



**MIDLANDS STATE UNIVERSITY**

**FACULTY OF COMMERCE**

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**DEPARTMENT OF INSURANCE AND RISK MANAGEMENT**

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**AN INVESTIGATION ON THE PRACTICABILITY OF USAGE BASED INSURANCE  
AND TELEMATICS TO THE ZIMBABWEAN MOTOR INSURANCE INDUSTRY.**

**BY**

**MATTHEW T MUNDOWA**

**(R136974E)**

**A DISSERTATION SUBMITTED TO THE FACULTY OF COMMERCE IN PARTIAL  
FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF COMMERCE  
(HONOURS) DEGREE IN INSURANCE AND RISK MANAGEMENT.**

**MAY**

**2017**

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### RELEASE FORM

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INSURANCE AND RISK MANAGEMENT

**DISSERTATION TITLE:** AN INVESTIGATION ON THE PRACTICABILITY OF  
USAGE BASED INSURANCE AND TELEMATICS TO THE  
ZIMBABWEAN MOTOR INSURANCE INDUSTRY

**SUPERVISOR:** MR. S. MASIYIWA

**YEAR OF AWARD:** 2017

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### APPROVAL FORM

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This serves to confirm that the undersigned has read and recommended to the Midlands State University for acceptance of a dissertation entitled,

**“An Investigation on the practicability of usage based insurance and telematics to the Zimbabwean insurance industry”**

Submitted by Matthew T Mundowa in partial fulfillment of the requirements of Bachelor of Commerce (Hons) Degree in Insurance and Risk Management.

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## **Dedication**

*This dissertation is dedicated to the lord Almighty and my mother the late Adeline Mundowa. If it had not been for her love and support I would not have made it this far, may her soul rest in eternal peace.*

## **Acknowledgements**

I would like to express my deep gratitude to my supervisor Mr. S Masiyiwa for the support, expertise, intellectual guidance and patience during the course of my work and throughout the period of the study. I would also like to extend my gratitude to my loving sisters, brother and friends, who were there for me, gave me encouragement as well as support during difficult times at University. Lastly a special mention goes to my lecturers who have been there to mold me to be what I am today, Mr. Makaza (Chairman), Mrs Matsika and Mrs Gangata.

God bless you all

## ***Abstract***

*The research sought to investigate the practicability of introducing usage based insurance to the Zimbabwean motor insurance industry so as to address short comings of the traditional rating method. Literature was reviewed on the different UBI programs, telematics, the shortfalls of the traditional rating method, benefits of UBI, how to implement it in to practice, the challenges with implementing it in the Zimbabwean context and a case study of Discovery Insure, a South African insurance company. The targeted population for this study where twenty short-term insurance companies registered with the Insurance and Pensions Commission (IPEC). From the target population the researcher obtained a sample size of fourteen insurance companies. These fourteen companies were chosen at random, using simple random sampling. The researcher administered questionnaires and used personal interviews in collecting information related to the research from respondents. The results obtained indicated that the majority of insurers were aware of UBI and where willing to implement UBI in the near future but less prepared to because of the high cost associated with putting the program into practice amongst other issues. The data collected was presented using tables, pie charts and bar graphs. The study recommends that insurance companies should come together and invite companies from abroad that have experience using UBI and host workshops or conferences that will help as a guide on ways to successfully implement the program. Other recommendations included forming partnerships with companies with the right infrastructure such as Econet, Involving the government as well as carrying out insurance awareness campaigns for the public due to the lack of knowledge and appreciation of insurance in general that lies in the with in the public, as this will have an impact on UBI uptake if implemented, as well as improve the performance of existing products.*

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# Chapter 1

## Introduction

### 1.0 Introduction

Technology has transformed the way business is conducted. It has slowly crawled through different industries, causing drastic changes and positive disruption. Likewise, the motor insurance industry has been affected through the introduction of telematics, also known as usage based insurance (UBI). According to the National Association of Insurance Commissioners (NAIC) (2016), the first UBI programs were introduced in the United States about a decade ago when Progressive Insurance Company and General Motors Assurance Company (GMAC) began to offer mileage-linked discounts through combined GPS technology and cellular systems that tracked kilometers driven. This chapter will focus on the background of study, statement of the problem, research questions, objectives, significance of the study, delimitation of study, limitations of study and definition of terms.

### 1.1 Background of study

The pricing scheme for usage based insurance deviates greatly from that of traditional motor insurance. Mutenga (2014) suggests that traditional motor insurance relies on actuarial studies of aggregate historical data to produce rating factors that include driving record, credit-based insurance score, personal characteristics (age, gender, marital status) vehicle type, garage location, vehicle use, claims history, liability limits and history. However the traditional method of rating and pricing does not take in to consideration the driving behavior of the policyholder. Bruneteau et al (2016) argues that the traditional rating system it is regarded to have the following weaknesses:

- It is based on statistical data, not individual behavioral data,
- It is not dynamic thus based on the risk factors at the time first set up (afterwards, depends on the willingness of the customer),

- There is significant delay between actual claims data and pricing decisions generally resulting in a 12 month time lag in pricing (an increase in claims in year N leads to increased premiums in year N + 1),
- Incentive to better driving is indirect ( better driving does not prevent accidents),
- It facilitates fraud as it is largely based on customers' own declarations,
- In case of an incorrect declaration, the risk exists of having an accident without indemnification,
- There are limited opportunities to develop direct link with the customer and
- No ability to recover vehicle in case of theft.

Hence today's current motor insurance, without telematics, is not comprehensive as it does not take the driver's behavior into account. Focus (2015) further argues that some underwriters charge higher premiums for the same type of cover to a buyer who is considered to be low financial profile and thus a higher risk. These are firmly established imbalances in the rating of motor insurance. Telematics is likely to gradually eliminate them because it is based on understanding actual individual driving risks rather than statistical proxies. The current rating system also uses gender as a factor, where women are regarded as better and more careful drivers thus a lower risk than men, hence men are charged higher premiums. McColgan (2009) argued that, while men may on average cost insurers more, it is unfair to penalize a man who drives like a woman, just because he is a man. Therefore it is better to differentiate people on the basis of factors such as driving behavior instead of gender. Bruneteau et al (2016) also states that the gender rating factor incentivizes the low risk consumers to look at other pricing options or deter them from seeking insurance altogether. Focus (2015) further argues that insurers are often viewed with mistrust, which means that drivers sometimes feel ripped off and are consequently more inclined to commit insurance fraud.

The use of age as a rating factor is also biased. Younger drivers are regarded as a higher risk as compared to older drivers, thus the younger drivers are charged higher premiums. Focus (2015) notes that currently risks are not properly priced by the market, because by comparing premium quotes, we observe an astonishing gap between the lowest and the highest quotes for the same profile. This means that the market is still inefficient, as insurers do not have a single-person risk profile but rather a statistical or at best a historical risk profile. They look at categories instead of

individuals, and when they do look at individuals, they look at the past, which is often a poor predictor. Another interesting example comes from the books of European insurers. Their claims ratios based on age are pretty low for young drivers and pretty high for senior drivers. Surprisingly, insurers do not use this information to increase their market share in the young drivers market. Underwriters at renewal tend to reduce rates or discount premiums for policyholders who have a no claims experience. Focus (2015) also notes that as it stands the industry only gives discounts for past risks, not current risks. Thus, if you have been a good driver, insurers automatically apply the idea that you will continue to be a good driver. We all know of drivers who have good driving skills but drive very aggressively due to a high level of confidence. Very often they do not have accidents for long periods, but when a crash does occur the loss can be very high. Hence insurers should resort to other indicators such as driving behavior as a rating factor, regardless of the no claims history.

Therefore, the current rating model is no longer the optimal solution for the industry. This is because low mileage drivers pay for road warriors, prudent drivers subsidize drivers who display an aggressive behavior, honest drivers pay for fraudsters, last but not least, customers without cars pay for car owners through other insurance activities which subsidize the loss-making automobile insurance business (Bruneteau et al ,2016).

In Zimbabwe policyholders tend to think of traditional motor insurance as a fixed cost, assessed annually and usually paid for in lump sums on an annual, semi-annual or quarterly basis. Third party insurance is charged at \$35.60 for light motor vehicles per term as set by the Insurance and Pensions Commission (IPEC). Comprehensive cover is charged at 4 to 5 percent of the vehicle's value. Good drivers and bad drivers are all being charged the same premium, not taking into consideration the possible liability each faces for example from hours spent on the road. Due to the liquidity challenges being faced in the country, insurance companies have been rate undercutting. Muchinguri (2013) reports that some insurance companies are lowering the third party insurance to \$25 or \$30 instead of charging \$35.60 set by the regulator just to win over motor business. Bruneteau et al (2016) further states that strong price competition is likely to continue in the foreseeable future. The high instances of fraud are also hurting the industry and thus far insurers have struggled to find a workable solution to combat this.

## **1.2 Statement of the problem**

Motor insurers in Zimbabwe currently use the traditional rating method which considers every driver as an average risk. Hence good and bad drivers are all being charged the same premium. Without considering each policyholder's driving behavior as well as hours spent on the road, which are important factors to take in to account. For example it is unfair to charge a client whose vehicle spends most of the day parked at his / her work premises the same premium with a client whose vehicle spends more time on the road. To add on to their driving behavior which is also subjective regardless of ones gender and age. The traditional rating method also exposes insurers to fraudulent claims as they rely on the policyholder's own declarations.

## **1.3 Research questions**

The study will answer the following questions;

- a) Is the local insurance market prepared to take up UBI?
- b) What is required for insurance companies for them to implement UBI?
- c) What are the key challenges to expect when implementing a UBI program in a new market?

## **1.4 Research objectives**

The study will achieve the following objectives;

- a) To evaluate the level of preparedness of the local market to take up UBI.
- b) To understand what is required for motor insurers to implement UBI.
- c) To investigate the key challenges to expect when implementing a UBI program in a new market.

## **1.5 Significance of the study**

The study is significant to the following;

### **a) To the researcher**

The research will give the student a deep understanding of telematics, sharpen his research technics as well as broadening his understanding of motor insurance underwriting.

## **b) To the University**

The research report shall be deposited in the university library and will provide reference material for other researchers conducting studies on the same or similar areas.

## **c) To the short term insurance industry**

The study will assist insurance companies to know if our local market is prepared for UBI. The study will also help them understand what is required for its implementation, as well as the challenges to expect and ways to counter them.

## **1.6 Delimitation of study**

The study will focus on the short term insurance companies and it will be conducted in Harare where most head offices of these companies are located. The period covered is from 1999 - 2017. The research will be conducted from January 2017 to May 2017.

## **1.7 Limitations**

The following limitations may affect the depth of the study:

- a) The time available is limited because the researcher has other college commitments.
- b) The researcher is a full time student with limited finance required for collection, travelling and printing research instruments.

## **1.8 Definition of terms:**

### **a) Telematics**

According to Focus (2015), it is a generic word used to define connectivity and geolocation for vehicles (cars, trucks, containers and trains).

### **b) PAYD**

It is an acronym for Pay As You Drive. A device in the vehicle that sends data to the insurance company. The premium is entirely or partly mileage based sometimes combined with time and location data (Brunetau et al, 2016).

**c) PHYD**

It is an acronym for Pay How You Drive. It is where by a device in the vehicle sends driving style data to the insurance company. The premium evolves with the drivers risk rating (Brunetau et al, 2016).

**1.9 Summary**

This chapter covered the background of the study, statement of the problem and research questions to be investigated on by the student. It also spelled out the significance of the study and delimitations of the study. Key terms used in the study were defined in light of the practicability of usage based insurance to the Zimbabwean market.

## **Chapter 2**

### **Literature Review**

#### **2.0 Introduction**

This chapter presents and reviews the secondary research done on telematics insurance. Rowley (2004) defines a literature review as a summary of a subject field that supports the identification of specific research questions. A literature review needs to draw on and evaluate a range of different types of sources such as academic and professional journal articles, books and internet based resources. Most of the research done was online, from which the researcher obtained a great deal of papers, journals, books and reports written by various experts.

#### **2.1 Telematics and UBI defined**

Telematics is the integrated use of telecommunications and information technology for vehicles. It is most widely used for providing services such as real time navigation, road side assistance, vehicle tracking and more recently motor insurance. Therefore insurance telematics is the use of telematics by motor insurers with the objective to adjust the premium to the actual risk (Bruneteau et al, 2016).

Telematics insurance uses data that describes how, when and where a vehicle is driven so as to equate the premium with the risk presented by the driver. The data is collected by an electronic device fitted to the vehicle and is transmitted to the insurer via a telecommunications network (Asquith et al, 2012).

UBI is insurance in which the premium is based on the policyholder's vehicle usage. The term is exclusively applied to motor insurance. When one incorporates some form of monitoring (possibly transmitting) device into the vehicle, it is referred to as telematics. Although in most cases the terms UBI and telematics are used interchangeably (MJW Topix, 2014).

The traditional rating method currently uses static and statistical criteria such as age, gender, vehicle type and age, place, business category, occupation and claims history to evaluate the driver's risk. UBI with telematics technology is a policy based on these criteria and four new

dynamic parameters which are distance, time (day or night), place (motor way, road, big or small city, parking area) and driving behavior (Focus, 2015).

## **2.2 The history of telematics insurance**

As cited in Boucher et al (2013), Vickery (1968) was one of the first authors to criticize the traditional pricing method for motor insurance, for being inefficient as a result of an inappropriate pattern of premium payment. Professor William Vickery promoted the implementation of distanced based insurance. One of the first proposals was distance- based pricing systems, such as pay at the pump insurance (PATP), where the driver will pay for his coverage as he refueled his vehicle. The other proposal was called ‘insured tires’ system, where an associated insurance company identified in some way with the tire itself, would cover the accident caused by the vehicle using these tires. These systems were criticized because they were measuring the use of the car in terms of fuel consumption or tire wear instead of real distance driven. Adding to the fact that they did not distinguish between good and bad drivers.

Progressive Insurance Company in partnership with General Motor Assurance Company (GMAC) based in the USA ran their first tests of offering PAYD discounts using global positioning systems (GPS) and cellular networks. Progressive’s first patent was in 1995 and it conducted its first public test in 1999 using GPS and the cellular networks. UBI then first sprung up in 2004 when Progressive Insurance launched a product known as Trip Sense in Minnesota, which enabled participants to save up to 25% on their premiums at renewal depending on how much and when they drove. The data was collected by a telematics device which is connected on the vehicles on-board diagnostic (OBD) port. It was a revolutionary concept in its own right and opened many new opportunities for other insurers. This product became the first ever motor insurance offering to use a policyholders actual driving behavior to price his/her risk rather than the risk pooling system that has been in the mainstay of motor insurance for decades. Progressive insurance received equal praise and skepticism, though most of the stakeholders appreciated its potential to price insurance premiums more fairly, reduce driving and promote safe driving habits. While others were concerned with the cost of technology, the potential invasion of consumer privacy and the difficulties in creating a sustainable business model (Bruneteau et al, 2016).

Today there is a wide range of telematics insurance models, each of which integrates different levels of connectivity to the vehicle. Such as PAYD which uses the registered distance travelled and the geographical zone. In telematics PHYD refers to the driving behavior plus PAYD. Various telematics based insurance service have been offered by insurers for over a decade now, such as stolen vehicle recovery, safety services and crash forensics(Focus,2015).

## **2.3 Traditional rating method Versus Telematics insurance rating**

### **2.3.1 Traditional rating method**

According to Mutenga (2015) the traditional rating method consider factors such as age, sex, marital status, age of the license and accident history. Using this rating model statistically, single persons tend to have a higher risk of being involved in an accident than married persons, and young people particularly young males tend to have more accidents than the older adults. The distance driven by the vehicle is also statistically determined to impact the likelihood of an accident. The type of vehicle or vehicles covered impacts the amount of damage the vehicle and the safety of the driver and passenger. It also considers the likelihood of theft based on the make and model of the vehicle insured and where it is parked at night.

### **2.3.2 Drawbacks of the traditional method**

According to Burtler et al as cited in Tselentis et al(2016) the current pricing of motor insurers around the world to charge a lump sum for each user is unfair and inefficient. Drivers with similar characteristics such as age, gender and location pay approximately the same premiums regardless if they drive 5 or 50km a year. This pricing policy encourages driving more kilometers annually, it does not punish aggressive driving behavior and on the other hand it does not encourage prudent driving behavior. Thus this implies an increased number of vehicles, traffic congestion, carbon emissions, pollution and oil dependence. The current pricing system is unfair because it literally forces policyholders with low annual mileages and safer driving behavior to subsidize the insurance cost for policyholders who drive more annually and dangerously. Hence drivers should be priced according to driving behavior. Charging all drivers a lump sum, leads to an assumption that the accident probability is the same across the entire population of drivers.

For many low income households, insurance is the largest cost of driving or the reason why they cannot afford a vehicle. With the current motor insurance pricing, lower income households thus

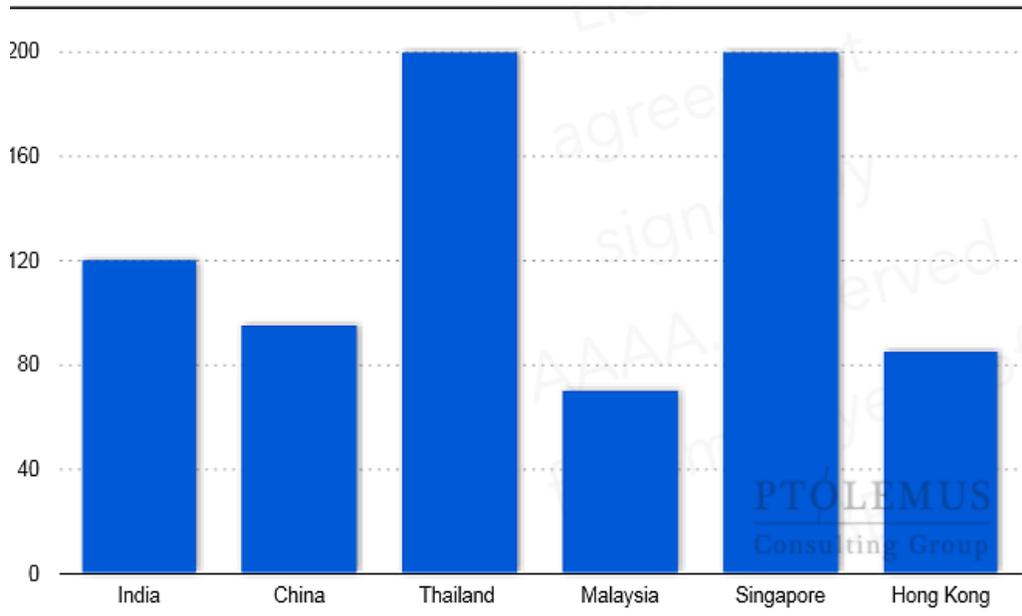
classified as higher risk face three options that are, to spend a large portion of income on vehicle insurance, forego vehicle ownership, although this reduces economic and social opportunities or drive uninsured, although this is illegal. Hence that is why many low income motorists drive uninsured. Traditional motor insurance also creates problems for middle income drivers who face high costs for insuring an extra vehicle, such as an old truck used for errands or a recreational vehicle that is only driven a few hundred miles each year (Litman, 2011). In lower income communities this creates a spiral of rising premium rates, declining insurance affordability, an increasing portion of uninsured vehicle and increasing claims per insured vehicle. In these areas motorists are labeled a high risk although their risk per mile drive is actually no greater than average (Burtler, 2000). Conventional insurance coverage is based on uncertainty as the extent of the amount of claims that will be paid is not known (Baggio, 2015).

The current pricing model no longer seems to serve the motor insurance industry well because the industry seems to be moving from a cyclical pattern to a more structural deterioration of business condition. The traditional rating system incorporates a certain degree of systemic error as all members of a particular risk class are not homogenous in their actual risk exposure and it relies on cross subsidization to create a balance between the high and the low risk customer. The European court of justice gave a ruling that forbids European insurers to take gender into account as a risk factor in motor insurance. This of course significantly reduces the accuracy of the current pricing models by preventing a difference between low risk (women) and high risk consumers (men) in a particular class. Product differentiation in this model is minimal and although service has become a focus area for most insurers, customer touch points are too few and far apart to have a big impact on purchasing behavior (Bruneteau et al, 2016).

Bruneteau et al (2016) further notes that the current rating system is prone to fraud. Fraud includes fraudulent claims, staged accidents, phantom passenger claims and underwriting fraud such as non-disclosure of information or false disclosure in order to obtain a favorable rate of insurance premium. For example actuaries know that adults have rising accident rates when they reach the ages of 45 to 55 years. This is because parents often take out motor insurance on a vehicle in their own name and their child aged between 16 and 25 use the vehicle. The diagram below illustrates the Asian market, only two of the countries do not have plans in place for UBI programs to be developed namely Thailand and Singapore, the other have active programs in

their motor insurance market today. Y-axes representing fraudulent claims (rate per 1,000 claims) and the X-axes representing the Asian countries.

**Figure 2.1: Showing the rate of fraudulent claims in Asian countries with and without UBI**



**Source: Ptolemus Consulting Group (2016)**

Despite the insurer’s best efforts, they are yet to find an effective solution to tackle fraud. Telematics has a clear role to play here.

### **2.3.3 Benefits of UBI over the current pricing system**

According to Pitblado (2015) one of the positive outcomes is that it gives consumers greater control over their premium costs. It also rewards those who already drive safely and motivates bad drivers to improve their driving habits. As reported by NAIC evidence from Canada and the UK indicates that increased use of UBI improves driving behavior. Another benefit is that the use of UBI may also reduce insurer’s reliance on other historical rating factors that at one time led to regulation against the use of certain rating factors like credit scores and geography that while employed with sound actuarial intentions, sometimes resulted in unfair discrimination. Telematics will also particularize rate making to individuals rather than demographic groups thus it will mitigate unfair discrimination in older rate setting models.

According to Asquith et al (2012) telematics allows providers to differentiate their products and create competitive advantage. It could also improve profitability as a result of better risk segmentation and deliver higher levels of customer insight, improving relationship management and increasing retention rates.

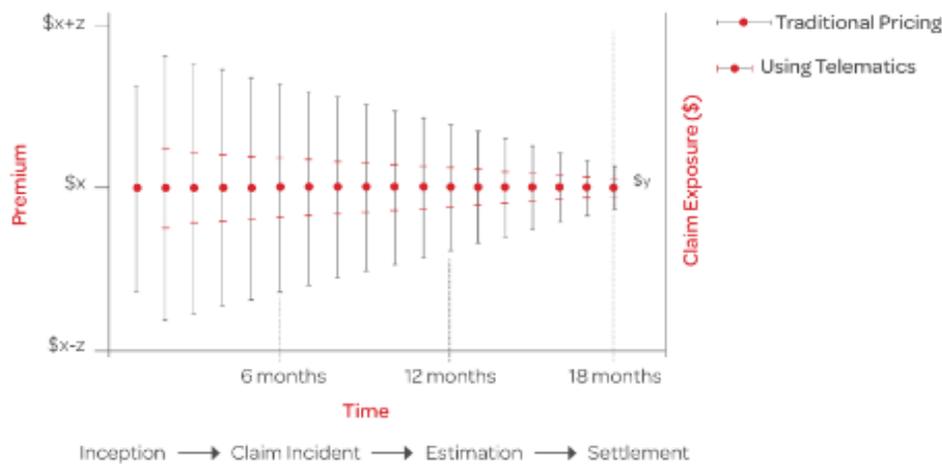
Telematics insurance includes pricing innovation, self-selection and a deeper customer engagement, which can support customer retention strategies. It also helps carriers understand which channels attract preferred risks, which results in effective channel management. UBI has the potential to change the claims handling process so as to reduce fraud exposure. Thus this innovative pricing model has the potential to be a long term antidote for the motor market rather than a short-term pricing win (Stacy and Luckens, 2014).

Telematics also opens a whole new world of rating factors for the insurer. The insurer will no longer have to use proxies to estimate how a person will drive. They are now able to measure it directly. The insurance company can now analyze a drivers cornering abilities, accelerating, braking habits, typical driving routes and distances. Insurers are able to incentivize their clients to drive safely and even provide feedback that teaches their clients to improve their driving. The benefits enjoyed by the policyholder go beyond reduced premiums. Some devices can be programmed to automatically contact emergency services in the event of a serious crash, or to contact the roadside assistance team if a vehicle breaks down (MJW Topix, 2014).

According to Roberts et al (2014), for buyers who view motor insurance as an immature annual fixed cost, this is great news. Converting insurance into a variable cost, with the promise of some savings holds a major appeal. Though estimates vary, UBI may reduce accident rates by 10% - 40% with considerable benefit for the individual and society. From the insurers' perspective, they will be selective in whom they provide insurance to (high, medium or low risk customers) and will be able to address the markets they believe yield maximum returns. Telematics is an entry of new route to building a more optimized business and of offering accurately tailored insurance products to customers. It also holds an attractive opportunity for insurers to build new revenue streams and gain benefits from non-traditional areas such as driving scores for claims predictions, using accurate data for third party rationalization such as towing services, road side assistance and replenishment or replacement of consumables such as batteries and for cross-selling and upselling other products. Telematics offer the insurance company a completely

different way of engaging with their customers which is a world entirely removed from the traditional process with little or no opportunity to build a relationship with the customer. Another benefit to take note of is that a smart phone based solution increases the frequency and richness of customer interaction. It adds interactivity to the relationship with the customer and makes it possible to have regular communication. It creates customer satisfaction and loyalty.

**Figure 2.2: Uncertainty pricing for traditional and UBI methods**



**Source: LexisNexis (2014)**

As shown in figure 2.2, based on a sample of 23,000 UBI policies compared to traditional pricing, UBI enables carriers to be more precise in aligning their pricing ( $\$x$ ) with variance ( $\$z$ ) the claims exposure ( $\$y$ ), with incremental improvements as the policy matures (Stacy and Luckens, 2014).

#### **2.4.0 Implementing telematics based insurance into practice**

According to Bruneteau et al (2016), telematics insurance is based on five new dynamic parameters which are the distance, time, place and context. The distance travelled remains the primary factor in the UBI sector and is recognized as the most predictive factor. It is also a very simple way of explaining how UBI is fairer. Time of day the drivers are on the road highlights specific higher risk ranges for them to avoid. It also includes the average length of the trips highlighting potential fatigue and distraction issues. Place considers the type of road, the type of traffic, the type of driving (urban or rural lanes) and is often augmented with road attributes.

Context is whereby external data sets are added to the algorithm to take into consideration where the vehicle was when the event was recorded to qualify whether or not it was appropriate. For example, the contextualized data will differentiate an acceleration on a slip road or in front of a school.

#### **2.4.1 Telematics insurance programs that are available**

##### **Pay As You Drive (PAYD)**

According to Boucher et al (2013) Pay-As-You-Drive (PAYD) is a UBI policy in which instead of an annual premium being established, the premium is fixed according to the distance driven by the car, besides other characteristics of the risk traditionally used in pricing. Therefore, those who use more the car are going to pay a higher premium because they are more exposed to the risk of an accident. Hence the premiums are more personalized. Other variables considered as well include speed, type of road or time of the day when the car is most frequently used by the driver.

Pay-As-You-Drive insurance may also be addressed as distance- based insurance. PAYD changes vehicle insurance from a fixed cost into a variable cost by prorating premiums by mileage. Thus the more you drive the more you pay and the less you drive the more you save. This is done by changing the unit of exposure from the vehicle-year to the vehicle-mile or vehicle-kilometer. PAYD can be optional, just as motorists would choose their rate structures for telephone and internet service. PAYD can help achieve several public policy goals including fairness, affordability, road safety, consumer savings and choice. It also helps reduce traffic congestion, road and parking facility savings and environmental impacts. It will mainly benefit lower income earners as it presents the concept that prices should be based on costs (Litman, 2011).

Insurers tended to underestimate the effects of mileage on crashes and insurance claims. Thus new data (such as mileage data collected during vehicle emission inspections matched to insurance claim records of individual claim records of individual vehicles) show a positive relationship between mileage and crashes. Even comprehensive claims such as theft, vandalism and weather damage are found to increase with annual mileage, apparently because such risks are greater away from home. PAYD currently uses three optional rating structures namely;

- i) **Mileage Rate Factor-** PAYD is implemented by incorporating annual mileage as a rating factor into premiums. The insurer offers discounts to the policyholders that drive less than certain level for example less than 7000 miles. These are currently based on the policyholders self-reported estimates of their future mileage, therefore the Mileage Rate Factor is inaccurate and can only apply a small portion of the actuarially justified weight on mileage.
- ii) **Per Mile Premiums-**In which vehicle insurance is sold by the vehicle-mile (or kilometer) rather than the vehicle year. Other rating factors are incorporated, so higher-risk drivers pay more per mile than lower-risk vehicles. Per mile premiums require odometer readings to collect vehicle-mileage data as well as odometer auditing to collect accurate data.
- iii) **GPS-Based Pricing-** This pricing option is the one which incorporates telematics technology. With this system, a device is installed in the vehicle to price insurance based on time and location. For example a driver might pay 7 cents per minute for urban- peak driving, 5 cents for urban- off peak driving and 3 cents for driving in rural areas. This allows more actuarially accurate pricing, but typically adds \$150 or more in annual costs for equipment, billing and royalties, and raises privacy concerns, although such can be addressed by controlling vehicle location data management (Litman, 2001).

Compared to the other two options, GPS based pricing offers significance over the non-telematics UBI products. This is because a GPS device can measure the distance travelled with greater accuracy compared to odometer reading. It also does not rely on consumer honesty when reporting annual mileage, the on-board unit (OBU) can be configured to measure other parameters that can help the insurer more accurately price the risk of the consumer and it can be used to deliver other vehicle or driver services such as stolen vehicle recovery, emergency call or roadside assistance. However PAYD does not take driving behavior into account. This is the reason why many insurers have launched telematics enabled policies that take other factors than mileage into account. These are named Pay How You Drive policies (Bruneteau et al, 2016).

### **Pay How You Drive (PHYD)**

According to Kentor and Stareck (2014) as cited in Tselentis et al (2016), the current PAYD systems are said to have many weaknesses and shortcomings, because they are focused on kilometers driven instead of driving behavior. Therefore modelling the driving pattern of each driver efficiently is a matter of significant importance for crash risk modelling, as it gives the opportunity not only to sufficiently understand differences between driving behaviors but take them into consideration as well

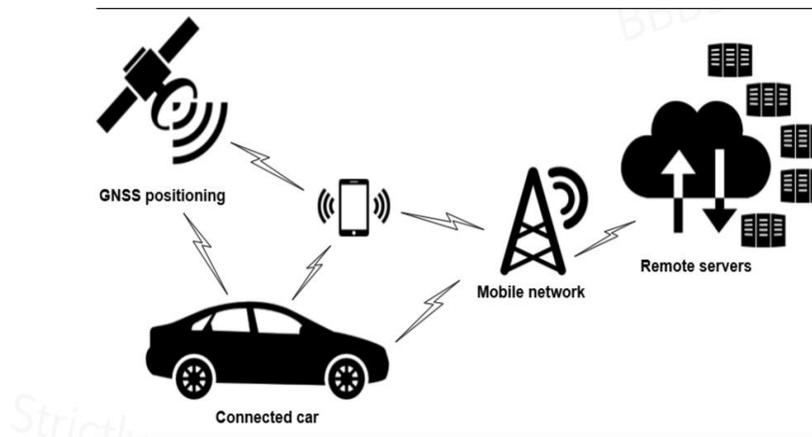
However PHYD is similar to PAYD, as the insured will pay a dynamic premium which is based on the data from telematics, though the factors in PHYD pricing are more than PAYD. Not only the actual kilometers, but also emergency brake, sudden turn, over speeding and other driving behaviors in consideration of pricing. The development of PHYD is closely related to the technology of telematics. The insurer gets the data about driving behaviors and calculate the premium. In practice, the insurer often scores the insured driving based on this data and charge a dynamic premium (Han, 2015).

According to Tselentis et al (2016), on board systems is inserted into the vehicles and data is transmitted using mobile data service to the control center. The basic concept is to build a premium cost model based on how much (mileage), where (zones used), when (day/night), and how (over speeding, harsh accelerations, number of passengers, mobile phone use) a vehicle is driven. Therefore premiums are calculated as a sum of a fixed charge imposed to each driver plus a linear combination of the above mentioned indicators and their coefficients. Performed research indicates that PHYD presents many potentials and appears to have many benefits. Although PHYD is undoubtedly the best way to rate a user's driving and estimate his crash risk, it still remains a sharp shift from today's lump sum policy; an alteration that probably needs some effort in order to be adopted by society. Moreover, PAYD methodologies implemented so far seems to be very persistent and unilateral as to the parameters considered. With regards to exposure-based modelling, mileage is not the only factor influencing traffic risk and therefore multivariate exposure-based insurance models should be developed taking into account parameters such as the road network used, time-of-the-day driving etc. (on the top of mileage driven).



## 2.4.2 Technology options available to implement telematics based insurance

**Figure 2.3: Architecture of Telematics**



**Source: Ptolemus Consulting Group (2016)**

As shown in figure 2.3, the most important factor to consider when implementing telematics is connectivity to the internet, hence the GNSS positioning. A device provided by the insurance company is installed in the vehicle. There are a number of technology options available in the market to enable telematics connectivity;

### **a) Black box**

This is a small device like a little black box connected preferably directly to the vehicles electronic control unit (ECU). This device will be able to transmit at predetermined intervals a lot of information during the travel of the vehicle about the driving behavior of the insured, such as location of the vehicle, the travel of vehicle time from the departure of the car, acceleration, and deceleration of the car, Gforces applied on the car in the curves, for example all these data give us a lot of precious information about the dynamics of the vehicle. Such data is transmitted via GPS or via a sim card (only for data transmission). The device may be set to transmit data to the receiver at certain predefined intervals, for example every minute, hour, day or more. Everything depends on the requirements of the insurer and the insured (Mirea, 2016).

### **b) OBD Dongle**

The on board diagnostics (OBD) is self-installed device, connected to the vehicles OBD port. The device supports vehicle self- diagnostic and reporting capabilities that collect real-time

vehicle parameters for monitoring and performance analysis (such as fuel consumption rate). OBD systems utilize in-vehicle buses, such as controller area network (CAN), to allow in-vehicle microcontrollers and devices to communicate with each other without a host computer. OBD has moved beyond the realm of professionals and hobbyists to telematics device manufacturers supporting fleet tracking, fuel efficiency monitoring, remote diagnostics, PAYD and PHYD insurance. Although not originally intended for the above purposes, commonly supported OBD data, such as vehicle speed and fuel level, allow GPS-based fleet tracking devices to monitor vehicle idling times, excess speeds, and fuel theft. OBD data is also used to block mobile usage while vehicles are in drive and to road trip data for insurance purposes. This device is more advanced than the black box (Intel, 2015).

An example would be Progressive's snapshot. A dongle the plugs into a vehicles OBD-II port in order to continually collect information about how the vehicle is driven. Many other insurers use the OBD dongle to monitor and record information on driving behavior (Future of privacy forum, 2014). However according to Focus (2015), this is light telematics, as the dongle is removed after the data collection phase (3 to 6 months).

### **c) Smart phone**

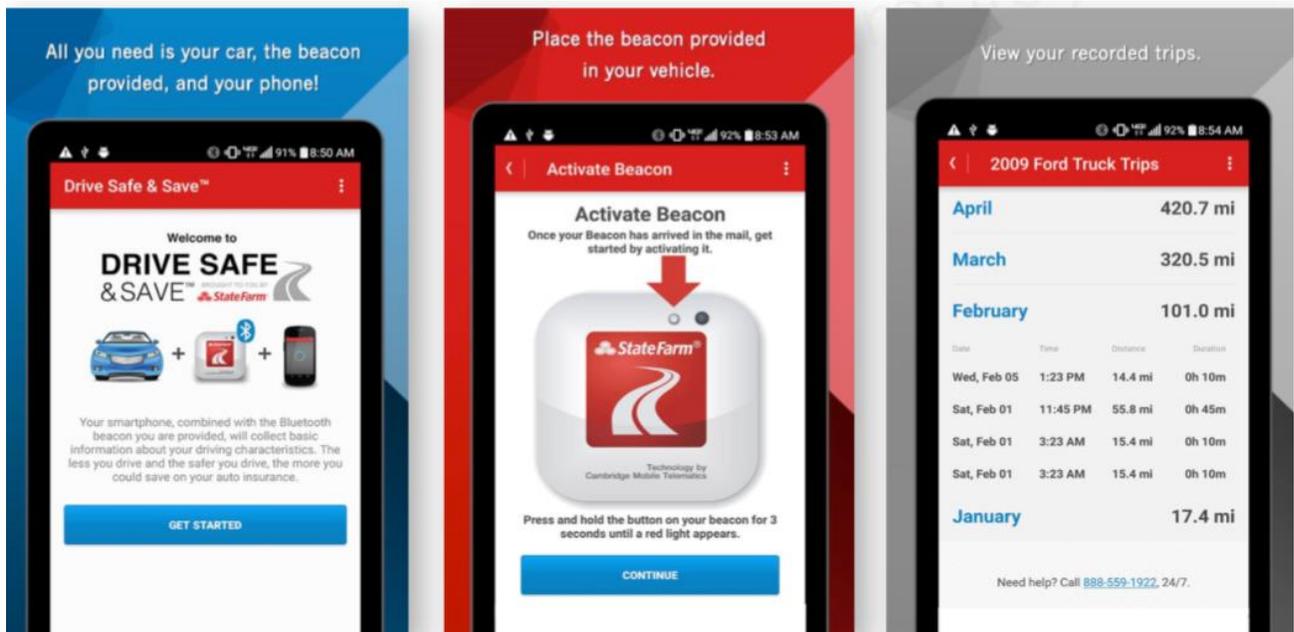
Due to technological advancement over the years, cellphones have developed sensors which made them smart, hence the term smart phone. Sensors are convertors that measure a physical quantity and converts it into a signal, which can be read by an observer or an instrument. The smart phone has various sensors which enable it to be used to analyze driving behavior. These sensors include the camera, microphone, as well as the following:

- i) Accelerometer- This is an electromechanical device that will measure acceleration forces. These forces may be static, like the constant force of gravity pulling at your feet, or they may be dynamic caused by moving or vibrating the accelerometer.
- ii) GPS- This is satellite based navigation tracking, often with a map showing your previous or current location. It gives us the value of longitude and latitude, which determines the location on earth.
- iii) Gyroscope- This detects the current orientation of the device or changes in orientation of the device.

- iv) Magnetometer- Magnetometers are measurement instruments used to measure the magnetic strength and the direction of the magnetic field at a point in space (Vavouranakis, 2016).

According to Bruneteau et al (2016), an Application (app) economy has been born. Mobile apps have impacted the automotive domain. In 2013, 346,000 different automotive apps were counted globally actively used by 156 million smartphone owners. Most of the mobile apps are used to monitor the driver’s behavior. State Farm insurance company based in the United States is an example of an insurer pricing UBI through a smartphone app known as Drive Safe and Save, which is a PAYD program. Fig 2.4 below shows the apps functionalities;

**Figure 2.4 State Farm’s Drive Safe and Save Smartphone PAYD program;**



**Source: Ptolemus Consulting Group (2016)**

The app records full acceleration, braking, cornering, and speed data is collected, however for State Farm only mileage is used for pricing. Driving data can be stored in the phone and uploaded when the phone is connected to Wi-Fi, meaning a data plan is not necessary.

**D) Embedded**

According to Reddy and Gunther (2012), vehicle manufacturers are increasingly embedding telematics to monitor system failures as well as performance of the vehicle, while meeting user

demand for wireless connectivity. By end of 2018, the proportion of new vehicles sold is likely to reach 46 % globally.

Embedded vehicles with telematics devices are the long term operations of both insurers and automakers, as insurers will not have to incur technology and installation costs. Several major automakers have already began down this path. General motors has installed Onstar system in its vehicles, while Ford and Microsoft have partnered to introduce the sync system into Ford vehicles (Kearney, 2010).

### 2.4.3 The pros and cons of the telematics insurance implementation options

When implementing UBI in a new market, insurers should take note of the benefits and drawbacks of the available options. These are summarized by Cruz et al (2014) in the table below;

**Table 2.1 Pros and Cons of the UBI implementation options**

Option	Pros	Cons
Black box	<ul style="list-style-type: none"> <li>• Prevents fraud and fraudulent insurance claims</li> <li>• Can be used in all business models</li> <li>• Automatically records and transmits data</li> <li>• Provides high quality information</li> <li>• Secure</li> </ul>	<ul style="list-style-type: none"> <li>• Most expensive UBI solution on the market</li> <li>• Requires professional installation.</li> <li>• Not portable</li> <li>• High administrative costs</li> <li>• May become obsolete</li> </ul>
OBD dongle	<ul style="list-style-type: none"> <li>• Widely used and proven</li> <li>• Easy to install/ self-installed</li> <li>• Can be transferred between vehicles</li> <li>• Collects high quality data about driving style and</li> </ul>	<ul style="list-style-type: none"> <li>• Can easily be stolen and tempered with</li> <li>• Vehicle must have an OBD diagnostics port.</li> <li>• Requires customers to self-report</li> </ul>

	location  <ul style="list-style-type: none"> <li>• Low cost</li> </ul>	<ul style="list-style-type: none"> <li>• May become obsolete</li> </ul>
Smart phone	<ul style="list-style-type: none"> <li>• Ubiquity of smartphones allows customers to easily utilize this option.</li> <li>• Can offer customers real time feedback on driving behavior with offered apps.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not collect robust data</li> <li>• Data may not be as reliable</li> <li>• Customer may incur data charges</li> <li>• Phone battery is drained quickly</li> <li>• Requires the driver to have their phone</li> <li>• Data security risks</li> </ul>
Embedded	<ul style="list-style-type: none"> <li>• Comes factory installed</li> <li>• Other value added offers with this device such as connected vehicles</li> <li>• Communication not reliant on external services</li> <li>• Data is secure</li> </ul>	<ul style="list-style-type: none"> <li>• Unable to distinguish between drivers</li> <li>• Expensive equipment</li> <li>• Hardware could become obsolete.</li> </ul>
Hybrid solution( Embedded plus smart phone)	<ul style="list-style-type: none"> <li>• Works with drivers smart phone via Bluetooth</li> <li>• Able to provide automatic information with an app</li> </ul>	<ul style="list-style-type: none"> <li>• Requires drive to have a smart phone</li> <li>• Possibility of some compatibility issues.</li> </ul>

**Source: Cruz et al (2014)**

### **2.5 Challenges with implementing UBI in a new market (Zimbabwean context)**

There is more to UBI than which meets the eye, thus making it difficult for local insurers to implement the program. The first and major cause of concern are the costs involved. UBI requires major commitment and investment by the insurer. The cost of purchasing and installing infrastructure to enable UBI is very costly. According to Bruneteau et al (2016), a single black

box purchase and installation costs between \$80 and \$100 United States Dollars. The insurer will also need to invest in technology that will enable the collection and management of the data. He also notes that UBI is a difficult model to implement in low premium markets. The insurer will also incur more costs from redesigning the organization's operations and processes. The underwriting, sales, marketing, claims and servicing departments will all require adjustments so as to enable the smooth implementation of UBI, which would be difficult if the employees are resistant to change. Another cost likely to be incurred is that from employing experts such as actuaries and data scientists.

Another cause of concern against UBI is that of data privacy. According to Friedman and Canaan (2014), some clients are discouraged to partake in UBI simply because they are not comfortable with having an invisible backseat driver who watches their every move when they drive. Others are mainly worried about hackers, thieves and those who will be able to access their phones if lost for villainous purposes as where and when UBI policyholders are driving. Fear of the insurer sharing the private information with third parties such as law enforcement or private litigators who may want his/her driving history for criminal or civil actions. Hence it is difficult to ascertain the regulators' approval on UBI that is telematics based as the policyholders personal data may be prejudiced or wrongly used. Therefore insurers implementing UBI are faced with the challenge of convincing the policyholder that the driving data obtained will be used for the agreed business purposes only, and that it will be cyber secure.

Most Zimbabwean roads are dilapidated and full of potholes which are found anywhere if not everywhere. Drivers end up driving on any side of the road avoiding these potholes. This may send the wrong information to the insurance company, as it may indicate hazardous driving and yet the driver would be avoiding potholes which may damage his/her vehicle. So as to accurately price the driver, telematics based insurance requires consistent monitoring, which is mainly assisted by mobile networks. However in Zimbabwe, this may be difficult, as some areas have poor mobile networks, and internet reception therefore when the driver enters these zones, connection is lost. Internet and mobile connections are strong in urban areas, and poor in rural zones, which makes it difficult to monitor the policyholder consistently.

Studies have also shown that age is a factor in openness towards UBI. Therefore the young drivers market compared to their older counterparts will be most comfortable with having a

backseat invisible driver. Hence UBI is most likely to attract the young drivers market more. Also UBI in its early stages, the first insurers to implement it have the opportunity to increase their market share through the discounts it offers. However once most if not all insurance companies have implemented it, it is unlikely that UBI discounts alone will help insurance companies to grow further (Friedman and Canaan, 2014).

### **2.5.1 Overcoming some these challenges**

However Tarantino (2016) presents steps that need to be followed when implementing UBI in a new market, which are as follows;

#### **i) Forming partnerships for telematics**

It is not simple implementing UBI in a new market. Despite the size of the insurer, implementing UBI becomes simple if he partners with a partner with right technology. The insurance company should carry out a research on the company the wishes to partner with. The partner should not only provide the technology but also provide extraordinary service, data management, cyber security, telematics experience as well as providing training for the insurer's employees on how to use the program. The partner should be familiar with the insurance company's operations as well as the whole insurance industry, as this will assist the insurer to execute the program smoothly. The partner also should help the insurer to work through its budget cycle.

Another factor to consider when choosing a telematics partner is viability. The chosen vendor should have a positive history, growth and development should be experienced in the long run, and the partner chosen should not need replacement in the next few years as this will affect the success of the program.

#### **ii) Secure top executive support**

Senior management of the insurance company should be fully committed and in full support of the program as it will have great effect to its success.

#### **iii) Setting realistic expectations**

It is highly unlikely that UBI will be smoothly implemented the first time. Therefore experiments should be ran, with the ability to make adjustments instead of trying to deploy a perfectly launched program.

**iv) Run a pilot program**

This should be done before the actual implementation. This should be done to help the insurer to learn more about telematics as well as test the infrastructure. The insurer should learn about the different telematics providers and should develop a comprehensive contract to govern the services rendered. The insurer should then identify the best devices to use and data management techniques. Volunteers should then be chosen to be test subjects of the program, the insurer may choose existing customers or his employees.

**v) Regularizing the program**

This is the most important step. The insurance company should gain regulatory approval. The regulator should fully understand the technology and its implications. After this has been done, companies may then launch the program.

**vi) Carry out a marketing campaign**

The insurance company needs to put a lot of resources towards the marketing of UBI in the new market as it plays a vital role in its success as well. UBI will also be new a program to the consumers just as it is new to the insurance companies. Therefore a marketing campaign should be carried out, so as to educate the consumers thus removing fear, uncertainty and doubt from the new market.

## **2.6 Data management**

Large amounts of data are generated when UBI is implemented by the insurer, and it involves an integrated set of processes and technologies. IBM (2014) highlights the way in which this data should be managed by insurer;

**i) Ingest**

Vehicles can generate terabytes of data per day and petabytes per year. Data might include information about vehicle speed, acceleration, braking, cornering, driving frequency, and driving distance, as well as weather conditions, traffic conditions and more. Insurers need to ingest those large volumes of data in analytics.

**ii) Cleanse**

Data quality and content may vary depending on the device or vehicle used. Insurers should cleanse data to ensure consistency and to support accurate analysis.

**iii) Enrich**

Insurers should enrich UBI data with geospatial data, road data and weather data to provide context that aids analytics.

**iv) Analyze, report**

Insurers need to invest in advanced big data analytics solutions that can analyze streaming data in real time and analyze increasingly large volumes of data. To generate and identify new insights, they must facilitate data exploration, enable predictive analysis and provide reporting capabilities.

**v) Deliver**

Insurers need to have solutions that can provide customers with feedback and information on a variety of mobile platforms.

**vi) Data governance**

They also need to ways to simplify data retention and governance. Asquith (2012) also notes that currently there are no agreed standards for telematics formats and records beyond those relating to raw satellite based GPS data. Data generated by the telematics device will be specific to an insurer's proposition and there will be a range of visualization and pricing approaches available to influence driver behavior and usage patterns.

Asquith (2012) also highlights the following when managing data;

**vii) Data archiving**

Insurers will need to adopt data archiving strategies that support the business processes as some may need 12 months of raw data to price policies while some will require a few months to. Once that data is used it should then be summarized in order to limit the amount of cloud storage required. This approach for managing big data is new for insurers.

### **viii) Data privacy**

Data privacy is an issue of concern in the telematics market. Insurers need to reassure clients that any collected data from telematics devices is for business purposes only and will not be sold or used for any other reason beyond this core business function.

### **2.7 Justifying entry into telematics based insurance**

Insurance companies may have different cases for entering the telematics market. One insurer may be concerned with brand interaction, customer retention and future pricing benefits, while the other will see risk selection, new rating and improved claims handling processes as the key. Both will need to be understood and be fully aware of the local market conditions. Telematics requires technology investment and these investments need to be viewed against improvement in loss ratios, not against the impact on the expense ratio. It is of importance to focus on the impact of telematics on the overall combined operating ratio, not the cost of the infrastructure relative to the expense allowance inside a single financial period. Insurers must also be certain that their clients will want to purchase UBI products. If they do then clients who will benefit from UBI will purchase these products, particularly if they receive wide mobility benefits. Eventually this will isolate the poorest drivers and insurers that do not invest in telematics may find themselves at risk of adverse selection. Clients will purchase UBI products if they trust the technology, the brand and if they believe they are a better driver than average and will receive large enough savings to warrant the underlying intrusion (Stacy and Lukens, 2014).

### **2.8 Case study: Discovery Insure, South Africa**

According to Bruneteau et al (2016), Discovery insure is a South African based personal insurance provider. Discovery launched on the first comprehensive PHYD program in 2011 called the Vitality Drive. From the start, this model was meant to reward safe drivers instead of a discount. If the customer drove well he/she would earn points based on his/her driving behavior. The more points earned, the greater the reward. The program originally was based on a black box. Discovery insure kept innovating and is one of the insurers today to also offer a program based on a smartphone app and a Bluetooth low energy beacon. Now drivers that do not wish to

use their smartphone or that do not have a compatible smartphone can opt for the black box solution.

Driving behavior is assessed on acceleration, speed, braking, cornering, night time driving (between 23:00 and 04:30), distance and smartphone usage (when the app version is selected). Since 2013, the reward model has evolved and Discovery now offers new rewards aimed at young drivers in addition to its previously available rewards. For example young adults below 26 years old, benefit from rewards of 25% of vehicle insurance back every six months based on driving behavior, as well as up to 25% on DriveMe partners, which are taxi services provided via contact from a smartphone app, these are Uber, Roadtrip and Smartguyz. This is done in an attempt to reduce night driving and drunk driving. The vitality driver telematics program has been growing steadily since 2011 and now counts more than 120,000 policyholders including both with professionally installed black box and smart phone apps.

Initially with black boxes, Discovery Insure experienced an improvement in driving behavior by an average of 20% within the first 12 months of joining Vitality Drive. With the smartphone enabled program, the insurer experienced a risk reduction of an average 15%, with the first 30 days. Through the smartphone, policyholders are able to receive instant feedback from their driving. The old architecture could only score once a week. However battery consumption remains one of the major challenges faced by smartphone data collection. According to Discovery an average driver who drives about one hour per day and uses a typical smart phone may experience battery drain in the range of 15% to 20% over the day.

Discovery also offers free online courses to young drivers to improve driving behavior. Discovery's success bring the evidence that promoting healthy leaving and driving can be combined under one umbrella program. Through the use of rewards to widen their app usage, Discovery also demonstrates that finding the reward that touches the driver's attention can become a key part of a successful UBI program.

## **2.9 Summary**

This chapter analyzed and evaluated published literature by various researchers, writers as well as corporates on telematics based insurance. The UBI programs available, the implementation options available for these programs, as well as the challenges with these options were carefully

examined in this chapter. The challenges to expect when implementing UBI and ways that counter these challenges were also discussed in this chapter.

## **Chapter 3**

### **Research Methodology**

#### **3.0 Introduction**

This chapter discusses the research design, study population and sampling techniques, research instruments, data collection and data analysis plan.

#### **3.1 Research design**

A research design is defined by Kothari (2004) as the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Research design is the conceptual structure within which research is conducted, it constitutes the blueprint for the collection, measurement and analysis of data. In simpler terms, a research design is a plan that describes how, when and where data is to be collected and analyzed (Parahoo, 1997).

The research design in this study is a qualitative approach, in which questionnaires and interviews were used. The reason for using the qualitative approach in this study is to investigate if the local motor insurance market's perception of UBI and their preparedness to implement it.

#### **3.2 Study population**

A study population includes all the individuals whom the researcher is interested in getting information from and making conclusions. According to Frankel and Wallen (1996), the study population consists of those subjects whose characteristics are similar to those drawn from this study population. For the purpose of this research, the study population consists of twenty short

term insurance companies registered with the Insurance and Pensions Commission (IPEC). The underwriting and claims managers were the targeted respondents. This is because they are responsible for risk assessment and claim payments.

However because of time and financial constraints the researcher could not collect data from the whole population, therefore sample representatives were selected.

### **3.3 Sampling and sampling technique**

Sampling, is the process of selecting part of the population to become the basis of coming up with results regarding the whole population. Therefore a sample is a chosen or selected number of representatives in a population (Walliman, 2011).

#### **a) Random sampling**

Random sampling is whereby each element in the population has an equal and independent chance of being selected. Equal implies that other considerations such as personal preference do not influence the sample, thus the probability of selection of each element in the population is the same (Kumar, 2005).

According to Robson (2009), Random sampling can be broken down into four methods, namely simple random sampling, stratified sampling, cluster sampling and systematic sampling. Simple random sampling, is where the sample is chosen at random from the population list, which is uniform or has similar characteristics. A simple random sample cannot be produced without a full list. Stratified sampling involves dividing the population under study into strata's, where members of a strata share a particular characteristic or characteristics. Random sampling is then performed within the strata. Systematic sampling is done by taking every  $n^{\text{th}}$  name from the population list. After deciding on the sample size needed, you divide the total number of names on the list by this sample size. For example if the sample required is 50 from the population total of 2000, then every 40<sup>th</sup> person is chosen as a respondent. The last one is known as cluster sampling which involves dividing the population into a number of clusters that contain individuals who have a range of similar characteristics. The clusters themselves are chosen on

random basis. This method is mostly useful when a population is widely dispersed and large thus requiring a great deal of effort to get the sample information.

#### **b) Non- random sampling**

Non-random random sampling designs differ from that random sampling which follow the theory of probability in choice of elements from the sampling population. When the elements in a population are unknown or may not be individually be identified non-probability sampling is used. Non-random sampling is also broken down into four methods namely quota sampling, convenience sampling, purposive sampling and snowball sampling. Quota sampling is performed when the researcher has an easy access to the sample population. The researcher is guided by some visible characteristics such as gender or race that maybe of interest to him/her. The most convenient location is chosen by the researcher, and whenever a person with the relevant characteristics is seen they are then asked to participate in the study. Until the required number of respondents is achieved, this process is continued. Convenient sampling which is also known as accidental sampling is based on the convenience of accessing the sampling population. Unlike quota sampling which makes use of visible characteristics, convenience sampling makes no such attempt. Market research and newspaper research are the common areas in which this research is used. Purposive also known as judgmental sampling, is mainly considered when the researcher judges whom can provide the best information to achieve the objectives of the study. The researcher only uses those people whom in his or her own opinion are likely to have the required information and will be willing to share it. Snowball sampling is whereby the researcher performs the process of selecting a sample using networks. This starts with a few individuals in a group or organization who are selected and the required information is collected from them. They then refer the researcher to other people in the group or organization, and they become part of the sample. This process continues until the researcher has acquired the information required (Kumar, 2005).

For the purposes of this study, the researcher used the simple random sampling method, which is a random sampling technique used to investigate the practicability of introducing UBI to the local motor insurance market. The population being uniform as none of the insurance companies have introduced the product to the local market.

### 3.5 Sample size

According to Kumar (2005), a sample size consists the few selected to represent the entire group (sampling population) to become the basis for estimating or predicting the prevalence of an unknown piece of information or situation under study. According to Yamane (1967), a sample size is determined using a formulae. An 85% confidence level was used therefore the margin of error is 0.15. The sample size is calculated using the following formulae;

$$n = \frac{N}{(1 + N(e)^2)}$$

Where; n = sample size

N = population size

e = margin of error

The sample size was therefore calculated as follows;

$$n = \frac{20}{1 + 20(0.15)^2}$$

$$n = 14$$

Fourteen insurance companies were selected using the Yamane formulae to represent twenty insurance companies (study population) in Zimbabwe. The larger the sample size the better the result, hence why an 85% confidence level was used.

### 3.6 Research instruments and data collection

For the purpose of this study, the researcher used the survey design in which data is collected using interviews and questionnaires. This method of data collection is known as the triangulation method, this is whereby the researcher uses two or more referents to draw conclusions. It involves evidence from different sources, different methods of collecting data and investigators (Robson, 1997). Triangulation enables the researcher to strive to distinguish true information.

#### 3.6.1 Questionnaires

A questionnaire is a data collection instrument that has a series of questions and other prompts for the purpose of gathering information from those whom the questionnaires are given to

(Abuwi, 2013). A questionnaire is a form or set of forms that consists of questions that are in a definite order (Kothary, 2004). A questionnaire comprising of a standard number of questions was designed and distributed to all the ten companies.

#### **Advantages of using questionnaires**

- a) Respondents who are not easily approachable are reached effortlessly.
- b) Questionnaires are economic as the researcher can contact a large number of participants at low cost.
- c) Questionnaires give respondents ample time to respond.
- d) Responses are free from the interviewers bias as they are given in the respondents own words.

#### **Disadvantages of using questionnaires**

- a) There is risk of low responses if the questionnaires are sent through email as respondents may forget.
- b) There is possibility of not understanding the replies or omission of replies to certain questions.
- c) It is difficult to know if respondents were truly representative (Kothary, 2004).

To overcome some of the challenges above, the researcher hand delivered the questionnaires and they were completed as he waited.

### **3.6.2 Interviews**

An interview is a method of collecting data whereby the interviewer uses oral-verbal stimuli, and responses given in oral verbal stimuli by the interviewee.

Interviews help the researcher to generate the respondents opinions on the current pricing model used in motor insurance underwriting as well as the practicability of implementing UBI to our local insurance industry.

#### **Advantages of interviews**

- a) Prompt responses were given
- b) Face to face interviews helped the researcher to control the conversation and interpret non-verbal cues.
- c) It helps finding common ground, as the researcher clarified the questions he asked

### **Disadvantages of Interviews**

- a) Interviews are time consuming as they need to be carried out effectively.
- b) There is risk of default as interviewees may have other commitments.

### **3.7 Other sources of data used**

Apart from primary data, the researcher also engaged in secondary data as a source of information. Secondary data included the internet, journals, company publications and electronic text books. Literature on UBI was more readily available in the markets in which it has been implemented already therefore American, Asian, European and South African publications were used. Most sources did not have information particular to the Zimbabwean market, but helped in presenting trends in other global markets.

### **3.8 Data analysis and presentation plans**

Data collected from research will be presented in bar graphs, pie charts, tables and narrations. Secondary information collected from journals and the internet will reference data collected using questionnaires and interviews.

### **3.9 Summary**

This chapter explained the various methods used to gather data that was needed to investigate the practicability of UBI to the Zimbabwean market. The study population, sample size and sampling techniques as well the research instruments used were also explained in this chapter. The sources of data used namely primary and secondary were explained in the chapter. Lastly the data presentation plans were outlined by the researcher.

## **Chapter 4**

### **Data Presentation and Analysis**

#### **4.0 Introduction**

The data collected from the field is presented and analyzed in this chapter. Tables, pie charts and bar graphs were used to illustrate the collected data. For data collection the researcher used questionnaires and interviews, the results are therefore presented with reference as primary data.

#### **4.1 Response rate**

The researcher distributed fourteen (14) questionnaires to 14 short term insurance companies which constituted of the study sample. Twelve (12) of the 14 questionnaires were returned, making 85% the response rate. The questionnaires were directed to either the claims manager or the underwriting manager of the company. Ten (10) interviews were successfully conducted out of the 14 respondents, which were also targeted to either the claims or underwriting managers of the company. Hence if the researcher interviewed the underwriting manager, the claims manager would then respond to the questionnaire. The overall response rate for the questionnaires is presented in the table below;

#### **Table 4.1 Response rate analysis**

<b>Respondent</b>	<b>Sent</b>	<b>Returned</b>	<b>Response Rate</b>
Underwriting Manager	8	6	75%
Claims Manager	6	6	100%
<b>Totals</b>	<b>14</b>	<b>12</b>	<b>85%</b>

Source: Primary data

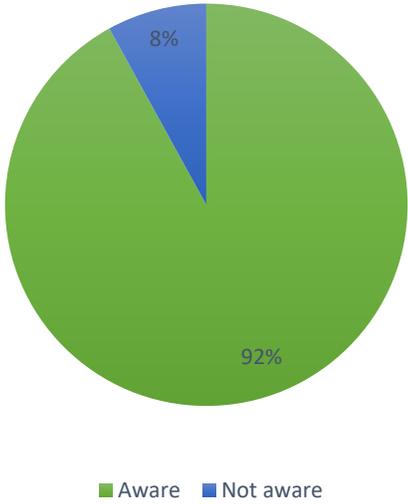
The researcher waited while the questionnaires were being completed. This was done to help clarify some of the questions asked when assistance was required. This also contributed to the high response rate.

**4.2 Discussion of findings**

**4.2.1 Awareness of usage based Insurance**

The question intended to find out if local insurers knew about UBI. 92% of the respondents were aware of this product, and only 8% were not. This shows that the majority of the insurance companies in our market are aware of UBI. These results are presented in the figure below;

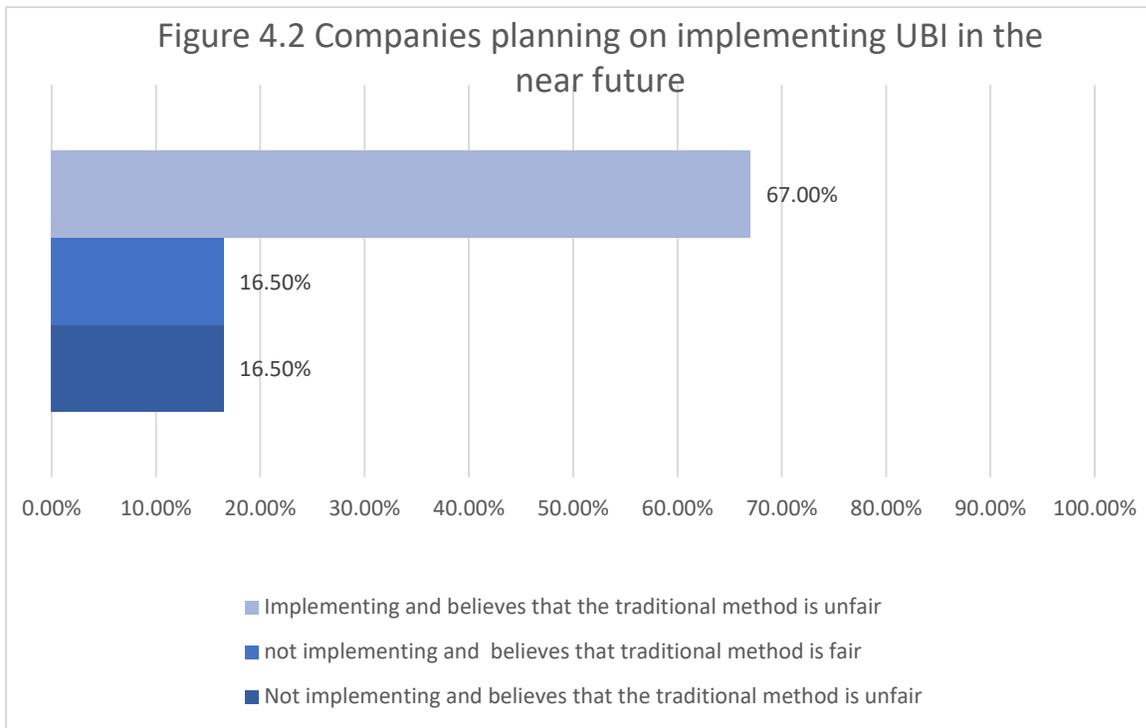
**Figure 4.1 UBI Awareness**



Source: Primary data

**4.2.2 Insurance companies planning to implement a UBI program in the near future**

The question sought to investigate the number of local insurers who were planning on implementing UBI in the near future. Some companies which are planning on implementing UBI



believe that the current rating method is unfair, whilst

those not planning to, believe in the traditional rating method's fairness. However other insurers even though believing that the current rating method is unfair still have no plans of implementing UBI, because of the current unfavorable economic conditions amongst other factors. 67% of the companies had plans of implementing UBI, supported by belief that the traditional pricing method is unfair. 16.5% respondents had no plans of implementing UBI because they believed that the traditional rating method was appropriate, with the remaining 16.5% disagreeing with the conventional pricing's fairness, yet not planning on implementing the program in the near future. These results are presented in figure below;

Source: Primary data

#### 4.2.3 Benefits of UBI to the insurer and value addition for the insured

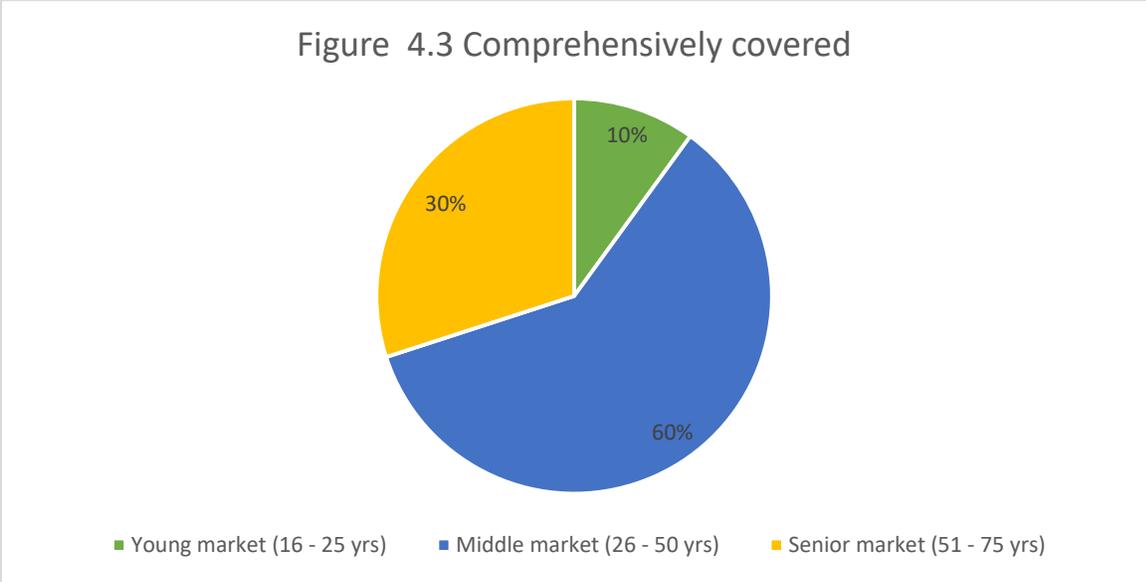
The question sought to investigate if the respondents expected any benefits from usage based insurance if they were to introduce it to their organization. All the respondents were in agreement that UBI would bring a reduction in the motor business loss ratio, better risk selection, elimination of fraudulent claims, increase in market share through innovation, retention of good

risks, improved claims procedure and processing as well as improved reserving. The respondents pointed out that if UBI was to be introduced their main objectives would be to fairly price their clients, attain a competitive advantage, increase Gross Premium Written (GPW), and reduction in the claims frequency which would be attained through better risk selection.

For insurance companies to enjoy these benefits, the drivers should also be able to experience some value addition from the UBI product. 25% of the respondents said they would stick to insurance business and offer discounts for good driving behavior only. 75% said they would offer add-ons such as road side assistance in case of emergency, safe driving tips, vehicle recovery when stolen and notifying the driver of the weather and traffic conditions.

**4.2.4 Which consumer’s market purchases comprehensive cover the most**

This question intended to find out which consumers market in terms of age where comprehensively covered the most. The results showed that the middle market was mostly covered, hence their result of 60%, senior market 30% and young market 10%.The results attained are shown in the diagram below;

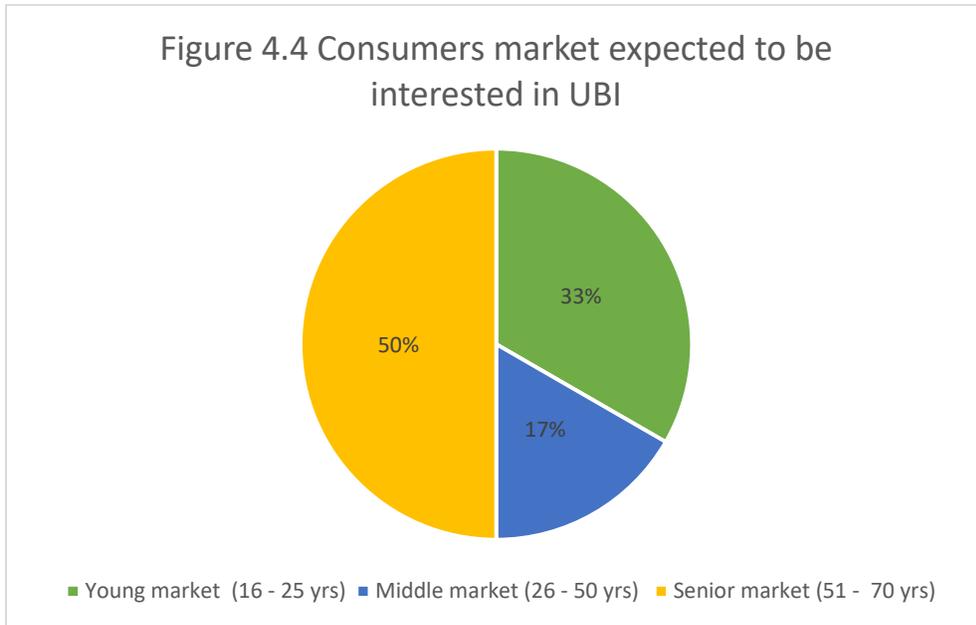


Source: Primary data

**4.2.5 Which consumers market would be mostly interested in UBI if introduced?**

The intention of this question was to find out which consumers market would be mostly interested in UBI. The senior market was said to be interested in UBI the most. Hence the results

for senior market where 50%, young market 33% and middle market 17%. These results are presented in the chart below;



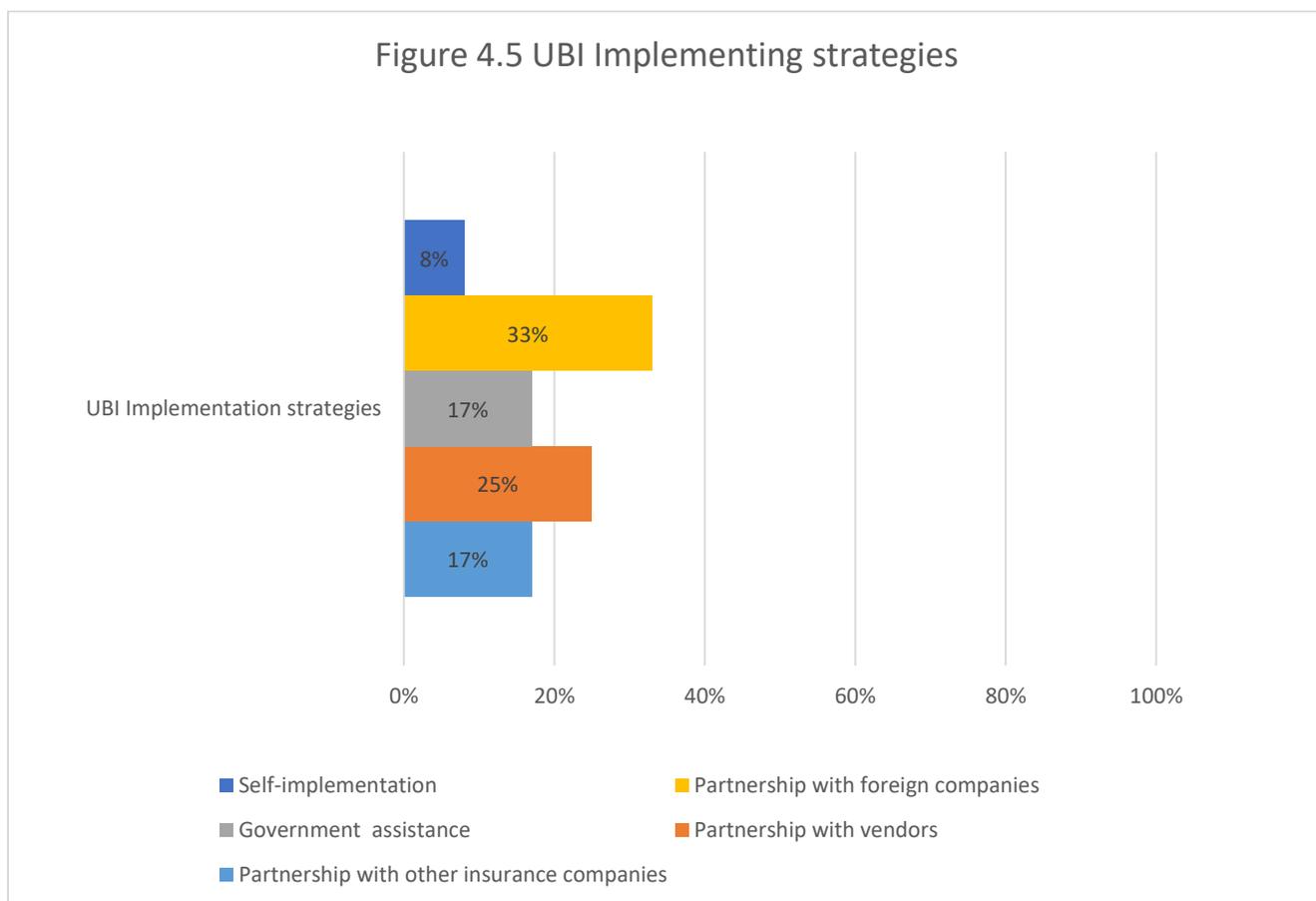
Source: Primary data

#### 4.2.6 Which UBI model would be most ideal for our market

There are two main UBI models available namely Pay As You Drive (PAYD) and Pay How You Drive (PHYD). PAYD prices the driver based on his/her mileage, time driven as well as geographical location being driven. PHYD considers the same parameters as PAYD, but also considers driving behavior such as braking, speeding and cornering. Hence PHYD is more comprehensive and complex compared to PAYD. The question intended to find out which model between the two would be most ideal for the Zimbabwean market. 92% of the respondents were in favor of PAYD and 8% of PHYD. This is because considering the liquidity challenges affecting the economy, PAYD would be more affordable for insurers to implement as it only requires mileage and geolocation data, compared PHYD which collects large amounts of data and investments which would be expensive for them to implement.

#### 4.2.7 Strategies to be used by insurers to counter the high cost of implementing UBI

UBI is very costly to implement, and considering the liquidity challenges being experienced in the country it then makes it more difficult for insurers. However there are various strategies that could be used by insurers to lessen the burden, hence the question sought to find out whether insurers were going to self-implement UBI or seek assistance. The respondents considered various strategies that would assist them in implementing UBI. These options included partnering with other insurance companies, vendors, foreign companies, seeking government assistance or rather self-finance the program. The results are presented in the chart below;

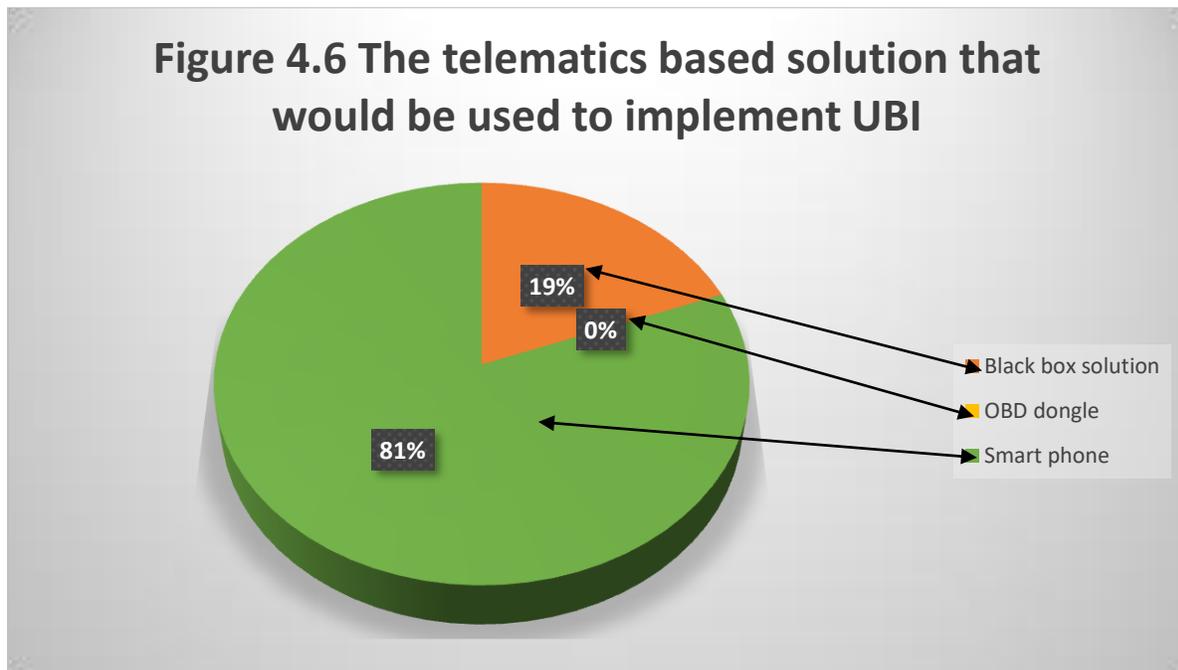


Source: Primary data

#### **4.2.8 Which telematics based insurance would be most ideal for a new market like Zimbabwe**

There are a number of telematics technology options that insurance companies can choose from when implementing UBI in a new market. The question intended to find out which option would be most efficient and effective for insurance companies to start with, so as to monitor the driver

in real time. There were three available options namely the black box solution, the OBD dongle and lastly the smart phone solution. 81% of the respondents were in favor of a smartphone solution this because it would be less costly for the insurance company to develop a mobile application that would best suit the UBI program as compared to the cost of importing and installing a black box or OBD dongle. The challenge then comes to those interested in the product but do not own a smartphone. 19% were in favor of the black box, in which the cost of acquisition and installation would be catered for by the insurer.0% of the respondents routed for the OBD dongle solution. These results are presented in the chart below,



Source: Primary data

#### 4.2.9 Interviews findings

The researcher was able to conduct ten interviews. This section therefore summarizes the findings. Firstly the interviewees had knowledge of usage based insurance and the benefits it would bring to the insurance industry as a whole if implemented in our market. They highlighted that the major objectives if introduced would be to fairly price vehicle insurance, gain competitive advantage as well as reduce road traffic accidents which would benefit the society at large. However one of the challenges to expect if implemented would be the collection of inaccurate data from the poor road networks, as the majority of the roads are filled with potholes.

Countering this challenge maybe very difficult as the city municipality is responsible for the repairing of these roads, however in the meantime they would advise the driver to take safer route. Another challenge is that of our mobile networks, which do not have network coverage in most outskirts of our country, hence this would interrupt real time monitoring of drivers who travel to these areas. However other networks such as South Africa's MTN would be available in such areas. To counter this challenge insurance companies agreed that partnering with companies in the telecommunication industry to lower the cost of implementation and encourage the expansion of their mobile network coverage. Respondents pointed out that partnering with a vendor to implement UBI in our country would be more appropriate especially with companies in the telecommunication as they have the infrastructure and technology required.

The researcher also intended to find out if insurers were to introduce UBI, if the traditional rating method would remain relevant to the organizations. Even though the traditional rating method has been distorted due to the rate under cutting being practiced in the market respondents pointed out that it is difficult to completely do away with it, therefore it will remain relevant.

However it was highlighted that it is difficult for insurers to implement UBI in Zimbabwe. This because of lack of information and a guide that could help insurance companies in implementing UBI in a new market. As well as lack of capital to invest into the program. UBI is costly to implement as it requires technological and infrastructural investment. The current economic and liquidity challenges being faced in the country then makes it more difficult for companies to make such an investment. Uncertainty is another cause of concern to insurance companies. There is risk the program failing or have a low uptake due to lack of knowledge in the consumers market about insurance in general and its benefits. Drivers may not want to be insured under UBI due to privacy concerns. As well as how UBI will be regulated, which is uncertain which will also influence its success.

### **4.3 Summary**

This chapter presented the data collected from the questionnaires as well as findings from the interviews. The data was presented on pie charts, tables and bar graphs. Some of the data collected was explained qualitatively. Based on the findings, the researcher will therefore make conclusions and recommendations in the next chapter.

## Chapter 5

### Conclusions and Recommendations

#### 5.0 Introduction

This chapter draws the conclusions and recommendations on the research. The chapter sets up to establish if the research objectives were achieved.

#### 5.1 Conclusions

The Zimbabwean insurance industry acknowledges the unfairness of the traditional rating method, in that it penalizes good drivers, and those whom use the vehicle less by charging the same premium on vehicle users who spend more hours on the road, or drive dangerously. The industry is also well aware of usage based insurance and the positive results that it could bring to the table against the short comings of the traditional rating method.

The successful implementation of UBI will reward insurance companies with a reduced claims ratio, improved risk selection, reduction in claims occurrence, fair pricing, prompt claims processing, settlement, reserving and could possibly be a solution to the issue of rate undercutting and fraudulent claims. Insurance companies also acknowledge that value addition promotes consumer loyalty, increases market share and gives them a competitive advantage, therefore additional services can be bundled together with telematics based insurance, such as road side assistance in case of emergency, safer driving tips, vehicle tracking and recovery when the vehicle is stolen. As it stands those who are middle aged (26 – 50) are comprehensively insured the most. The introduction of UBI could be an opportunity for insurers to exploit the young and senior consumer markets. The young market (below the age of 25) will be able to control their cost on insurance by driving less and those in the senior market (above the age of 60) who are retired and use the vehicle less would take advantage of the low premiums bought by UBI.

However there is so much to UBI than which meets the eye, this making it difficult for insurers to put the program into practice. Therefore the findings from the research carried out show that insurance companies plan on implementing UBI in the near future, however currently not prepared to. This is because implementing UBI comes at a high cost, one which insurance companies are not yet prepared to incur. It requires them to invest in infrastructure as well as

telematics technology installment that enables them to monitor the driver in real time. There is also high costs involved in redesigning the organization's processes, employing data experts and actuaries to ensure accurate data collection, interpretation, premium calculation and management, as well as marketing the program to ensure its success.

Another cause of concern that was highlighted is the little awareness of the public when it comes to insurance. Already the majority of vehicle users regard comprehensive cover as a fixed cost that one can leave without, and they purchase third party insurance only because it is a mandate. Hence insurance companies are not prepared to introduce UBI in our market because of the public's lack of knowledge and appreciation of insurance in general.

Usage based insurance being a new program that has not been implemented in our market holds a lot of uncertainty. Hence insurers have that fear of the unknown, whether making such an investment will be fruitful and if it will be accepted by the public because of its lack of privacy. Privacy is a factor that may contradict the uptake of UBI if introduced, this is because drivers may not be comfortable having an invisible back seat driver who will be watching their every move. Drivers may also worry that this private information may be misused or possibly end up in the wrong hands.

Regardless of the high cost involved in implementing UBI, insurance companies are prepared to lessen it through partnerships instead of launching the program on their own. Insurers have various options to choose from, namely partnering with other insurance companies, choosing a vendor who has the technology and infrastructure at their disposal, seeking government support as UBI will bring societal benefits from reduction in accidents or forming partnerships with foreign companies.

From the telematics based options that are available, insurance companies also opt for the smartphone based solution in which the driver would be monitored via a smartphone app. This option has a number of drawbacks namely data being less secure, data collected is not robust and reliable, the phones battery is reduced quickly, a smartphone is disposable thus can easily be lost or forgotten at home , and the customer may incur data charges. However it is less costly to implement compared to the black box or on board diagnostics (OBD) dongle solution.

## **5.2 Recommendations**

From the research findings the following recommendations can be made;

Insurance companies can start by implementing UBI on a less costly scale. There are UBI programs such the mileage based program that do not require heavy investments by the insurer as it doesn't necessarily require geolocation of the driver, but only for the driver to report his/her odometer readings. The driver is then priced depending on his/her mileage. This will help insurers test the markets response to UBI, and then fully implement telematics based insurance at a later stage. This will help consumers familiarize themselves with the basic concept of UBI. It will also help insurers increase their market share as well as exploit other consumer markets that are not comprehensively insured and help them keep up with the global dynamic trends of insurance, as gone are the days where insurance companies solely depended on the traditional rating method.

The whole insurance industry should also come together and host workshops or conferences and discuss on usage based insurance amongst other current and future trends. They can invite foreign insurance companies that have experience in usage based insurance to provide training on ways to implement the program successfully. Companies such as Hollard Insurance Company and Discovery Insure both based in South Africa have implemented UBI, and could be of assistance to our local market.

Insurance companies may also form partnerships with other local companies that are already in the vehicle tracking industry. An example is Econet Wireless, which has recently launched its vehicle tracking program bundled together with a motor insurance cover known as iDrivesure. This service offers comprehensive cover, with free Econet connected car vehicle tracking service and road side assistance. As Econet has the infrastructure and technology in place, a partnership with Insurance companies would lessen the cost of implementing UBI. A partnership with a local telecommunication company such as Econet will also be an encouragement to the telecommunication company to widen its network coverage in other areas they have not yet reached particularly in the rural areas. This will in turn enable insurers to monitor the driver in real time at any geolocation in the country without any disruptions.

Insurance companies should also involve the government as usage based insurance will bring with it societal benefits such as reduced accidents and carbon emissions. These benefits work in

the best interest of the government, hence it would then encourage or offer assistance in implementing the program. Insurers when implementing UBI should involve Government agencies such as the Zimbabwe Traffic Council and the Environmental Management Agency (EMA). As the implementation of UBI will promote less and safer driving therefore in turn reducing accidents as well as carbon emissions. It will also reduce the crime rate, as police will be able to recover the stolen vehicle via the telematics device installed.

Insurance companies and the governing boards such the Insurance Council of Zimbabwe should come together and hold insurance awareness campaigns targeting the general public. These campaigns are meant to educate the public about insurance and its importance to the society. This will not only improve the uptake of UBI when introduced in to our market, but also for existing programs.

### **5.3 Summary**

This research concluded the findings from the research and recommendations where made that will help insurance companies prepare themselves to introduce usage based insurance.

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**APPENDIX 1**  
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Zimbabwe

**FACULTY OF COMMERCE**

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**DEPARTMENT OF INSURANCE AND RISK MANAGEMENT**

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Date 23/03/2017

To Whom It May Concern:

Dear Sir/Madam

**Ref: Request for information needed for a research**

My name is Tanaka M Mundowa (Registration Number – R136974E); I am a student at the Midlands State University studying for a Bachelor of Commerce Insurance and Risk Management Honours Degree. I am currently undertaking a research project for my final year entitled “*AN INVESTIGATION ON THE PRACTICABILITY OF USAGE BASED INSURANCE AND TELEMATICS TO THE ZIMBABWEAN MOTOR INSURANCE INDUSTRY*”. To this end, I intend to collect data by use of the attached questionnaire. All information you provide will be treated with strict confidentiality and used solely for academic purposes.

Should you require more details about the researcher, you are free to contact the chairperson of the Department of Insurance and Risk Management; Mr. F.Makaza on his mobile number, 0774620669 or email [fmakaza@msu.ac.zw](mailto:fmakaza@msu.ac.zw). Your co-operation will be strongly appreciated.

Yours sincerely

Tanaka Mundowa

0773399252 email; [tanaka.mundowa@gmail.com](mailto:tanaka.mundowa@gmail.com)

**APPENDIX 2**

**Questionnaire for Short term insurance companies**

May you kindly tick in the boxes below.

**1) What is your view on the current rating method (traditional) used in our motor insurance industry of pricing every driver as an average risk?**

Fair	
Unfair	

**2) Do you know about usage based insurance?**

Yes	
No	

**3) Is your organization planning on implementing a UBI program in the near future?**

Yes	
No	

**If the answer is No what strategies have you put in place to counter the problems with the traditional rating method?**

.....

.....

.....

.....

**4) What benefits would you expect UBI to bring to your organization?**

Reduced claims ratio	
Better risk selection	
Reduced fraudulent claims	
Increased market share	
Retention of current customers	
No more rate undercutting	
Improved claims procedure and processing	
Improved reserving	

**5) How would you use UBI to add value to your customers?**

Discounts for good driving behavior	
road side assistance in case of emergency	
Safe driving tips	
Vehicle recovery when stolen	
Traffic congestion and weather notifications	

**6) Which consumer's market purchases comprehensive cover from your organization the most?**

Young market (16- 25 yrs)	
Middle market (26 – 50 yrs)	
Senior market(51 – 75yrs)	

**7) Which consumer's market do you think would be most interested in UBI if implemented?**

Young market (16- 25 yrs)	
Middle market (26 – 50 yrs)	
Senior market(51 – 75yrs)	

**8) Which UBI model do you think would be most ideal for our market?**

PAYD	
PHYD	

**9) Considering the high cost associated with implementing UBI, how best would you counter this challenge?**

Partnership with other insurance companies	
Partnership with vendors	
Government assistance	
Partnership with foreign companies	
Self-implementation	

**10) Which telematics based insurance option do you think would be most ideal for a new market like Zimbabwe?**

Black box solution	
OBD dongle	
Smart phone app	

*Thank you for your time.*

## **APPENDIX 3**

### **Interview guide for Short term Insurance companies**

1. What do you understand about UBI?
2. If implemented by your organization, what would be your core objective?
3. Our roads are unfit, filled with potholes. If UBI is implemented how do you think insurers can avoid collecting inaccurate data?
4. Would you partner with a vendor or implement UBI on your own?
5. Most outskirts in Zimbabwe have poor internet and mobile reception from local network providers, however if using other regional services such as MTN they would be available for communication, which makes it difficult to consistently monitor the driver under the local network service. How best do you think this challenge would be countered?
6. If UBI is introduced by your organization, would the traditional rating method remain relevant?
7. What other challenges do you see in your way to successfully implement UBI?