

**EFFECT OF AUTOMATION OF SERVICES ON REVENUE  
GENERATION AT THE NATIONAL TRANSPORT AND SAFETY  
AUTHORITY, KENYA**

**BY**

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## DECLARATION

This research project is my original work and has not been presented for a degree at any other university for examination.

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This research project has been submitted for examination with my approval as the University supervisor.

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## **DEDICATION**

I dedicate this work to my family, friends and colleagues. God bless you

# TABLE OF CONTENTS

<b>DECLARATION</b> .....	<b>ii</b>
<b>ACKNOWLEDGEMENT</b> .....	<b>iii</b>
<b>DEDICATION</b> .....	<b>iv</b>
<b>LIST OF TABLES</b> .....	<b>viii</b>
<b>LIST OF FIGURES</b> .....	<b>ix</b>
<b>LIST OF ABBREVIATIONS</b> .....	<b>x</b>
<b>ABSTRACT</b> .....	<b>xi</b>
<b>CHAPTER ONE: INTRODUCTION</b> .....	<b>1</b>
1.1 Background of the Study.....	1
1.1.1 Automation .....	2
1.1.2 Revenue Generation .....	4
1.1.3 Automation and Revenue Generation.....	5
1.1.4 The National Transport and Safety Authority .....	6
1.2 Research Problem.....	8
1.3 Research Objective.....	10
1.4 Value of the Study.....	10
<b>CHAPTER TWO: LITERATURE REVIEW</b> .....	<b>11</b>
2.1 Introduction .....	11
2.2 Theoretical Review .....	11
2.2.1 Technology Adoption Model.....	11
2.2.2 Diffusion of Innovation Theory.....	12
2.2.3 The Unified Theory of Acceptance and Use of Technology.....	13

2.3 Determinants of Revenue Generation .....	14
2.3.1 Automation .....	14
2.3.2 Effective Monitoring and Control .....	14
2.3.3 Revenue Diversification .....	15
2.3.4 Revenue Management .....	15
2.4 Empirical Review .....	16
2.5 Conceptual Framework .....	19
2.6 Summary of Literature Review .....	20
<b>CHAPTER THREE: RESEARCH METHODOLOGY .....</b>	<b>21</b>
3.1 Introduction .....	21
3.2 Research Design .....	21
3.3 Data Collection .....	21
3.4 Data Analysis .....	22
3.4.1 Analytical Model .....	22
3.4.2 Test of Significance .....	23
<b>CHAPTER FOUR: DATA ANALYSIS, RESULTS AND INTERPRETATION ....</b>	<b>24</b>
4.1 Introduction .....	24
4.2 Descriptive Statistics .....	24
4.3 Graphical Trends .....	25
4.4 Paired Correlations .....	27
4.5 Paired Samples Test .....	28
4.6 Interpretation of the Findings .....	29
<b>CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS ..</b>	<b>31</b>

5.1 Introduction .....	31
5.2 Summary .....	31
5.3 Conclusions .....	32
5.4 Recommendations of the Study .....	33
5.5 Limitations of the Study .....	33
5.6 Suggestion for Further Research .....	34
<b>REFERENCES.....</b>	<b>35</b>
<b>APPENDICES.....</b>	<b>40</b>
Appendix I: Research Data .....	40

## LIST OF TABLES

Table 4.1: Paired Summary Statistics .....	24
Table 4.2: Paired Samples Correlations.....	28
Table 4.3: Paired Samples Tests .....	28

## LIST OF FIGURES

Figure 2.1 Conceptual Framework .....	20
Figure 4.1: Revenue Trend before Automation .....	25
Figure 4.2: Revenue Trend after Automation .....	26
Figure 4.3: Revenue Growth before Automation .....	26
Figure 4.4: Revenue Growth after Automation .....	27

## **LIST OF ABBREVIATIONS**

<b>GDP</b>	-	Gross Domestic Product
<b>IFMIS</b>	-	Integrated Financial Management Information Systems
<b>KRA</b>	-	Kenya Revenue Authority
<b>NSE</b>	-	Nairobi Securities Exchange
<b>NTSA</b>	-	National Transport and Safety Authority
<b>TAM</b>	-	Technology Adoption Model
<b>TIMS</b>	-	Transport Integrated Management System
<b>UTAUT</b>	-	Unified Theory of Acceptance and Use of Technology

## **ABSTRACT**

Automation plays an increasingly important role in the world economy and in daily experience. Automation allows fewer support staff to perform more tasks with greater speed and efficiency. Therefore, the aim of this research was to determine the effect of automation of services on revenue generation at the national transport and safety authority, Kenya. The study employed a descriptive research design employed and used secondary data, which was source from the national transport and safety authority's financial records. The study used monthly secondary will cover a 24 months before automation (2013-2014) and 24 months after automation (2015-2016). To analyze the obtained data the research used descriptive statistical technique and the event study methodology. The findings revealed a significant and negative relationship between revenue before automation and revenue after automation but there was an insignificant and negative relationship between revenue before automation and revenue after automation. The study concludes that automation of service at the NTSA significantly influenced in revenue collection. The study recommends that the management of NTSA should enhance its automated service to enhance revenue generation.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the Study

Automation is one of the critical steps driving cost savings in the current economic landscape across industries including the public sector, manufacturing and financial services (Deloitte, 2017). System automation gives improvements that are measureable in terms of effectiveness and efficiency in regards to activities that involve maintenance and development with deliveries that are on time and of quality that's predictable. It permits organizations to automate platforms that are new of their systems of revenue collection so as to gain benefits maximally (Lowry, 2005). Globally, the private sector has been the pioneer in adopting automation, with automation being applied widely in contact centres, insurance enrolment and billing, claims processing, accounts payable, to invoicing and medical coding (Deloitte, 2017). However, of late the public sector is also adopting these technologies to gain efficiencies and effectiveness, albeit gradually (Tetteh, 2012).

The system theory argues that an institution is a set of interrelated and interdependent set of elements functioning as a whole thus automation systems should cover all the entities function and services to enhance its performance (Sharma & Mishra, 2015). The diffusion of innovation theory expounded that adoption of automation and innovation happens after passing over some stages such as confirmation, implementation, decision, persuasion and understanding (Lai, 2017). The expectancy value theory presupposes that the measurement of negative or positive outcome likelihoods is related with a specific act hence the positive or negative outcomes of revenue generation may be associated with the automation of services by public institutions (Lai, 2017). The technology adoption

model supports that it's a must for automation to still be highly cooperative and allows the operator to depend on it properly (Ghazizadeh, Leen & Boyle, 2012).

In Kenya, revenue generation is very important for every for all public institutions since it allows the institutions to get assets that are off the hook when it comes to debt and which the organizations use to offer services to citizens (Ngotho & Kerongo, 2014). Over the years, the Kenyan government has increased spending in developing the information technology sector matched to other sub-Saharan African countries with the same GDP per capita. Annual Kenyan country uses a significant amount on information technology based management systems such as IFMIS, which is normally used in most public institutions (Kemboi & Muturi, 2016). However, in Kenya, many of the government institutions have been faced with an impossible situation where their entire revenues have not been enough to meet their budgetary needs. Most of these have not had enough money to pay the wages of their employees (Kirimi, 2015).

### **1.1.1 Automation**

Automation is the change of operations controlled by humans to automatic, that is, conversion of procedures, work process or equipment to automatic. Automation does not only handover functions of humans to machines, however includes a work process reorganization that's deep, where by there is redefinition of both functions of machine and humans (Lowry, 2005). Automation entails a range of applications that use computer technology, which comprises of the generic software, like database applications, spread sheet, and word processing or records management applications that are specially written (Mbuvi, Namusonge & Arani, 2016). Automation is also a technology concerning the

computers and mechatronics application so as to produce services and goods (Kitheka & Ondiek, 2014). Automation entails information technologies and control systems usage to decrease the human work need in services and goods production (Tetteh, 2012).

Automation includes the equipments and systems functioning in a manner that's desired at an appropriate time under electrical devises or mechanical control that function without or with lesser intervention from humans (Mbuvi, Namusonge & Arani, 2016). Automation is an industry practice that allows their autonomous users to acquire, adjust and manage services by use of self service concepts and technology so as to methodically surpass expectations of the user (Lowry, 2005). It's proven that automated systems are able to introduce huge efficiencies to processes of business that can lead to revenue increase. A major step in government transformation into an institution that keeps up with the demands, expectations and requirements of nowadays digital world is application of technological answers in to the strategic goals for government (Tetteh, 2012).

Automation increases capabilities of humans and releases the operators of demanding and dangerous tasks (Ghazizadeh, Leen & Boyle, 2012). The major motives why most firms automate is to control the labour shortage, high cost of labour, upsurge productivity pressure problems (Kitheka & Ondiek, 2014). The benefits of automation include the ability to accurately predict public sector infrastructure breakdowns and other related changes in the service delivery environment (Deloitte, 2017). Automation which teaches commonly enhancement in technology in terms of advanced software and hardware in order to prevent inherent risks as a result of reductions of revenue or the vice versa for expenditures (Gitaru, 2014). Technological developments are crafting a new automation

age that is increasingly smarter and complementary to existing processes (Deloitte, 2017).

### **1.1.2 Revenue Generation**

Revenue is generally defined as the obtainable total amount gotten from trade with clients on merchandise services. In the public sector, revenue is defined as the rates, taxes, fines, duties, fees, fortunes, penalties, and all other receipt of an entity from whatsoever source rising over either six months or one year period (Olajide, 2015). In a profit making entities, revenue refers as the inflows or assets improvements of an enterprise or its liabilities settlement during a time from goods production or delivery, services provision or activities which may comprise of other entity's ongoing central or major operations (Ndungu, 2013). Addition, revenue is seen here as the gross receipts by a company irrespective of the net profit within a time span and can be described as inflows of asset given for services or products delivered to customers (Nwekeaku, 2013).

Revenue is one of the sources of income generation. Revenue is a key aspect in the income statement of an organization or nation, since it provides us with the financial standing idea of the country or company. Revenue is an important tool of the fiscal policy of the public institutions and it is the contradictory factor of institutions spending (Nwekeaku, 2013). The increase in revenue definitely enhances their economic fortunes and service delivery ability. The primary aim of revenue generation is to increase income for expenditure. Revenue is the best and quickest mode of raising revenue open to public institutions for economic activities so as to increase the life quality of its citizens (Baryeh & Ezeka, 2017)

Revenue generation enables the public institutions to get assets not answerable to debt financing, and which public entities use to fund their operations hence is very useful to all world governments (Abdullai & Nyaoga, 2017). Performance of an organization in revenue generation terms depicted by the accumulation of assets level, created wealth, and the services quality shown by satisfaction level of the customer and their complaints (Ndungu, 2013). In the public sector, revenue can be enhanced though keeping operating costs as low as possible, operating efficiently, coming up with efficient ways of revenue collection.

### **1.1.3 Automation and Revenue Generation**

Automation is empowered in administration of revenue collection and also other many non-governmental and governmental institutions. This is to gain maximum on the major objectives and still have a run that's smooth in terms of other operations as well as discourage any risks (Gitaru, 2014). According to Samuel and Ondiek (2014), automation guarantees, secure, reliable and automated exchange of data that's sensitive with a big customer network and partners. Additionally, automation causes operational costs that are lower and customer service that are improved. New technical, communication and information technologies and the changes in the workforce linked to them drives and supports work practice that are innovative, improves care processes, and impacts productivity and efficiency (Ngotho & Kerongo, 2014).

On the theoretical perspective, the technology adoption theory suggest that the contest amid significant work goals and the impacts of doing job tasks using the system acts as a founding for creating perceptions concerning the systems importance concerning

improvement of an organizations performance (Lai, 2017). The diffusion of innovation theory adoption of technology that's new, that can cause innovation, is acceptable due to the goal of altering the status quo of an organization in pursuit of enhancements interpreted in providing a service or product that's customer satisfactory (Miranda et al., 2016).

Empirically, a study by Ward and Al-Hawari (2006) assessed impacts of automated quality of service on performance and found that automated service quality enhances performance of firms. In their study Kemboi and Muturi (2016) investigated the effect of automation of financial management processes using information communication technology on the financial management and concluded that automation enables tracking the performance of the revenue collection process and ensures timely financial reporting. A study by Miranda et al. (2016) established that innovations as a result of adoption of new technology, through new practices, processes, and structural organization implementation, results in the organization reaching its objectives and goals effectively.

#### **1.1.4 The National Transport and Safety Authority**

This is a state corporation under the Ministry of Transport and Infrastructure. The authority was created through; Act Number 33 of 2012,an act of Parliament. The act provides for the powers and functions of the Authority and for connected purposes and in particular the interrelation with other Acts i.e. the Traffic Act Cap 403 (NTSA, 2015). The general policy and strategic decision of the NTSA is administered through the state transport department. The Authorities objective is to synchronize key road transport departments operations which were previously handled by various government

departments, manage the road transport subsector and lower deaths due to accidents (NTSA, 2016).

NTSA uses the TIMS, that is, Transport Integrated Management Systems which was sponsored by World Bank through the Kenya Transparency and Communication Infrastructure Project. To carry out activities meant to modernize the transport sector the system depends on Internet and Mobile technology. TIMS is a portal based system that incorporates all registration functions, inspection, licensing and enforcement of all trailers and motor vehicle online. It is designed to achieve among them eliminating fraud/corruption within the road transport sector, providing a single window single source of truth on road transport data and providing access to shared transport data through the internet and mobile technologies. The system provides online access to citizen services and integrates all existing heterogeneous databases from the various transport stakeholders into one Central Data Repository (NTSA, 2016).

NTSA generates revenue through services it offers to the public. Such services include issuance and renewal of driving licenses, issuance of number plates, transfer of motor vehicle ownership, vehicles inspection and the search for motor vehicles details. Since 2015, NTSA services have been offered through the TIMS system, which is integrated with the government platform known as the E-citizen. The E –citizen is an online platform that enables citizens, resident and visitors to access and to pay for government services online. Users who seek NTSA services normally pay a specified amount of fee to each service (NTSA, 2015).

## 1.2 Research Problem

Automation has a huge part in the economies of the world and in experience experienced daily (Tetteh, 2012). It allows fewer support staff to perform more tasks with greater speed and efficiency. The distribution of automation technologies brings a variety of benefits due to company performance. Such benefits are however varied, reliant on the entities use, and potentially more and more substantial in some cases, significantly superior than reductions of cost linked with substitution of labor (Lowry, 2005). To be effective, automation must be comprehensive and integrated within the whole organization, which may be costly. In addition, automation of the public sector is not a recent phenomenon, and queries about its promised benefits and effects have long accompanied its advances. However, across the world, automation in the public sector is accompanied by concerns of job losses (Baryeh & Ezeka, 2017).

In Kenya, public institutions remain in the experience of generating minimal levels of revenue most are manmade and economic based. In spite of the many guidelines and regulations, the changing levels in revenue creation happens through all government entities (Ndungu, 2013). As such, the situation in Kenya in regard to revenue maximization by public institutions has also been wanting. For example, revenue collected is inadequate to achieve the objectives of self-reliance and structural transformation of the economy (Kirimi, 2015). According to Ngotho and Kerongo (2014) despite automation, revenue collection among government parastatals in Kenya has not always been as effective as it should be. Kemboi and Muturi (2016) posit that despite the automation of various government services statistics indicates that the benefit of automation have not been realized and felt by users.

Various studies have been conducted on the concepts of automation and revenue generation in various organizations worldwide. Tetteh (2012) in their examination of the Ghana Revenue Authority automation system procedures and their revenue collection effectiveness found an automation system usage that had a direct impact and automation, cost of tax management, and effectiveness of collection of revenues also positive. The study however concentrated on automation and tax revenue collection. Rasheed and Latif (2011) in their study examined the results of information technology on quality of service and established that automation enhances service quality and customer satisfaction in the financial sector. The scope of the study however was on the banking sector and not the public sector.

Kirimi (2015) in Kenya studied the influence of automation of revenue collection by the county government of Meru and found that online payment and online responses influence revenue collection to a large extent. The context of the study however was county government, which mostly rely on integrated financial systems as opposed to tailor made automations. Gitaru (2017) assessed the impact of automation on system on collection of revenue in KRA and the results obtained that the number of transactions, and the revenue amount collected enhanced significantly after the automation of KRA services but the study focus was on tax revenue enhancement. As per the empirical studies reviewed, studies on effects of automation in government parastatals in Kenya are insufficient. This research thus tries to fill the literature gap through solving the question, what is the effect of automation of services on revenue generation at the national transport and safety authority?

### **1.3 Research Objective**

To assess the impacts of automation of services on generation of revenue at the national transport and safety authority

### **1.4 Value of the Study**

The outcome of this research will be important to the national transport and safety authority as it will be able to establish the relationship, which exists between automated services it offers to citizens, and its effects on their revenues. The authority will also know the areas in which they need to improve with regards to services automation. Other public institutions can also apply the findings of the study if they automate their services.

The findings can also be useful to policymaking institutions like the ministry of transport in Kenya who may use the finding to come up with policy mechanisms on automation of services by other parastatals under their control. The findings will also add on to the theory of finance and accounting as it will be helpful to researchers who may be interested in the study topic. The study will also open up new academic frontiers and gaps, which may require additional investigation.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This section previews the study theories, the determinants of revenue generation, a review of empirical studies, the conceptual model and a summarised review of the explored literature.

### **2.2 Theoretical Review**

#### **2.2.1 Technology Adoption Model**

The Technology Adoption Model (TAM) originated from Davis (1989). TAM explains the over-all computer acceptance determinants that help explain users' behavior's through an extensive series of end user technologies of computing and their populations. The undeveloped TAM incorporated and tested two specific assumptions, that is, Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) (Lai, 2017). This models strength exists in its simple nature since it has two constructs only, that is perceived ease of use and perceived usefulness through predicting individual levels of new technologies extents of adoption (Sharma & Mishra, 2015). PU is explained from the view point of the prospective user's. Will the application increase his or her organizations job performance? PEOU is a key factor which explains the user's perception that the automated system and how its user friendly (Bradley, 2009).

The technology acceptance model additionally suggests that usage of a computer is guaranteed by behavioral intention to use, which foretells the intention of a user to carry out an intentional act like accepting and using the system of information. The reasoning

of TAM is that the effect of variables from the external on technology acceptance behaviour is facilitated throughout user attitudes and beliefs, where beliefs symbolize an instrumentality degree tied to attitudes and action that are purely affective (Erasmus, Rothmann & Van Eeden, 2015). TAM sees the impacts of these firm specific-level variables as key aspects which lead to usage intentions and as they sway acceptance as mediated by perceptions of system usefulness and ease of use. Therefore, TAM gives us a general context that explains issues upsetting acceptance of automation, like compatibility of task, mandatory usage, and experience (Ghazizadeh, Leen & Boyle, 2012).

### **2.2.2 Diffusion of Innovation Theory**

This theory was proposed by Rogers (1983) and it talks of the reason why, how and the level at which technology and ideas that are new extent over cultures, performing at the levels of firm and individual (Bradley, 2009). It sees innovations as being conveyed over definite channels over a period and within specific social systems (Abdullai & Nyaoga, 2017). The main idea of the theory is that there are four elements influencing spread of ideas that are new and they comprise of the, social system, time, communication channels and innovation. The diffusion process involves five phases that is persuasion, knowledge, confirmation, implementation and decision. It results in six user categories: leap froggers, laggards late majority, early majority, early adopters, and the innovators (Sharma & Mishra, 2015).

The diffusion theory of innovation proposed that adoption of an innovation is influenced by five attributes which have common concepts with studies of diffusion and adoption

research, being used to evaluate a variety of information technology and communications (Olatokun & Igbinedion, 2009). The theory asserts that channels of communication disperse innovation knowledge, plays a role in the formation of attitudes about the innovation by the prospective user leading to a, accept or reject decision to the innovation (Bradley, 2009). The diffusion of innovation states that fresh technologies have brought about huge changes in the organizational production which can be in an order that's continuous or episodic, hence making settings for innovations occurrence (Miranda et al., 2016).

### **2.2.3 The Unified Theory of Acceptance and Use of Technology**

This was proposed by Venkatesh et al (2003) It serve as a comprehensive model applicable thought a variety of applications (Sharma & Mishra, 2015). It was suggested and validated so as to give a unified theoretical foundation which can aid research on information systems, adoption of information technology and diffusion. The theory proposes that four key concepts, that is, effort expectancy, performance expectancy, facilitating conditions and social influence, determine behavioral intention and ultimately behavior of IS/IT directly (Williams et al., 2011). This theory comprises of three direct determinants which includes, social influences, effort expectancy and performance expectancy and two direct determinants of use behavior that is, facilitating conditions and intention (Lai, 2017).

## **2.3 Determinants of Revenue Generation**

### **2.3.1 Automation**

Automation involves technology that executes a role performed previously by people. Through partially or fully taking on roles accomplished by people previously, automation helps humans to accomplish tasks. It does not only substitute the person and his importance but also alters the structure of the task, introduces newer responsibilities and tasks, like automation monitoring and activity coordination (Ghazizadeh, Leen & Boyle, 2012). The condition of being automatically operated or controlled automation increases productivity (Lowry, 2005). Activity automation enables entities to enhance performance, by error reduction and speed and quality improvement, and in other situations getting results that go past the capabilities of humans. It still contributes to productivity (Deloitte, 2017).

### **2.3.2 Effective Monitoring and Control**

All revenue agents require effective monitoring and control to enable them to do their duties. Effective monitoring reduces usual problems of assessment delays, remittances and collection, and also revenue diversion by public entities (Nwekeaku, 2013). A system of effective monitoring and controls techniques is an important aspect of management of an organization and a basis for the safe operation of an entity. However, ineffective monitoring and controls techniques result in ineffective programs and eventually leading to losses. Effective monitoring and control goes past matters relating openly to accounting functions and the financial statements and deals with evaluating the level of

correlation amid an well-known criteria and the real results of the organization (Nwekeaku, 2013).

### **2.3.3 Revenue Diversification**

This system assists public institutions to lower any loss encountered by any source of any single tax due to non-economic or economic changes, enhances the general stability of revenue and reduces the central government's fiscal reliance (Yan, 2008). Therefore, diversification of sources of revenue can either be deliberate or strategic policy action in that it can assist public entities to widen their base of revenue acquisition, give more flexibility and stability in financial management, and hence gain a performance that's better (Ryzin & Talluri, 2005). In this research, revenue diversification gains from portfolio theory analysis and application. Based on this theoretical model, diversification is aimed at reducing risk or volatility. In that case, diversifying the structure and mode of revenue generation and collection can be termed a result of choices of policy makers that look to gain the benefits linked with diversification, or due to a reaction to a policy involving economic and political restraints of a jurisdiction (Yan, 2008).

### **2.3.4 Revenue Management**

This is the gathering of tactics and strategies used by firms to manage want for their services and products scientifically (Ryzin & Talluri, 2005). Also termed as yield management. Can also be defined as the combining of methods used to enhance the businesses viability. Revenue management is a means that uses a number of aspects of management like revenue streams, rate and distributions channel management. It includes several disciplines such as operations, marketing, and financial management into an

approach that's both new and highly successful. To create a fruitful strategies of revenue management a revenue manager should work as a team with other departments (Matamande et al., 2014).

## **2.4 Empirical Review**

Omuchesi and Bosire (2014) investigated automation effects on stock market price volatility of the NSE. The research considered the pre-automation which covered 200 and 2006 and post-automation period which covered 2008 and 2012. The authors used a a longitudinal research design and monthly secondary data on the NSE 20 Share Index and the average share closing prices on 37 firms listed at NSE from 2002 to 2012. The study used the chi-square test and t-test to analyze the study data. The study found that the introduction of the automation on stock market price volatility had no statistically significant effect on price volatility at the NSE.

Feizollahi et al (2014) investigated the casual relation amid internet technology with e-commerce orientations and the performance of an organization. The study adopted a casual-correlation and targeted the chief and assistant managers. The study selected a sample of 394 and used questionnaires to gather data. Using Structural Equation Modeling the study revealed a positive and significant relationship amid internet technology and customers familiarity with the e-commerce and experiences of e-commerce for internal processes of organizations with their performance. The findings further found both meaningful and positive connection amid customer's familiarity with the e-commerce and performance of the organization; however there are negative and

meaningful connections amid internal processes and performance of organizations ecommerce experiences.

Alade (2015) investigated the result of generation of revenue as an income source by state governments to solve misappropriation, mismanagement, manipulation and corruption problems as it impacted the efficient use of the collected revenue. The study used questionnaires to gather data. The findings showed that the revenue allocated to local government is slowed down by practices that are corrupt and also performance of public sectors is enhanced by efficient revenue generation

Okiro (2015) examined the impacts of e-payment on collection of revenue by the county government of Nairobi using a descriptive research. The study targeted 18 Nairobi government departments, which were operational between 2013 and 2015 and used secondary data. The findings showed increase of performance of revenue collection in the Nairobi County after the introduction of the system of e-payment. Regression results established a significant relationship between level of compliance to budget estimates in before adoption e-payment and level of compliance to budget estimates after application of e-payment and performance of revenue collection. The study concluded that its adoption impacts the performance of revenue collection positively in Nairobi.

Edogbanya and Jaâ (2013) analyzed the level of affection of revenue generation to the growth of the local Governments selected. The study employed both secondary and primary data collection methods to produce the data that's required. The collected data analyzed using the regression method. The finding revealed a significant connection amid revenue created and government's developmental efforts, poor growth of the areas,

absence of social amenities that are basic to the people in the rural areas and absence of revenue to help maintain the infrastructures in existence.

Kitheka and Ondiek (2014) studied the impacts of inventory management automation on Western Kenya supermarket performance. The research used a survey design that's descriptive and 12 selected supermarkets. The study gathered data using questionnaires and used regression to analyze the collected data. The findings established inventory management automation impacted supermarkets performance and there was presence of positive linear relation amid the supermarkets performance and inventory management automation.

Gitau et al (2017) examined the effect of the system of sales force automation on performance of sales in Kenya through a descriptive survey research. This study sampled 250 respondent from firms dealing with consumer goods in Nairobi and targeted project/IT managers and sales force teams. The study collected primary data using questionnaires and used descriptive statistics to analyze the collected data. The study found that the automation of sales force allows sales persons to do their work more efficiently and more effectively.

Bryan Sinkovics and Kim (2008) studied the effect of information technology and performance of an organization inside international business to business relationships. The authors came up with an IT-mediated relationship conceptual model in the chain of supply international relationships which integrated economics of transaction costs and perspectives of theories that are resource based. The finding revealed that capabilities of IT contribute openly to organizational process that are improved like transaction specific

investment, coordination, monitoring, and absorptive capacity which in turn add to the strategic and operational outcomes of performance.

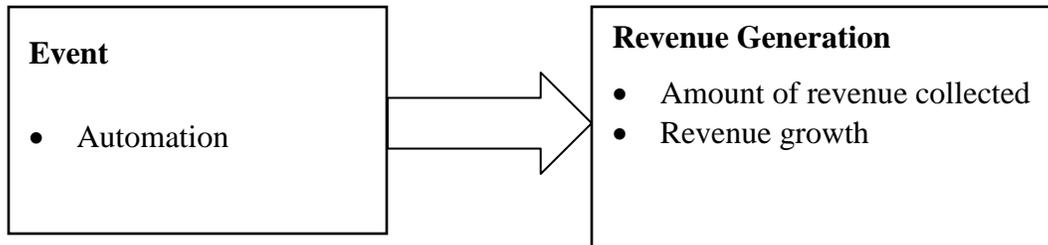
Namusonge, Arani and Mbuvi (2016) assessed the conditions that affected the automation of inventory management in micro, SMEs in Kenya. The research employed descriptive design and sampled 200 respondents. The researcher used questionnaires to collect data, the findings showed that most employees have information that's not adequate in regards to skills in technology and which has prevented the inventories automation. Further, the authors showed that accessibility of financial aid is an hindrance in funding automation of inventories.

Asaolu, Dopemu and Monday (2015) in Nigeria evaluated the effects of tax reforms on revenue creation in the state of Lagos. The research used time series study modeling and data on quarterly basis from 1999 to 2012 and data analysis was done by use of ordinary least square regression techniques. The findings established existence of a long-run relation with the tax-reforms and the amounts gotten hence the tax reforms had optimistic and important impacts on the States structure and mode of revenue. The research came to a conclusion that tax reforms had a meaningful contribution to generation of revenue in form of taxes had allowed the state to perform her duties with minimal Federal Government reliance.

## **2.5 Conceptual Framework**

This is a tool of research that aims to help the investigator develop understanding and awareness of the condition under study and to communicate it. The conceptual framework helps to illustrate the causal relationships amid variable(s) that are

independent and the dependent. The conceptual framework for this study is shown as follows



**Figure 2.1 Conceptual Framework**

**Source: Researcher**

## **2.6 Summary of Literature Review**

The chapter made a review of the TAM, The Diffusion of Innovation theory and The UTAUT. The chapter also review a number of studies among them Omuchesi and Bosire (2014) who studied automation effects on stock market price volatility of the Nairobi Security Exchange and Feizollahi et al (2014) who investigated the impacts of internet and digital technology on the organization performance. Okiro (2015) also examined the Nairobi county government system of e-payment on collection of revenue by the using a descriptive research. Bryan Sinkovics and Kim (2008) who examined the effect of information technology and organizational performance and Gitau et al (2017) examined the effect of sales force automation system on sales performance in Kenya. This studies however examined either one of the concepts against a different concept. The studies have not explored the combination of automation of services and revenue generation in totality.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This section outlines the design of research, the techniques of collecting data and method of analyzing it, which comprises of the analytical model and the tests of significance.

### **3.2 Research Design**

This refers conditions arranged for data collection and analysis in a way that tries to pool relevance with the purpose of the research (Kothari, 2004). To form the effects of automation of services on generation of revenue at the national transport and safety authority, Kenya a descriptive research design will be employed. This design includes collecting data that describes events and then organizes, tabulates, depicts, and describes the data. A descriptive design gives numeric or qualitative trend, attitudes and perception descriptions of a sample population (Kothari, 2004). In the context of this study, there is automation, which will be compared with revenue generated by the parastatals 24 months before and 24 months after automation

### **3.3 Data Collection**

The research will use secondary data, which will be source from the NTSA financial records. NTSA was established in 2012 through the National Transport and Safety Authority act of 2012. The parastatals automated its services in 2015 after the successful adoption of the Transport Integrated Management System (TIMS). Therefore, the study will use monthly secondary will cover a 24 months before automation (2013-2014) and 24 months after automation (2015-2016).

### 3.4 Data Analysis

To analyze the obtained data the research will use descriptive statistical technique and the event study methodology. Descriptive statistics will use various forms of summary statistics to summarize the data using arithmetic mean, standard deviation, sum and other methods. The event study methodology is a standard methodology for evaluating the performance of an organization in reaction to a specific event. The event methodology will be used to investigate the response to revenue generation by the NTSA 24 months after automation and 24 months before automation.

#### 3.4.1 Analytical Model

To assess the relationship before and after automation the paired t test will be used. The paired t- test model is derived mathematically as follows

$$\text{Paired } t - \text{test} = \frac{x - \mu}{\frac{s}{\sqrt{n}}}$$

Where;

$x$  = Population mean

$\mu$  = t critical value

$S$  =Sample mean

$n$  = Sample size

Revenue generation will be measured in terms monthly amount of revenue collected, number of monthly transactions completed, monthly revenue per service and the number of invoices processed

### **3.4.2 Test of Significance**

The P-values will be employed to determine the statistical significance of the study variables where if the p value is less than 0.05 ( $P < 0.05$ ) it will be considered significance while where the p values is greater than 0.05 ( $P > 0.05$ ) it will be considered insignificant.

# CHAPTER FOUR: DATA ANALYSIS, RESULTS AND INTERPRETATION

## 4.1 Introduction

This section presents the results of the analyzed data and the interpretations of the data analysis. The chapter therefore contains the descriptive statistics, the paired correlation results, the paired samples tests and the findings interpretations.

## 4.2 Descriptive Statistics

The descriptive statistics include the paired summary statistic which comprises of the mean, number of observations (N), standard deviation and the std error of the mean.

Table 4.1 depicts the results

**Table 4.1: Paired Summary Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Revenue before automation	17.8679	24	.25129	.05129
	Revenue after automation	18.2809	24	.17739	.03621
Pair 2	Revenue growth before automation	.0212	24	.08970	.01831
	Revenue growth after automation	.0267	24	.18759	.03829

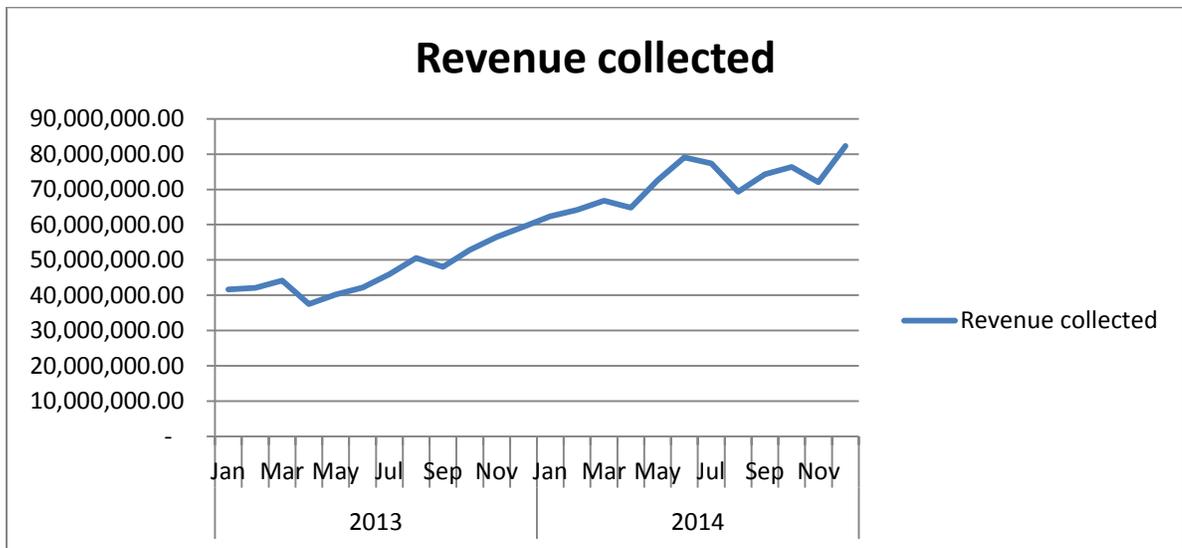
**Source: Research findings**

The paired summary statistics on table 4.1 shows that the mean revenue before automation was 17.8679 while the mean revenue after automation was 18.2809 respectively. This indicates that the average revenue of the NTSA increased after

automation. The findings also indicate that the average revenue growth before automation was 0.0212 while the average revenue growth after automation was 0.0267 hence an indication that the average revenue growth after automation at the NTSA had increased respectively.

### 4.3 Graphical Trends

#### 4.3.1 Revenue Trend before Automation

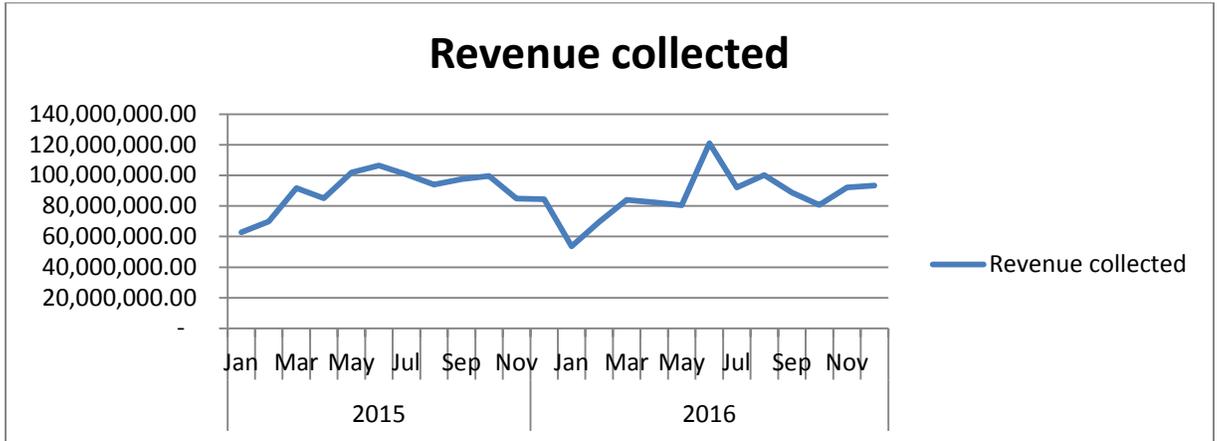


**Figure 4.1: Revenue Trend before Automation**

**Source: Research findings**

Figure 4.1 shows the trend of revenue before automation, According to the figure monthly revenue for the parastatal had been steadily increasing over the considered period between 2013 and 2014. However, some slumps in revenue had been experienced in some months of the year.

### 4.3.2 Revenue Trend after Automation

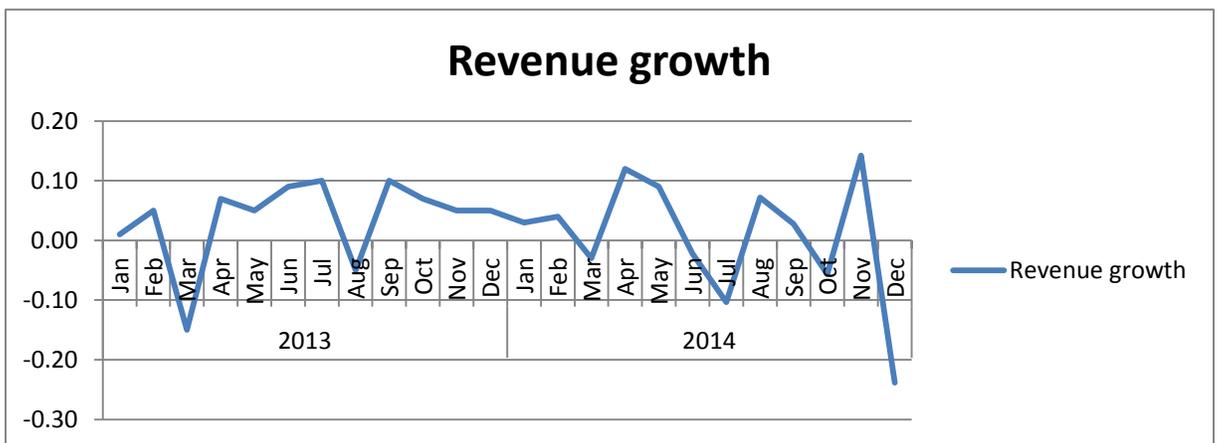


**Figure 4.2: Revenue Trend after Automation**

**Source: Research findings**

The results on figure 4.2 illustrates that the trend of revenue after automation at the NTSA had been fluctuating up and down between 2015 and 2016. However, the increase is higher compared to the period before automation.

### 4.3.3 Revenue Growth before Automation

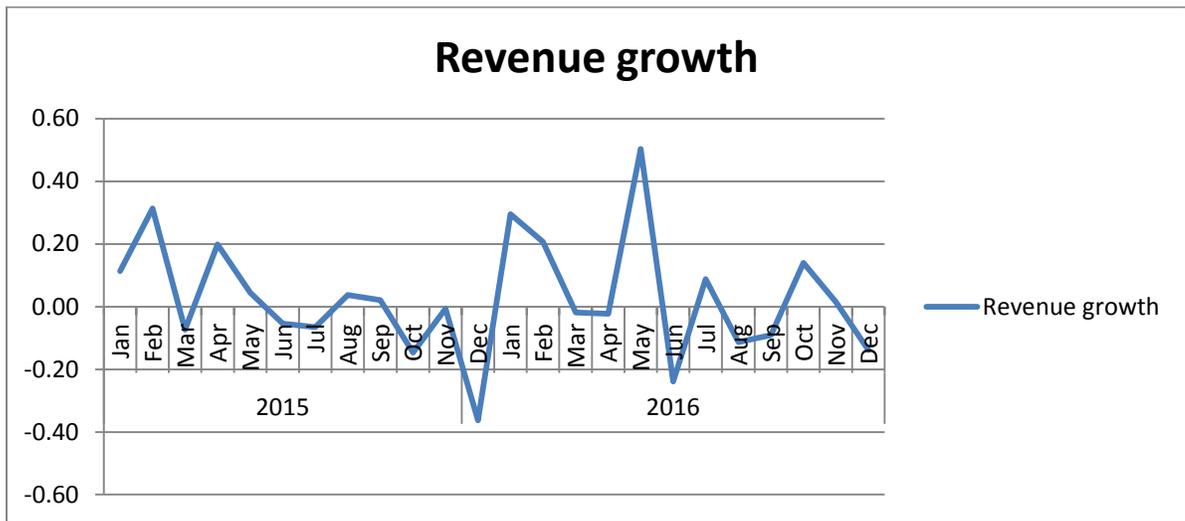


**Figure 4.3: Revenue Growth before Automation**

**Source: Research findings**

Figure 4.3 show the revenue growth before automation. According to the figure, there has been fluctuation in revenue growth at the NTSA over the considered study period with some period having a negative growth rate while other periods experiencing a positive growth rate.

#### 4.3.4 Revenue Growth after Automation



**Figure 4.4: Revenue Growth after Automation**

**Source: Research findings**

The results on figure 4.4 depicts the trend of revenue growth at the NTSA after automation. The figure shows that the parastatal had witnessed fluctuations in monthly revenue growth over the considered period between 2015 and 2016.

#### 4.4 Paired Correlations

The paired samples correlations were undertaken to determine the correlations before and after automation at the NTSA. Table 4.2 shows the results

**Table 4.2: Paired Samples Correlations**

		N	Correlation	Sig.
Pair 1	Revenue before automation & Revenue after automation	24	.054	.803
Pair 2	Revenue growth before automation & Revenue growth after automation	24	.159	.458

**Source: Research findings**

The paired correlation results indicate that there is a weak and positive correlation for revenue before automation and revenue after automation respectively. The results also show that the correlations between revenue growth before automation and revenue growth after automation is also weak and positive.

#### 4.5 Paired Samples Test

The paired t- test method was used to determine whether automation affects revenue generation at the NTSA. Table 4.3 shows the obtained results

**Table 4.3: Paired Samples Tests**

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Revenue before automation - Revenue after automation	-.4129	.2997	.06118	-.53954	-.28643	-6.751	23	.000
Pair 2	Revenue growth before automation - Revenue growth after automation	-.0054	.1946	.03973	-.08760	.07677	-.136	23	.893

**Source: Research findings**

The paired samples test results on table 4.3 indicates that there is a significant and negative relationship between revenue before automation and revenue after automation as indicated by the P value ( $0.000 < 0.05$ ). The results however indicate that there is an insignificant and negative relationship between revenue growth before automation and revenue growth after automation as indicated by the P value ( $0.893 > 0.05$ ) respectively.

#### **4.6 Interpretation of the Findings**

The findings revealed a significant and negative relationship between revenue before automation and revenue after automation. This indicates that automation of services significantly affects revenue generation. This finding is similar to that of Feizollahi et al (2014) revealed a positive and significant relationship between internet technology and customers familiarity with the e-commerce and experiences of e-commerce for internal processes of organizations with their performance. Okiro (2015) concluded that its adoption impacts the performance of revenue collection positively in Nairobi. Bryan Sinkovics and Kim (2008) revealed that capabilities of IT contribute openly to organizational process that are improved like transaction specific investment, coordination, monitoring, and absorptive capacity which in turn add to the strategic and operational outcomes of performance.

The findings of established an insignificant and negative relationship between revenue growth before automation and revenue growth after automation. This is an indication that revenue growth is not significantly affect by automation of services. This findings concurs with that of Omuchesi and Bosire (2014) who found that found that the introduction of the automation on stock market price volatility had no statistically

significant effect on price volatility at the NSE. However, Kitheka and Ondiek (2014) supports automation impacted supermarkets performance and there was presence of positive linear relation amid the supermarkets performance and inventory management automation. Additionally, Gitau et al (2017) found that the automation of sales force allows sales persons to do their work more efficiently and more effectively.

## **CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter summarizes the findings of the research, presents the research conclusions and the study recommendations. The chapter also identifies the research limitations and suggests additional areas for further research.

### **5.2 Summary**

The key objective for this research was to determine the effect of automation of services on revenue generation at the national transport and safety authority, Kenya. The study adopted the Technology Adoption Model (TAM), Diffusion of Innovation theory and the Unified Theory of Acceptance and Use of Technology. The study adopted a descriptive research design was employed and used secondary data, which was source from the national transport and safety authority's financial records. The study used monthly secondary, which covered 24 months before automation (2013-2014) and 24 months after automation (2015-2016). To analyze the obtained data the research used descriptive statistical technique and the event study methodology. To establish the relationship before and after automation the paired t test was used

The paired summary statistics established that the mean revenue before automation was 17.8679 while the mean revenue after automation was 18.2809 The findings also revealed that the average revenue growth before automation was 0.0212 while the average revenue growth after automation was 0.0267 hence an indication that the average revenue growth

after automation at the NTSA had increased respectively. The trend analysis indicated monthly revenue for the parastatal had been steadily increasing over the considered period between 2013 and 2014 whereas the trend of revenue after automation at the NTSA had been fluctuating up and down between 2015 and 2016. The findings also revealed that there has been fluctuation in revenue growth at the NTSA over the considered study period with some period having a negative growth rate while other periods experiencing a positive growth rate and that the parastatal had witnessed fluctuations in monthly revenue growth over the considered period between 2015 and 2016.

The paired correlation results established that there was a weak and positive correlation for revenue before automation and revenue after automation respectively. The results also revealed that the correlation between revenue growth before automation and revenue growth after automation was also weak and positive. The paired samples test results established that there was a significant and negative relationship between revenue before automation and revenue after automation as indicated by the P value ( $0.000 < 0.05$ ). The findings however established that there was an insignificant and negative relationship between revenue growth before automation and revenue growth after automation as indicated by the P value ( $0.893 > 0.05$ ) respectively.

### **5.3 Conclusions**

The findings of the research established that there was a significant and negative relationship between revenue before automation and revenue after automation. Based on

this finding the study concludes that that automation of services significantly affects revenue generation at the National Transport and Safety Authority.

The findings of the study found that there was an insignificant and negative relationship between revenue growth before automation and revenue growth after automation. Based on this finding the study concluded that that revenue growth is not significantly affect by automation of services at the National Transport and Safety Authority.

#### **5.4 Recommendations of the Study**

The research concluded that that automation of services significantly affects revenue generation at the National Transport and Safety Authority. The study therefore recommends that the management of the parastatal should enhance it automation of service and ensure the mechanisms used are used friendly and understandable by their clients.

The research also study concluded that that revenue growth is not significantly affected by automation of services at the National Transport and Safety Authority. Nonetheless, the study concludes that the management of the parastatal should educate their clients on the usage of online service to enhance its usage thus revenue growth.

#### **5.5 Limitations of the Study**

This context of this study was the National Transport and Safety Authority therefore the findings are limited to the sampled government institution despite the fact that most government institutions having automated their services. The findings are also limited

with the considered study period between 2013 and 2016 since subsequent changes may affect revenue generation at the institution.

Additionally, the study was based on secondary data, which was source from the parastatal finance department. Nonetheless, secondary data is historic and normally indicates what has been happening in the past. Therefore, secondary data may not explain or depict the current happenings. Secondary data is also quantitative in nature and may not cover the qualitative aspects of automation, which affect revenue generation.

## **5.6 Suggestion for Further Research**

This study was only carried out at a single government institution in Kenya. In Kenya, however all parastatals and government related institutions have automated their services thus this research recommends an additional study on the effects of automation on revenue generation in several government institutions as opposed to a single institution to establish the aggregate effect of automation by parastatals.

The study also used secondary data leaving out the qualitative characteristics that might affect revenue generation at the National Transport and Safety Authority. The study therefore recommends an additional research using primary data, which can be collected through questionnaire or interview guides from the key respondents at the parastatal.

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## APPENDICES

### Appendix I: Research Data

<b>Year</b>	<b>Month</b>	<b>Revenue collected (KShs.)</b>	<b>Ln Revenue</b>	<b>Revenue growth</b>
2013	Jan	41,653,980.00	17.54	0.010
	Feb	42,070,519.80	17.55	0.050
	Mar	44,174,045.79	17.60	-0.150
	Apr	37,547,938.92	17.44	0.070
	May	40,176,294.65	17.51	0.050
	Jun	42,185,109.38	17.56	0.090
	Jul	45,981,769.22	17.64	0.100
	Aug	50,579,946.14	17.74	-0.050
	Sep	48,050,948.84	17.69	0.100
	Oct	52,856,043.72	17.78	0.070
	Nov	56,555,966.78	17.85	0.050
	Dec	59,383,765.12	17.90	0.050
2014	Jan	62,352,953.38	17.95	0.030
	Feb	64,223,541.98	17.98	0.040
	Mar	66,792,483.66	18.02	-0.030
	Apr	64,788,709.15	17.99	0.120
	May	72,563,354.25	18.10	0.090
	Jun	79,094,056.13	18.19	-0.023
	Jul	77,307,960.00	18.16	-0.103
	Aug	69,323,557.00	18.05	0.072
	Sep	74,322,996.00	18.12	0.028
	Oct	76,380,012.00	18.15	-0.057
	Nov	72,053,672.00	18.09	0.142
	Dec	82,308,301.00	18.23	-0.238
2015	Jan	62,703,744.00	17.95	0.113

	Feb	69,819,091.85	18.06	0.314
	Mar	91,723,931.00	18.33	-0.073
	Apr	85,020,934.00	18.26	0.199
	May	101,904,445.00	18.44	0.044
	Jun	106,427,455.00	18.48	-0.055
	Jul	100,611,896.00	18.43	-0.066
	Aug	94,004,250.00	18.36	0.037
	Sep	97,513,126.00	18.40	0.021
	Oct	99,564,635.00	18.42	-0.147
	Nov	84,933,605.00	18.26	-0.007
2016	Dec	84,346,820.00	18.25	-0.363
	Jan	53,708,272.00	17.80	0.295
	Feb	69,578,019.00	18.06	0.206
	Mar	83,939,221.00	18.25	-0.018
	Apr	82,400,809.00	18.23	-0.023
	May	80,488,030.00	18.20	0.503
	Jun	121,013,213.00	18.61	-0.239
	Jul	92,100,583.00	18.34	0.088
	Aug	100,211,217.00	18.42	-0.113
	Sep	88,853,870.00	18.30	-0.091
	Oct	80,744,606.00	18.21	0.140
	Nov	92,059,972.00	18.34	0.015
	Dec	93,419,870.00	18.35	-0.139

Source: NTSA (2016)