: L1**

## 1. INTRODUCTION

Transport plays an important role in any country's economy as it is responsible for moving all goods and services from point of origin to point of consumption or respective destinations. Kekana (2006) argues that there are several modes of transport, but road transportation is the largest and fastest growing. This is confirmed by Tseng, Lin and Chien (2013) who indicate that road usage increases all the time. Automobile traffic is increasing and travel time is lengthened, leading to congestion and time wasted on roads (Kekana 2006). Peters (2014) states that for a country to realise its economic potential fully, necessary infrastructure such as better roads are required. Kekana (2006) opines that road transport is fast growing and it poses a need for improved roads that can handle high volumes of traffic. Chi and Waugaman (2010) describe non-tolled roads as congested, of lower quality and with too few lanes to drive on. Non-tolled roads are roads that can be used by any individual at no fee charged for the part used/ consumed or rather, at no additional cost. Non-tolled roads often are financed through fuel taxes and vehicle registrations. But with high government standards and increased fuel-efficient cars, fuel taxes are no longer providing enough funds to maintain and develop new roads (Chi & Waugaman, 2010). According to Brits (2010), fuel taxes are inadequate to finance roads. Income from fuel taxes must be combined with other state revenues and should be used according to priorities. Poverty, health and education are more prioritised than road infrastructure, resulting in only approximately 33 percent of the South African fuel taxes being allocated to roads (Brits 2010). Swan and Belzer (2010) argued that replacing fuel taxes with road charges based on road usage and the type of vehicle rather than the type of fuel used, is the solution to insufficient funds for maintaining and developing roads. This was an indication that South African National Roads Agency (SANRAL) was to proceed on its mission of providing and maintaining good roads as cost-effectively as possible (Brits, 2010).

A public outcry of e-tolls, the Opposition to Urban Tolling Alliance (OUTA), which is an organisation opposing e-tolls in Gauteng, is based on the facts that they labelled the e-tolls as irrational, unreasonable and not planned in the best interest of the public (Duvenage, 2013). John Moodey, the Democratic Alliance (DA) political group Gauteng provincial leader, argues that the DA has declared e-tolls as an enemy of the people and they will remove the e-tolls once they win the municipal votes and take over the cities of Tshwane and Johannesburg in Gauteng province (Smith, 2016).

## **2. PROBLEM STATEMENT**

The South African Government is experiencing difficulties with the collection of funds to maintain and build new roads (Duvenage, 2013; Smith, 2016). The money obtained from authorities and from other taxes is used for other important programmes, thus a user charge was introduced on some roads to obtain extra funds for maintaining and building new roads (Kekana, 2008). James and Anne (2010) describe e-tolls as a faster way of getting enough funds to build a new road or to keep roads maintained whilst reducing congestion on the roads. Although the e-toll system may collect funds faster, the public should be consulted beforehand and needs to agree on the implementation thereof and accept the e-tolls. Jakobsson, Fujii and Gärling (2000) argue that some people have a negative attitude towards e-tolls because they believe that e-tolls infringe on their freedom. Road charges are causing people to travel less or to make use of public transport because they cannot afford to pay, which is infringing on the freedom of movement of people. This paper will help understand the attitudes or the frustration of motorists driving through e-tolls, while at the same time helping to understand why the government implemented the e-tolls. This study is of great importance as it will bring light to the origin of e-tolls and make government officials aware of the motorists' attitudes and the voters' relationship that might be jeopardised.

### **3.2. E-toll charges**

E-toll charges may be referred to as road user charges or congestion pricing as the road users are being charged to use the road (Odeck & Kjerkreit, 2010). Congestion pricing is a way of reducing the number of vehicles on the roads, because some motorists will start avoiding the roads where they pay and use ones on which they do not pay. Pricing of e-tolls decreases the time wasted on congested roads and the uncertainty of delays on the road. It also reduces the waste associated with traffic congestion such as carbon dioxide (Decorla-Souza & Whitehead, 2003). The more vehicles are congested on a highway the greater the

volumes of gasses released into the atmosphere and the environment. The price of e-tolls plays an important role in the acceptance of tolls by the public. It is well known that e-tolls were implemented to maintain roads and build new ones, but at the same time, they have to be affordable and accommodate people with a lower income (Peters, 2014). It is very important for the government to be transparent and honest when setting a charge for the e-tolls as this will assist the government gain the trust of motorists. If e-toll charges are not transparent, motorists may view the secrecy of charges as being unfair to them and, as a result, it will make motorists start being against road user charges. Therefore, it is best to know when to disclose information about charges and what to disclose, in that way motorists will have less negative attitude and have more trust on the charging system, ultimately complying with the e-toll system (Ferguson & Ellen, 2013).

***H<sub>1</sub>***: E-toll charges have a significant influence on the attitude towards e-tolls.

### **3.3. Attitude towards e-tolls**

The e-toll system is used to earn funds faster than fuel taxes or vehicle registration levies for building new roads and maintaining existing roads. The safety of roads is increased as the roads are in good condition, less vehicles are travelling on the roads, while the time spent on roads is also decreased (Odeck & Kjerkreit, 2010). As new motor vehicles are being produced to be more fuel efficient and emit less carbon, the overall income on fuel sales was reduced. That, together with the need for an improved road system, motivated the government to introduce an e-toll system (Velaga & Pangbourne, 2014). According to Di Ciommo, Monzón and Fernandez-Heredia (2013), the income level of different motorists has an influence on the attitude towards e-tolls. The result was that Cyril Ramaphosa assigned a team to research on the concerns of the public, which resulted in the financial burden of low income people being only 0.4 percent, as 98 percent of the users of e-tolled roads are middle and higher income earners (Harvey & Mona, 2015). The willingness of motorists to comply with e-toll policies depends on their attitudes towards e-tolls, meaning that once motorists have a positive attitude towards e-tolls they will comply with the e-toll policies (Van Damme & Pauwels, 2016).

***H<sub>2</sub>***: Attitude towards e-tolls has a significant influence on the e-toll compliance.

***H<sub>3</sub>***: Attitude towards e-tolls has a significant influence on the consumer trust of e-tolls.

### **3.4. E-toll compliance**

Edwards and Wolfe (2004) define compliance as a term that includes concepts of obedience, governability, non-resistance and submission, meaning that if road motorists are non-resistant and submissive to the e-toll policies, they will continue supporting the e-toll policies and be committed. According to Jimenez and Lyer (2016), where there is compliance, there is trust. This simply means that motorists trust the e-toll policy and they see the benefits of it thus, they are complying with the policies, resulting in the continuing use of the e-toll and being committed to complying with the e-toll policy. Motorists may see e-tolls as infringing on their freedom of movement, as they will have to minimise their movement and select certain roads to travel, restricting them to the roads they can use. The level of information received by the public before the implementation of e-tolls has an influence on the acceptability of e-tolls (Odeck & Kjekreit, 2010). In a number of studies using information from the World Values Survey (WVS), Torgler (2003a, 2004) found that trust in government is positively related to individuals' willingness to comply with tax laws in various countries. Other studies have confirmed a positive relationship between trust in government and compliance in various countries (Jimenez & Lyer, 2016).

*H<sub>4</sub>*: E-toll trust has a significant influence on e-toll compliance.

*H<sub>5</sub>*: E-toll compliance has a significant influence on e-toll use continuation.

### **3.5. Consumer trust of e-toll**

Lack of support for tolls could be due to the lack of trust in government, mainly associated with the fact that road users have no information on the implementation of e-tolls or how the government resources are spent, which leads them to believe that government funds are misused (Yusuf, O'Connell & Anuar, 2013). Schmöcker, Pettersson and Fujii (2012) state that trust in government is a crucial factor to the public as it is an important determinant of toll acceptability. The public needs to have some trust in the government that the e-tolls are there to benefit the environment and the society as a whole and not just the government. This will encourage e-toll compliance among the motorists. Velaga and Pangbourne (2014) further state that the system security holds confidential information about motorists; therefore, user privacy should be prioritised. According to Schade and Baum (2006), there is enough evidence that e-tolls are implemented against the choice of the majority of the voters and motorists. In addition, the voters or motorists do not have control or a say over the planning and

decision making of the implementation of e-tolls. One of the most important determinants of acceptability of road charges is trust in the government.

*H<sub>6</sub>*: Consumer trust of e-tolls has a significant influence on the e-toll use continuation.

#### **4. METHODOLOGY AND DATA ANALYSIS**

The article used a non-probability convenience sampling technique to select respondents. A confirmatory factor analysis was applied in examining and testing the relationships between observed constructs and their causal latent constructs while structural equation modelling (SEM) was used to test the hypothesised relationships between constructs.

**Table 1: Accuracy analysis statistics**

Research constructs		Descriptive statistics		Cronbach's test		C.R. value	AVE value	Factor loading
		Mean	SD	Item-total	$\alpha$ Value			
E-Toll Charges (ETS)	ETS1	4.163	5.420	0.790	0.910	0.909	0.788	0.829
	ETS2			0.867				0.904
	ETS3			0.587				0.587
	ETS4			0.792				0.842
	ETS5			0.839				0.930
Attitude Towards E-Tolling (ATE)	ATE1	3.778	4.149	0.500	0.713	0.713	0.609	0.954
	ATE2			0.517				0.942
	ATE3			0.551				0.556
	ATE4			0.520				0.509
	ATE5			0.500				0.501
E-Toll Compliance (ETC)	ETC3	3.211	3.377	0.511	0.654	0.654	0.503	0.654
	ETC4			0.613				0.679
	ETC5			0.500				0.555
Consumer Trust of E-Tolls (CTE)	CTE1	2.900	4.879	0.597	0.854	0.853	0.708	0.606
	CTE2			0.606				0.671
	CTE3			0.725				0.838
	CTE4			0.775				0.894
	CTE5			0.636				0.674
E-Tolls Use Continuation (EC)	EC1	3.976	5.802	0.503	0.719	0.719	0.611	0.504
	EC2			0.501				0.500
	EC3			0.579				0.700
	EC4			0.603				0.744
	EC5			0.519				0.593

A high level of Cronbach’s alpha coefficient depicts a higher reliability of the scale. For a set of items to be considered, a minimum of 0.6 for Cronbach’s alpha should be accepted. The Cronbach alpha values of the research constructs ranged from 0.65 to 0.91. The lowest value is 0.65, which is acceptable, followed by 0.71 with a good internal consistency; the highest Cronbach alpha of this article has a value of 0.91, which gives excellent internal reliability. The Cronbach alpha coefficient values are well above the recommended level of 0.7; therefore, this indicates a higher degree of internal consistency. Item-to-total correlation and factor loadings were assessed using SPSS. For consistency in assessing the items, factor loadings should be greater than 0.5 (Fornell & Larcker, 1981). As seen in Table 1, the factor loadings of all the measurement items are within the range of 0.5 to 0.9, with the highest value of 0.954 for ATE1 and the lowest value of 0.500 for EC2. All the items are greater than 0.5. Moreover, in this paper, item-to-total was used to assess convergent validity. Table 1 depicts that the item total values ranged from 0.500 to 0.954; these values are all above the recommended threshold of 0.5. Discriminant validity refers to the extent to which a measure is distinct from other measures. Discriminant validity was assessed in this article with the purpose of having confidence in the research results.

**Table 2: Correlations between constructs**

Research Construct	Construct correlation				EC
	ETS	ATE	ETC	CTE	
<b>ETS</b>	1.000				
<b>ATE</b>	0.660**	1.000			
<b>ETC</b>	0.553**	0.580**	1.000		
<b>CTE</b>	0.599**	0.492	0.605**	1.000	
<b>EC</b>	0.465**	0.588**	0.590**	0.544**	1.000



The correlation between all the constructs is less than the standard threshold of 1.0. Therefore, these results confirm the existence of discriminant validity.

#### **4.1. Confirmatory factor analysis**

The degrees of freedom of the chi-square are 2.978, whereby the value should be between one and three, this means that a chi-square value of 2.978 in this article is acceptable and fits the model. Furthermore, Goodness of Fit Index (GFI) (0.901), Normed Fit Index (NFI) (0.904), Relative fit index (RFI) (0.923), Incremental Fit Index (IFI) (0.920), Tucker Lewis Index (TLI) (0.933), Comparative Fit Index (CFI) (0.900) and Adjusted Goodness-of-Fit Index (AGFI) (0.902) meet the recommended threshold of 0.9, which indicates a good model fit. Finally, Root Mean Square Error of Approximation (RMSEA) is 0.078, which is less than the minimum threshold of 0.08 (Hoe, 2008), this results in a good model fit. In totality, scrutinising these eight statistics, it can be concluded that all of them are acceptable and that the data fits the model accurately.

#### **4.2. Structural equation modelling (SEM)**

The chi-square value of 2.990, which is below the recommended threshold of three (Hinterhuber & Liozu 2013), as a result this suggests an acceptable model fit. Furthermore, GFI (0.900), NFI (0.905), RFI (0.907), IFI (0.918), TLI (0.914). However, CFI (0.893) and AGFI (0.867) are close to the normal standard of 0.9. The CFI value of 0.893 and AGFI value of 0.867 are acceptable and fit the model accurately. All results are above the recommended value of 0.9, which means a satisfactory model fit. The value of RMSEA is 0.079, which is below the required threshold of 0.08, thus confirming an acceptable fit of the data to the model. In entirety, examining these nine goodness-of-fit statistics, it can be concluded that all of them are acceptable and that the data fits the model.

#### **4.3. Hypotheses testing**

This section discusses the six hypotheses by addressing their validity or acceptance through SEM.

**Table 3: Results of hypotheses testing (path modelling)**

Proposed hypothesis relationship	Hypothesis	Path coefficient estimates	P-value	Decision
ETP→ATE	H1	0.308	***	Accepted
ATE→ ETC	H2	0.455	***	Accepted
ATE →CTE	H3	0.390	***	Accepted
CTE →ETC	H4	0.501	***	Accepted
ETC→ EC	H5	0.206	***	Accepted
CTE→ EC	H6	0.301	***	Accepted

The levels of the coefficients of all the six hypotheses are significant at a level of  $p < 0.01$ . Significance levels of  $p < 0.05$ ,  $p < 0.01$  and  $p < 0.01$  are indicators of positive, strong and significant relationships between the research constructs. Based on that, all of the six hypotheses proposed in this article were supported and accepted.

## 5. DISCUSSION OF RESULTS

**Hypothesis 1**, stated that there is a positive and significant relationship between e-toll charges and the attitude towards e-tolls. This means that a decrease in the price of e-tolls may have resulted in a better and good attitude towards e-tolls. The article supported and accepted the stated hypothesis (H1). This is due to the fact that a moderate and positive significant relationship was observed between e-toll charges and the attitude towards e-tolls ( $r = 0.308$ ;  $p < 0.01$ ). **Hypothesis 2**, stated that there is a positive and significant relationship between attitude towards e-tolls and e-toll compliance. Table 3 revealed that H2 was found to be supported and acceptable ( $r = 0.455$ ;  $p < 0.01$ ). This finding illustrates that attitude towards e-tolls has great influence on e-toll compliance. **Hypothesis 3**, which pertains to attitude towards e-tolls, has a significant influence on the consumer trust of e-tolls information. This hypothesis was supported and accepted. This decision is based on the fact that there are strong and positive associations established between the two constructs ( $r = 0.390$ ;  $p < 0.01$ ). **Hypothesis 4**, there is a positive and

significant correlation between consumer trust of e-tolls and e-toll compliance ( $r = 0.501$ ;  $p < 0.01$ ). These findings are further validated by a number of studies using information from the World Values Survey. Torgler (2003a, 2004) found that trust in government is positively related to individuals' willingness to comply with laws in various countries. **Hypothesis 5**, stated that there is a positive and significant relationship between e-toll compliance and e-toll use continuation. Table 3 revealed that H5 was found to be supported and acceptable ( $r = 0.206$ ;  $p < 0.01$ ). **Hypothesis 6**, consumer trust of e-tolls and e-toll use continuation has been found to be positively and significantly correlated ( $r = 0.301$ ;  $p < 0.01$ ). This illustrates the fact that road users that trust the e-toll policy and see the benefits of it will comply with the policies, resulting in the continuation of use of the e-toll.

## **6. LIMITATIONS OF THE ARTICLE**

This article was restricted only to the motorists driving on the Gauteng Province roads with e-tolls; other provinces did not form part of this article. Even though the results were valid and reliable, other variables such as marital status, race and occupation, could be investigated. Furthermore, respondents were reluctant to fill in the questionnaire because they were not sure if this article was only for school use or for government use. Only after assuring them that it is strictly for academic use were they willing to participate. There was very little literature available as there are no or few studies about e-tolls in South Africa.

## **7. IMPLICATIONS FOR FUTURE RESEARCH**

Since this article was only focused on e-toll charges, attitudes towards e-tolls, trust, compliance and commitment in explaining the motorist's attitude towards e-tolls, future researchers may include other constructs such as information sharing, cost reduction methods and better communication between the road users and the government to obtain acceptance or positive attitude towards e-tolls. It has been confirmed that e-toll charge, trust, compliance and commitment are the main factors to achieve a positive attitude towards e-tolls. Therefore, future researchers should try to find methods in which motorists and the government can increase the level of trust, compliance, commitment and lower the e-toll charge.

## **8. RECOMMENDATIONS**

In order to improve e-tolls use continuation, government is encouraged to respect and consider the needs and ideas of the motorists. Motorists are more likely to commit to the e-toll system when their needs are considered.

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