

# Assessing Factors Affecting the Adoption of E-Government Services in Developing Countries for Transport Sector, amidst the Covid-19 Pandemic

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## Abstract

The study was looking at establishing factors that are affecting the adoption of electronic government services in the Developing Countries for Transport sector amidst the Covid-19 pandemic based on the Unified Theory of Acceptance and Use of Technology Model (UTAUT). The study first looked at the major challenges faced by the Zambian transport sector in the implementation of e-government services among the citizens. The study then proposed a model through a web-based e-commerce web portal that could be adopted to address the challenges identified in the study. The study was based on all registered motor vehicles. These were from the various transport sectors in Zambia's capital city, Lusaka. Both qualitative and quantitative data was collected from respondents using a structured questionnaire. The questionnaire was generated based on the UTAUT conceptual model. The response rate was 57% giving 141 questionnaire responses from the four transport providers. The Chi-Square test of independence was used to analyze the data using SPSS software. The results showed that interaction between trust in government and trust in the Internet has a significant effect on the utilisation of e-government services. The test had an observed P-Value of 0.05 against the Chi-Square value of 59.535. The results further showed that e-services control and effort expectancy had a significant impact on the actual utilisation of e-government services.

## Keywords

E-Government, Adoption, Trust, UTAUT Model, Transport Sector, Information & Communication Technology (ICT)

## 1. Introduction & Background

The era of Information and Communication Technology (ICT) has influenced behavior as well as raised a lot of expectations among citizens on how government should deliver public services [1]. The emergence of Information and Communications Technology (ICT) has created a serious transformation in the way governments interact with their citizenry as it places them at the center of government business. Electronic Government (E-government) has been defined in so many ways by different scholars and the meaning is also different for diverse people. The United Nations Department of Economic and Social Affairs (2006) defines e-government as the application of information and communications technology within public administration, to optimise its internal and external functions by providing government and the citizens with tools that transform the way interactions takes place, services are delivered and the way citizens participate in governance [2]. While e-government provides a different platform to citizens and governments on how to interact, it is imperative to take cognizance of the fact that we live in a digital world where information travels so fast. The web-based networks; internet and mobile computing have the ability to transform citizens, businesses, and other arms of Government [3].

It has been argued that for any country to achieve meaningful development there is a need to make advances in information and communications technology, as this will break barriers in communication and create a more conducive and faster way of communicating. Information and Communications Technology (ICT) which is comprised mainly of the Internet, cell phones, computers, video conferencing and social networking allows people to have access to accurate and authentic information in the quickest way possible. The change in the dissemination of information through digital platforms reduces the chances of citizens speculating on government policies as they are able to channel their concerns through various websites at a click of a button. Electronic Government (E-government) is a vital tool in enhancing citizens and government engagement electronically. A Government that is connected offers a more participative democracy, a well-aligned and integrated information flow, capacity building, and immediate feedback. E-government has been described as the connected governance which has various approaches through which it is achieved [4]. While e-government provides a different platform to citizens and governments on how to interact, it is imperative to take cognizance of the fact that we live in a digital world where information travels so fast. The web-based networks; Internet and mobile computing have the ability to transform citizens, businesses, and other arms of Government [2]. Generally, e-government has taken advantage of Information and Communications Technology and positioned it in such a way that it is able to bring government closer to the people through the provision of information in a more convenient way as well as improve service delivery. Broadly speaking e-government is one of the tools aimed at reforming the civil service to be more efficient and effective in-service delivery [5].

Governments world over have realized that in order to make meaningful development in their respective countries, e-government offers them an opportunity to interact with the citizens in a cost-effective manner. Doing business and following policy directions made by the government has been made easy because citizens are able to find the information, they need through various government websites. If utilized properly e-government has the potential to build trust between governments and its citizens as well as improve the government's image. At a global level according to the United Nations (UN's) E-Government survey (2018) Denmark, Australia, and the Republic of Korea came out top on the list of forty (40) countries scoring very high on an index, of the countries' use of Information and Communication Technology to deliver services to the public [6]. Although Africa has largely been labelled as a "Technological desert" due to lack of requisite infrastructure, literacy levels and, a diversity of cultural factors, the continent has in recent years significantly invested in the Information and Communication Technology infrastructure [7]. United Nations (UN's) E-Government survey (2018) [6], states that Mauritius is leading in Africa with a global rank of 66.

Sub-Saharan Africa is a geographical term that refers to the area in the African continent that is fully or partially located to the south of the Sahara. Geographically Sub-Saharan Africa covers an area of 24.3 million square meters whose e-government status is said to be barely registered on the E-government radar screen. However, there are few countries such as South Africa which are doing well with the provision of services to the public through Information and Communications Technology [8]. Zambia like most developing nations has devised strategies to implement e-government at a full scale (Weerakkody *et al.*, 2007) [9]. Despite putting in place policies to drive the whole process the UNPAN survey reports rated Zambia as "no online presence" meaning there is no specific national e-government website in Zambia [10]. In the recent past, the government of the Republic of Zambia has made tremendous strides in embracing the use of e-governance [11]. Among such initiatives include, the Zambia Integrated Land Management and Information System (ZILMIS), aimed at tackling land malpractice, the Zambia Integrated Agricultural Management Information System, and the Integrated Financial Management System (IFMS) to consolidate all government transactions from one central point. In the transport sector, an electronic Zambia Transport Information System (e-Zamtis) was launched and implemented at the Road Transport and Safety Agency (RTSA). The system was meant to carry out all RTSA function which includes motor vehicle registration, driver's license, road tax, and fitness payments. The services provided by RTSA are accessed by millions of Zambians who own vehicles. According to the Central Statistical Office (CSO) 2010 census, Zambia has a population of 13,092,666 and was projected at 18,074,829 in 2019 [12]. The Ministry of Transport and Communication in its 2019-2021 strategic plan outlined the vision for the Ministry by focusing on improving transport systems and infrastructure as well as enhancing Information & Communication Technology (ICT). The transport

sector in Zambia is divided into four. This includes road, railway, water, and air transport. The ministry of transport is responsible for over ten statutory bodies that oversee various functions of the ministry. Road transport which is our main area of study falls under the Road Transport and Safety Agency (RTSA) while railway transport falls under Zambia Railways Limited (ZRL) and air transport falls under Zambia Airports Corporation Limited (ZACL) [13].

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The Road Transport and Safety Agency (RTSA) has had difficulties in dealing with a large number of people accessing their products such as road tax, driver's license, and road fitness among others. The long queues before and after the Covid-19 pandemic have been a source of worry among motorists. Despite Zambia Launching its first-ever National Information and Communication Technology (ICT) Policy in 2006 by the late 3rd Republican President Levy Patrick Mwanawasa SC as well as an electronic Zambia Transport Information System (e-Zamtis), RTSA has had difficulties to enhancing accessibility and effective service delivery. As a result of the various challenges that the country was facing due to the Covid-19 pandemic, RTSA initiated the development and implementation of an online service portal via the Government Service Bus (GSB) as a pilot project to enable Zambian citizens to access government services electronically as well as reduce on the long queues during peak time [15]. It is against this background that the study embarks on assessing the factors affecting the adoption of e-government services in the transport sector amidst the Covid-19 pandemic in developing countries such as Zambia.

## 2. Literature Review

The functions of governments around the world are said to be huge and complex as a result of their many operations [16]. The use of Information and Communications Technology (ICT) has been seen as beneficial to those tasked to run the affairs of the nation on behalf of the citizens. While governments could be struggling with strategies and how to implement the use of e-government to enhance service delivery, it is important to note that the use of ICTs has the potential of improving efficiency and effectiveness in the internal administration within government as well as relocating government services from the offices and take it closer to the citizens [17]. Electronic Government (E-government) is

a vital tool in enhancing citizens and government engagement electronically. A Government that is connected offers a more participative democracy, a well-aligned and integrated information flow, capacity building, and immediate feedback. E-government has been described as the connected governance which has various approaches through which it is achieved [4]. Governments of various countries are trying to achieve a reasonable level of satisfaction in providing the highest quality of services to their citizens. In order to provide better services and retain the citizen's confidence, the government needs to understand how citizens perceive and evaluate the electronically offered services [18]. Public institutions are directly involved in the provision of services to the people. However, many services offered by the public institution are accessed physically, implying that the public or the people have to physically visit these institutions. The physical access to government services makes it difficult for clients to complete tasks in the quickest time possible. The implementation of e-government, therefore, makes accessibility of services much easier and quick [19]. In theory, the Zambian government is supposed to operate in a decentralised manner, with the delivery of services close to the people. However, in practice service delivery tends to be centralised to the national government. However, the implementation of e-government has the potential to circumvent inefficiencies in government [20].

### 2.1. Related Works and Gaps in the Literature

Based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model, a number of researchers have attempted to explain factors that influence technology acceptance or rejection. In their study titled the adoption of e-government in Kuwait, AlAwadhi and Morris conclude that performance expectancy, effort expectancy, peer influence, and facilitating conditions were significant in the adoption of e-government services in Kuwait. The study was general and not based on a specific sector [21]. Another related study, Logistics and Transportation Information System in Turkey was conducted whose main goal was to discuss the critical success factors of e-transport applications in Turkey, using the UTAUT model as a guide. According to the findings, the UTAUT factors of trust in government, trust in the internet, performance expectancy, and social influence all have a positive effect on behavioral intention to use e-government services. Daka and Phiri (2019) also contributed to the discussion with their study, Factors Influencing the Adoption of E-banking Services Using the UTAUT Model. According to the study's findings, performance expectancy, effort expectancy, facilitating conditions, and behavioral intention all have a significant impact on users' intentions to use e-banking services. Although this study focused on e-banking, the focus of our research is e-government in the transport sector. The study was only undertaken in Lusaka, Zambia despite e-banking in Zambia being widespread across the entire country [22].

The findings of Wang's (2009) study, Investigating E-Government Services

Uptake in Mauritius, using the UTAUT model, demonstrated that users' adoption of e-government services in Mauritius could be explained by the UTAUT constructs of performance expectancy, effort expectancy, social influence, and facilitating conditions [23]. Trust in the internet was also discovered to be a significant predictor. Gupta *et al.* (2008) used UTAUT to investigate the factors that lead to the adoption and use of ICT to improve G2E interactions in a government organization in a developing country. The authors used the UTAUT's four core constructs, but left out experience, age, and voluntariness as moderating variables, leaving only gender. The findings demonstrated that UTAUT is a valid model for understanding the adoption and successful use of ICT in developing-country government organizations. The study was limited only to users of e-government services and perceptions of non-users in regards to e-government services will have to be investigated [24].

Al-Awadhi and Morris (2009) applied a modified UTAUT model to e-government service adoption in Kuwait. They discovered that performance expectancy and EF influence use intention, while FC and use intention influence actual service use. In addition, they discovered that more internet experience increased the effect of performance expectancy on use intention in the short run [21]. Al-Shafi and Weerakkody (2009) added their contribution in their research entitled factors influencing the adoption of e-government in Qatar. They found that Expectancy performance and social influence encourage the intent to use e-government services and influence the actual use of the services. However, the gaps found in the study were that age, gender, and marital status were not factored [25].

Consistent with previous studies on e-government adoption (Alsaif, 2014; Chau and Hu, 2002), the findings show that effort expectancy is negatively related to behavioral intention for early adopters and to use behavior for experienced users [26] [27]. Furthermore, Alshehri *et al.* (2012) [28] and Al-Sobhi *et al.* (2011) discovered a non-significant relationship between social influence and the intention to use e-government. However, the results of our study are consistent with Hussein *et al.* (2010) on their research entitled investigating the impact of social norms on online tax filing services. The research finding showed that social influence did not affect the intent to use the online tax filing service [29]. Ashehri *et al.* (2012) [28] and Al Sobhi *et al.* (2011) in their study E-Government also found a slight correlation between social impact and the intent to use e-Government [26]. The findings of Gupta *et al.* (2016) entitled "Citizen Adoption of E-Government" show performance expectations, effort expectations, social impacts, promotion of conditions offered, promotion of available conditions, and government. With the introduction of e-government, trust in the internet and trust in government, are the main relevant factors [24]. AlLawadhi and Morris (2008) used a modified version of the UTAUT model to investigate the factors that determine the adoption of e-government services in the developing country of Kuwait. Their results show that performance expectations, ef-

fort expectations, and facilitation conditions have a significant impact on the acceptance of e-government services [21]. Alryalat *et al.* (2013) investigate the constructs of (UTAUT) as well as trust and security to study their influence on Jordanians' behavioral intention to use e-government systems. According to their findings, trust, perceived security, facilitating conditions, and social influence all have a positive and significant impact on behavioral intention to use the e-government system [30].

Voutinioti (2013) uses the UTAUT model in conjunction with trust to investigate citizens' behavior in the adoption and diffusion of e-government domains in Greece. According to their findings, the key drivers that influence the user's intention are performance expectancy, effort expectancy, trust of the government, trust of the internet, and social influence. In terms of e-government usage, their analysis indicates that "facilitating Conditions" explain a significant portion of usage behavior [31]. Meanwhile, Azam *et al.* (2013) developed an integrated study entitled factors influencing the adoption of e-government services in Pakistan. According to their findings, performance expectancy, social influence, and initial trust all have a positive influence on behavioral intentions to use e-government services [32]. Among other researchers, Thompsom *et al.* (2009) emphasized the importance of Trust on Government (TOG) and Trust on Internet (TOI) in the success of integrating e-Government into the government system [33].

## 2.2. Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified theory of acceptance and Use of Technology Model (UTAUT) is a Technology acceptance model which explains user intentions to use an information system and subsequent usage behaviour [34]. This theory was formulated by Vnkatesh and others (2003) in a quest to harmonise earlier technology adoptions namely Theory Planned Behaviour (TPB), The Technology acceptance Model (TAM), Diffusional of Innovation (DOI), Social Cognitive theories, and TRA [34]. The theory was established for theoretical constructs in place of determinants of Use of Behavior or intention of use, which play crucial roles as substitutes for Technology of acceptance. Vinkatesh *et al.* examined eight technology acceptance models and used the findings to identify the four core determinants of intention and usage. The four determinants are performance expectancy, social influence, effort expectancy, and facilitating conditions as shown in **Figure 1** [35].

## 3. Research Methodology

The research questions were answered using the descriptive study design. This design enabled an analysis of the effective use of e-government services in the various transport sectors in Lusaka. Quantitative data was collected in the form of a questionnaire. The use of questionnaires helped the study to generalize findings from data collected from the respondents' considerations.

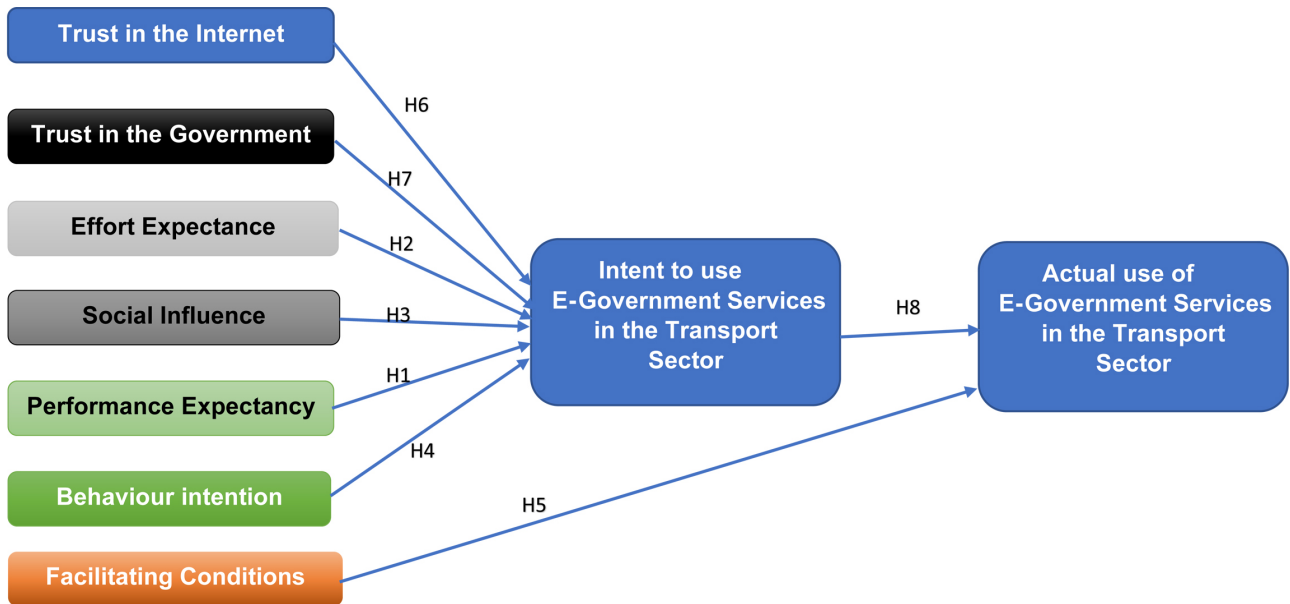


Figure 1. Conceptual framework.

$$n_o = \frac{Z^2 pq}{e^2} \tag{1}$$

The target population is defined as the entire group to which the study is focused (Bryman *et al.*, 2003). Opoku, (2009) also defines Population as the sum of items that can be sampled for research [36]. This survey is based on all registered vehicles. These came from various transport sectors in Lusaka, the capital of Zambia. The study conveniently sampled from various transport sectors and respondents were chosen at random from the above-mentioned category.

**Response rate:**

- Issued questionnaire: 249
- Completed questionnaires: 141
- Uncollected/incomplete: 108
- Response rate: 57%

The sample size for this study will be determined using the Cochran’s formula.

$$n_o = \frac{Z^2 pq}{e^2} \tag{2}$$

*e*—is the desired level of precision (*i.e.* margin of error);

*p*—is the (estimated) proportion of the population;

*q*—is 1 - *p*;

*z*—value as tabulated below.

*e* = 0.05;

*p* = 0.5;

*z* = 95% = 1.96;

(1.96)<sup>2</sup>(0.5)(0.5)/(0.05)<sup>2</sup> = 384.

A random sample of 249 people in our target population should be enough to

give us the confidence levels we need. Therefore, the sample size calculated was 249 as shown below:

$$n = \frac{n_o}{1 + \left( \frac{n_o - 1}{N} \right)} \quad (3)$$

$n$  = the adjusted new sample size – 250;

$N$  = Population size – 340,000;

$250 / (1 + (249 / 340,000))$ ;

$250 / 1.0007323529$ ;

$249.81700457621$  Sample size = 249.

There were a total of 249 surveys distributed. We did, however, receive 141 responses. This equated to a response rate of 57%. Data was gathered from a variety of sources. Respondents provided primary data via self-administered questionnaires. The questionnaire's validity and reliability were ensured by using well-structured and unambiguous questions, as well as conducting a pilot test prior to its initial distribution. Data was analyzed using descriptive and inferential statistics. The data was analyzed with SPSS software using the Chi-Square test of independence.

### 3.1. Data Collection and Analysis

The data obtained was intricately compiled, sorted, edited, classified, coded, and checked for accuracy and relevance. Data from questionnaires was carefully read and edited for completeness and accuracy using Excel and SPSS.

The collection of data was done through Primary sources. Questionnaires were used to collect primary data from respondents. The validity and reliability of the questionnaires were achieved by using well-structured and clear questions, as well as by conducting a pilot test prior to the initial administration.

The questionnaire was divided into three pieces. The first segment consisted of demographic questions, the second of computer knowledge and expertise, and the third of adoption variables from **Figure 1**, all of which were triggered using a five-point Likert scale ranging from 1 strongly disagree to 5 strongly agree. Kotthari (2004) defines a hypothesis as a proposition or a set of propositions set forth as an explanation for the occurrence of some specified group of phenomena either asserted merely as a provisional conjecture to guide some investigation or accepted as highly probable in the light of established facts [37].

The following hypothesis were used

- H1: Performance expectancy will positively influence the citizen intention to use e-government services
- H2: Age, marital status and education have no influence on citizen intention to use e-government services.
- H3: Social Influence positively influence the adoption of e-government services
- H4: Facilitating conditions has no influence on the adoption of e-government

service

- H5: Actual Use of e-government has no influence on the adoption of e-government services.
- H6: Trust in government will positively influence citizen intention to use e-government services.
- H6a: There would be a significant positive relationship between Trust in government and Trust in internet.
- H7: Trust in Internet will positively influence citizen intention to use e-government services.
- H8: Behavior intention has no influence intention to use e-government services.

### 3.2. Conceptual Framework

In e-government services, the use of information and Communication Technology (ICT) is vital for citizens to access information through various government platforms. Venkatesh *et al.* provided empirical evidence that IT use behavior can be explained by UTAUT and encouraged other researchers to further validate and test the model. Venkatesh *et al.*'s UTAUT model has been chosen as a primary theoretical framework to assess factors affecting the adoption of e-government services in the Zambian Transport Sector Amidst the Covid -19 pandemic.

**Figure 1** depicts the research model used in this study. The researcher adopted the conceptual framework from the Unified Theory of Acceptance and Use of Technology (UTAUT) model. It is a Technology acceptance model which explains user intentions to use an information system and subsequent usage behavior (Venkatesh *et al.*, 2003) [34].

The model put forward has the following variable; performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC), Trust in the government (TOG), Trust in internet (TOI) behavioral intention (BI) and Actual use of e-government services. The literature supports the proposed constructs and hypotheses.

Of the above factors that make up UTAUT, the study used three independent variables (performance expectations, effort expectancy, and social influence).

Social impact is “the extent to which peers influence the use of the system”, positive or negative, which is a very important factor in many aspects of adolescents’ lives and is likely to be significant (Venkatesh *et al.*, 2003) [34].

Facilitating condition is an extent to which one believes that that the organizational and technical infrastructure as inexistent to support the system is in place. Facilitation conditions consist of three root structures: perceived behavioral control, facilitation conditions, and compatibility [34].

## 4. Results and Discussion

This chapter presents data analysis and interpretation of findings. It also covers

respondent profiles, reliability tests, and descriptive analysis of variables. This chapter also answers survey questions. The table below illustrates the rate of the questionnaire administered: The main objective of our analysis is to provide or find out answers to the research questions as to whether there exists a significant link between Trust in the Internet (TI), Effort Expectancy (EE) and social influence (SI) has an influence on the adoption of E-Government Services as well as if the E-Government adoption variables have a positive impact on citizen participation on e-government services. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper.

#### 4.1. Demographic Data

The presentation of the data from the questionnaire administered to respondents began with the identification of the respondents in terms of their, age, gender, marital status, distribution by education level, level of income, and occupation.

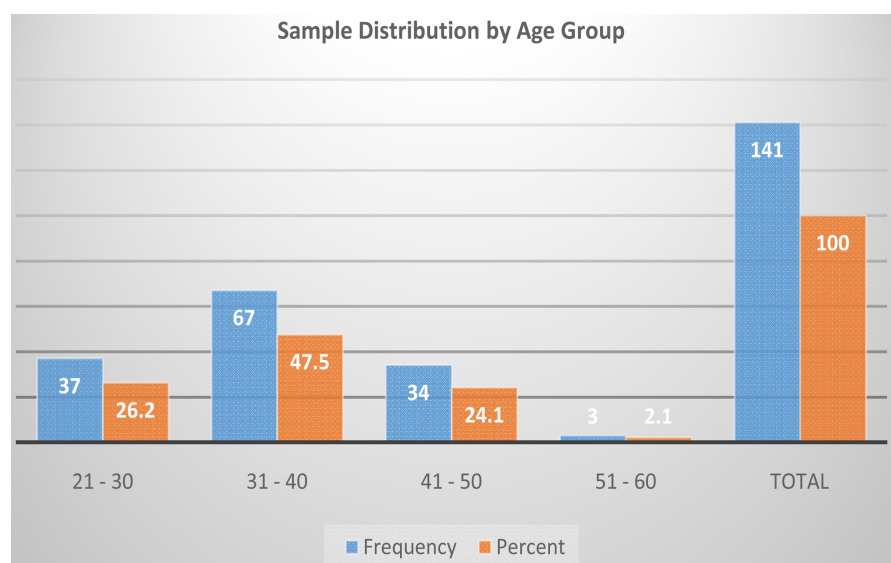
##### 1) Age

Females account for 29% of the total population. This indicates that the overall field is male-dominated.

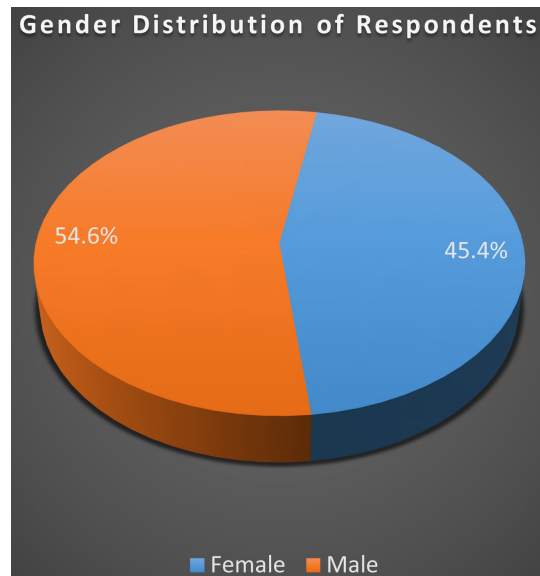
From **Figure 2**, the age distribution shows that the majority that uses e-government services are between the ages of 31 and 40 while the least respondents were from the range of 51 to 60. The middle range of respondents ranges from 21 - 30. From the age groups, it can be noted e-government users are from the middle-aged.

##### 2) Gender

In **Figure 3** the female population accounts for 45.4% of the total population. This indicates that the overall field is dominated by men.



**Figure 2.** Age distribution of respondents.



**Figure 3.** Gender.

### 3) Education Level

**Figure 4** shows the distribution of qualifications. First degrees have the highest number of respondents with 46.8%, seconded by Master's degree representing 30.5%, Grade 12 and below 2.8%, and Ph.D. respondents representing 1.4%.

### 4) Level of Income

The large numbers of the respondents in **Figure 5** are under the 5000 - 10,000 income bracket. In the middle, we have those under 15,000 and above and the last in the category are in the income bracket ranging between 3000 - 5000.

## 4.2. Occupation

**Figure 6** shows occupation of the respondents. Salaried workers are at 76.6% of the total population. This indicates that the retired, not working and self-employed are the least respondents.

**Table 1** below depicts the relationship between perceived adoption of e-government services in relation to age, marital status and education background.

According to the Chi-square test results, the Chi-Square value was 59.535 and the p-value was less 0.05. The conclusion is that there is no evidence to suggest, age, marital status and education background has perceived effect on the utilisation of e-government services.

### 1) Parameter Estimates

According to the survey conducted in **Table 2** below, the use of e-government tools is somewhere between excellent and poor. The results in **Table 3** were obtained from a survey of respondents to determine their knowledge on the use of e-government services. The findings of the study, using a likert scale was ranging from poor to excellent was provided. We can see from the parameters estimates on **Table 4** that those with less than 5% significance, such as E-services in the

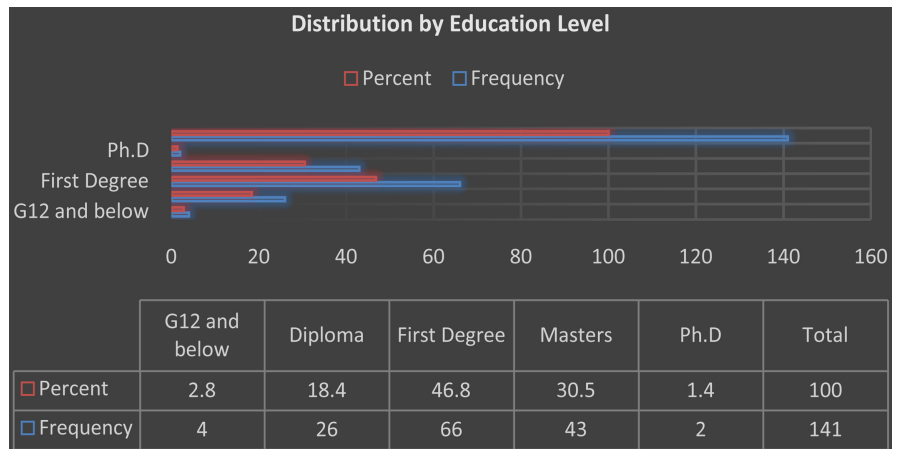


Figure 4. Education level.

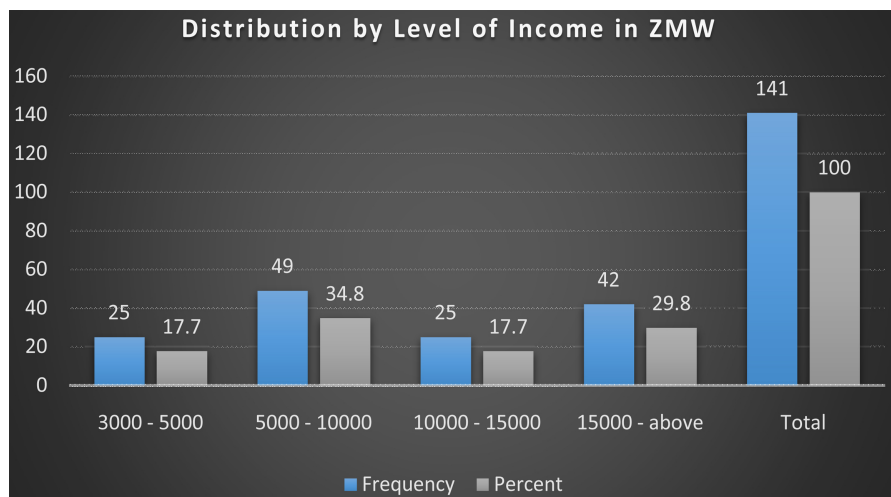


Figure 5. Income level.

Sample Distribution by Occupation

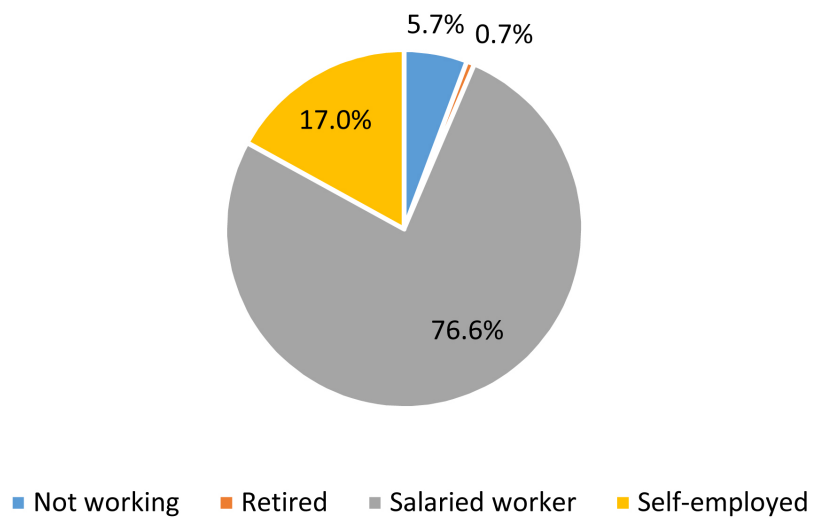


Figure 6. Occupation.

**Table 1.** Chi square test.

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	150.954			
<b>Final</b>	<b>91.419</b>	<b>59.535</b>	<b>18</b>	<b>0.000</b>

**Table 2.** Computer knowledge.

Computer Knowledge	Poor	2	1.4%
	Good	26	18.4%
	Excellent	113	80.1%
Valid		141	100.0%
Missing		0	
Total		141	
Subpopulation		141 <sup>a</sup>	

poor intercept (0.003), Effort Expectancy (0.019), facilitating conditions (0.080), Trust in Government and Trust in Internet (0.007) in the good intercept, have an impact on the use of e-government services.

The remaining parameters, which include social influence, performance expectancy, actual use of e-government services, and behavior intention, have greater than 5% significance and thus have no effect in the use of e-government services. It is important to note that among those who use e-government services infrequently, E-services control had a significant impact on actual e-government service utilization. However, if E-services control could be improved by one point, the multinomial log-odds of poor utilization would be reduced by 2.725. When the predictor variables (E-Services Control; Performance Expectancy; Effort Expectancy; Social Influence; Facilitating Conditions; Trust in Government; Trust in Internet; Behavior Intention; and Trust in Government) are absent, the logic for moderate (good) e-governance service utilization decreases by 29.318 times when compared to excellent utilization. The interpretation of the multi log-odds is that if a person with poor internet usage is given the necessary tools, such as an income, and can trust the government and the internet, their performance in the utilization of e-government can improve up to a certain percentage.

## 2) Hypothesis Testing

The Chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0. From **Table 3** above after examining individual path coefficient corresponding to our hypothesis we can conclude that predictor variables like

**Table 3.** Parameter estimates.

		Parameter Estimates						
Utilization <sup>a</sup>	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Poor	Intercept	-2.184	5.847	0.140	1	0.709		
	E-Services Control	-2.725	0.933	8.536	1	0.003	0.066	0.011 0.408
	Performance Expectancy	1.341	1.338	1.005	1	0.316	3.824	0.278 52.620
	Effort Expectancy	0.542	1.002	0.293	1	0.588	1.720	0.242 12.251
	Social Influence	-0.327	1.016	0.104	1	0.747	0.721	0.098 5.278
	Facilitating Conditions	-0.015	1.463	0.000	1	0.992	0.985	0.056 17.316
	Trust in Government	3.549	2.498	2.019	1	0.155	34.766	0.260 4646.189
	Trust in Internet	1.903	2.003	0.902	1	0.342	6.703	0.132 339.710
	Behaviour Intention	-0.357	0.769	0.215	1	0.643	0.700	0.155 3.158
	Trust in Government* Trust in Internet	-0.827	0.596	1.930	1	0.165	0.437	0.136 1.405
Good	Intercept	-29.318	11.073	7.010	1	0.008		
	E-Services Control	-1.949	0.974	4.007	1	0.045	0.142	0.021 0.960
	Performance Expectancy	1.236	1.554	0.632	1	0.427	3.442	0.164 72.428
	Effort Expectancy	2.795	1.193	5.489	1	0.019	16.370	1.579 169.689
	Social Influence	-0.651	1.083	0.361	1	0.548	0.522	0.062 4.361
	Facilitating Conditions	-0.861	1.555	0.307	1	0.080	0.423	0.020 8.897
	Trust in Government	7.698	3.177	5.869	1	0.015	2202.841	4.350 1,115,567.254
	Trust in Internet	7.246	2.775	6.818	1	0.009	1401.941	6.091 322,694.680
	Behaviour Intention	-0.101	0.895	0.013	1	0.910	0.904	0.157 5.218
	Trust in Government* Trust in Internet	-2.072	0.772	7.198	1	0.007	0.126	0.028 0.572

Effort Expectancy, Social influence (H2 and H3), Trust in Government and Trust in Internet positively influence the adoption of e-government services (H6 and H7). The rest of the predictor's variables such as Performance expectancy, facilitating condition, Actual use of e-government service and Behaviour intention do not (H1, H4, H5 and H8).

The chi-square statistic is the difference in  $-2$  log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis in **Table 4** shows that all parameters of that effect are 0. The likelihood ratio tests prove that the predictor

**Table 4.** Hypothesis test.

Intercept	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
E-Services Control	104.722	13.303	2	0.001
Performance Expectancy	121.242	29.823	2	0.000
Effort Expectancy	92.555	1.137	2	0.566
Social Influence	104.907	13.488	2	0.001
Facilitating Conditions	92.055	0.636	2	0.728
Trust in Government	92.984	1.565	2	0.457
Trust in Internet	98.489	7.070	2	0.029
Behaviour Intention	101.552	10.133	2	0.006
Trust in Government * Trust in Internet	91.821	0.402	2	0.818
	100.830	9.411	2	0.009

variables like E-Services Control; and Effort Expectancy; Trust in Internet; and Trust in Government were significant and that these predictors contributed significantly to the final model.

**Table 5** shows the Pearson goodness of fit test which assess the discrepancy between the use of the UTAUT model and whether it is fit in the Zambian setting in assessing factors affecting the adoption of e-government services. It determines whether the predicted probabilities deviate from the observed probabilities in which the multinomial distribution does not predict.

In this case, the Pearson (131.891) and Deviance (91.419) statistic tests prove that the model is fit since the tests are not statistically significant.

Based on the findings of the preceding study, the researcher concludes that the UTAUT model is applicable in determining the factors that influence the adoption of e-government services in the Zambian context. According to the study's findings, TOG, TOI, EE, and SI all positively influence users' intentions to adopt the technology. The goal of this study was to identify the major factors influencing the adoption of e-government services in the transportation sector in the midst of the COVID-19 pandemic and to propose a solution to help improve the level of e-government service adoption. This has been accomplished by implementing the findings of the adoption drivers and adoption barriers.

3) Proposed Model that would help to improve the adoption of e-government services in the transport sector in Zambia based on the UTAUT Model

The researcher developed four hypothesis and used Chi = square to identify if there is a significant relationship between the variables in the model used and to determine the strengths of these relationships. The level of significance was used

for the correlation analyses, the P-value, was less 0.05 and The Chi-Square value was 59.535. The likelihood ratio tests prove that the predictor variables like E-Services Control; Effort Expectancy; Trust in Internet; and Trust in Government were significant and that these predictors contributed significantly to the final model.

**Figure 7** is the new model adopted from the Venkatesh's (2003) UTAUT model re-created with a few changes from the results analysed above. The solid lines signify hypothesis that were significant to the adoption of e-government services while the broken lines signify the hypothesis that do not apply to the adoption of e-government services [34].

**Table 6** is the summary of the hypothesis. It highlights the hypothesis according to the UTAUT Model.

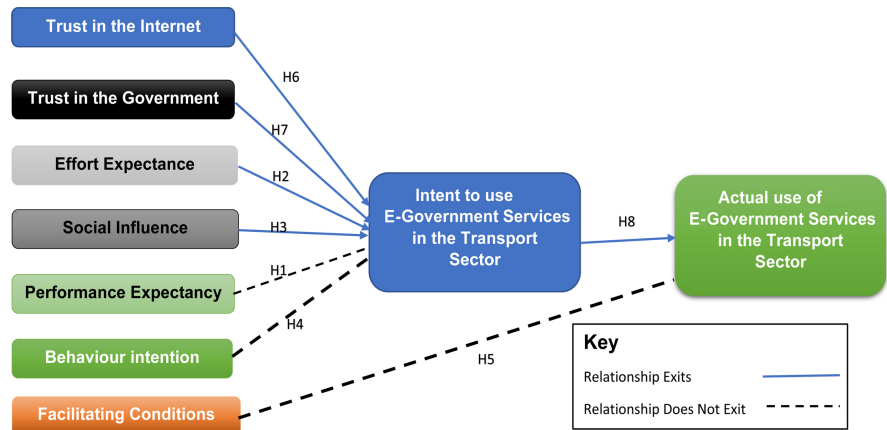
4) Proposed model for adoption of E-government services in the Transport sector

**Table 5.** Pearson goodness of fit test.

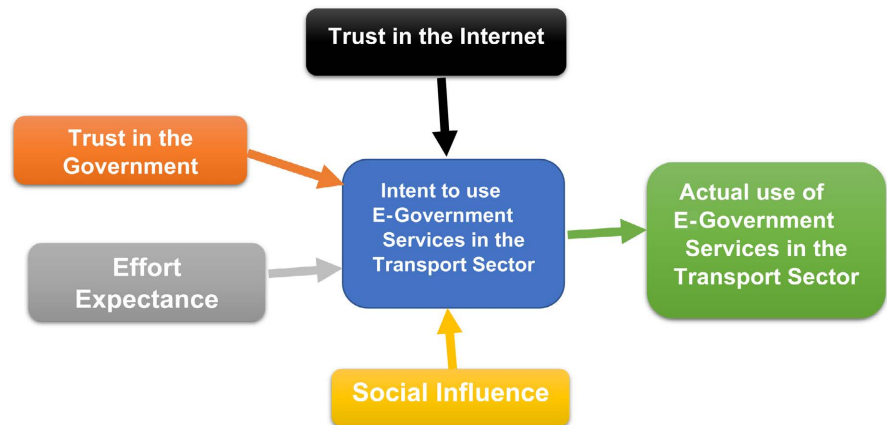
	Goodness-of-Fit		
	Chi-Square	df	Sig.
Pearson	131.891	262	1.000
Deviance	91.419	262	1.000

**Table 6.** Summary of hypothesis results.

Hypothesis	Results
H1: Performance expectancy will have no influence on citizen intention to use e-government services.	Rejected
H2: Effort expectancy can positively influence on citizen intention to use e-government services	Rejected
H3: Social Influence can positively influence on citizen intention to use e-government services	Accepted
H4: Facilitating conditions has no influence on citizen intention to use e-government services	Rejected
H5: Actual Use of e-government has no influence on citizen intention to use e-government services	Rejected
H6: Trust in government will positively influence citizen intention to use e-government services.	Accepted
H7: Trust in Internet will positively influence citizen intention to use e-government services.	Accepted
H8: Behavior intention has no influence on citizen intention to use e-government services	Rejected



**Figure 7.** Factors affecting the adoption of E-government services based on the UTAUT model.



**Figure 8.** Proposed model for adoption of E-Government services in the transport sector.

According to the questions and objectives given and guided this study in section 1.5 on page 5, a model was developed to address the factors influencing the adoption of e-government services in the Zambian transportation sector during the Covid-19. Evidence suggests that trust in government, trust in the internet, social influence, and effort expectancy all play a role in the adoption and use of e-government services.

In the model proposed in **Figure 8**, behavioral intent, enabling conditions, performance acceptance, and actual use of e-government services have been removed as they do not have significance in the adoption of e-government services in the Transport Sector.

### 5. Conclusion & Recommendations

The study sampled a total of 141 road transport providers from the Target population. Data was collected by way of structured questionnaires. SPSS aided the analysis of both the qualitative and quantitative aspects of the data. The Chi-square Tests of Independence formed the basis of statistical analysis so as to ascertain if there was a significant relationship between two nominal (categori-

cal) variables of interest to the study. The research, therefore, concluded that the researcher concludes that the UTAUT model is applicable in determining the factors that influence the adoption of e-government services in the Zambian context.

Adoption of E-Government is viewed as the first step toward providing more efficient, enhanced services to better serve citizens, improved accessibility of public services, and increased transparency and accountability of government services. Citizens can access information that will allow them to participate in the governance system with the click of a button. The absence of e-government services encourages bureaucracy and a lack of transparency between governments and their citizens. Therefore, the researcher put forth these recommendations:

The Road Transport and Safety Agency, a statutory body in charge of road transport in Zambia, should educate users on the importance of e-government services as well as citizen protection in order for citizens to feel safe and secure when receiving services electronically. It is critical that government agencies such as Zambia Information & Communication Technology (ZICTA) collaborate with RTSA to foster citizen trust, as a lack of trust impedes the adoption of e-government services. To prevent e-government users from losing money on the internet, the government should enact stricter laws that punish cyber-theft perpetrators.

## 6. Limitations

Like many others, this research has limitations. Of the ten (10) provinces of Zambia, only the Zambian capital, Lusaka province, was considered in this study. Future research should also consider other provinces to compare the results. The future researchers should consider undertaking a study that explains the challenges the transport sector in Zambia is facing in the implementation of the E-Government services.

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper but at here.

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