

**GPS TRACKING TECHNOLOGY ADOPTION IN MOTOR VEHICLE
INSURANCE SECTOR IN KENYA**

BY

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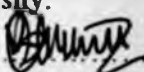
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DECLARATION

This research project is my original work and has not been presented for a degree in any other University.


Signed 

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This proposal has been submitted for presentation with my approvals as University Supervisor.

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DEDICATION

I would like to give a special consideration to my Wife Rose and our Daughter Victoria for all their love and support. May God keep you and bless you.

I also dedicate it to my dear Mum Veronicah and the entire family for their encouragement, support and prayers.

ABSTRACT

The purpose of the study was to explore the adoption and impact of GPS technology on motor vehicle insurance in Kenya's insurance industry. The problem being addressed by this research was the increase in insurance losses as a result of theft of motor vehicle covered by insurance. The research was seeking to find out the use of GPS tracking a tool to reduce such losses. The objectives of the study are; to determine the extent to which GPS tracking technology has been integrated to motor vehicle insurance sector in Kenya, to establish the impacts of GPS tracking technology on insurance firms and to identify the factors affecting adoption of GPS tracking technology in the insurance industry in Kenya.

To achieve the objectives of the study, the researcher adopted a descriptive survey design and data was collected from respondents by use of questionnaires. The questionnaires were self-administered to the respondents who were selected employees of all the insurance companies offering motor vehicle insurance cover in Nairobi. Once the pertinent data was collected, the researcher carried out analysis of the same using descriptive statistics, regression and factor analysis. Where appropriate, the study results were presented in tables and graphs.

Findings of the study show that not all the insurance companies have adopted the use of GPS tracking technology. The study also clearly shows that even though some of the insurance companies adopted the use of GPS it is not fully utilized because it mainly targets trucks and lorries and not all types of vehicles.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Integration of information technology (IT) by organizations has been growing at a rapid pace. The use of the technology has evolved from the automation of structured processes to systems that are truly revolutionary in that they introduce change into fundamental business procedures. Indeed, it is believed that more than being helped by computers, companies will live by them, shaping strategy and structure to fit new information technology (Fortune, 1988). With the spread of global information and aggravation of business competition, companies try to provide customers with goods and services faster and cheaper than their competition. To a higher degree, they focus more on cost control. There is a need to increase productivity, save operational expenses, reduce delivery times, and cut down costs to deal with shorter product life cycles (Qingwei and Ziyao, 2010). The correct choice of an information system can provide a solution to such challenges and assist the organizations to cut down on costs. The Global Positioning System (GPS) is one system that can do this.

GPS is an information system that is rapidly becoming as much a part of our daily lives as the internet, and it is now being used to navigate and locate cars, commercial and private aircraft, military vehicles, ships, spacecraft, recreational vehicles, hikers, and wildlife (Nerem and Larson, 2001). Although much of its common application were consumer goods like cars, PDAs, cell phones and handheld navigation units, the technology is mature and is finding increasing use in business applications (Robb, 2006). The guaranteed accuracy of GPS signals has lifted the levels of uncertainty over the acceptance of commercial applications based on GPS technology.

1.1.1 GPS Technology

GPS is made possible by a group of satellites in earth orbit that transmit precise signals, allowing GPS receivers to calculate and display accurate location, speed, and time information to the user (Fuller& Melt, 2009). The concept of GPS came up during the Cold War between the United States, the Soviet Union and their respective allies, which witnessed a number of such technological advancements. It was initially meant for the operation within the U. S. military. But today, it is accessible to the public across the whole world. The public is allowed to use the Service without any charge or restrictions.

GPS is a Global Navigation Satellite System (GNSS) for location or position determination – so called ge positioning (Raper, Gartner, Karimi, & Rizos, 2007) Navigation satellites systems cover geographical locations all over the world. According to Brawn (2003) global positioning systems have been designed to determine the location of GPS navigation device. A GPS navigation device is any device that receives GPS signals for the purpose of determining the device's current location on Earth (O'Brien, 2010). GPS devices provide latitude and longitude information, and some may also calculate altitude. With the latitude and longitude information one can track the exact location and also compute velocity and time.

1.1.2 GPS in business

Even as businesses rapidly move to GPS tracking technology to help with daily operations, e.g. such as motor vehicle tracking, monitoring of employee, and theft prevention, we can only expect the use of GPS tracking to increase in the next coming years. As technology continues to evolve, GPS tracking devices will continue to decrease in size, increase in accuracy, and be utilized by even more businesses as a common, yet powerful tool (TTW, n.d).

GPS tracking systems are commonly used by business organizations for recovering stolen vehicles, fleet management, tracking of assets, field service management, field sales and Surveillance (Garmin, 2008). A vehicle GPS tracking system combines the installation of a GPS device in a vehicle, or fleet of vehicles, with purpose-designed computer software

at least at one operational base to enable the owner or a third party to track the vehicle's location (Thomas, 2009). This allows the management to monitor vehicle movement, operating status and monitor sales personnel daily travel. GPS vehicle tracking can make a serious difference when it comes to business because it allows a business owner or manager to be in a position to better keep track of company vehicles, employees and importantly monthly budgets, a GPS system can be a solution to high operating costs.

1.1.3 GPS tracking technology in Kenya

GPS tracking system that enables a car owner to monitor his vehicle full time from across the world has gained a lot of popularity in Kenya, because it is cheaper and can monitor vehicles anywhere in the world. Most Kenyan business owners have resolved to track trucks to increase productivity, and to find out possible options through which they can save money for example through reduction of truck vandalism and unauthorized transportation of goods (Mbogo, 2009). The major contributing factor to the growth in popularity of GPS tracking technology is the fact that GPS tracking devices available in the market nowadays, hence become more affordable and allow transport and logistics companies to save money in different areas, offering great return on investment (ROI), (Arora, 2012).

GPS car tracking is the most common form of tracking .It is the form of tracking that is generating the most interest largely because of the increasing number of car breaks and thefts. Motor vehicle theft in Kenya is on the rise, in the year 2010 there were 1365 vehicle thefts and in the year 2011 there were 1768 vehicle theft representing 30% increase (Kenya Police, 2011), this has made some of motor vehicle owners to install tracking devices in their vehicles.

The introduction of GPS tracking has allowed businessmen in Kenya especially the truck owners to keep track of their goods around the clock by a click of a mouse. With this technology businessmen can dare to expand their businesses to other countries that are considered "high-risk" within the trucking world. Before this technology came into being cargo could disappear not to be traced again. Now, technology has found a way to make trucks and goods safer irrespective of their location.

Tracking also has not only benefited the transport sector in Kenya but has also contributed a lot to wildlife sector. In 2005 GPS tracking technology was used to follow Marsabit elephants and track their behavior in the forest. This technology was able to show the researchers that elephants spend a very limited amount of time in the forest and use only a small portion of the mountain where they live to graze (Ngene et al, 2008).

1.1.4 Insurance industry in Kenya

The concept of insurance and especially the “social insurance programme” handling socio-economic issues is not a new thing in Africa it has been there for a long time (Kenyatta, 1962). Community members used to create a “social insurance fund” by pooling resources together. The “premiums” contributed by the members were material, moral support and/or other payments in kind. From the contributions indemnity was to be given to members in case they lose their property or suffer any peril (Azevedo, 1993).

Commercial insurance came into being when Kenya was conceived as a nation by British colonies before independence (Throup, 1988). Investments made by the white settlers needed some form of protection against various risks and exposures. This was an opportunity to British insurers which saw them establish agency offices to service the colony’s insurance needs. These agency networks were later transformed to branch networks with more autonomy, and expertise to serve the growing insurance needs. Most branches had been transformed to fully pledge insurance firms by the time Kenya attained independence in 1963 (Maxon, 1993). Over forty years later after independence, Kenya’s insurance industry has grown massively. By the year 2010 there were 45 registered insurers, 20 doing general insurers, 8 long term insurers and 17 composite (both life and general) insurance. The largest 10 insurers handle over 70% of the motor business with a similar number handling well over 90% handling property business (AKI, 2011).

Most insurance companies recorded underwriting losses in the year 2006. Sixteen general insurance companies had an underwriting profit but only four life insurance companies recorded an underwriting profit. The overall underwriting loss for the industry was Kshs 1.23 billion with general insurance recording an underwriting profit of Kshs 0.58 billion while life insurance recorded an underwriting deficit of Kshs 1.81 billion. Insurance

companies rely heavily on earnings from investment income. The insurance earnings from investment were Kshs 14.42 billion which mitigated an otherwise undesirable situation resulting in a gross profit of Kshs 5.8 billion in 2006 compared to Kshs 4.32 billion in 2005 (AKI, 2006). The losses are mainly attributed to the net claims made by the insured clients, which are quite high in the insurance industry. The insurance industry incurred net claims totaling Kshs 40.07 billion in 2010 compared to Kshs 30.66 billion in 2009, representing an increase of 30.7% (AKI 2011). With such a growing trend insurance sector face a big challenge of trying to reduce such costs on the insurance claims and maximize on the returns.

Loss ratio is the ratio of total losses incurred (paid and reserved) in claims plus adjustment expenses divided by the total earned premiums (Robinson, 1997). The loss ratio for Motor private has maintained a big ratio of over 74% in the last five years and for Motor commercial the loss ratio has been increasing steadily for the past five years (AKI, 2010).

Motor vehicle insurance is classified as general insurance and is meant to cover cars, trucks, motorcycles, and other road vehicles against physical damage and/or bodily injury resulting from traffic collisions and against liability that could also arise therefrom. In Kenya it is compulsory to have vehicle insurance before using a motor vehicle on public roads, which exposes insurance companies who offer insurance cover and GPS can come in place to limit some of the exposure e.g. car theft.

1.2 Statement of the Problem

This research focused on the integration of Global Positioning Systems (GPS) to business as an IS technology and its impact on the business. Goldberg (2010) argues that adoption of an information system by organizations has three implications on costs. First adopting and information system can be costly in that it is time consuming to implement a new system, labour intensive and requires a lot of capital. Secondly IS can lower operating costs by eliminating redundant efforts by sharing information across functional areas. Thirdly IS can increase profits by pulling together information, this will help in identifying ways of improving products and expand the customer base. The second and

third cost considerations show that in the long-run, the costs of not adopting IS can far exceed the costs of adopting and implementing a system (Goldberg, 2010).

Insurance companies in Kenya in the past have been suffering losses and continue to suffer losses due to theft and loss of insured property. In the early 1980's most motor claims involved accidental damage and liability claims, while theft claims formed a relatively small percentage of the total claims bill. The theft of motor vehicles was minimal and claims made were for stolen accessories. However towards the end of 1980s theft claims assumed greater percentage and particular types of vehicles appeared as the target such as luxury 4 wheel drive vehicles. Come the 1990s the situation has become more serious with all makes of vehicles at risk (LIC, 2009). In the year 2009 statistics by Association of Kenya Insurers (AKI) indicate that the total claims including theft claims paid by the industry under the motor class of business were a whopping Kshs.10 billion (AKI, 2011).

GPS tracking device may come to the rescue to this situation of car theft in Kenya by lowering the risk of losing a vehicle and accelerating recovery should a loss or theft attempt occur. According to Neely (2009) GPS tracking device makes most insurance companies almost virtually guaranteed of a recovery if it is stolen. Insurance companies can lower premiums to help encourage this type of effort to protect assets.

Many studies for example Adoptability Issues of GPS in Public Sector in Pakistan (Tanvir & Rafaqat, 2011), Integrating GPS Technology (Haghighat, 2008) and Enhanced Functionality of GPS-Integrated Systems in Agricultural Machines (Sanchez & Heun, 2012), have been done on GPS technology with focus on technical issues regarding GPS, rather than on the application of knowledge and application of tracking technology. Although a few of the insurance companies in Kenya are beginning to embrace the GPS technology, little or nothing has been researched on GPS as cost control measure in the insurance business. The study therefore attempted to investigate GPS tracking technology integration as a cost control measure by motor vehicle insurance sector in Kenya.

1.3 Objectives of the Study

- i. To determine the extent to which GPS tracking technology has been integrated to motor vehicle insurance sector in Kenya.
- ii. To establish the impacts of GPS tracking technology on insurance firms
- iii. To identify the factors influencing adoption of GPS tracking technology in the insurance industry in Kenya.

1.4 Importance of the study

An investigation of GPS tracking technology integration as a cost control measure by motor vehicle insurance sector in Kenya will benefit the following groups;

This study will be of critical importance to the management of insurance industry. Today's turbulent environment with fast changing technologies requires adoption of cost control measures and especially in insurance sector which cuts across almost every business world. The current research project work will be useful as a reference to building and create ideas on cutting on cost, reducing on losses and attracting customers.

The policy makers will find the findings of this study useful for future decisions regarding adoption of new technologies, particularly GPS technology, and further come up with ways of minimizing risks and promote effectiveness.

Researchers will also benefit from this study as it adds to their knowledge GPS in the Kenyan context, impacts of GPS to organization and challenges of implementation. The findings will also open up new areas for research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter is concerned with the review of literature related to the study. It summarizes the information from other researchers who have carried out their research in the same field of study and other existing literature by scholars. The literature review will help in understanding what other related studies have found out and suggested in their recommendations. This section further presents the conceptual framework that shows variables to the study.

2.2 Information systems and Organizations

Information Technology (IT) has been widely applied across many sectors in order to increase competitiveness and reduce costs (Marsh and Flanagan, 2000), and is today seen as a vehicle to gain a competitive advantage (Ives & Jarvenpaa, 1991, Earl 1993). The contribution of information technology and its impact on the organization is emphasized by Nadler (1992), by pointing out that perhaps the largest single influence on organizational architecture and strategy has been the advancement of information technology. Information technology undoubtedly has its place among the vital elements which shape an organization. The formal structure or arrangements inside an organization have been affected by technology through changes in factors such as job design, physical outline or location, supervisory relationships and autonomy, cooperation inside and outside the organization, and establishment of work teams (Gerstein, Nadler and Shaw, 1992).

Generally implementation of information systems and technology can be an advantage to an organization and be part of a transformation that results in radical improvement; however it also has some drawbacks associated with it. These disadvantages can be categorized as behavioral and non-behavioral. With non-behavioral there are potential problems with the networks that would be established to allow information to flow. First of all as the number of users increase, there will be strain on the system and also difficulty to monitor users' activities. Secondly systems that cross organizational

boundaries lead to utmost level of outsourcing or collaborating design efforts, which are potentially risky as related companies can gain access to sensitive information using it to the disadvantage of the outsourcing company (Friedmann, 1994).

The behavioral disadvantage revolves around two major themes. One is that people and organizations tend to castoff new technology because they are reluctant to change. For this reason it is significant that technology change come about as part of accompanying change in the organizational practices and culture. It is also essential to incorporate organizational learning in to the acceptance of information technology (Seybold, 1993). The second theme concerns employee involvement in the change and the resulting job satisfaction. If it is not viewed as part of an overall transformation, the addition of technological process improvements or information systems which on the surface take away human responsibility is likely to lead to job dissatisfaction (Alexander, 1977). The bottom line is that as good as technology may be, it cannot act alone as a cure-all to improve organizational effectiveness.

2.3 Global positioning system (GPS)

GPS is a satellite based navigation information system that provides the location, direction and speed of a vehicle anywhere on the globe. Unlike cellular communications, that often experience dead spots, GPS receivers and satellites are capable of maintaining strong locks, even in regions with dense foliage or urban settings with tall building (Taylor and Bogdan, 2007). With the aim of understanding the relationship between GPS and Geographic Information System (GIS), Guo, Polling and Poppe (1996), affirmed that liaison between both systems. GIS is an information technology that analyzes, store and displays both spatial and non-spatial data. It combines the power of relational database software and power of a Computer-aided design (CAD) package. It offers the potential to assemble and process data from diverse sources and present it in an easily understood graphical format. GIS are recognized as a very useful too in transportation planning, engineering and management. On the other hand GPS is a positioning and a navigation system.

A GPS receiver receives the signal broadcast by satellites and uses information contained in the signal to calculate the position of the receiver. Guo, Polling and Poppe (1996) affirms that the positional accuracy that can be achieved with GPS ranges from 100 meters to millimeters, depending on the type of receiver used and if the data collected are differentially corrected either in real time or in a post process fashion. This space-age technology has found a variety of applications in natural resource management, urban development/analysis, agriculture, and social sciences. For the past several years, Guo, Polling and Poppe (1996) have been actively exploring these new technologies in solving a variety of transport problems. He concluded that the GIS/GPS experiences can be summarized into three general types of applications, GPS as a data collection device, GIS as transportation database manager and GPS as a traffic guide.

2.3.1 GPS Functionality

In recent years, GPS have improved in their level of performance and functionality in part because new GPS receivers can track satellites not only from the 32 NAVSTAR satellites of the United States but also from the Russian GLONASS consisting approximately 24 satellites systems (Sanchez and Heun, 2012). Sanchez and Heun (2012) anticipate that even higher levels of performance will be achieved when the Galileo satellite constellation by the European Union becomes available in 2014 with an initial operating capacity of 18 satellites and expanding to 30 satellites by the year 2020.

Over the years, the technology in manufacturing an automobile has become more advanced, as automakers shift their focus from basic transportation to the design of features that make a vehicle safer, more comfortable and more easily operated. One such feature is the GPS (Cao-Hsu, 2002). According to Cao-Hsu (2002), when installed in a vehicle or a car, a GPS unit can provide useful information about the vehicle's position and the best travel routes to a given destination by linking itself to a built-in digital map. A monitor in the vehicle shows the relevant portion of the map. The driver can enter the target location, and the computer will calculate the optimal route and display it instantly. It can respond to user preferences and map a route that avoids highways or avoids local roads. If a map is detailed enough, it will also provide the locations of the nearest gas

station, supermarket, restaurant, hotel or even ATM machine. Some GPS units can issue auditory directions to guide drivers as they travel.

GPS also tracks the distance travelled on per trip, speed and vehicle mileage. It can record a driving activity, including the address of each destination, the names of the streets the vehicle went through, and how long the vehicle remained at each location, which allow owners to monitor the use of the vehicles by their drivers. Some systems issue warnings when the vehicle is speeding and when the vehicle is approaching a speed trap (Cao-Hsu, 2002). In addition to these applications, GPS is being used by commercial shipping companies to speed the delivery of cargo (Cao-Hsu, 2002). It allows companies to track their fleets, record the movements of their trucks, and control route planning. Besides the car rental companies also can equip their cars with GPS technology to find stolen rental cars and charge.

It is also clear that GPS will continue to have a great impact on production agriculture. According to Sanchez and Heun (2012), Vehicle guidance or automatic steering control has been adopted GPS technology among growers in the last five years. Every year new and improved navigation systems become available with a range of precision capacities to fit most mechanical operations and with new functional capabilities.

2.4 Insurance Business

The desire of human beings to be secured against uncertainties is as old as mankind, and evolving along with stages of human and socio-economic development. Human beings strive for security against uncertainty, as initially witnessed by helping one self, and then by establishing the family, tribe, associations, and then community and society. The idea of “one for many and many for one” is the basis for the emergence of insurance concept (Swiss Re, 1996). Insurance is a mechanism of the spread of financial loss through the pooling of risks whereby the losses of the few are borne by the many (UNCTAD, 2007).

From 1997 to 2009 insurance companies globally have not be doing well in overall. However in the year 2010, according to Swiss Re’s latest, “World insurance in 2010” sigma study things have changed. Table 2 clearly shows that the world insurance

premium volume increased 2.7% on an inflation-adjusted basis and life premiums rose by 3.2%, non-life by 2.1%. Premium growth in emerging markets accelerated. The industry's capital and solvency improved, while low interest rates weighed on investment income.

Table 2: Real Premium Growth

	Life	No n – Life	Average Growth
Industrialized countries	1.80%	1.00%	1.40%
Emerging markets	13%	8.50%	11%
World	3.20%	2.10%	2.70%

Source: Swiss Re - Sigma 2/2011

Despite this growth in premium, underwriting results deteriorated by most in the US and turned negative in large European markets, in the latter case due to dismal motor results. In most markets, premium income did not fully cover claims payments and other costs for the second year in a row. “The average combined ratio of the leading markets worsened to 103%, compared to 101% in 2009. This indicates that prices are inadequate. In some markets, such as Italy and the UK, rates began to mount, most notably in the personal motor business, signaling that the underwriting cycle is at long last beginning to turn.

It's evident that motor vehicle insurance remains an impediment to profit maximization by insurance companies. According to Makove (2011), the motor vehicle and medical classes of insurance made underwriting losses of Sh912.6 million and Sh529.9 million respectively last in the year 2011 in Kenya, pulling down the profitability of the insurance sector in which all the other 11 classes made profits. Affordable educators (2011), argues that for an insurance company to reduce on losses it has to adopt some strategies i.e. risk

management, safety management, increase efficiency, increase efficiency, crisis management, safety awards, staff training and agent training.

2.5. GPS adoption and use in insurance

GPS tracking technology has been adopted by insurance companies in USA, with most of the insurance companies giving discounts to their clients for installing such gadgets in their vehicles. According to Yvkoff (2011), the installation of a GPS system may qualify a client an insurance discounts ranging from 5-33% in the USA. Some states have mandated anti-theft device discounts. These states include Texas, Rhode Island, Pennsylvania, New York, New Mexico, New Jersey, Minnesota, Massachusetts and Illinois. Each insurance company has a set of criteria that will determine the discount level. Yvkoff (2011) further points out that, most insurance companies in USA use the GPS device to monitor driving habits if it complies with insurance regulations, to determine eligibility for discounts and not to set or increase rates. These developments show that insurance companies are looking to technology for more driver data and as a way to provide incentives rather than penalties to encourage safe driving.

Insurance businesses are always on the lookout for techniques to improve their business. They are most exposed when they insure assets such as motor vehicles, since they lose their value quickly and are every so often targets of thieves because of their mobile nature. It makes good sense for insurance companies to embrace GPS Tracking systems and require installation of them where they can. Neely (2009) pointed out that benefit from GPS tracking is the lowering insurance risks. He said that insurance companies are all about reducing their risk because the lower their risk, the higher their profits. When customers install GPS Tracking devices into their vehicles it renders them traceable from virtually any point above ground. This means that even if the vehicle is stolen, chances of getting it back are almost one hundred percent. That means that risk is reduced.

Neely (2009) also argues GPS tracking systems also assists insurance companies to recover Stolen items. Should a client's vehicle ever become the target of thieves, you can get it back sooner. Working with local police in providing location information, they can respond to the place where the vehicle is located quickly and even if the vehicle is on

transit, they can be provided with the coordinates so that they can intercept it. This helps make sure that the vehicle does not end up in pieces on a chop shop floor. Or, that the vehicle is trashed and damaged beyond repair.

GPS tracking also offers the insurance industry an opportunity to protect its investment. Insurance companies make an 'investment' if a client declares the value of the vehicle when insuring it against loss. GPS Tracking aids to protect that investment which helps those who are the owners to retain their value in the vehicle (Neely, 2009).

2.6 GPS utilization success and hindrances

In the year 2011, jewelry insurance claims increased by four percent to 17 percent, while electronic insurance claims decreased by two percent to 13 percent, both of which were ordered by dollar value as a percent of total value. One factor that may be coming into play with respect to insurance claims is a rising number of electronic gadgets are equipped with GPS tracking technology. On an increasing basis, law enforcement have been able to track down thieves of iPads and smartphones through the use of GPS tracker integrated into the device or through a GPS tracking application. Even individuals who have lost their device have been able to find it on their own through integrated GPS technology. Either way, having the GPS tracking technology integrated into electronic devices has reduced insurances costs in terms of insurance claims (LVG, 2011).

Despite of all the benefits from GPS tracking technology discussed in the literature, Tanvir & Rafaqat (2011) in their study of adoptability issues in Pakistan concluded that the greatest obstacle in the way of GPS adoption is poorly planned government policies and lack of support from the private sector. Another factor that makes the issue even more complex is the general lack of awareness about the technology in the masses and inflated prices by the service providers due to few clients. As a consequence, mass acceptance in favour of this technology is also less

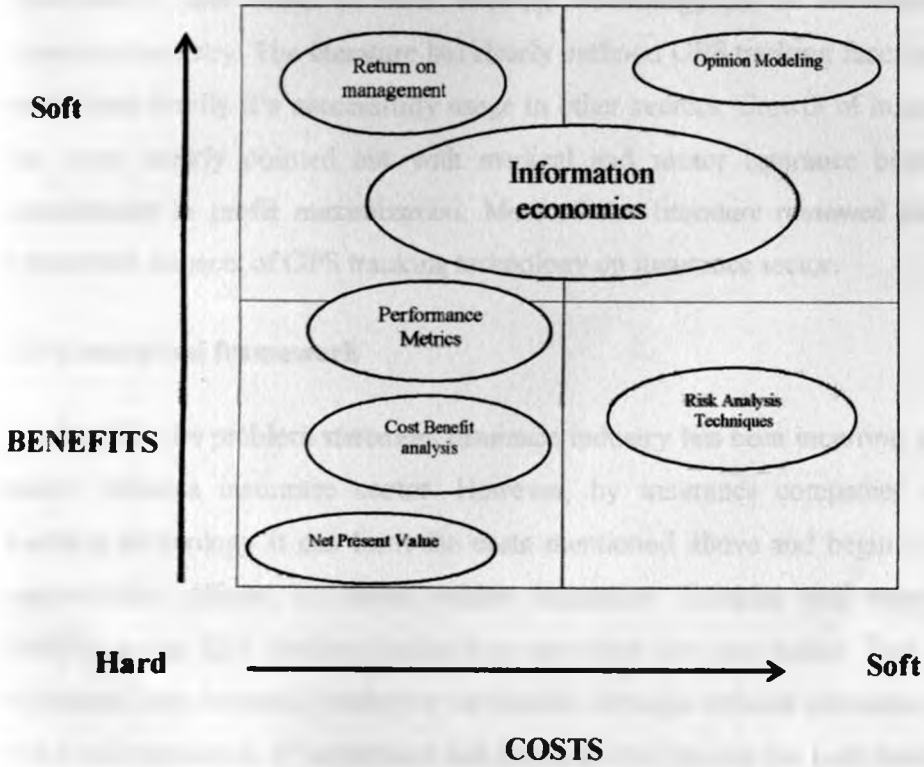
2.7 IT/IS Evaluation models

With increasing levels of IS/IT investments and the growing significance of information systems within organizations, IS/IT investments evaluation is becoming widely recognized as a very important activity. The measurement of the business value of IS/IT investment has been the subject of considerable debate by many academic and practitioners (Weill and Olson, 1989). The difficulties in measuring benefits and costs are often the cause for the uncertainty about the expected benefits of IS/IT investments and hence are the major constraints to IT/IS investments. Organizations seeking value for money in IS/IT investments have spent a lot of energy, time and money that has largely gone to waste. Therefore evaluation is often ignored or carried out inefficiently or ineffectively because of its elusive and complex structure. The traditional financially oriented evaluation techniques can be problematic in measuring IS/IT investments (Kumar, 1998). The problems with these methods are that they largely exclude the significant problem of risk as well as cost and benefits that may be difficult to quantify. Those benefits which are intangible or soft appear to be written off as unquantifiable and thus beyond an effective measurement technique (Sutherland, 1994).

As a result of evaluation gaps from traditional financial methods, several methodologies have been formulated by different scholars. SESAME methodology developed by IBM is a method which provides a more flexible approach to cost/benefit analysis. This model suggests that the cost and benefit of an IT-based system are compared against an equivalent manual system. This method bases much of the assessment on user opinion, which may involve users more in the process of assessment (Willcocks, 1992).

Another model in use is Matching Objectives, projects and techniques methods by Butler Cox Foundation (1990) which basically attempts to match the IS/IT projects with appropriate techniques of measurement. It proposes the appropriate techniques to measure the benefits associated with a certain cost depending on the complexity of the cost or benefit.

Figure 2.7: Matching Projects to Techniques



Source: Butler Cox Foundation, 1990

Other methods of evaluating IT are Return on management (ROM) by Strassman (1990) is another model that attempts to measure performance based on the added value to an organization provided by management, and Information economics approach by Parker et al.,(1988) which attempts to identify and measure or rank the economic impact of the changes brought about by the introduction of the new system on an organization's performance.

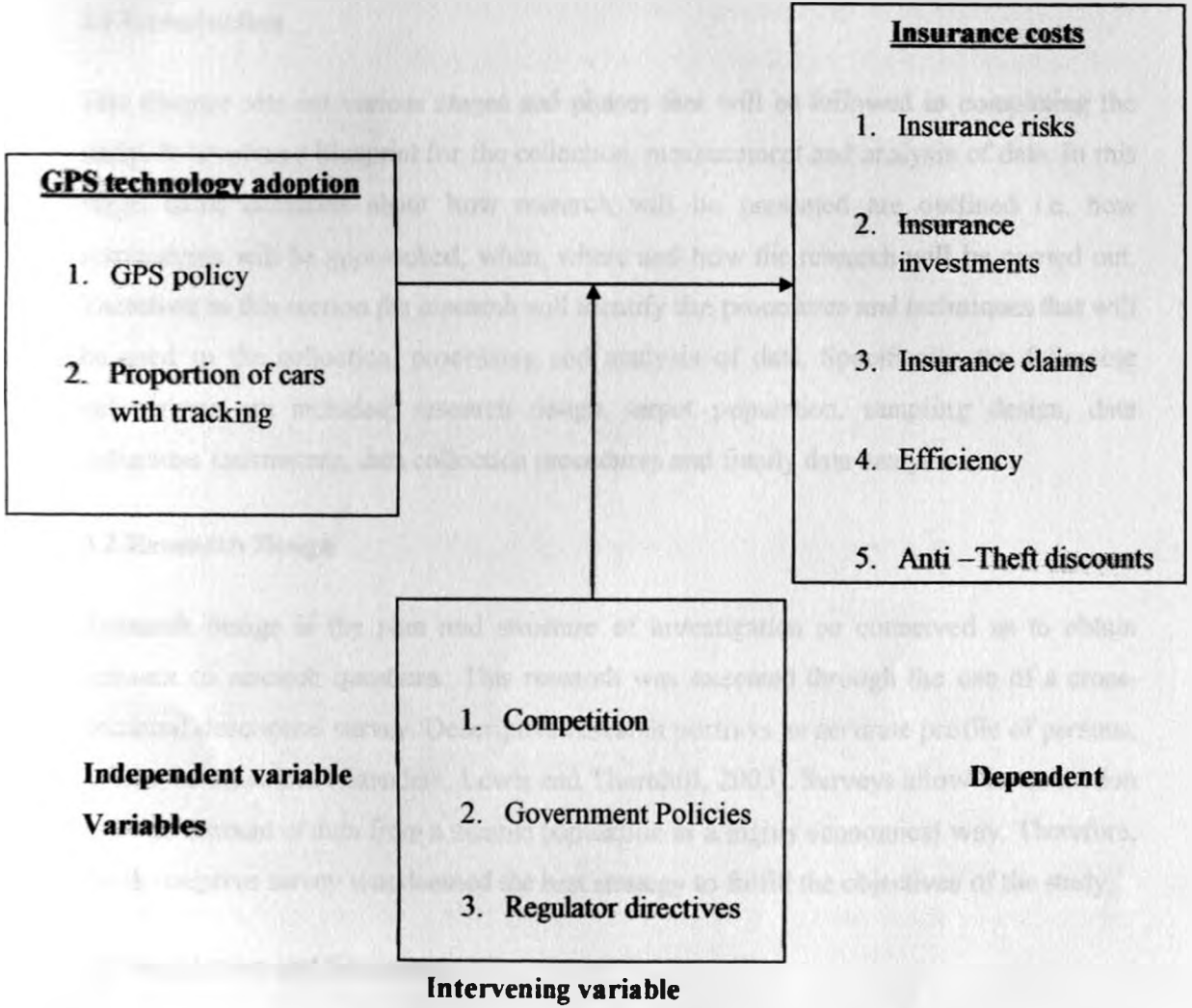
2.8 Summary

The literature review covered usage of IS/IT in an organization and its impacts as well as functionality and usage of GPS tracking technology as an information system in insurance industry. The literature has clearly outlined GPS tracking functionality and also mentioned briefly it's successfully usage in other sectors. Growth of insurance overtime has been clearly pointed out with medical and motor insurance being depicted as impediment to profit maximization. Most of the literature reviewed has shown well researched impacts of GPS tracking technology on insurance sector.

2.9 Conceptual framework

As stated in the problem statement insurance industry has been incurring a lot of costs in motor vehicles insurance sector. However, by insurance companies adopting GPS tracking technology it can limit the costs mentioned above and begin to harness huge opportunities offered by motor vehicle insurance. Tracking and recovery of motor vehicles using GPS tracking technology can solve the cost issues. This therefore, will culminate into increased customer satisfaction through reduced insurance rates, reduced risks and protection if investment and hence greater profits for both insurance industry and motor vehicle sector through reduced costs. These results are the dependent variables captured by the conceptual framework below:

Figure 2.8: Conceptual framework



Source: Author

Hypothesis

H1: GPS adoption has impact on insurance costs

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out various stages and phases that will be followed in completing the study. It involves a blueprint for the collection, measurement and analysis of data. In this stage, most decisions about how research will be presented are outlined i.e. how respondents will be approached, when, where and how the research will be carried out. Therefore in this section the research will identify the procedures and techniques that will be used in the collection, processing and analysis of data. Specifically the following subsections are included; research design, target population, sampling design, data collection instruments, data collection procedures and finally data analysis.

3.2 Research Design

Research design is the plan and structure of investigation so conceived as to obtain answers to research questions. This research was executed through the use of a cross-sectional descriptive survey. Descriptive research portrays an accurate profile of persons, events, or situations (Saunders, Lewis and Thornhill, 2003). Surveys allow the collection of large amount of data from a sizable population in a highly economical way. Therefore, the descriptive survey was deemed the best strategy to fulfill the objectives of the study.

3.3 Population and Sampling

The population of study consisted of all the 37 Insurance companies who are members of the Association of Kenya Insurers (AKI) and offer motor vehicle insurance cover as a product (Appendix I). The study was a census survey targeting claim managers, IT managers and Strategy planners of the 37 insurance companies in Kenya offering motor vehicle insurance cover. These groups of executives were important to the study as they provided provide needed information regarding the costs incurred by motor vehicle insurance and also had some idea on GPS tracking technology.

3.4 Data Collection Procedures and Instruments

The study used primary data which was collected using a self-administered structured questionnaire (Appendix II) served on respondents. The first stage entailed completion of the Questionnaires administered to the 37 insurance companies. The Questionnaire used consisted of four sections.

Section A: Was seeking general information about the organization, and the respondent.

Section B: Sought to determine extent to which GPS tracking technology has been integrated to motor vehicle insurance industry.

Section C: Examined the impacts of GPS tracking technology on insurance firms.

Section D: Identified factors influencing adoption of GPS tracking technology.

3.5 Data Analysis

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 17 and content analysis to assist in summarizing the findings. The data was analyzed, summarized in tables and presented using charts according to the sections of the questionnaire: Section A which includes general information about the organization and the respondent, the responses was shown as a percentage of each factor and descriptive analysis used to interpret the results.

Section B consisting of the extent to which GPS tracking has been adopted by insurance companies and the evaluation of impacts of GPS tracking technology on insurance firms as a cost control measure. Regression analysis was used to test the correlation between costs and GPS use. For Section C and D, cumulative table will be used to sum similar responses. Data was then analyzed using descriptive statistics and factor analysis.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter deals with the analysis, presentation of data and discussion of the results. The data collected in this chapter was mainly analyzed mainly using content analysis, descriptive statistics and factor analysis. A total of 37 questionnaires were distributed to claim managers, underwriting managers, and IT managers of the 37 insurance companies offering motor vehicle insurance cover.

4.2 Response Rate

Of the 37 questionnaires sent to the sampled subjects, 32 were filled and returned which translate to 86% response rate. This response rate is above 70% hence considered to very good according to Mugenda and Mugenda(1999).

4.3 General Information

This section entailed gathering general information about individual and the organization.

4.3.1 Respondents Position in the organization

Table 4.1 Respondent's positions in the organizations

<i>Position</i>	<i>Frequency</i>	<i>Percent</i>
IT Manager	7	22%
Claim Manager	15	47%
Strategy Planner	1	3%
Support manager	1	3%
Underwriting Manager	8	25%
Total	32	100%

Finding represented in table 4.1 indicates that 47% of the respondents were claim managers, 25% were underwriting managers and 22% are IT managers. This is an

indication that the respondents were well versed with the study in question and hence the correctness of the information is high.

4.3.2 No of years worked for the organization

Figure 4.1 No of years worked

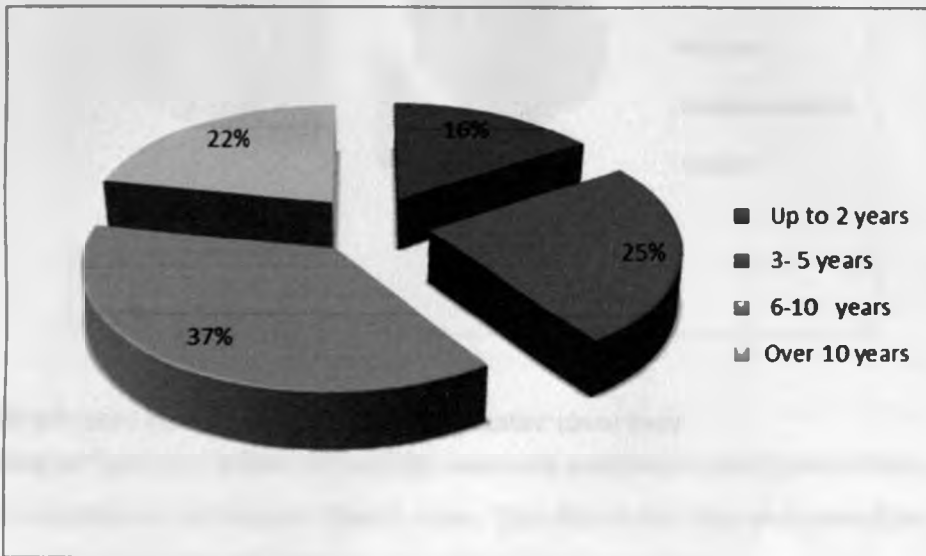
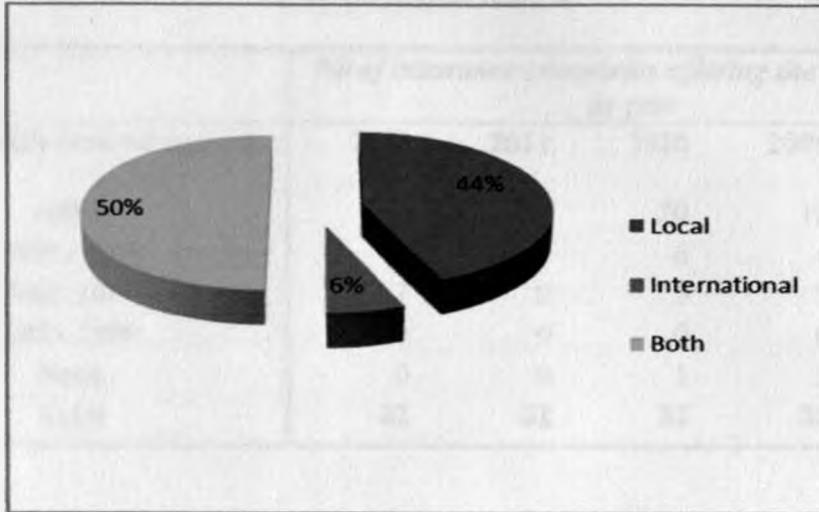


Figure 4.1 above show that 74% of the respondents have worked in their organizations for more than 3 years, with 22% having worked for over 10 years, 37% for 6-10 years, 25% for 3-5 years and 16% for up to 2 years. This shows that most of the sampled subjects are aware of the organizational practices on motor vehicle insurance.

4.3.3 Ownership of the company

Figure 4.2 below presents 50% of the insurance companies are owned by both local and international investors, 44% of the insurance companies are owned by local investors and only 6% are owned by international. This shows that 94% have local owners who understand the local market.

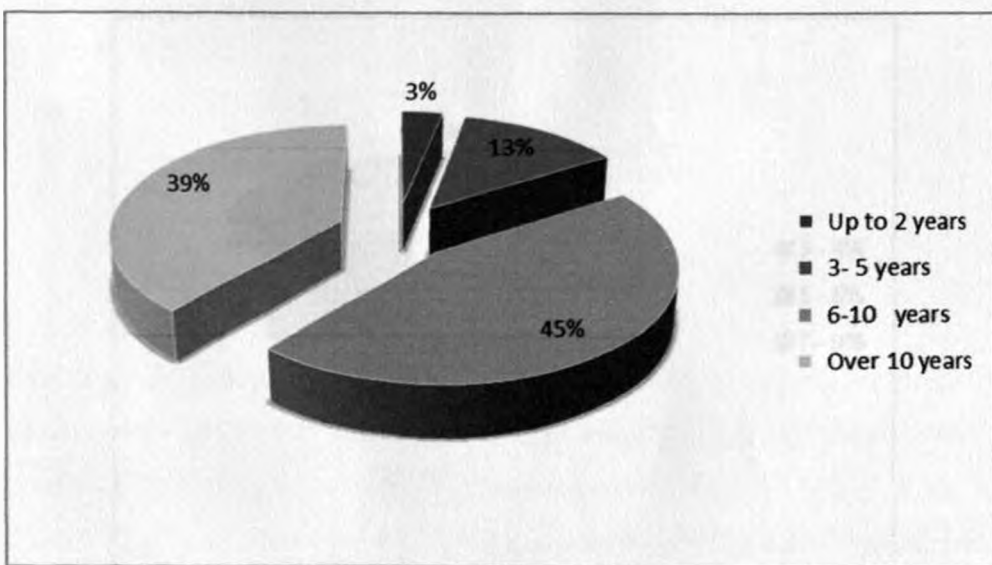
Figure 4.2 Ownership of the company



4.3.4 No of years the company has offered motor insurance

According to figure 4.3 below, 84% of the insurance companies have been offering motor vehicle insurance cover for more than 6 years. This shows that they understand the market trends and dynamics of the motor vehicle insurance sector.

Figure 4.3 no of years insurance cover offered



4.3.5 No of vehicles covered against theft

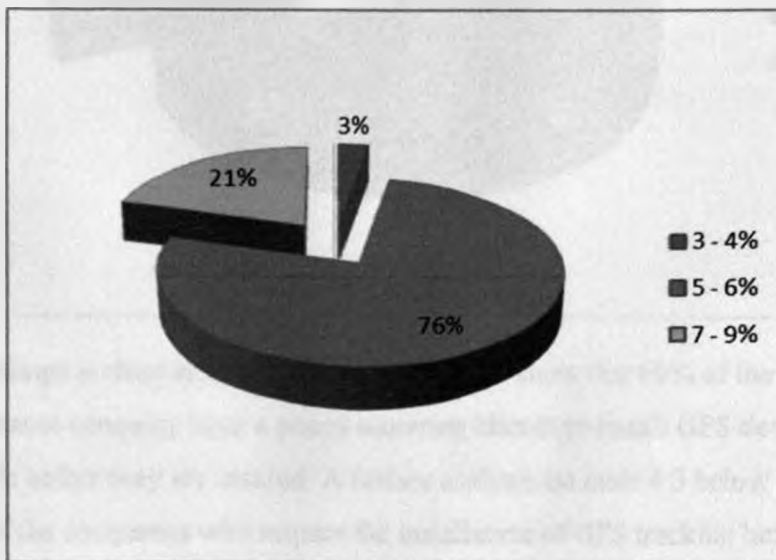
Table 4.2 vehicle insured

No of vehicles covered against theft	No of insurance companies offering the cover year by year				
	2012	2011	2010	2009	2008
>5000	25	21	20	18	19
1500 - 4999	6	11	6	4	1
500 - 1499	1	0	5	7	2
500 - 1499	0	0	0	0	7
None	0	0	1	3	3
Total	32	32	32	32	32

Findings represented in table 4.2 indicate that there is an increasing trend of the number of vehicle covered per year in the insurance industry for the last five years. About 78% of the insurance companies cover more the 5,000 motor vehicle. Most of the insurance companies have been covering vehicles in two ranges, 1500-4999 and >5000 per insurance company per year for the past five years.

4.3.6 Premium rates

Figure 4.4 premium rate



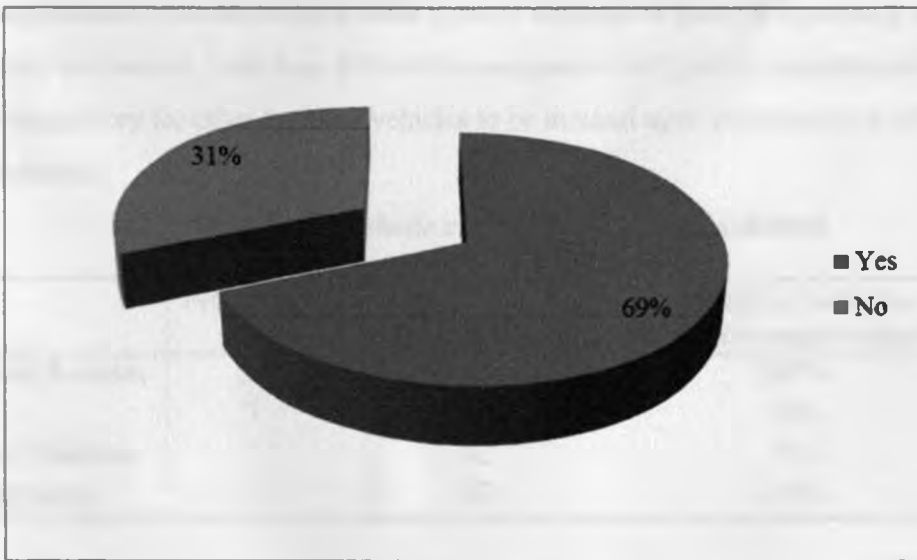
Findings presented in figure 4.4 shows that 76% of the motor vehicle insurance companies offer 5-6% premium rate to clients who take comprehensive insurance cover, while 21% offer 7-9% and 3% offer 3-4%.

4.4: Extent of integration of GPS tracking technology in motor vehicle insurance industry

The study sought to determine the extent to which GPS tracking system has been integrated to insurance companies. Respondents were therefore asked six questions in this section to evaluate the extent of integration.

4.4.1 GPS policy requirement

Figure 4.5 policy requirement



Research findings as displayed in the figure 4.5 above show that 69% of the motor vehicle insurance company have a policy requiring clients to install GPS device on their motor vehicle before they are insured. A further analysis on table 4.3 below on the ownership of the companies who require the installation of GPS tracking before insuring show that 100% of the international insurance owners have made it mandatory to install a

car track system before the car is insured, 69% of local insurance owner have made it a requirement whereas 64% of companies owned by both local and international investors have made it mandatory.

Table 4.3 policy acceptance

	<i>Yes</i>	<i>No</i>	<i>Total</i>	<i>Percentage of acceptance</i>
Local	11	5	16	69%
International	2	0	2	100%
Both	9	5	14	64%
Total	22	10	32	69%

Research finding further show that the policy requirement set by the insurance companies mainly targets the trucks and Lorries. Table 4.4 below show that 100% of companies with policy requirements make it mandatory for trucks and Lorries to have GPS installed before they are insured. It further shows that some insurance companies who have the policy requirement does not require other types of vehicles to have GPS tracking installed before they are insured. Less than 20% of the companies with policy requirements have made it mandatory for other types of vehicles to be insured upon installation of GPS tracking device.

Table 4.4 Types of vehicle recommended for installation

	<i>Frequency</i>	<i>Companies with policy requirement</i>	<i>Percentage of vehicles over policy requirement</i>
Trucks & Lorries	22	22	100%
Buses	3	22	14%
Taxis & Matatus	1	22	5%
Personal cars	4	22	18%

4.4.2 No of year insurance companies have been using GPS and number of vehicle installed.

The respondents were asked to indicate by ticking the number of years they have been using GPS and number of vehicle fitted with GPS in the past 5 years, the finding were summarized in the tables below

Table 4.5 Insurance companies with GPS tracking

<i>No of years used</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Cumulative percentage</i>
2 - 3 Years	3	9%	9%
4 - 5 Years	11	34%	44%
> 6 Years	8	25%	69%
Not used	10	31%	100%
Total	32	100%	

From the finding in table 4.5 above show that 69% of the insurance companies have been using GPS tracking system for more than 2 years whereas 31% have not integrated GPS tracking technology to their insurance product.

Figure 4.6 Vehicles fitted with GPS

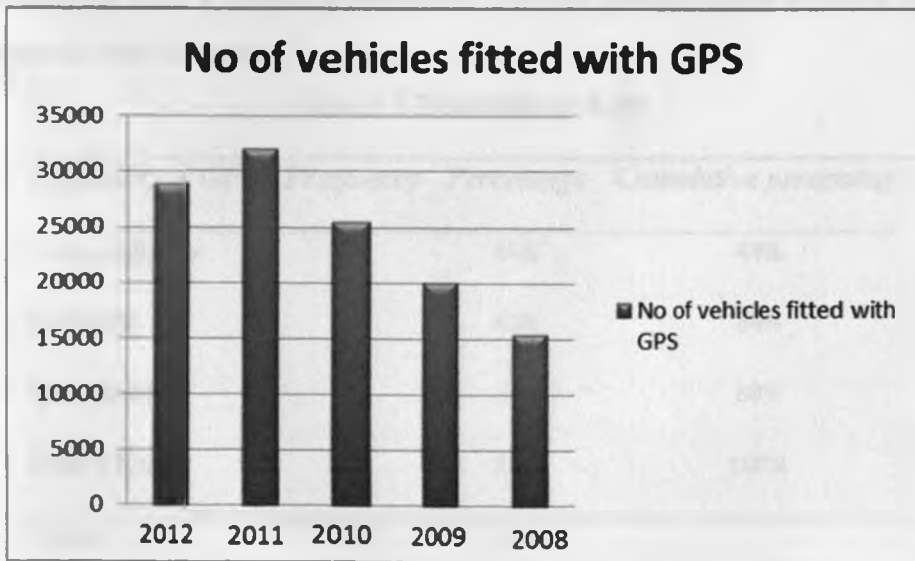


Figure 4.7 above show that GPS use in the insurance company has been growing in the past five years. The highest number of cars fitted with GPS was in the year 2011. This shows that most of the insurance companies are beginning to embrace GPS tracking technology

4.4.2 Incentives and reliability of GPS

The respondents were asked to indicate by ticking the incentives that is being offered by insurance companies that they work for. They were also requested to give their opinions on the reliability of GPS. The outcomes are presented in the tables below

Table 4.6 GPS incentives

<i>Incentives offered on Installing GPS</i>	<i>No of insurance offering</i>
Excess charges waiver	22
Free personal accident cover	8
Premium Discount at	6

Findings of the research show that most of the insurance companies offer incentives for customers who install GPS tracking on their motor vehicle. All the 22 insurance companies who confirmed that have GPS policy give excess charges waiver to clients who install GPS. Only 8 insurance companies give free personal accident cover and 6 give premium rates discount.

Table 4.7 Reliability of GPS

<i>Reliability of GPS</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Cumulative percentage</i>
Very reliable	14	44%	44%
Reliable	13	41%	84%
Unreliable	1	3%	88%
Don't Know	4	13%	100%
Total	32	100%	

Finding from table above show that 84% of the respondents accept that GPS is reliable in tracing stolen motor vehicles, out of this figure 44% accept that it is very reliable and 41% think that it is reliable. However there are there are 4 respondents constituting of

13% of the sample size who don't know and 3% who is for the opinion that it is unreliable.

4.5 Impacts of GPS on insurance industry

The respondents were to give their opinion on the impacts of GPS on the insurance industry. The range was 'strongly disagree' (1) to 'Strongly agree' (5).

Table 4.8 Impacts of GPS on Insurance

Impacts of GPS on insurance industry	Mean	Standard deviation
GPS use lowers the risks of losing an insured motor vehicle by enhancing ease of recovery	4.84	0.37
GPS assist the insurance industry to protect investments made as a result of declared value of a motor vehicle before insuring it against loss	4.69	0.64
GPS tracking use leads to reduced motor vehicle loss claims	4.56	0.72
The use of GPS tracking technology reduces investigation costs in vehicle loss cases	4.47	0.51
GPS use leads to reduces insurance rates in the insurance industry	4.41	1.16

According to the results in table 4.8 above, most of the respondents agree with the impacts of GPS tracking. These factors describe instances where the level of acceptance is very important and their acceptance rating (mean 4.83 for GPS lower insurance risks, 4.69 for GPS protects investment, 4.56 for GPS reduce claims, 4.47 GPS reduces investigation costs and 4.41 for GPS reduce insurance rates) indicate the factors are very impactful and agreeable be respondent.

Table 4.9 Vehicle recovered

No of vehicle recovered	<i>No of insurance companies that recovered the vehicles year by year</i>				
	2012	2011	2010	2009	2008
0	0	0	1	2	8
1-49	13	8	16	16	10
50-199	10	15	7	2	2
200-1000	2	2	0	2	2
Blank	7	7	8	10	10
Grand Total	32	32	32	32	32

Table 4.9 above show that most of the cars recovered in the last five years reveal that most of the cars recovered as a result of GPS tracking technology lies in the range of 1-49 and 50-199, with a few cars being recovered under the range of 200 – 1000. In the year 2008-2010 some insurance companies reported no recovery of the lost car through GPS tracking technology.

Table 4.10 GPS as a cost control tool

<i>Influence of GPS as a cost control tool</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Cumulative percentage</i>
Extremely significant	7	22%	22%
Very significant	16	50%	72%
Significant	8	25%	97%
Not significant	1	3%	100%
Total	32	100%	

Finding on table 4.10 above reveal that most of the respondents agree that GPS can be a very influential tool in cutting down on insurance costs. 22% of the respondents concur that GPS is extremely significant tool in cutting costs, where as 50% agree that it is very significant, 25% accept that it is significant and 3% saying that it is not significant.

4.6 Factors influencing adoption of GPS tracking technology

Factor analysis was carried on the questionnaire response on factors influencing adoption of GPS tracking technology in the insurance industry.

4.6.1 Factor Analysis

Factor analysis was performed using a Principal Component Analysis (PCA) alongside with Varimax with Kaiser Normalization rotation method until the Eigen value of each factor was equal to 1 or more

Table 4.11 Communalities

	Initial	Extraction
Client complaints on high cost of installing GPS system	1.000	.863
Efficiency of the Tracking system	1.000	.826
Lack of government polies that support the adoption	1.000	.824
Incentives given to clients who install GPS	1.000	.822
Organizational structure to support adoption	1.000	.813
Lack of Client awareness	1.000	.805
Support from other players in the industry	1.000	.769
Lack of management support for the use of GPS	1.000	.767
GPS tracking service providers have too complex and time consuming GPS systems	1.000	.745
Management awareness	1.000	.610
Organizational support boosting implementation of GPS	1.000	.506

Extraction Method: Principal Component Analysis.

Initial communalities are estimates of the variance in each variable accounted for by all components or factors. Extraction communalities are estimates of the variance in each variable accounted for by the factors (or components) in the factor solution. Extracted communalities with small values are normally rejected in the analysis, research finding above show that there is no extracted communality that will be rejected. Therefore the analysis of all the 11 factors was done as shown below

Table. 4.12 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.316	30.148	30.148	3.316	30.148	30.148	2.832	25.742	25.742
2	1.999	18.174	48.322	1.999	18.174	48.322	2.245	20.413	46.155
3	1.662	15.110	63.432	1.662	15.110	63.432	1.833	16.666	62.821
4	1.373	12.478	75.910	1.373	12.478	75.910	1.440	13.089	75.910
5	.796	7.238	83.149						
6	.489	4.443	87.592						
7	.413	3.757	91.348						
8	.344	3.129	94.477						
9	.229	2.083	96.559						
10	.210	1.905	98.464						
11	.169	1.536	100.000						

Extraction Method: Principal Component Analysis.

Table 4.12 above shows the actual factors that were extracted. Rotation Sums of Squared Loadings shows factors that met the cut-off criterion (extraction method) of four factors with eigenvalues greater than 1. Factor 1 accounts for 30.148% of the variability in all 11 variables, factor 2 accounting for 18.174, factor 3 accounting for 15.110 and factor 4 accounting for 12.478.

Table 4.13 Results for the 4 factor model

	Component			
	1	2	3	4
Incentives given to clients who install GPS	.771			
Management awareness	.739			
Organizational support boosting implementation of GPS	.575	.410		
Efficiency of the Tracking system	.580		.511	
Support from other players in the industry		.863		
Organizational structure to support adoption		.848		
Lack of Client awareness			.886	
Lack of management support for the use of GPS			.685	
Lack of government polices that support the adoption			.414	
Client complaints on high cost of installing GPS system				.732
GPS tracking service providers have too complex and time consuming GPS systems				

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 15 iterations.

Table 4.13 above contains the rotated factor loadings (factor pattern matrix), which represent both how the variables are weighted for each factor but also the correlation between the variables and the factor. Because these are correlations, possible values range from -1 to +1, the correlations that are .4 or less which are of low correlations were removed for ease of analysis and interpretation. The 11 factors was then reduced by grouping into four factors below,

Factor 1: Incentives given to clients who install GPS

Management awareness

Efficiency of the Tracking system

Organizational support boosting implementation of GPS

Factor 2: Organizational support boosting implementation of GPS

Support from other players in the industry

Organizational structure to support adoption

Factor 3: Lack of Client awareness

Lack of management support for the use of GPS

Lack of government polices that support the adoption

Factor 4: Client complaints on high cost of installing GPS system

The grouped factors above can be summarized by getting a common name to get four factors that influence GPS tracking technology adoption.

Factor 1: Client incentive, management involvement and efficiency of GPS tracking

Factor 2: Organizational and industry players support

Factor 3: Client awareness and GPS adoption support from the government

Factor 4: Cost of installing GPS tracking

4.7 Relationship between GPS and insurance costs

4.7.1 Regression Analysis

From table 4.14 below, the established linear regression equation becomes:

$$Y = 0.55 + 0.87 X_1$$

Where:

Constant = 0.55 shows that if at any given time GPS tracking was non existent, then the insurance costs will be 0.55.

$X_1 = 0.87$. This shows that one unit change in the GPS tracking use would change the insurance cost by 0.87.

Table 4.14 Regression

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0.55	1.57	0.35	0.75	-4.44	5.54	-4.44	5.54
X	0.87	0.34	2.58	0.08	-0.20	1.93	-0.20	1.93

Using both regression above and Z-test below it clearly show that P value is > 0.05 which leads to the conclusion that the null hypothesis cannot be rejected.

Table 4.15 Two sample Z - test

	<i>Variable 1</i>	<i>Variable 2</i>
Mean	4.59	4.67
Known Variance	0.03	0.03
Observations	5.00	5.00
Hypothesized Mean Difference	-	-
z	-0.73	-
P(Z<=z) one-tail	0.23	-
z Critical one-tail	1.64	-
P(Z<=z) two-tail	0.47	-
z Critical two-tail	1.96	-

At 95% confidence level the Z critical value is -1.65 and from table 4.15 the Z value is -0.73. Since -0.73 is less than -1.65 then null hypothesis will not be rejected. GPS tracking system has no impact on insurance costs.

Table 4.15 Regression statistics

<i>Regression Statistics</i>	
Multiple R	0.83
R Square	0.69
Adjusted R Square	0.59
Standard Error	0.11
Observations	5

The squared multiple R value of 0.69 in table 4.15 below indicates that the independent variable X1 explains 69 % of the total variation in the dependent variable (insurance

costs). This means that 31% of the changes in the dependent variable are explained by other factors outside the independent variable.

Table 4.16 ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.08	0.08	6.66	0.08
Residual	3	0.04	0.01		
Total	4	0.12			

From table 4.16 above F - value of 6.66 is higher than the critical value at 1% significance level of 4.51 and 2.92 at 5% significance level. This implies that with a null hypothesis that the GPS adoption has no impact on insurance costs; the null hypothesis can be rejected. With the rejection of the null hypothesis, it means that the GPS tracking technology has impact on insurance costs.

4.8 Discussions

The study aimed at investigating GPS tracking technology adoption in motor vehicle insurance sector in Kenya. Therefore the results of the study has been divided into three parts, extent GPS tracking technology integration to motor vehicle insurance sector in Kenya, impacts of GPS tracking technology on insurance firms and factors influencing adoption of GPS tracking technology in the insurance industry in Kenya

4.8.1 Extend of GPS integration.

Majority of the respondents have worked in the insurance companies for more than 3 years and therefore they understand the insurance operations, hence were able to give response regarding GPS tracking technology.

The study revealed that 69% of the insurance companies have integrated GPS tracking in their products with 100% of the insurance companies with GPS policy making it mandatory for trucks and lorries to have GPS tracking fitted before they are insured this is mainly because, they are very expensive and increase the risks when insured. The insurance industries offer incentives for clients who install GPS tracking technology to

encourage them to accept the installation. All the insurance companies who have GPS policy give clients who install GPS tracking excess charges waiver and with a few companies giving premium rate discounts between 6-10% and free personal accident cover. Neely (2009) argued that with GPS almost guaranteeing recovery of the vehicles insurance companies can offer discounts and incentives to encourage the use of GPS tracking, the research finding is agreeing with Neely's arguments because insurance companies in Kenya are now offering incentives to encourage GPS use.

The study shows that 56 - 78% of the insurance companies covered more the 5,000 motor vehicle per company per year in the past 5 years but less than 32,000 vehicles were fitted with GPS tracking per year. This shows that there are quite a number of motor vehicles which are not fitted with GPS tracking. However it was noted that there has been an increasing trend of the number of vehicle that have been fitted with GPS tracking system in the past five years, showing that there is increased acceptance of GPS tracking.

4.8.2 Impacts of GPS on insurance.

The impacts of GPS on insurance industry were rated high by the respondents and over 97% of the same respondents also confirmed that the GPS tracking technology was significant as a cost control tool in the insurance industry. It is apparent that there are great impacts of GPS tracking on insurance industry including, lowering the risks, reducing investigation costs, reduced motor vehicle loss claims, protected investments and reduced insurance rates. The use of GPS tracking as a cost control too seem to be in agreement with Affordable educators (2011), who argued that for an insurance company to reduce on losses it has to adopt some strategies i.e. risk management, safety management, increase efficiency, increase efficiency, crisis management, safety awards, reduce claims, staff training and agent training. The findings from the study show that GPS tracking use helps in achieving the strategies above.

The suitability of GPS as a cost control tool was also confirmed by the number of vehicle recovered by insurance industry as a result of installing GPS on their clients' vehicles. About 37-71% of the of insurance companies have recovered between 1 – 199 vehicles per insurance company per year, this shows that the insurance companies have saved

some money they would have gone to the clients as indemnity. It shows that the claims were reduced agreeing with the literature brought forth by live view GPS that insurance claims in USA reduced by 2% (LVG 2011).

T-test and Z-test fails to reject the null hypothesis, GPS use has no impact on insurance costs whereas the F-test confirm otherwise. With two tests giving similar responses then we adopt the null hypothesis confirming that GPS use has no impact on insurance costs.

4.8.3 Factor influencing adoption of GPS

The findings show that adoption of GPS tracking technology by insurance companies is influenced by several factors which include Client incentive, management involvement and efficiency of GPS tracking, Organizational and industry players support, Client awareness and GPS adoption support from the government and cost of installing GPS tracking. This research agrees with the previous researcher, Tanvir & Rafaqat (2011) who concluded that the greatest obstacle in the way of GPS adoption is poorly planned government policies, management awareness, mass awareness and lack of support from the players in the same sector.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

From the analysis and data collected, the following summary, conclusions and recommendations were made. The responses were based on the objectives of the study.

5.2 Summary

The study carried revealed that some insurance companies have adopted the use of GPS tracking system however the use is not fully maximized. Most of the respondents were in agreement that GPS tracking technology is a very important cost control tool in insurance industry however the test carried out to test the relationship between GPS use and insurance costs gave a different result. This shows that as much as most of the respondents have confidence on the GPS tool the impacts of GPS as cost control tool has not yet been realized. The study reveal that there are several factor that influence the adoption of GPS tracking which include Client incentive, management involvement and efficiency of GPS tracking, Organizational and industry players support, Client awareness and GPS adoption support from the government and cost of installing GPS tracking which could be responsible to the rejection of alternative hypothesis.

5.3 Conclusion

The study has investigated the GPS tracking technology adoption in Motor vehicle insurance sector in Kenya. Despite the fact that the study show that GPS use has no impact on insurance cost, it is important to note that GPS tracking use among insurance is increasing year by year and the impact can be felt in the near future. More so the respondents strongly rated the use of GPS tracking to have a lot of impact on insurance business. More impacts on GPS tracking is likely to be seen and felt in the future due to the growing use of GPS tracking among insurance companies and the confidence expressed by the employees who happen to be in management and can influence the use of GPS tracking technology.

Most insurance companies have partially adopted the use of GPS tracking technology with most of them focusing on the expensive motor vehicles such as Lorries and trucks because of the greater risks they get into when they insure. With the study revealing that motor vehicle have been recovered as courtesy of GPS tracking, insurance companies can benefit a lot from GPS tracking if they extend its use to all ranges of motor vehicles and by closing the huge gap that exist between motor vehicles insured and motor vehicles fitted with GPS tracking.

The adoption of GPS tracking technology is mainly influenced by Client incentive, management involvement and efficiency of GPS tracking, Organizational and industry players support, Client awareness and GPS adoption support from the government and cost of installing GPS tracking. The insurance industry can increase the use of GPS tracking and gain a lot from it by taking into consideration these factors influencing the adoption of GPS tracking technology and in that way its impact can be easily felt.

5.4 Recommendations

The following recommendations are given to both the policy makers and researchers;

The study revealed that client awareness about this technology should be increased by conducting awareness programs and narrating its benefits to customers and potential customers. The study also revealed that the incentives given to clients by the insurance companies are not directly beneficial to the customer in that the customer will not see direct benefit for example reduced insurance premium. Therefore the insurance industry needs to work on improving on the clients' awareness and also provide 'tangible' incentive to the clients to improve on the adoption of GPS tracking.

From the findings there are some insurance companies who have no idea of GPS tracking technology and those who have are not utilizing the policies in place. The government through the insurance regulator, association of Kenya insurers and the insurance players should work together to come up with polities to be followed by all insurance companies to

ensure that there is a level playing ground and also boost the GPS use and reduce the insurance costs. Also the findings proved that management in organizations are aware of GPS technology but they have not set structures to fully utilize it. All levels of managements in the insurance industry should be trained on the importance of GPS and the benefits that comes with the adoption of GPS tracking technology

The research revealed that there are clients' complaints on the high cost of installing GPS tracking. The insurance industry should work with GPS tracking service providers to ensure that GPS tracking costs are customer friendly so as to boost that consumer use of the product.

5.5 Limitations of the study

The fact that Motor vehicle insurance service providers in Kenya don't directly offer the GPS tracking service was a challenge in data collection as the respondents had to consult the with the GPS service providers installing GPS tracking systems on their behalf. This made the questionnaire to take long to be returned. The outcome could therefore be different if the insurance companies could be offering GPS tracking.

Another limitation is the fact that there are few literatures of GPS tracking technology and insurance companies making it a difficult task to search for the information.

5.6 Suggestions for further Research

Further research on the possible impact of the GPS tracking technology should be done on commercial banks. With most of the commercial banks offering financing for most of the motor vehicle especially trucks and lorries it could be interesting to find out the impacts of GPS on the industry.

This research also recommends that a customer directed research such as a satisfaction survey be carried out to find out if GPS tracking technology is of importance to motor vehicle owners who have installed and those who haven't installed.

REFERENCES

- Affordable Educators (2011), *Loss Control Practice*. Retrieved on July 10, 2012 from www.ceclass.com/CE-163%20LOSS%20CONTROL.pdf.
- Arora, V. (2012). *Transforming India's transport sector*. Geospatial World. Retrieved on June 10, 2012, from <http://www.trimble.com/gps-fleet-tracking/pdf/42-45%20MRM.pdf>.
- Association of Kenya Insurers (AKI). (2011) *Bulletin: A newsletter of the AKI*. Retrieved on June 14, 2012, from http://www.akinsure.or.ke/public_site/webroot/cache/article/file/AKI_BULLETIN_April_2011.pdf.
- Azevedo, M.J. (1993). *Kenya: The Land, the People and the Nation*. Carolina Academic Press, Durham, NC.
- Brawn, D. A. (2003), *GPS - the easy way*, Discovery Walking Guides, Northampton.
- Cao-Hsu, Y. (2002). *Global Positioning System (GPS) Technology and Cars*. Retrieved on June 13, 2012, from [Http://www.csa.com](http://www.csa.com).
- Fortune. (1988) *The winning organization*. Pg 50-60.
- Friedmann, A. L. (1994), "*The Information Technology Field: Using Fields and paradigms for analyzing technological change*" Human Relations.
- Fuller, R. & Melt (2009), '*Mobile entity localization and tracking in GPS less environments second international workshop; proceedings*', Berlin; Heidelberg; New York, NY.
- Garmin International, incorporation (2008). *GPS beginners guide*. Retrieved on June 14, 2012, from http://www8.garmin.com/manuals/GPSGuideforBeginners_Manual.pdf.
- Gerstein, M.S., Nadler, D.A and Shaw, R.B. (1992). *Organizational Architecture*, Jossey-Bass Publishers, San Francisco.

- Goldberg, B (2010). *Reducing Costs and Improving Efficiency with New Management Information Systems*. Retrieved on August 6, 2012 from www.qfinance.com
- Guo, B., Polling, A.D., Poppe M.J. (1996). *GIS/GPS in Transportation, Real World Experiences*. Paper by Lee Engineering, Inc. Retrieved on June 14, 2012, from <http://gis.esri.com>.
- Ives, B. and Jarvenpaa S. L. (1991). *MIS Quarterly Applications of global information technology: key issues for management.* ", Mar 91 15(1): 33-49.
- Kenya Police. (2011). *Crime Report 2011*. Retrieved June 14, 2012, from <http://www.kenyapolice.go.ke/resources/CRIME%20REPORT%202011.pdf>.
- Kenyatta, J. (1962). *Facing Mount Kenya*. Random House, New York.
- Kothari, C. R. (2004). *Research Methology: Methods and Techniques. 2nd Edition*. New Delhi: New Age International.
- Kumar, R.L. (1996). *A Not on Project Risk and Option Values of investments in information Technology*. Journal of management Information systems, 13(1)
- LVG. (n.d). *Insurance Claims on Electronics Drop*. Retrived July 11, 2012 from <http://www.liveviewgps.com/blog/insurance-claims-electronics-drop>.
- LIC. (2009). *Motor insurance*. Retrieved from <http://www.lionofkenya.com/Motor%20Insurance.html>.
- Main, J, (1988) "*The Winning Organization*" Fortune, Vol 118.
- Marsh, L. and Flanagan R. (2000). "*Measuring the costs and benefits of information technology in construction.*" *Engineering Construction and Architectural Management* 7(4): 423-435.
- Maxon R. M. (1993). *Struggle for Kenya: The Loss and Reassertion of Imperial Initiative, 1912-1923*. Fairleigh Dickinson University Press. Madison, NJ.

- Mbogo, S. (2009, Sept 22). *Vehicle Tracking System Gains Popularity in Kenya*. Business Daily, P 8.
- Mugenda, A., and Mugenda, O. (2003). *Readings in Research Methods: Quantitative and Qualitative Approaches*. African Centre for Technology Studies, Nairobi, Kenya.
- Neely, J (2009). *Three Justifications or GPS Tracking From Insurance Companies*. Ezine Articles. Retrieved June 14, 2012, from <http://EzineArticles.com/3706838>.
- Nerem, R. S. and Larson, K. M. (2001). *Global Positioning System, Theory and Practice*, 5th Edition, Eos Transactions, Colorado.
- Ngene, S.M., Gils, H.V., Wieren, S.E., Rasmussen, H., Skidmore, A.K., Prins, H. T., ... Hamilton, I.D. (2008) The ranging patterns of elephants in Marsabit protected area, Kenya: the use of satellite-linked GPS collars. *African Journal of Ecology*. Retrieved June 14, 2012, from <http://www.resourceecology.org/publ>.
- O'Brien, K.J. (2010, Nov 15). *Smartphone Sales Taking Toll on G.P.S. Devices*. New York Times. Retrieved from June 14, 2012, <http://www.nytimes.com/2010/11/15/technology>.
- Oso, W. Y., & Onen, D. (2009). *A general guide to: Writing Research proposal and report. A handbook for beginning reseachers*. Nairobi: Jomo Kenyatta Foundation.
- Park. J. A. 1799. *A System of the Law of Marine Insurance*. Second American Edition from the Latest English Edition. Boston, Massachusetts: Thomas and Andrews, David West, John West. 276-277.
- Parker, M.M., Benson, R.J. and Trainor, H.E. (1988). *Information Economics: Linking Business performance to information Technology*. Prentice-hall, NJ.

- Qingwei, Z. and Ziyao, L. (2010) Study on ERP-Based Cost Control in SME, Zhongyuan University of Technology, retrrived August 7, 2012, from <http://www.seiofbluemountain.com/search/detail.php?id>
- Raper, J., Gartner, G., Karimi, H., & Rizos, C. (2007). Applications of location based services: A selected review. *Journal of Location Based Services*, 1:2, 89 – 111. Retrieved June 13, 2012, from <http://dx.doi.org/10.1080/17489720701862184>.
- Sanchez, P.A. and Heun, J.T. (2012). *From GPS to GNSS: Enhanced Functionality of GPS-Integrated Systems in Agricultural Machines*. The University of Arizona. Retrieved June 13, 2012, from <http://cals.arizona.edu/pubs/farm/az1558.pdf>.
- Saunders, M., Lewis, P. and Thornhill. A. (2003) *Research Methods for Business Students*, 3rd edition, Pearson Education Limited, Edinburg.
- Seybold, P. (1993), "The Learning Organization" Byte, Vol 18.
- Strassman, P.A. (1997). *The squandered Computer; Evaluating the business alignment of Information technologies*. Information economics press, New Canaan, Connecticut.
- Swiss, Re. 1996. *An Introduction to Reinsurance*. Zurich: Swiss, Re.
- Tanvir, A and Rafaqat, N (2011), *Adoptability Issues of GPS in Public Sector in Pakistan*. World Academy of Science, Engineering and Technology.
- Taylor, S. J. and Bogdan, R.(1998) *Introduction to qualitative research methods. A guidebook and resource*, third edition. New York: Wiley.
- Thomas, C. (2009, March 4). Court Asked To Disallow Warrantless GPS Tracking. *Information Week*. Retrieved June 13, 2012, from <http://www.informationweek.com/news/215800542>.
- Throup W.D. (1988). *Economic and Social Origins of Mau Mau 1945-1953*. Ohio University Press, Columbus, OH.

TTW, (n.d). *The Future of GPS Tracking Systems*. Retrieved June 14, 2012 from http://www.trackingtheworld.com/article_the-future-of-gps-tracking-systems.html.

DTEGPS (n.d). *Business GPS success stories*. Retrieved on June 16, 2012 from <http://www.dtegps.com>.

Weil, P and Olsen, M.H. (1989). *Managing investment in information technology: mini case examples* 56 Mackay and Marshall

Willcocks, L. (1992). *Evaluating Information Technology Investment: Research findings and Reappraisal*. *Journal of information systems*.

APPENDICES

Appendix I: List of Insurances service providers in Kenya

	Insurance Company	Type of Business
1	APA Insurance Company	Composite
2	British American Insurance Company	Composite
3	Co-operative Insurance Company	Composite
4	First Assurance Company	Composite
5	Geminia Insurance Company	Composite
6	GA Insurance Company	Composite
7	Heritage Insurance Company	Composite
8	Insurance Company of East Africa (ICEA)	Composite
9	Intra Africa Assurance Company	Composite
10	Jubilee Insurance Company	Composite
11	Kenindia Assurance Company	Composite
12	Mercantile Insurance Company	Composite
13	Pacis Insurance Company Ltd	Composite
14	Phoenix of East Africa Assurance Company	Composite
15	Pioneer Life Assurance Company	Composite
16	Monarch Insurance Company Limited	Composite
17	Concord Insurance Company	Composite
18	Madison Insurance Company	General
19	Blue Shield Insurance Company	General
20	African Merchant Assurance Company (AMACO)	General
21	Cannon Assurance Company	General
22	CFC Life Assurance Company	General
23	Chartis Kenya Insurance Company	General
24	Corporate Insurance Company	General

25	Directline Assurance Company Ltd	General
26	Fidelity Shield Insurance Company	General
27	Gateway insurance	General
28	Kenyan Alliance Insurance Company	General
29	Kenya Orient Insurance Company	General
30	Lion of Kenya Insurance Company	General
31	Mayfair Insurance Company	General
32	Occidental Insurance Company	General
33	Real Insurance Company	General
34	Takaful Insurance of Africa	General
35	Tausi Assurance Company	General
36	Trident Insurance Company	General
37	UAP Insurance Company	General
38	Shield Assurance Company	Long term
39	UAP Life Insurance Company	Long term
40	Apollo Life Assurance Company	Long term
41	Capex Life Assurance Company Limited	Long term
42	Metropolitan Life Insurance Kenya Ltd.	Long term
43	Old Mutual Life Assurance Company	Long term
44	Pan Africa Life Assurance Company	Long term
45	Xplico Insurance Company Limited	Long term

Source: AKI

Appendix I: Questionnaire

Dear Respondent,

Introduction

Thank you for your willingness to respond to this questionnaire, I am carrying out a research to study GPS tracking technology adoption in motor vehicle insurance sector in Kenya. All the information you will provide will be treated as confidential and will only be used for purposes of this study. The final report of this study will not disclose individual names or any other information that may identify you as an individual.

Kindly answer the questions by ticking and explaining where necessary.

SECTION A: Background information.

1. What position do you hold in the organization?

IT Manager

Claim Manager

Strategy Planner

Other (Specify)

2. How long have you worked for the institution (Years).

- Up to 2 years
- 3- 5 years
- 6-10 years
- Over 10 years

3. The ownership of your organization is mainly.

- Local
- International
- Both
- Not aware

4. How long has the company been offering motor vehicle insurance cover?

- Up to 2 years
- 3- 5 years
- 6-10 years
- Over 10 years

5. What is the average number of vehicles covered against theft in your company per year in the past five years? (Tick the box containing the number of vehicle covered matching the year the vehicles were covered).

No of Vehicles	2012	2011	2010	2009	2008
1 - 99					
100 - 499					
500 - 1499					
1500 - 4999					
> 5000					

6. What percentage of the value of the motor vehicle does a client pay for a comprehensive motor vehicle cover?

- 1 - 2% []
- 3 - 4% []
- 5 - 6% []
- 7 - 9% []
- >10% []

SECTION B: Extent to which GPS tracking technology has been integrated to motor vehicle insurance industry.

1. Do you have a policy requiring clients to install GPS tracking before insuring motor vehicles?

- Yes []
- No []

2. How long have you been using of GPS tracking technology as part of your insurance products?

- < 1 Year []
- 2 - 3 Years []
- 4 - 5 Years []
- > 6 Years []
- Not used []

3. What types of motor vehicles do you recommend the installation of GPS before insuring? (Select all that apply).

- Trucks & Lorries
- Buses
- Taxis & Matatus
- Personal cars

Other (Specify).....

4. What is the approximate numbers of clients in your company who have installed GPS tracking on their vehicles per year for the past five years? (Fill in the approximate figures per year).

Year	2012	2011	2010	2009	2008
Average number of clients					

5. My company gives the following incentives to clients who install GPS.

Excess charges waiver

Free personal accident cover

Premium Discount at _____%

Other (Specify).....

6. How do you rate the reliability of motor vehicle GPS tracking system in tracking stolen vehicles?

Very reliable []

Reliable []

Unreliable []

Very unreliable []

Don't Know []

SECTION C: Impacts of GPS tracking technology on insurance firms.

1. What is the average number of claims that have been written off as a result of recovered motor vehicle through GPS tracking system in the past five years? **(Tick the box containing the number of claims written off matching the year the claims were received).**

No of claims written off	2012	2011	2010	2009	2008
0					
1 - 49					
50 - 199					
200 - 1000					
> 1000					

2. The following are some of the impacts of GPS tracking on insurance industry, how strongly do you agree or disagree with these impacts in relation to the use of GPS tracking in your organization.

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
	1	2	3	4	5
GPS use lowers the risks of losing an insured motor vehicle by enhancing ease of recovery	[]	[]	[]	[]	[]
The use of GPS tracking technology reduces investigation costs in vehicle loss cases	[]	[]	[]	[]	[]
GPS tracking use leads to reduced motor vehicle loss claims	[]	[]	[]	[]	[]
GPS assist the insurance industry to protect investments made as a result of declared value of a motor vehicle before insuring it against loss	[]	[]	[]	[]	[]
GPS use leads to reduces insurance rates in the insurance industry	[]	[]	[]	[]	[]

3. How would you rank the influence of using GPS tracking technology by insurance industry as a cost control tool?

- Extremely significant []
- Very significant []
- Significant []
- Not significant []
- Not at all []

SECTION D: Factors affecting adoption of GPS tracking technology

1. How strongly do you strongly agree or disagree with the following factors affecting the adoption GPS tracking technology in your organization? (Select a number from 1 to 5 indicating the importance of the item with "1" – Strongly disagree to "5" Strongly agree).

In my organization there is:

	1 Strongly disagree	2 Disagree	3 Undecided	4 Agree	5 Strongly agree
Lack of Client awareness	[]	[]	[]	[]	[]
Incentives given to clients who install GPS	[]	[]	[]	[]	[]
Management awareness	[]	[]	[]	[]	[]
Client complaints on high cost of installing GPS system	[]	[]	[]	[]	[]
Efficiency of the Tracking system	[]	[]	[]	[]	[]
Organizational support boosting implementation of GPS	[]	[]	[]	[]	[]
Lack of government polies that support the adoption	[]	[]	[]	[]	[]
Support from other players in the industry	[]	[]	[]	[]	[]
Lack of management support for the use of GPS	[]	[]	[]	[]	[]
GPS tracking service providers have too complex and time consuming GPS systems	[]	[]	[]	[]	[]
Organizational structure to support adoption	[]	[]	[]	[]	[]