CUSTOMER ACCEPTANCE OF USAGE-BASED MOTOR INSURANCE POLICIES IN SRI LANKA

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Specialized in Business Analytics

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Declaration

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Abstract

Motor insurance segment which accounts for a larger portion of the Gross Written Premium (GWP) of non-life insurance industry in Sri Lanka, is currently facing challenges such as increasing claims ratio, reduced switching costs, and intense completion, threatening both short and long-term profitability as well as sustainability of the industry. Usage-Based Insurance (UBI) is a relatively new concept mostly used in developed countries to overcome such challenges. In UBI the premium is calculated based on the level of risks the insured vehicle is involved with. If the vehicle is driven in a way, that is less prone to accidents, the premium is expected to be reduced and vice versa if not. This encourages policyholders to use their vehicles in a safer manner. However, drivers' interest in UBI seems to vary across countries with different policy models and contexts. Therefore, this study explores the Sri Lankan drivers' perception on accepting UBI policy schemes. 295 responses were collected from both online and printed forms which were analyzed using Structured Equation Modeling against the conceptual framework developed based on the Technology Acceptance Model. It was identified that the direct determinants of customers' acceptance of UBI are perceived individual benefits and concerns regarding the current premium calculation method. Moreover, UBI is preferred by the younger customers, and those who use their vehicles less and have involved in less accidents. Furthermore, if an insurer launches a UBI policy scheme, many drivers are willing switch to that insurer. It was also identified that privacy concerns were not a significant determinant for accepting UBI in the Sri Lankan context, though studies conducted elsewhere indicate so. Hence, this study indicates that Sri Lankan customers will accept UBI policy schemes if the insurers target the proper customer segments, emphasizing on the individual benefits.

Keywords: Internet of Things, Motor Insurance, Structural Equation Modeling, Telematics, Usage-Based Insurance

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List of Abbreviations

GPS	Global Position System
GWP	Gross Written Premium
IBSL	Insurance Board of Sri Lanka
ICT	Information Communication Technology
IoT	Internet of Things
IT	Information Technology
LV	Latent Variable
MEMS	Microelectromechanical Systems
NCB	No Claim Bonus
PAYD	Pay-As-You-Drive
PHYD	Pay-How-You-Drive
SEM	Structural Equation Modeling
SUV	Sport Utility Vehicle
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
UBI	Usage-Based Insurance
UBP	Usage-Based Pricing
VMT	Vehicle Miles Travelled

1. INTRODUCTION

1.1. Background

The motor insurance industry has a long history that dates to the late 19th century when the first motor policy was sold in 1898 (Wickert, 2012). Since then, the industry has thrived to become one of the most financially strongest industries in the world. However, like many other industries today, the motor insurance industry is also facing several challenges such as increasing claims ratio, intense competition and demands from digital savvy customers (Ernst and Young, 2011, 2012; IIF, 2016).

Those challenges are not alien to Sri Lankan motor insurance industry as well. Though the industry has managed to increase the revenue and market penetration (Insurance Board of Sri Lanka, 2015), with the growing vehicle population (Ministry of Transport & Civil Aviation, 2017), same challenges are affecting the local industry, stressing for innovative approaches. Referring to the annual reports of leading motor insurance providers in Sri Lanka and 2015 annual report issued by the insurance regulatory body, Insurance Board of Sri Lanka (IBSL), it can be identified that the claims ratio, the total claims paid as a percentage to the premium income, has increased in the recent years, as illustrated in the Figure 2.1. Increasing number and severity of road accidents, which lead to increased motor insurance claims, can be identified as the main reason for increasing claims ratio. Although there have been several campaigns such as “Parissamen Gihin Enna” and “Make roads Safe” by insurance companies and authorities to encourage safe and disciplined driving, the statistics indicate, that there is an increase in road accidents in the recent years (Department of Police, 2014).

Due to the intense price competition in motor insurance industry in Sri Lanka, insurance companies have not been able to increase the premium income proportionately with the increase of the total claimed amount, hindering the expansion of the industry and the profitability of the companies (Rajakaruna & Perera, 2017; India Insure, 2013; FitchRatings, 2015). Moreover, due to rules and regulations made by regulator, none transparent nature of traditional insurance

models and low switching cost, retaining existing customers has become a difficult task for the companies (LexisNexis, 2016). Furthermore, due to price-targeted marketing strategies, the companies may not focus on product differentiation (Garbelli, 2005) preventing innovations in the industry.

To overcome some of the challenges the industry is faced with, companies mostly from western countries, have come up with motor insurance schemes based on a concept called Usage Based Insurance (UBI) (Tselentis, Yannis and Vlahogianni, 2016). The idea behind this concept is to calculate motor insurance premium based on how the insured vehicle is being driven. If the vehicle is driven more or driven in a way that is more prone to accidents, the premium will be increased, and vice versa, if not. Typically, a set of sensors are attached to the vehicle or inbuilt sensors are used to collect the driving related data. The collected data are sent to the insurer either real-time or periodically, to analyze driving behavior and determine the premium. This way the insurers have access to comprehensive and accurate data to determine driving habits of the said driver/vehicle and compare it to other drivers/vehicles. Whereas, the customers will be encouraged to drive less and safely, which would result in decreased premium, number of accidents and carbon emission. This is a win-win to both insurer and drivers, as well as to the society. While developed markets are moving to UBI, it is imperative to determine whether UBI is an acceptable model to markets like Sri Lanka where the drivers tend to give priority to reduce premium than safety or other benefits.

1.2. Motivation

The traditional lump-sum based insurance premium calculation model, which is practiced globally, is known to prompt issues. Inability to create accurate risk profiles, increasing claims ratio, demands from IT-savvy customers, increasing number of fraudulent claims and narrowing profit margins are some of the challenges companies are faced with (Jason, 2008; Ernst and Young, 2010,2012; Abraham et al., 2013; Fitch Rating, 2016).

Several disadvantages can be identified from the customers' perspective as well. Vehicles manufactured in the same year, valued with the same amount could be

given with premiums nearly the same, despite how they are used and their associated risks. For example, two vehicles where one has driven 2,000 km per month and another 200 km per month are usually given approximately the same premium. Similarly, vehicles which have met with a different number of accidents might be given nearly the same premium. Therefore, the customers who claim less must subsidize claims costs of the insurer for customers who have claimed more. Hence, it is apparent that the traditional premium calculation method is not fair to all the customers (Bordoff and Noel, 2008). Furthermore, non-transparent premium calculation methods and claims underwriting processes make the customers frustrated.

Sri Lankan motor insurance industry is also practicing the traditional premium calculation method; thus, inherit the mentioned issues. Moreover, the competition among the companies is also intense, leading to narrowing profits margins. Due to regulatory enforcements, the switching cost for the customers is low, making it harder to maintain long-term customer relationships. As UBI would encourage the customers to use their vehicle less, it would lead to decreased number of accidents (Litman, 2011), decreased traffic congestions and lower emissions. Moreover, due to the decreased premiums, the insurers may have an opportunity to encourage third-party policyholders, to obtain comprehensive UBI policies, which would lead to increased premium income while providing customers comprehensive coverage. This is especially useful as third-party motor policies accounted for more than 54% of the total motor policies in 2015 (IBSL, 2015).

1.3. Problem Statement

Several market surveys conducted in different countries, mainly in the United States of America, indicate that majority of the customers are likely to accept UBI policies (Chen and Llaguno, 2015). However, it is still important to determine how Sri Lankan customers will respond, as the Sri Lankan context might be different from contexts of those countries. Although the premium calculation of traditional auto insurance policies of those countries and Sri Lanka, are based on characteristics of the vehicle and the policyholder, there are other determinant factors which

influence acceptance of UBI policies in a given market. When comparing vehicles per-capita, Sri Lanka is in 115th position with 76 vehicles per 1000 people, while USA is in 3rd position with 797 vehicles per 1000 people (Nationmaster, n.d.), which indicates that their affordability of a vehicle is much higher than an average individual in Sri Lanka. Therefore, their perception on affording and maintaining a vehicle might be different from a Sri Lankan. UBI policy schemes heavily rely on Information Communication Technology (ICT) both at the customers' and companies' ends. This alone differentiates UBI from any other existing policy schemes currently offered in Sri Lanka. And most of the surveys being conducted in the USA and their auto insurance policies different from the schemes available in Sri Lanka, may also affect the perception of UBI. In USA the minimum requirement of an auto insurance is a "liability cover" which is bound to the insured person, but not to the vehicle (Wickert, 2014). Whereas in Sri Lanka, both the insurance policy schemes available, comprehensive and third-party, are bound to the vehicle. Furthermore, when comparing with the developed countries which have launched UBI policy schemes, the digital literacy rate in Sri Lanka is relatively low, which may lead the customers to believe that, this model is too sophisticated and complex to use. Moreover, educational and income levels of developed countries are also higher comparing to Sri Lanka, which may result in Sri Lankan customers not being concerned about environmental benefits, as it is indicated by a study which concludes that income level and educational level correlates with the awareness towards the environment (Philippsen, Angeoletto, and Santana, 2017). Moreover, due to intense price competition in Sri Lanka, the premium prices maybe more affordable to local customers compared to the policyholder in western counties. Due to these differences in the contexts, conducting a pre-launch study is important to determine the acceptance of UBI by the Sri Lankan customers.

Therefore, the research questions can be formulated as:

Would UBI policy scheme be accepted by the Sri Lankan motor insurance customers as a viable insurance solution, over the traditional motor insurance model?

1.4. Research Objectives

Following objectives are proposed to address the above research question:

- To identify the critical factors in choosing a UBI policy over a traditional policy through a literature survey.
- To evaluate the possibility of acceptance of UBI policy schemes by Sri Lankan motor insurance customers by analyzing the data collected through a survey.
- To provide insights to the Sri Lankan insurance companies and authorities, of the customers' attitude towards accepting a UBI policy scheme.
- Contribute to the existing research knowledge on usage-based insurance and other related concepts.

1.5. Outline

The rest of the report is organized as follows: Chapter 2 presents a detailed literature survey of the factors found for formulating the research model and related work. Research methodology and the conceptual framework developed based on the Technology Acceptance Model (TAM) are presented in Chapter 3. It further discusses population and sampling. Data analysis which is conducted using Structural Equation Modeling (SEM) is presented in Chapter 4. Research conclusion, limitations, and the future work are presented in Chapter 5.

2. LITERATURE REVIEW

2.1. Introduction of Usage-Based Insurance

Usage-Based Insurance (UBI) is a relatively new concept, which enables insurers to collect driving data of the insured vehicles and calculate the premiums, targeted to each, based on their driving behaviors. This concept was initially proposed in 1968 by Nobel Prize-winning economist, William Vickrey, as an alternative pricing model for motor insurance, because the traditional lump-sum based premium pricing model encourages excessive use of vehicles which increase the risks of having accidents. Moreover, it was found to be unfair to the customers who use their vehicles less (Ferreira and Minikel, 2010; Bordoff and Noel, 2008; Vickrey 1968) and in a safer manner. According to his proposal, the premium should be calculated based on the mileage traveled. However, as there are other factors of driving that contribute to motor accidents, UBI solutions nowadays, take a variety of aspects of driving into consideration when the premiums are calculated.

Though William Vickrey suggested odometer readings and service records to obtain mileage for premium calculation process, they were not reliable and practical (Bordoff and Noel, 2008). Today, insurers have implemented UBI by benefiting from two disruptive technologies, namely Internet of Things (IoT) and big data analysis. Typically, sensors are attached to the vehicle to collect data on driving behaviors such as mileage, speed, harsh braking, and acceleration. The collected data will be transmitted real-time to the insurer, so that they can conduct analysis to determine the risks that the vehicles are involved in which will lead to calculating the premium and to provide value-added services.

According to Rouse (2005) the size and the cost of these telematics or sensory devices which are being used to capture vehicular data, are decreasing drastically, due to the rapid development of microelectromechanical systems (MEMS). In the scope of UBI or IoT, often these MEMS are sensory devices. They are capable of providing accurate and reliable data, which can be transformed into information of driving behavior of the insured vehicle. Using real-time big-data analysis

echnologies, the insurer can determine the risk level that the insured vehicle is associated with. Based on the level of risk, the premium is calculated.

UBI policies can be categorized into two based on the aspects of driving information that the insurers monitor and take into account, in calculating the premiums.

2.1.1. Pay As You Drive (PAYD)

This is the most straightforward category of UBI and the first to be implemented. In fact, this is the UBI concept that William Vickrey had proposed in 1968. In this model, the insurer monitors and considers the distance traveled in the premium calculation process, because the mileage is considered as one of the main risk factors (Litman, 2011) of a vehicle. Therefore, this model is also identified as Vehicle Mile Travelled (VMT) based premium calculation. Although there have been efforts in the past, to implement this type of policy schemes with odometer readings, they were not successful due to the fact customers could alter mileage traveled in their odometers (Kuryłowicz, 2016). However, due to the development of Global Position System (GPS) and the rapid development of MEMS which captures GPS location, the insurers are now capable of obtaining accurate readings.

Because statistics show that vehicles driven more, are more prone to accidents (Litman, 2001), the insurer will be able to encourage policyholders to reduce the risks they are involved with by limiting their vehicle usage. According to a study conducted by Butler in 1996, the main reason for the lower crash rate of female drivers is, the lower average of mileage. Moreover, a study conducted by Mercer in 1987, indicates that, unemployment negatively correlates with accident rate, due the fact that unemployed persons cannot afford high mileages. It can be derived from these studies that, lesser the vehicles are driven, the lesser the occurrences of accidents.

Since 70% of the motor accidents are involved with multiple vehicles (Litman, 2005), an average number of claims is about 1.5 times of average accidents (Vickery, 1968). If the insurance industry was able to reduce the mileage by 10% of all the insured vehicles in general, it could be expected to obtain a 17% reduction of motor accidents (Litman, 2005). Furthermore, a research conducted by Edlin in 1999 (as

cited in Litman, 2005) analyzing state-level total mileages in US and insurance data, indicates that reduction 10% of total mileage would lead to 14% to 18% reduction in crashes and insurance claims.

2.1.2. Pay How You Drive (PHYD)

As there are more factors contributing to risks involved in motor accidents, apart from mileage and PAYD schemes being unfair to drivers who drive long distances but drive safely, this concept was introduced. With this scheme the insurers will have to capture various aspects of driving, to determine the risks the insured vehicle is involved with. Speed, the hardness of braking, acceleration, driving times and cornering speeds are some of the aspects they consider.

USA based, Progressive Insurance is among the first to adopt PHYD to provide automotive insurance policies. In 1998 they launched UBI scheme called Snapshot. They are using a dongle connected to the OBD (On Board Diagnostic) port of a vehicle to gather real-time data, which will be used to calculate the discount rate given to the customers (or subscribers). Using the OBD port traveling speed, engine revolutions per minute (rpm), coolant temperature and fuel and oxygen consumption rate can be captured (Mirani, 2014). If a customer agrees to be a participant in this discount scheme, he/she will have to attach this dongle to his/her vehicle's ODB port.

The data collected from this port is transmitted to the insurer, so that they can generate information on the speed the customer is traveling at, the acceleration and deceleration rates, how hard the customer applies brake and cornering speeds. By analyzing the data of several billion hours of driving, the insurer can differentiate the risky and non-risky driving behaviors. Although some individuals are reluctant to share their driving information, Progressive Insurance alone had captured over two million subscribers by 2012 while earning revenue of over one billion US Dollars. It is mentioned that the average discount rate received by Progressive Insurance customers vary from 10% to 15% (Mirani, 2014).

Apart from using the inbuilt telematics via the OBD port, multiple sensors fixed by the insurer also can be used to capture driving behavioral data. While in North America OBD port-based devices are widely used for UBI solutions, in

Europe, multiple sensors fixed by insurers are often used (Ptolemus Consulting Group, 2012). This telematics could be connected directly to the insurer, or they could be connected to a networking hub in the vehicle which is also connected to the insurer.

As smartphones have several sensors built in, they too can be used to capture data of driving, under the assumption, that the mobile phone will be kept inside the vehicle while it is being driven. Or they can be used as a device to transmit the data collected by the sensors attached to the vehicle. Typically, this model is being used for trialing purposes because the unreliability of the gathered data. In this approach the insurer is not required to invest money in hardware but still the customers will be given a try-before-you-buy facility.

2.2. Challenges expected to be covered by UBI

One of the most significant challenges the insurance companies are faced with is, having to make decisions only by analyzing large volumes of historical data (Reifel, 2014). Although the years of data is extremely vital to decision making, there are no streams of real-time data which could be used to make essential business decisions for the current context. In fact, in the insurance industry, some of the traditional premium calculations are based only on the historical data, which could be decades old (CEIOPS, 2007; PWC, 2014). Moreover, some of the insurance products are developed based only on the historical data (Batty, et al., 2010). Therefore, those data might not reflect the current situations, causing the solutions generated by analyzing them, not to be effective as they were intended to be. Since UBI will be based on data which is generated during the policy period, which is generally no more than one year, the data would be more relevant to the decisions to be made.

Due to the intense competition in the motor insurance industry in the world as well as in Sri Lanka, the profit margins are becoming narrow, posing threats to the industry in the long run (Abraham et al., 2013). To ensure customer retention, the insurers will have to invest in both pre-transaction and post-transaction relationships causing higher marketing costs and narrowed profit margins (Ernst and Young, 2012).

Mainly due to increased traffic congestion in Sri Lanka, the number of motor accidents has increased in the recent past years, leading to increased total claims. Since the premiums are not being increased proportionately, the claims ratio in the motor insurance is increasing as illustrated in Figure 2.1. This also poses a serious threat to the industry, as the insurers will have to depend on income streams from external investments rather than the business itself.

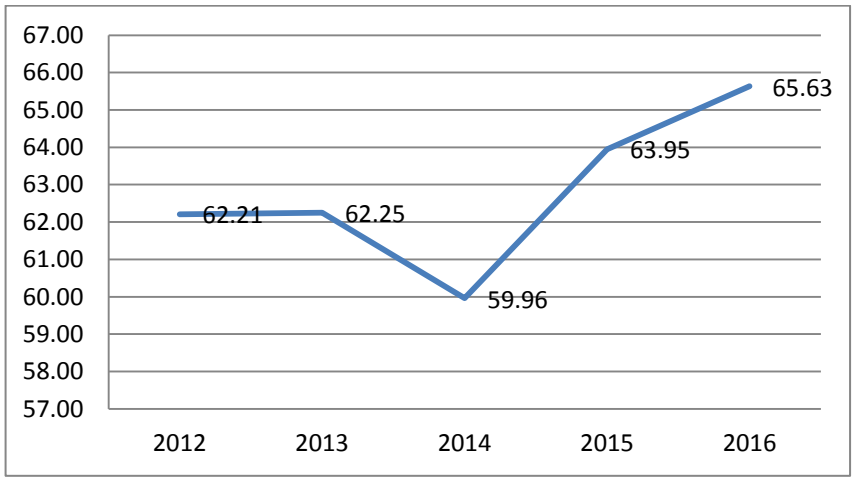

Figure 2.1: Claims ratio of the motor insurance industry.

(Source: IBSL, 2016, p51)

Customers providing false information, is another issue that the insurers are facing. Cases have been identified where the customers have provided with fraudulent information at purchasing a policy. Not disclosing previous claim information and driving convictions are some of the common cases of providing false information. In the UK alone, 180,675 fraudulent applications for motor insurance have been identified in 2013 (Jones, 2014). Fraudulent claims and surrenders in both general and life insurance are also increasing, posing a threat to the industry. Indian insurance companies have lost over one billion Indian Rupees over fraudulent life insurance claims in 2010 (Ernst and Young, 2011).

Although some short-term indicators show growth in the industry, it is forecasted that the industry will run into profitability issues in the long run (Abraham et al., 2013). In fact, during 2004-2013 total premiums of private vehicles in the US

have increased from $158 billion to $175 billion, making the increment rate lower than the inflation rate (Karapiperis et al., 2016). Further, it is also predicted that the industry will go through rapid changes and the industry will be faced with new challenges along the way due to those changes. Aging population, intense competition and high marketing costs are some of the other challenges pressing the industry to innovate (Abraham et al., 2013). Introduction of various new technologies such as IoT, mobile connectivity, cloud computing and big data analytics, and changing customer preferences put additional pressure on the industry. Furthermore, worldwide economic recession and low-interest rates also stress the insurers to produce innovative solutions. It is expected that the growth of the premiums will be slowed down within next five years and come to flat growth in a decade or so (Reifel, 2014). Due to the introduction of new safety mechanisms, the rate of accident occurrence and the damages will be reduced. Therefore, urge to purchase insurance policies and their premiums will be reduced due to discount schemes such as No Claim Bonus (NCB).

The concerns that the customers have towards the traditional motor policies also should be considered, as some customers believe that the premium calculation method is non-transparent and unfair to the customers who claim less than who do more, because those who claim less will have to subsidize the cost of the customers who claim more. In fact, because of the mentioned reason, it is believed the traditional premium calculation method, in fact, promotes risky and excessive driving (Bordoff & Noel, 2008).

2.3. Benefits of UBI

Benefits of UBI can be divided into three main categories based on the party it is benefitted from as (1) insurance company, (2) Customer and (3) society.

2.3.1. Benefits to the insurance companies.

The insurance companies will be able to capture real-time, driving information which can be used in creating accurate risk profiles of their customers so that they can calculate premiums as well as design their products accordingly (Łukasz, 2016). The insurer will be capable of entertaining their customers in a better way knowing

their accurate risk profiles. Further, because the insurers will have large volumes of data of each vehicle, the services provided to the customer can be extended. The insurer can observe the unusual patterns of the data and evaluate the driving condition of the vehicle. If any technical failures can be forecasted, they can be notified to the customers (Soleymanian, Weinberg, and Zhu, 2016). Therefore, the customer can maintain the vehicle in good condition which is an indirect cause of reduced accident rates. Moreover, if the vehicle runs into an accident, the insurer can inform of it to the emergency services and direct them to the site of the accident. It will not only help the customers and the medical teams to minimize the injuries caused; it will help the insurers in underwriting and claim preparation processes (LexisNexis, 2017; PWC, 2013).

A study has been conducted to determine the effect of annual mileage on claims frequency, with 200,000 vehicles, insured with Progressive Insurance's UBI scheme. Those vehicles had been separated into several groups based on the annual mileage. According to the findings, the vehicle group which had the highest annual mileage, had the highest claims frequency. The lowest claims frequency has been found with the group which had done the least annual mileage, indicating that accident rate negatively correlates with the mileage (Texas Mileage Study, 2005).

By introducing UBI schemes, the customers will have goals to reduce their premiums. Moreover, the Insurers also can help the customers to achieve their goals of lower premium rates. Since the customers will have more control over their premium, they will tend to drive less, and in a safer way (Łukasz, 2016; Edlin, 2003) leading to reduced motor accidents and the liability, the insurers will have to bare (PWC, 2013). Moreover, it will also help to increase the opportunities for the companies to reduce the claims ratio, as the UBI policies will encourage customers to adhere safe driving practices, leading to lower number of accidents.

Further, the insurance companies will be able to retain existing customers and maintain long-term relationships through the value-added services. Although due to some regulations, the switching cost of insurers has reduced, the companies can increase the switching cost indirectly, through the value-added services. Moreover, the insurers will be able to venture into new businesses on their own or with partnerships with companies from different industries. In Sri Lankan context by

launching the insurance companies will be able to enjoy first mover advantage as there are no UBI providers presently and also will able to attract new safe drivers to the company.

UBI policies transform the insurance products from passive response to active response model. Further, this goal-oriented and digitized consumption solution will be beneficial to maintain post-transaction relationships with customers as well. In the insurance industry, the relationship with the customers mostly has been pre-transaction (PWC, 2013). They are mainly focused on attracting new customers to the business. However, post-transaction relationships are more focused on customer retention, which is more profitable to the business (Gallo, 2014). By helping the customers to achieve their goals of decreased premiums and providing with other value-added services the insurers can improve the possibility of sustainable long-term relationships which will be beneficial for both the parties.

2.3.2. Benefits to the customers

Since the premium will be calculated based on the driving behavior of the customers, they will be in control of their premiums. Therefore, the customers have the liberty of determining the premium (or discount rate) that suits them the best. Like the augmentation experience created by Allstate Insurance, the customers can be notified real-time when they engage in a risky maneuver, so that they can immediately correct themselves. Therefore, the customers will be able to reduce the amount they pay for motor insurance. In the year of 2008 alone, the average of premium reduction in US was expected to be $496 per year (Bordoff & Noel, 2008).

Furthermore, the transparency in premium calculations will also be increased as the customers will know, that the premium is proportional to the risks they involve in when driving the insured vehicle. Moreover, the lesser the risks are involved, the higher the discount on premium they get. Therefore, it also brings fairness to the customers who drive less and drive more safely.

The customers will be able to enjoy a wide array of value-added service from their motor insurance policy. With the real-time data captured of various aspects, the insurers will be able to provide a variety of value-added services widening the business opportunities.

The customers will be encouraged to adhere to safe driving practices. Allstate Insurance has introduced an augmentation solution which will notify the driver real-time whenever he/she makes risky moves while driving. This solution will be advantageous to drivers, as it will help him/her to reduce the risky driving behavior, which could cause accidents and also higher premium rates (PWC, 2013)

2.3.3. Benefits to the society

Reduced accident frequency and severity can be expected with UBI policies because, the customers are encouraged by themselves to drive safely. According to Fincham, et al., (1995), the mere presence of sensors which recorded the data related to the accelerations of the vehicle during an accident, correlates with reduced accident rates. Lesser the vehicles are on the road the lesser the accidents would be. According to the Economist Aaron Edlin (2003), 10% decrease in VMT would lead to 17% decrease in total road accidents. Moreover, during the economic recession in the US during the early 1980s, VMT has been reduced by 10%. Similarly, motor claims also have been reduced by 12% (Litman 2005). Through the researches of Edlin(2003) and Parry (2005), it is indicated that 10% reduction of vehicle usage can be expected because of PAYD model UBI policy. Therefore, if customers get encouraged to limit their unnecessary use of their vehicles, the number of motor accidents will be reduced. Moreover, the country can expect a reduction of foreign exchange spent on fossil fuel.

Because fixed price encourages customers to maximize consumption to get their payment worth, the traditional pricing model causes policyholders to use their vehicles more. However, with UBI, the customers will be encouraged to use their vehicles less, that would cause reduced air pollution and traffic congestion. Because of consuming fossil fuel, greenhouse gases like Carbon dioxide (CO_2) and Carbon monoxide (CO) will be released to the atmosphere, leading to global warming, which would negatively impact on the whole planet causing major climate changes. According to Cazorla and Toman (2000), by continuing to consume fossil fuel, it would cost the economy by 1.5 % of its GDP.

Because of the GPS based value-added services like vehicle theft recovery and roadside assistance, illegal acts involved with vehicles may decrease as the evidence of vehicle being in a certain location will be logged at the insurer's end. By offering an opportunity to reduce the premiums, a citizen with lower income will be able to afford motor insurance policies, especially comprehensive policies instead of third-party policies, which cover the damages of the policyholders. Though insurance cost is a relatively a smaller proportion of total traveling cost for a citizen with high income, for a citizen with lower income the proportion is high. Therefore, UBI can be used to create equity in the society (Dimitris, 2016).

2.4. Challenges of UBI

Although there are various benefits of UBI solutions to the customers, there is a considerable reluctance use to them. UBI being based on IoT concept, the concerns related to IoT are common to UBI solutions too. Therefore, it is important to address the issues that the insurers are facing when adopting IoT based UBI solutions into the business.

2.4.1. Information Security

The sensory devices used in UBI are developed in a way to function or to respond according to the commands received from another device connected through the Internet. Therefore, unless those sensory devices are securely designed and developed, they can be exploited to conduct cyber-attacks. Since IoT will increase the number of connected devices, the possibilities to conduct such attacks would be higher. Cyber-attacks will not only threaten the insurers for potential misusing of data, but they also pose threats to the customers, as the attackers can manipulate the devices. For example, an attacker could hack into an inbuilt sensor through ODB ports and change the vehicle's driving configurations. Similarly, since these sensory devices are contained with micro computers, they may get affected by malware such as viruses and worms. In such scenario, the traffic generating from that device could be erroneous. Furthermore, such malware can spread throughout the network (Internet Society, 2015).

These IoT devices are developed to serve for a longer period and most of the time they cannot be reconfigured or upgraded. Even if they are re-configurable, it would be a cumbersome process after installation. Therefore, with the evolvement of various cyber threats, these devices will not be upgraded to match them. Moreover, if the customer decided not to continue with the policy after several years or if the insurer withdraws from the industry, the devices will continue to operate as orphan devices, transmitting data, which can be misused. Because, the customer will not be the direct contact point of those sensors, even they are infected or malfunctioning, it may take a while for the customer to realize.

2.4.2. Privacy Concerns

To ensure the social acceptance of IoT-based insurance solutions, the insurers must take sufficient precautions to ensure the information privacy their customers. Even though there are many benefits offered in IoT-based solutions, many individuals raise concerns regarding their privacy. Generally, the sensory devices are being used to capture the behavior in day to day activities, closely. In such scenarios, the sensory devices will be able to access personal information of customers. For example, a GPS sensor in a car could expose the customer's current location and possible activities they are engaged in.

Similarly, the customers are uncertain of the data handling procedure, data ownership and the accountability of the data gathered. In the ecosystem of IoT, there will be sensory data that would be used cross-industries. For example, vehicle location information retrieved could be shared by both insurance company and location-based advertising service providers. However, the customer may not want to expose certain information to other companies or other industries (Internet Society. 2015). According to a study conducted by Towers Watson in 2012, 40% market in the US is concerned about sharing their data by subscribing to a UBI policy scheme.

2.4.3. Volume of Data

Once the customers subscribe or purchase IoT-based insurance solutions, the insurer will be receiving large volumes of data, real-time. Therefore, the insurer should have the necessary infrastructure including bandwidth, database storages,

real-time data processing and analytical capabilities in place. To retract insights from the real-time data, the insurance companies will have to gather a large volume of data and analyze them to identify behaviors of the customers, before introducing the insurance products to the market. According to Mirani (2014), Progress Insurance had gathered over ten billion driving hours to capture insights of driving behavior of customers. Therefore, not all the insurance companies will be able to produce IoT-based UBI solutions due to technical and financial requirements.

2.5. Customers' Perspectives of UBI

This insurance solution being a product developed upon latest technologies and being almost entirely different from the traditional motor insurance premium calculation method that the customers are used to for decades, there is a possibility of customers being skeptic and hesitant to accept this model, despite the benefits it may bring to them, society and the insurance industry. To determine customer's' attitude toward this model, there have been studies conducted in various parts of the world. The insights drawn from those studies could be used to determine how Sri Lankan customers will react to launch of this model.

UBI model is being developed to through the concept of Usage-Based-Pricing (UBP) model (Soleymanian, Weinberg and Weinberg, 2016), the characteristics of UBI is similar to characteristics of UBP. Bauer and Wildman (2012) indicate the UBP model is advantageous not only to the service providers but the customers as well, as it provides opportunities to the customers who consume the services at a lower level to be included. Moreover, because UBP will be more beneficial to the customers who use the services lesser, the insurance companies will be able to attract low-risk drivers to UBI policy scheme (Soleymanian, Weinberg and Weinberg, 2016).

Though UBI policy scheme was made available in the United States of America in the late 1990s by Progressive Insurance, still there is a significant portion of the customers who have never been offered a UBI policy. Further, there is a considerable portion of customers who are not aware of such policy scheme. Moreover, even in 2014, when UBI is placed along the product adoption curve, UBI policyholders were believed to be the innovators and tech enthusiasts, which justify the low number of

customers (LexisNexis, 2014). The same study indicates that the customers who are subscribed with a UBI scheme is only 2% of all personal lines and forecasted to grow up to 20-30% in five years. Moreover, Towers Watson survey done in 2015 on customers' perception of UBI, indicates that millennials in Brazil being tech-savvy, they are more likely to enroll with UBI policy schemes and value-added services that may be offered.

Information security and privacy are one of the major concerns that prevent customers from accepting UBI policies. They are not certain of what type of data is being captured, how they will be handled, should they be disclosed to other parties and how premium is calculated from the collected data. However, LexiNexis report indicates that the customers' comfort of sharing driving data is similar to the comfort level of customers' using online banking solutions. Therefore, it can be assumed, that the challenge of customers being concerned that their privacy will be violated, or information will be misused can be overcome, if they were addressed properly. According to a study conducted by Towers Watson in 2012, 40% of individual customers are concerned about losing their privacy. Moreover, 11% of small businesses which is less likely to obtain UBI policies have indicated that violation of privacy is the main reason for rejection (LexisNexis, 2014). Moreover, another study conducted by Soleymanian et al in 2016, also suggests that violation of privacy causes customers to reject UBI policies. However, a study by Rejikumar (2013) indicates that privacy concerns do not influence acceptance of UBI policy. Moreover, it is only the financial benefits have a strong influence on acceptance of UBI policy.

According to a survey conducted in 2014 by Towers Watson, over 90% of the customers were willing to accept UBI policy scheme if there is an assurance that their premiums will not be increased. Moreover, in the USA market, during the years of 2010, 2013 and 2014, the expected premium discount percentage has been decreased gradually, indicating that the insurers will not have to offer significant discount rates to attract new customers. Since only 38% of customers in the US (LexisNexis, 2014) were aware of UBI insurance model by 2014, in a country like Sri Lanka, with an effective marketing campaign, insurers might be able to witness decreasing expected discount rates in a shorter period.

While premium discounts being the main benefit of UBI to the customers, insurers can use value-added-services to attract new customers. It is indicated by a study done by Towers Watson in 2013 that the parents of young drivers have high interest in UBI policy scheme, mainly because of the value-added services provided by the insurance companies. Most interested value-added services identified in the mentioned survey are shown in Figure 2.2.

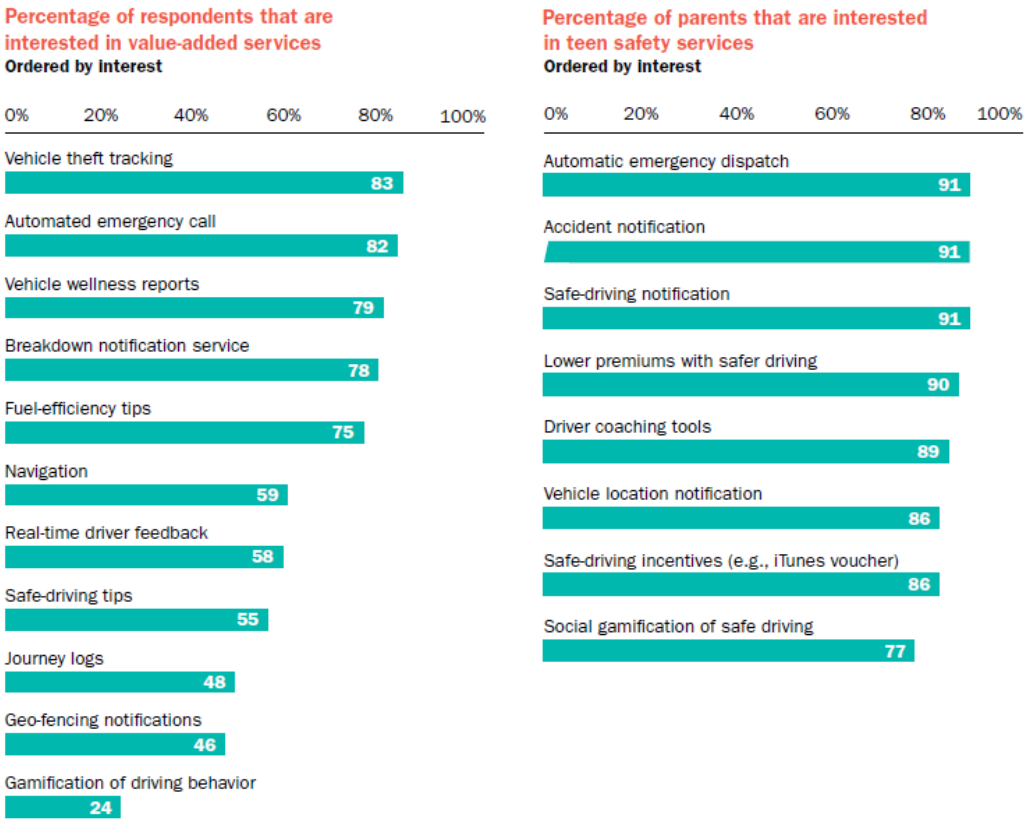

Figure 2.2: Value Added Services

(Source : Towers Watson, 2013)

Another interesting aspect in the adoption of UBI solutions is, younger drivers prefer to subscribe more than the matured drivers (Towers Watson, 2013; Friedman, Canaan, 2014). Moreover, a study conducted by LexisNexis in 2016, for United States context, indicates that the younger drivers have the highest awareness of UBI, they are more tech-savvy and more price sensitive. Moreover, they expect a lower discount rate from UBI (Friedman, Canaan, 2014). It is understood that the younger drivers are more likely to have accidents than the matured (Transport

Accident Commission, n.d.; Arnett, Irwin and Feldsher 2002; Williams, 2006). Therefore, these UBI policies will contribute in motivating the risky young drivers to drive in a safer manner, as they are more interested in obtaining UBI policies. According to a study conducted in Netherland, mainly young drivers who have obtained PHYD policies tend to avoid speeding to keep their premiums low. Thus, the insurers can reduce the risk factor that the insurer will have to bear on the young drivers, who were identified as risky drivers.

Although income levels of the customers may vary, the acceptability of UBI and the expected discount rate is not largely differentiated. Similarly, gender also does not differentiate acceptability of UBI and the expected discount rates (Friedman and Canaan, 2014). According to the same report, with the increase of the income, the likelihood of allowing monitoring the usage of a vehicle increases.

As a critical concern of accepting a UBI policy fear of premium increases can be indicated, as 49% of survey participants have indicated so, according to a report by Towers Watson in 2013. Since the premium could be increased for over-using and risky behaviors, UBI might increase subscribers' premiums. This concern is also reflected in LexisNexis report on Usage-Based Insurance in 2014 too. Since the insurers will have information of driving behavior, the customers could be concerned that if they met with accidents, the claim could be rejected if they were driving in a risky way at the time of the accident (Towers Watson, 2013). Concerns of UBI sensors might harm the vehicle and interfering driving is also being raised.

Lack of transparency is being one of the major issues with the traditional motor insurance policies (Ernst and Young, 2015), it is important UBI policy schemes to be transparent enough for the customers. Ease of understanding of policy terms and conditions have a strong influence on customers' acceptance of UBI (Rajkumar, 2013). In fact, the customers, who have enrolled with UBI policies in the USA, are now demanding more transparency in how the premium calculation is done using driving information (Jones, 2017).

Similar to traditional motor insurance, UBI insurance will also be offered through agents and direct channels. According to the survey conducted by LexisNexis in 2015, 63% of the customers who have purchased UBI policies have obtained assistance from representatives of their insurers. Even though the tech-

savvy customers are more interested in UBI policy schemes, the majority they have not relied solely on published information. It could be due to that fact that this concept is still new to many customers even in US. In fact, according to the same report 73% of the participants were never offered UBI policies via any channel. And according to the survey conducted by LexisNexis in 2016, most of the US customers have indicated, that they require social proof prior to accept UBI policies. 56% have indicated that they require reviews from UBI policyholders. Moreover, 54% of them have indicated that they require knowing a higher number of customers to be enrolled to be assured that UBI concept and policy schemed to be legitimate. Furthermore, 40% of have indicated that they require someone they know to have UBI policy and their recommendation to accept a UBI policy. Most importantly, only 29% of the participant had indicated that they want to accept UBI and waiting to be offered. Therefore, a well-trained staff will be required to explain concept and the possible benefits that the customers may enjoy from UBI (Subodh, 2015).

The same report by LexisNexis in 2013 indicates that by offering a trial period, the acceptability of the customers can be increased. According to the report by offering a 3-month trial period, the likelihood of accepting a UBI policy can be increased by 61%. Moreover, if a trial period is given for six months with an automatic 10% premium reduction, the likelihood will be increased by 71%. The main reason for customers' request for a trial period is, UBI being unfamiliar to them rather than financial benefits. By providing an opportunity to have a trial period, the companies will not only increase the likelihood of the customers who are offered with UBI policy, but the companies will also be able to attract the customers who are looking for social proof before subscribing, by increasing the number of UBI subscribers.

2.6. Theories to determine customers' acceptance of UBI

The prime objective of this study, being evaluating Sri Lankan customers' acceptance of UBI policies, it is important to determine customers' behavioral intention towards acceptance of UBI, as the Theory of Reasoned Action (TRA) suggests that behavioral intention has a strong influence in the expected behavior. However, UBI being more involved with IT, Technology Acceptance Model (TAM)

which is an extension of TRA and specific to evaluate the acceptance of IT systems is more appropriate for this study.

2.6.1. Theory of Reasoned Action

Theory of reasoned action (TRA) (Fishbein & Ajzen, 1980) is one of the theories that is often used to determine or predict a person's behavior. This model suggests that the most reliable fact that can predict a specific behavior is the behavioral intention. Moreover, the behavioral intention is influenced by a person's attitude to perform the intended behavior and the influence of subjective norm on the intended behavior (Hale, Householder & Greene, n.d.). If a person has a favorable attitude towards the intended behavior, the likelihood of performing the mentioned behavior is higher. Moreover, the attitude towards specific behavior is based on the behavioral beliefs. Hence, if a person believes that by performing a specific behavior will result in a better outcome, he/she will have a positive attitude towards the particular behavior. Subjective norm is referred to the pressure received from the society to perform or not to perform the intended behavior. If a person believes that the important referents in the society approve the intended behavior, he/she will be motivated to perform the intended behavior. These beliefs are known as normative beliefs (Tlou, 2009).

2.6.2. Technology Acceptance Model

Technology acceptance model (TAM) (Davis, 1989) is a specifically focused theoretical framework to predict a person's behavior in accepting or rejecting an information system. This model is believed to be an extension to the model Theory of Reasoned Action (TRA) and was initially proposed in 1986 by Fred Davis in his doctoral proposal, which he refined in 1989, and introduced as the first version of TAM, which is found in Figure 2.3 (Lai, 2017; Park, 2009).

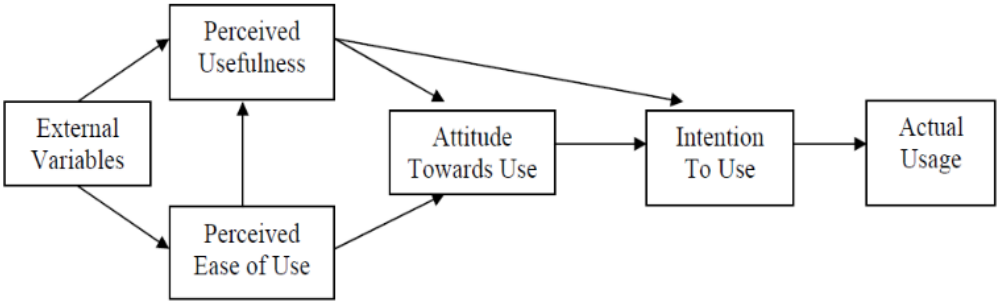

Figure 2.3: First version of Technology Acceptance Model

(Source -: Lai, 2017)

In his study, Davis has indicated a certain user's motivation for usage of a certain IT solution can be explained by perceived usefulness, perceived ease of use and attitude towards the usage (Chuttur, 2009). Perceived ease of use can be defined as the degree of the belief of a user that the IT solution would free from his/her effort (Davis, 1985) of conducting his/her work. Perceived usefulness can be defined as the degree that a user believes the IT solution will enhance his/her performance (Davis, 1985). The variable, attitude towards usage can be defined as the user's positive or negative feelings towards using the IT solution (Abu et al., 2014). According to the theory, this model suggests that two cognitive variables, perceived ease of use and perceived usefulness are influenced by external variables. Moreover, the actual use of an information system is directly or indirectly influenced by perceived usefulness, perceived ease of use, user's attitude and behavioral intentions (Park, 2009). Moreover, perceived ease of use affects attitude towards usage and perceived usefulness, while perceived usefulness affects attitude towards usage and intention to use (Davis, 1985).

2.7. Summary

Sri Lankan motor insurance industry is also facing several challenges, which threaten the profitability and the sustainability of the industry. To overcome some of those, UBI policy schemes can be introduced. To determine whether the Sri Lankan customers will accept, seven constructs were identified through the literature survey. They are Concerns regarding traditional premium calculation method, Perceived

personal benefits, Perceived social benefits, Perceived ease of use, Trust towards the insurer regarding UBI, Presentation of UBI and Intention of accepting a UBI Policy.

3. RESEARCH METHODOLOGY

Unlike most of the other insurance products, UBI products are heavily reliant on several disruptive technologies in the area of information technology. Moreover, the customers are also actively involved in the process of the premium calculation process, as their driving behavior which is monitored by the insurer through the data captured from the telematics attached to the insured vehicle is the determinant factor of their motor policy premium. In addition to the premium calculation, value-added services delivered to the customers are also developed and delivered via media found in the domain of information technology. Hence, when predicting the acceptability of UBI products, it is essential to evaluate it as a product based on information technology rather than a traditional insurance product.

3.1. Conceptual Framework.

Unlike traditional motor policies, with UBI policies the customers are actively involved in the premium calculation process as the premium is based on driving data retrieved by the telematics attached to their vehicles. As the customer is able to obtain value-added services mainly through electronic media, the customers will be connected to the insurers in a closer manner. Therefore, to determine customers' intention of acceptance of UBI policy scheme, we need to take into account their willingness to adopt an IT/ICT solution as well.

Because TAM is focused on usage of IT solutions and provides the flexibility to address other factors that may influence intention of accepting UBI, the conceptual framework in Figure 3.1 was developed using TAM.

In the conceptual framework, the concerns regarding the traditional premium calculation model, which is an external factor, is identified as an influencer to perceived individual benefits, perceived societal benefits, perceived ease of use and intention of accepting a UBI policy. Perceived individual benefits, perceived societal benefits and perceived ease of use affect the trust towards the insurer as well as the intention of accepting a UBI policy, while trust towards the insurer influences the

intention of accepting a UBI policy. Furthermore, Presentation of UBI policies influences both the trust towards the insurer and the intention to accept a UBI policy.

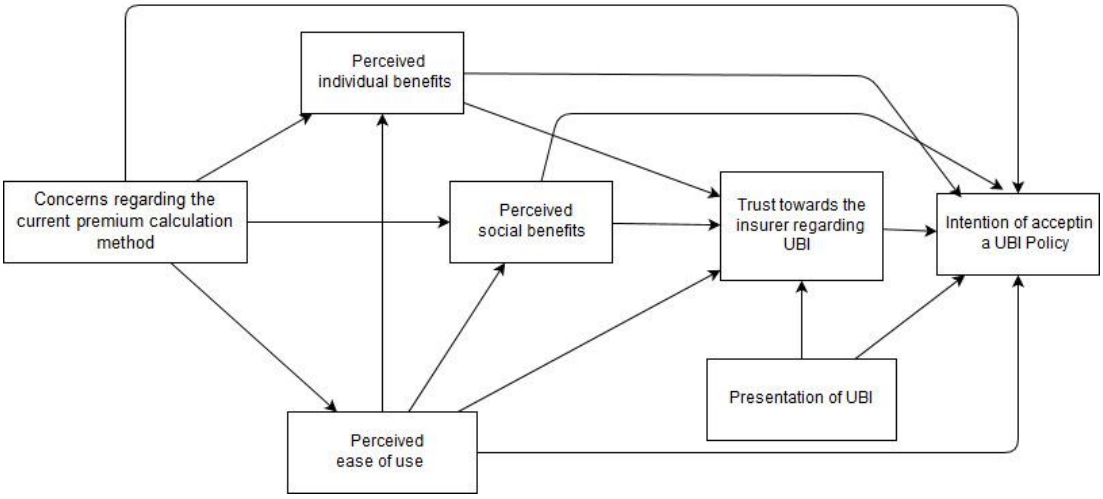

Figure 3.1: Conceptual framework

3.2. Hypothesis

Based on the propped conceptual framework following hypothesis can be derived:

Hypothesis 1 (H1): Concerns regarding the traditional premium calculation method have a positive effect on the intention of accepting a UBI policy

Hypothesis 2 (H2): Concerns regarding the traditional premium calculation method have a positive effect on trust towards the insurer regarding UBI

Hypothesis 3 (H3): Concerns regarding the traditional premium calculation method has a positive effect on perceived personal benefits

Hypothesis 4 (H4): Concerns regarding the traditional premium calculation method have a positive effect on perceived social benefits

Hypothesis 5 (H5): Concerns regarding the traditional premium calculation method have a positive effect on perceived ease of use

Hypothesis 6 (H6): Perceived personal benefits have a positive effect on the intention of accepting a UBI policy.

Hypothesis 7 (H7): Perceived personal benefits have a positive effect on trust towards the insurer regarding UBI

Hypothesis 8 (H8): Perceived social benefits have a positive effect on the intention of accepting a UBI policy.

Hypothesis 9 (H9): Perceived social benefits have a positive effect on trust towards the insurer regarding UBI

Hypothesis 10 (H10): Perceived ease of use has a positive effect on trust towards the insurer regarding UBI

Hypothesis 11 (H11): Perceived ease of use has a positive effect on the intention of accepting a UBI policy.

Hypothesis 12 (H12): Trust towards the insurer regarding UBI has a positive effect on intention of accepting a UBI policy.

Hypothesis 13 (H13): Presentation of UBI has a positive effect on the intention of accepting a UBI policy.

Hypothesis 14 (H14): Presentation of UBI has a positive effect on trust towards the insurer regarding UBI

Hypothesis 15 (H15): Perceived ease of use has a positive effect on perceived personal benefits.

Hypothesis 16 (H16): Perceived ease of use has a positive effect on perceived social benefits.

Because one of the primary objectives of a study to identify the relationships among the constructs, it is essential to understand how they should be measured. A construct can be defined as a "conceptual term used to describe a phenomenon of theoretical interest to the researcher, and one that is not directly measurable" (Rejikumar, 2013).

As we are focused on constructs that are not directly measurable, typical data analysis methods are not ideal for the analysis. Therefore, the concept of latent variables is used in this study. *Latent variables* are hidden variables that are hypothetical constructs (Bollen, 2002). Therefore, it can be used to explain the relationship between observable behavior and the unobservable attributes which influence behaviors (Borsboom, Mellenbergh and Heerden, 2003).

However, as the latent variables cannot be measured directly, the measurable indicator variables are used to examine the latent variables (Rejikumar, 2013). Two models, namely reflective models and formative models, are used to determine latent variables. *Reflective model* is used when a variation in the latent variable causes variations in measurements all indicators. The *formative models* are used when the variations in the indicators cause a variation in the latent variable.

3.3. Latent Variables

As our study plans to examine the relationships between constructs that determine the acceptability of UBI policy schemes by Sri Lankan customers, through literature survey, we identified the following set of constructs have a direct or indirect effect in accepting a UBI policy:

1. Concerns regarding traditional premium calculation method

   Having low-risk policyholders to subsidize for the cost of claims made by high-risk policyholders, the traditional premium calculation method is found to be unfair and unresponsive to the safe driving habits (Bordoff & Noel, 2008). Customers are not certain how their premiums were calculated, based

on attributes such as the age of the driver, values of the vehicle, and year of manufacture. Consequently, customers tend to venture for alternative motor insurance solutions.

2. Perceived personal benefits

   Customers being empowered to determine their premiums, they are capable of gaining financial benefits by reducing their premiums (Bordoff & Noel, 2008). In addition to the financial benefits, value-added services also have a positive impact on persuading customers to adopt UBI policy schemes (Towers Watson, 2013).

3. Perceived social benefits

   As the UBI concept is believed to be encouraging safer driving practices, it is believed to reduce the number of accidents and their severity (Litman, 2005; Edlin, 2003). Moreover, by encouraging customers to drive less, congestion and emission of greenhouse gases could be reduced, which could be seen as a social benefit that influences the customers to adopt UBI.

4. Perceived ease of use

   Because UBI policies are involved with latest technologies and involve the customers in the process of calculating the premiums, it is essential the customers perceive that the UBI policies will not make their day-to-day work difficult (Towers Watson, 2015).

5. Trust towards the insurer regarding UBI

   Similar to most of the IoT-based solutions, UBI policy schemes also causes issues regarding privacy and information security. In fact, LexisNexis (2014) study indicates violation of privacy, is the main reason for customers rejecting UBI policies. Because the insurers will have access to their customers' data, customers must be assured how they will be handled.

6. Presentation of UBI

   Presentation of UBI is also a key construct in this study as the clarity of the terms and conditions of UBI policy are important due to the novelty of the concept. LexisNexis 2017 report indicates that UBI customers are now demanding UBI solution providers to be more transparent of the premium calculation process. Therefore, campaigns such as trial periods, minor incident forgiveness, and assurance of a certain discount have significant effects on accepting UBI.

7. The intention of accepting a UBI Policy

   This construct is the primary determinant of the study as according to TRA which is the base model of TAM which suggests as the most reliable fact that can predict a specific behavior is the behavioral intention. Therefore, the intention of accepting a UBI policy has the strongest effect on purchasing a UBI policy.

3.4. Questionnaire Development

Because the constructs of the study are latent variables, to measure them it is required to define indicators which are measurable. Therefore, initially indicators for each construct were identified through a literature survey. Then questions were formed in a way each addressing an indicator. In addition to them, questions regarding participants' demographic information were included in the questionnaire, to explore relationships that may exist with indicators or latent variables. Questions regarding the indicators were given as five-point Likert scale. The complete questionnaire is found under Appendix A.

Two questions were placed to check whether the participants are paying attention and being genuine. The questions "With a UBI policy, I will be able to get my premium decreased." and "If I get enrolled to a UBI policy scheme, my premium is likely to be increased." should be answered differently unless participants answered as "Neutral". The responses that do not comply with the mentioned assumption should be opted out

3.5. Population

The population can be defined as individuals, objects or items, where the sample is taken from for analysis (Singh and Masuku, 2014). The target population for this study is motor insurance policyholders, mainly those who use cars and dual-purpose vehicles. According to the Ministry of Transport and Civil Aviation the vehicle population of private cars and dual-purpose vehicles in Sri Lanka is over one million by the end of the year 2016 (ministry of transport and civil aviation, 2017). The main reasons to opt out other vehicle types are the practicality issues, and likeliness of obtaining UBI policy is lower comparing to private cars and dual-purpose vehicles.

3.6. Determining Sample size

A sample of a survey can be defined as a "subgroup of a population" (Latham, 2007). Selecting the correct sampling method is also important as it would increase the efficiency, flexibility, and accuracy of the research study (Latham, 2007). Because there were no subgroups of the population were defined for this study, simple random sampling method was used in collecting data for the survey, where anyone from the population has an equal opportunity to be selected for the sample. To determine the sample size, the website SurveyMonkey which uses the formula presented by Krejcie and Morgan in 1970, was used.

Given the fact that there are over one million private cars and dual-purpose vehicles it is taken as the population size for the study. 5% is given as the margin of error while z-score value associated with 95% of confidence level taken in calculating the sample size. According to the mentioned parameters the sample size should be 385.

3.7. Collection of data

The questionnaire was distributed in both printed and electronic formats. The printed questionnaire was made available in both English and Sinhala mediums among different communities to assure that the sample reflects a wide range of segments of the population. The electronic form of the questionnaire was distributed mainly through social media. The responses were collected for four months.

3.8. Summary

Unlike any other motor insurance policy available, in UBI policy schemes which are highly dependent on IT, the customers are directly involved in the premium calculation process. Therefore, the conceptual framework was developed based on Technology Acceptance Model. As this study consists of variables which are not directly measurable, the concept of latent variables has to be adopted. As a latent variable should be defined by indicators, when the questionnaire was formed, each question addressed an indicator. Random sampling method with 95% of confidence level with 5% margin of error was used to determine sample size. As it was required to collect 385 responses from current motor insurance policyholders, the questionnaire was distributed in both online and printed forms.

4. DATA ANALYSIS

This study aims to determine whether the Sri Lankan customers are ready to accept UBI policies instead of the traditional motor policies. Through the literature survey, six variables were identified which influence the intention to accept UBI policies. Considering their relationship with each other conceptual framework in Figure 3.1 was formulated. This chapter presents the observations and statistical analysis of the data collected by the survey, to evaluate the research design developed to explore the possibility of Sri Lankan customers' acceptance of UBI.

4.1. Pilot Survey

Before the actual survey, a pilot survey was conducted with 15 participants to test reliability and validity of the survey. The validity of a questionnaire refers to the degree of the accuracy of the instruments' measurement of the research objective (Sullivan, 2011). The reliability of a questionnaire refers to the accuracy of instruments. Therefore, in a reliable questionnaire, the answers given to each question should be consisting. To measure the reliability of this study's questionnaire, Cronbach alpha was calculated using software IBM SPSS version 20. Cronbach alpha is calculated by considering correlations of the answers given to all the questions in every combination (Sullivan, 2011). Therefore, an utterly reliable questionnaire should have a Cronbach alpha value of 1. However, a value over 0.7 for Cronbach alpha is considered to be acceptable (Tavakol and Dennick, 2011). Thus, the pilot survey proved that the questionnaire was reliable, as for each construct, Cronbach alpha value was above 0.7.

4.2. Data Cleansing

Data cleansing is an essential process that must be conducted to assure the accuracy of the data analysis. The questionnaire made available online was enforced with constraints to prevent users submitting partially completed forms, where as in the printed format it was unable to do so. However, before the data analysis, they were manually removed, as missing values may cause the results to be inaccurate and

the software used for SEM analysis would anyway omit them. The responses of the participants who have not driven at all and those who do not use cars, SUVs or vans also were removed as they are unlikely to adopt UBI. After conducting the mention cleansing procedures, 295 responses were left to conduct the analysis.

4.3. Normality of the Data

Typically, testing data for normality is conducted to ensure a good distribution of the dataset to avoid statistical errors which may occur in data analysis phase. A normally distributed dataset considered to have several characteristics. The distribution should be perfectly symmetrical, bell shaped, and the mean, median and mode should be equal (Ghasemi and Zahediasl, 2012; Gordon, 2006).

To test data for normality, there are visual graphs which could be generated. Boxplot, Q-Q plot, P-P plot, and stem and leaf plot are some of them. However, for this study, the skewness test and kurtosis test were used as the visual methods are less reliable (Ghasemi and Zahediasl, 2012). To conduct both mentioned tests the software SPSS version 20 was used. The generated report is found in Appendix B. The acceptable range for the values of skewness test is considered to be -2 to 2 (Medrano, Liporace, and Pérez, 2014). For Kurtosis test, the acceptable range is defined as -3 to 3 (Razali and Wah, 2011). Based on the mentioned ranges, the skewness of the dataset was acceptable. However for following questions, Kurtosis values were not acceptable.

- PIB4: *I would be encouraged to obtain a UBI policy because of value added services like roadside assistance, vehicle theft recovery, emergency assistance, and vehicle fault notification.*
- CTI5*: Benefits of a UBI policy is greater than third-party insurance, though premium may be slightly higher.*

The main reason for the high Kurtosis values is, the responses were not correctly distributed. Table 4.1 and 4.2 consist of the distribution of the responses received for the mentioned questions.

Table 4.1: Frequency statistics of the indicator PIB4

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	0.3	0.3	0.3
2	8	2.7	2.7	3.1
3	29	9.8	9.8	12.9
4	217	73.6	73.6	86.4
5	40	13.6	13.6	100.0
Total	295	100.0	100.0	

The question PIB4 inquiries about the customer's willingness of value-added services. 87.2% of the responders responded that they are interested in UBI because of them, even though they have not expressed their acceptance of UBI due to other reasons. From them, 73.6% have responded as "Agree", thus the distribution is violated. However, due to the importance of the question to the study, it is not removed from further analysis.

Table 4.2: Frequency statistics of the indicator CTI5

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	0.3	0.3	0.3
2	2	0.7	0.7	1.0
3	31	10.5	10.5	11.5
4	242	82.0	82.0	93.6
5	19	6.4	6.4	100.0
Total	295	100.0	100.0	

The question CTI5 inquiries, whether the participants believe that UBI policies are superior to third-party motor policies. As UBI policies will offer more benefits to the customers than a typical third-party policy, 88.4% of the responders have expressed so. Because 82% of them have responded as "Agree", the distribution of the data is not normal. However, due to the importance of the question to the study, it is not removed from further analysis.

4.4. Reliability test

Though the pilot survey indicated the questionnaire is reliable, it is essential to test the final dataset of 295 responses for the reliability to assure the accuracy of the data analysis. Therefore, like the pilot survey, Cronbach alpha was calculated for the entire dataset and the results are listed in Table 4.3

Table 4.3: Initials reliability test results

Construct	Cronbach Alpha	No. of Items
PIB	0.829	5
PSB	0.891	5
PEU	0.344	6
TTI	0.363	6
PUBI	0.721	3
CTI	0.346	6
PI	0.847	4

According to the values retrieved, the constructs; *perceived ease of use*, *trust towards the insurer* and *concerns regarding the traditional motor insurance premium calculation model* were found to be not reliable. Therefore, following questions (indicators) had to be removed to make the dataset reliable for the analysis.

Perceived ease of use:

I would anyway be enrolled, as it is involved with latest technologies.

It would be fun to brag about how much I save from UBI.

Trust towards the insurer

I can trust my motor insurance provider.

I would enroll in UBI policy scheme as it would reduce my premium, even if the insurance company monitors and handles my personal information.

Concerns regarding the traditional motor insurance premium calculation model
I understand how my current motor insurance premium is calculated.
With the current premium calculation method, I am in control of my premium.

Table 4.4 contains the Cronbach alpha calculated after removing them along with the number of items per construct. Under Appendix C, the complete reliability test results can be found. As each construct is over has over 0.7 for Cronbach alpha, it can be concluded that refined responses are reliable to be used for further analysis.

Table 4.4: Cronbach alpha figures after refining the questionnaire.

Construct	**Cronbach Alpha**	**No. of Items**
PIB	0.829	5
PSB	0.891	5
PEU	0.776	4
TTI	0.703	4
PUBI	0.715	3
CTI	0.756	4
PI	0.847	4

4.5. Descriptive Analysis

The purpose of the descriptive analysis is to get an impression of the data before conducting an in-depth analysis. Hence, this section illustrates the profile of demographic information of the sample used for this study. Appendix D contains analysis results generated from the software IBM SPSS version 20.

4.5.1. Age

Figure 4.1 illustrates the age composition of the participants of the survey. During the data cleansing process, participants who were less than 18-years were removed. The highest number of participants is of the age range from 26 to 35 years, which accounts for 180 out of 295 (61.0%) of the total number of participants. Second highest percentage of 21.7% is for the age group 36-45 years with 64 participants. 35 participants from the age group 18-25 years (11.9%) and 16 from the age group 46-55 (5.4%) years have made valid responses to the survey. No valid responses were made by the participants, who are over 55 years.

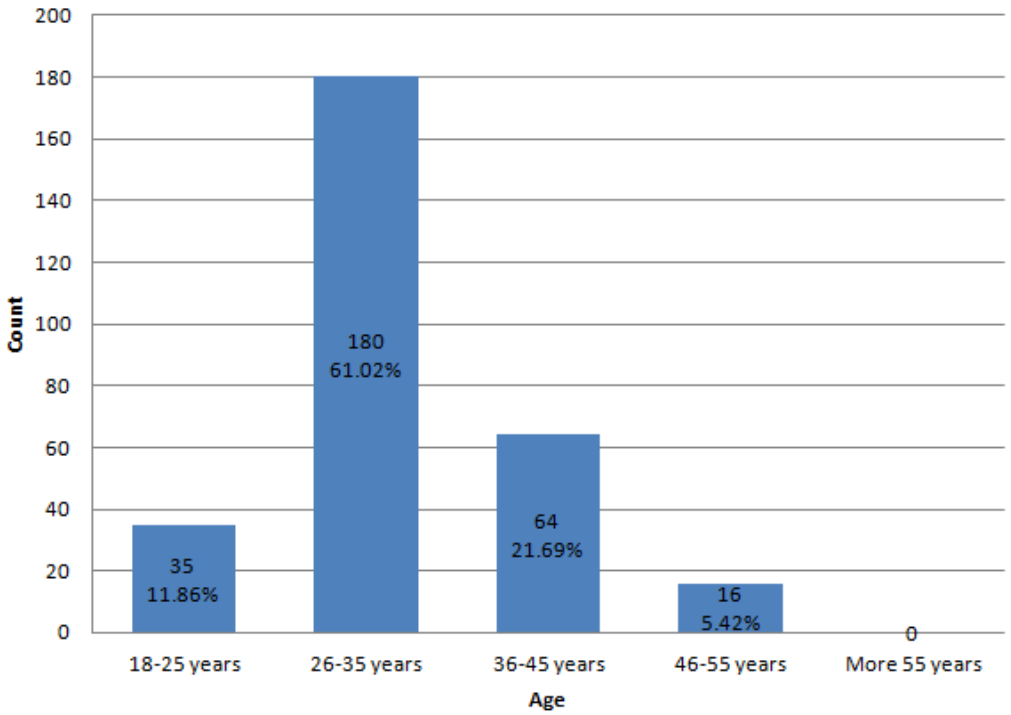

Figure: 4.1 Age composition

4.5.2. Gender

Figure 4.2 illustrates the distribution of the participants by gender. 230 of 295 (78%) valid responses have been submitted by male responders, while female participants accounts for 22% with 65 valid responses.

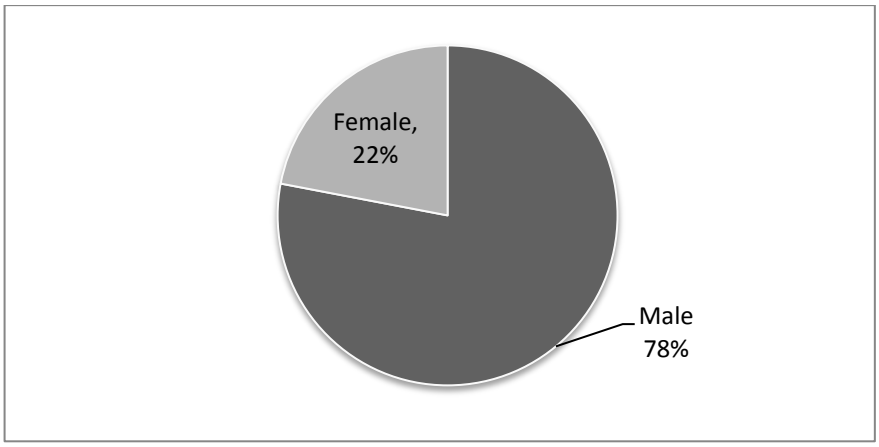

Figure: 4.2 Distribution of gender

4.5.3. Time spent driving in a week

Figure 4.3 depicts the distribution of a number of hours of driving per week. 119 (40.3%) of the participants out of the total 295, spend 10-20 hours driving in a week. The second highest number of hours spent, is 5-10 hours with 76 responses (25.7%). 58 participants (19.7%) have indicated they spend less than 5 hours driving in a week. 34 responders (11.5%) spend 20-30 hours for driving. 8 participants have indicated that they spend more than 30 hours for driving in a week.

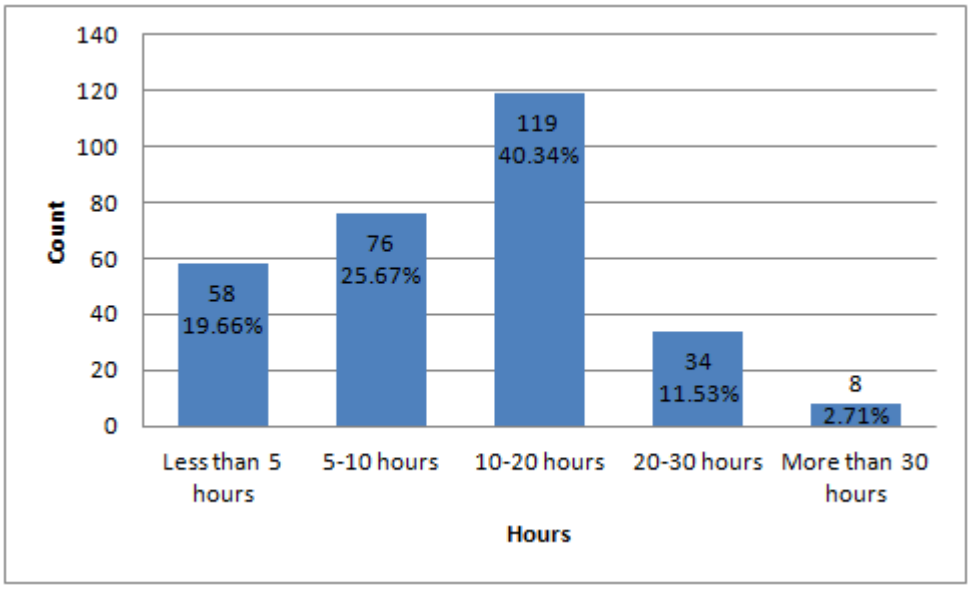

Figure 4.3: Time spent driving in a week

4.5.4. Miles Driven

In the survey we asked participants to indicate the total miles that he/she has driven, to estimate the driving experience of responders. As seen in Figure 4.4, it is apparent that most of the participants have an acceptable level of driving experiences, as 128 of the participants (43.4%) have indicated that they have driven more than 50,000 km. 75 of the participants (25.4%) have indicated that they have driven 25,000-50,000 km. Accounting for 18.3%, 54 responses have driven 10,000-25,000 km. 24 responders have driven 5,000-10,000 km, while 14 participants have driven less than 5,000 Kilometers.

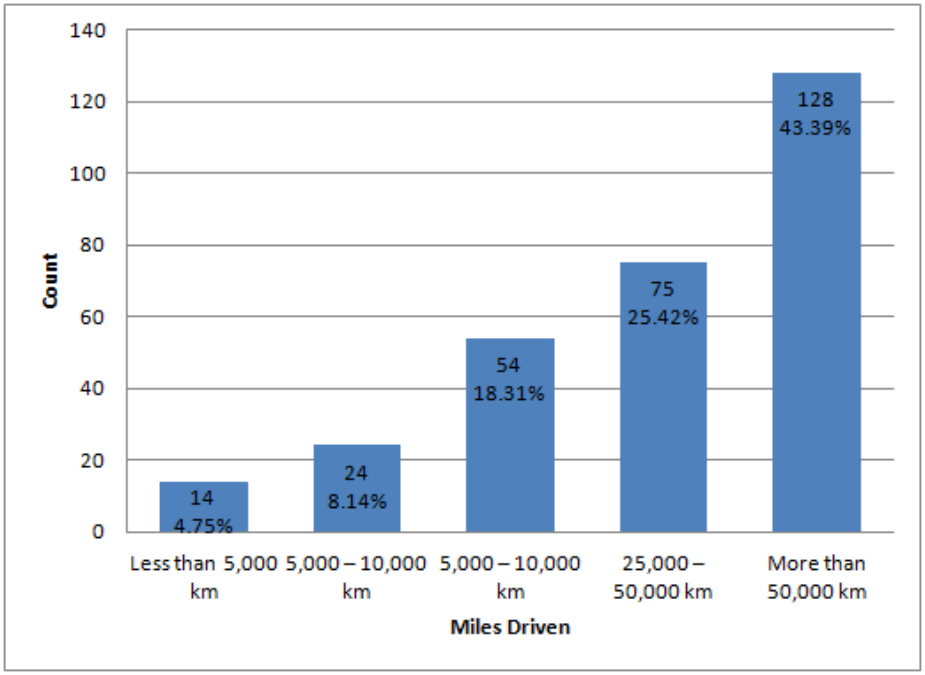

Figure 4.4: Distribution the participants by the miles drove

4.5.5. The area where most of the time spent in driving.

From the options city, suburbs and rural areas, the participants were asked to indicate the area where they spend most of the time in driving. Moreover, they were enabled to indicate multiple options if they believe that they spend an equal amount of time in two or more areas. According to the responses, most of the time is spent in is in city areas as 49.17% of the responses indicate so. “Suburbs” is indicated by 44.17% responses. Moreover, the rural area was marked only by 6.67%. Following graph found in Figure 4.5 illustrates the number of responses.

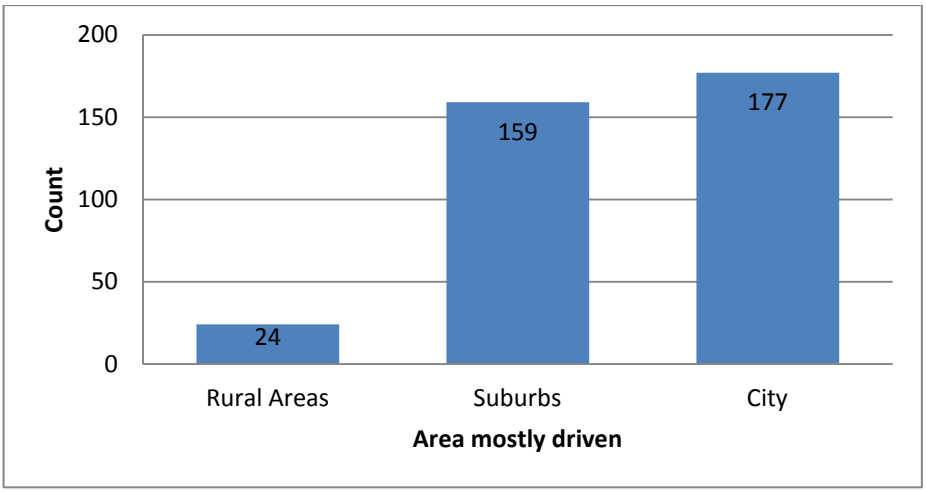

Figure 4.5: Distribution the participants by the area mostly driven

4.5.6. Vehicle Type

For the vehicle type, the responders were enabled to choose multiple answers as, one might own multiple vehicles. During data cleansing process, the responses which had not marked Car, SUV or Van were opted out. However, since there were 21 responses, which is 6.42 % of the sample indicating that the participant uses a Motorbike with a Car, Van or SUV, they were included in the study. 76.76% of the participants had indicated that they use cars. 13.15% had indicated that they use SUVs. Moreover, only 3.67% of the responses indicated that the participants use vans. Following graph found in Figure 4.6, illustrates the mentioned distribution.

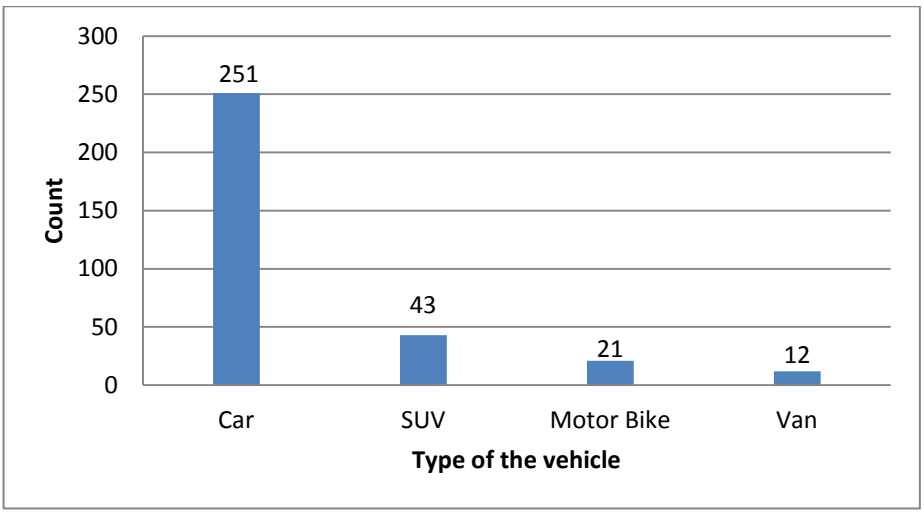

Figure 4.6: Distribution the participants by the vehicle driven

4.5.7. Value of the vehicle

This survey has requested information on the value of the vehicle that the participants use. 138 responses, which is 46.78%, have indicated that the values of the vehicle lies between 2.0-3.5 million Rupees. The range of 3.5-5.0 million has been marked by 80 responses, which account for 27.12%. 27 responders have indicated that their vehicle value is below 2.0 million rupees. Moreover, six and three responses indicate that their vehicle values belong in the range of 6.5-8.0 million and over 8.0 million rupees. Figure 4.7 illustrates this distribution of the value of the vehicle.

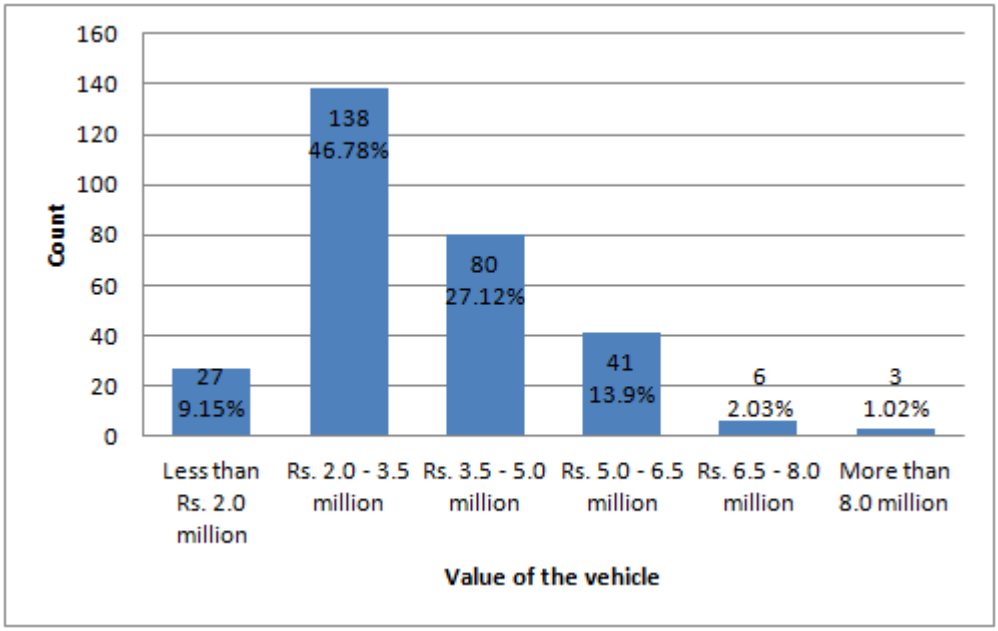

Figure 4.7: Distribution of the responses by the value of the vehicle

4.5.8. Number of accidents

The responders were requested to indicate the number of accidents that they have been involved in during the last five years. After the data cleansing process, the number of accidents was ranged from 0 to 11. According to the responses, following basic statistics were calculated to understand the sample. Table 4.5 lists the values retrieved for mean, mode, median, first quartile and third quartile. Figure 4.8 illustrates the distribution of the responses for the same aspect.

Table 4.5: Distribution of the responses by number of the accidents in last 5 years.

Mean	2.915254
Mode	2
Median	3
Quartile 1	1
Quartile 3	4

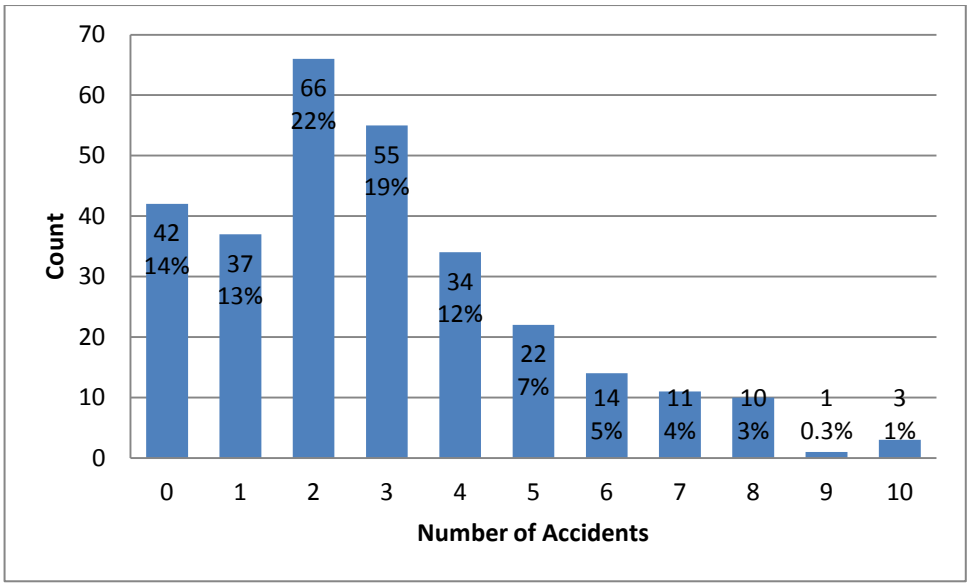

Figure 4.8: Distribution of the responses by a number of the accidents in last 5 years.

4.5.9. Rating of driving

Distribution of self-rating of theirown driving is illustrated in Figure 4.9. 127 responders (43.1%) indicated that their driving as “Moderate”. 107 (36.3%) indicated as “Cautious”. 36 responses (12.2%) indicated that the driving rate is “Very cautious”. 24 participants (8.1%) indicated that their driving is “Aggressive” while only one response was received for “Very Aggressive”.

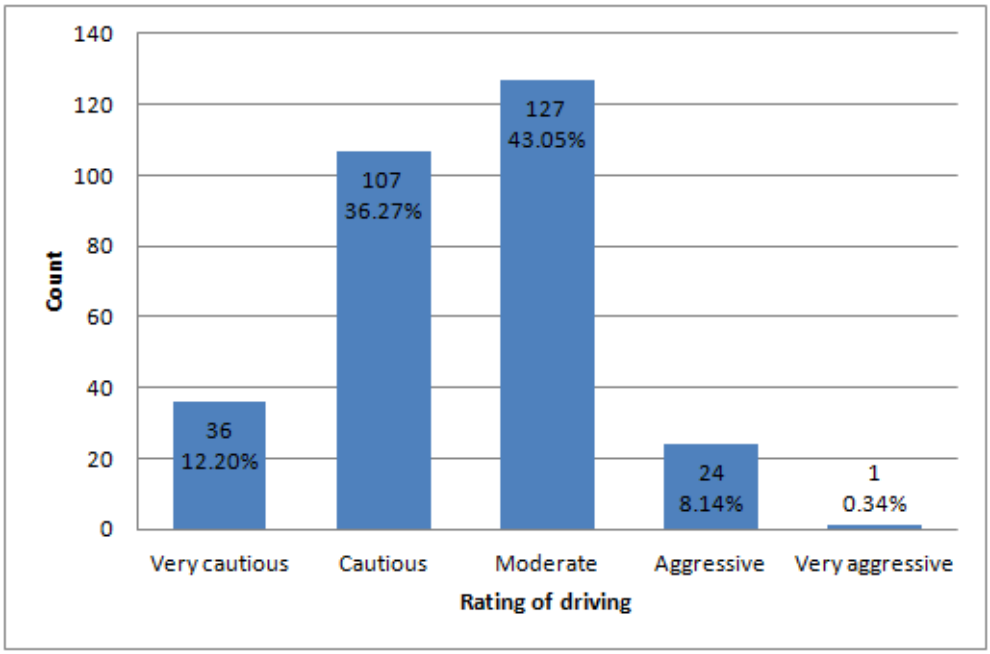

Figure 4.9: Distribution of the responses by the rating of driving

4.6. Structural Equation Modeling.

Hypothesis testing using multiple regression model is carried out by calculating the coefficients between independent variables and the dependent variables. Moreover, the *p*-value represents the probability of the null hypothesis is true. Therefore, a lower *p*-value suggests rejecting H_0 and accepting an alternative to the hypothesis. Any path analysis problem can be addressed by breaking it down into multiple regression problems. When those multiple regression model problems are solved individually, they can be combined to form a solution to a path analysis problem (Kock, 2011). However, because the constructs in this research are not directly measurable, typical analysis techniques cannot be adopted. An analysis technique that can analyze latent variables should be used for this research. Hence, the technique Structural Equation Modeling (SEM) was used for the analysis.

Structural Equation Modeling is a statistical modeling concept that is often used in behavioral science (Hox, n.d.). Moreover, it is used to examine the relationships between latent variables and typical observable variables (Suhr, 2006). Hence, SEM is also referred to as a technique of path analysis for latent variables (Kock, 2011). In fact, SEM considers of two types of relationships, inner relationships between

independent and dependent LVs, and outer relationships between constructs and their indicators (Wong, 2013).

Once the scores for constructs or LVs are calculated by the weighted averages of each indicator defined for the construct, the problem can be addressed using path analysis model which is typically solved by calculating *p* values and path coefficients (Kock, 2011). In fact, path coefficient is same as partial regression coefficients which are resulted by regression analysis on standardized variables (Akintunde, 2012). Hence, SEM differs from path analysis and regression analysis in the process of calculating the weighted averages for each LV.

There are two main approaches to assigning scores for LVs in an SEM analysis such as covariance based and variance based. Typically, the *covariance-based approach* is used when the sample size is large and evenly distributed, and the relationships are accurately defined. Therefore, this approach is ideal when a researcher is required to confirm or reject a certain theory. A *variance-based approach* which referred to as Partial Least Squares (PLS) is believed to be ideal when the sample size is small, the relationships specified in the research diagram are uncertain, and the accuracy in the predictions made are the most important aim of the analysis (Kock, 2011; Wong, 2013). Therefore, PLS-based SEM is chosen as the data analysis model for this study. WarpPLS version 5.0 software is used as it uses PLS approach in analyzing the relationships of LVs.

4.7. Analysis using SEM

When performing SEM analysis from the selected software, following settings were used. For the outer model analysis "PLS regression" algorithm was used while "Warp 3" algorithm was chosen as the algorithm for inner model analysis. Trust towards the Insurer and Purchase Intention were defined as reflective LVs while the rest of the LVs were defined as formative LVs, based on the definitions provided in Chapter 3. Once the SEM analysis is completed using the software, the beta values, *P* values, and R^2 values can be found in the analysis result diagram, as in Figure 4.10. R^2 values are generated only for LVs which are defined to be affected from another. Appendix E contains the complete result set generated in SEM analysis.

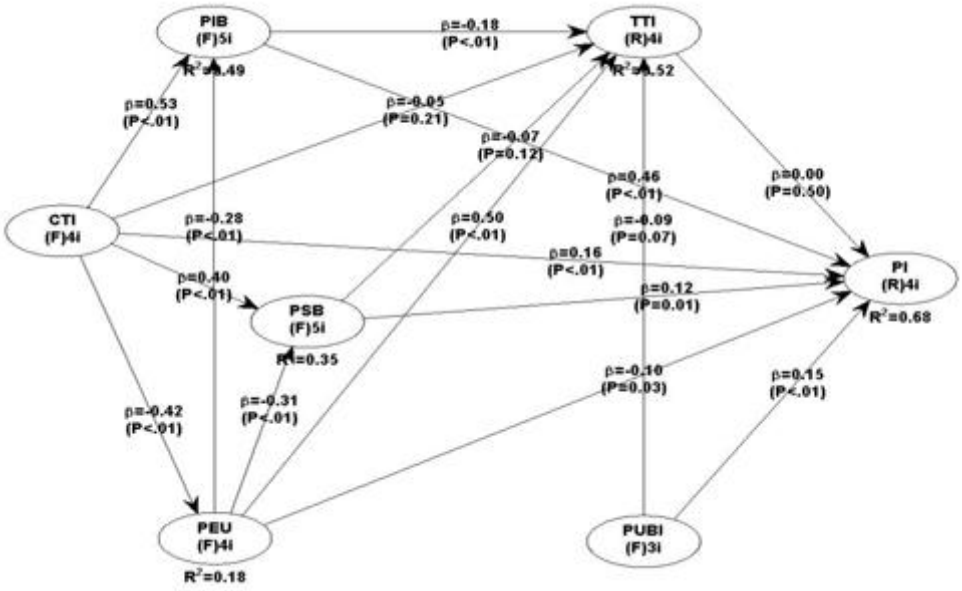

Figure 4.10: SEM analysis

4.8. Model fit

In SEM it is essential to assess the collected data for its fitness. Therefore, it is essential that the calculate model fit indices to determine the data's fitness with the theoretical model defined in the study. With the software that is used in this study, ten model fit indices are automatically generated in the SEM analysis. They are: Average adjusted R-squared (AARS), Average block VIF (AVIF), Average full collinearity VIF (AFVIF), Average path coefficient (APC), Average R-squared (ARS), Nonlinear bivariate causality direction ratio (NLBCDR), R-squared contribution ratio (RSCR), Statistical suppression ratio (SSR), Sympson's paradox ratio (SPR) and Tenenhaus GoF (GoF). In addition to them, *p* values for ARS, APC and AARS, which would be essential to determine the goodness of fit. Table 4.6 list the values retrieved for the mentioned indices and their validity.

Table 4.6: Model fit indices

Index	Value	Recommended Value/Range	Result
P value of AARS	P<0.001	0.05	Satisfied
AVIF	1.720	<= 5, ideally <= 3.3	Satisfied
AFVIF	2.204	<= 5, ideally <= 3.3	Satisfied
P value of APC	P<0.001	0.05	Satisfied
P value of ARS	P<0.001	0.05	Satisfied
NLBCDR	1.000	>= 0.7	Satisfied
RSCR	1.000	>= 0.9, ideally = 1	Satisfied
SSR	0.938	>= 0.7, ideally = 1	Satisfied
GoF	0.515	small >= 0.1 medium >= 0.25 large >= 0.36	Satisfied

4.9. Hypothesis testing

Table 4.7 contains *path coefficient* values, R^2 values and *p*-values retrieved from SEM analysis.

Table 4.7: Hypothesis testing

Effect	Path Coefficient (β Value)	R^2	P Value	Result
CTI -> PI	0.16	0.11	<0.001	Acceptable
CTI -> TTI	-0.05	0.02	0.210	Not Acceptable
CTI -> PIB	0.534	0.35	<0.001	Acceptable
CTI -> PSB	0.40	0.21	<0.001	Acceptable
CTI -> PEU	-0.423	0.18	<0.001	Not Acceptable
PIB -> PI	0.462	0.36	<0.001	Acceptable
PIB -> TTI	-0.177	0.10	<0.001	Not Acceptable
PSB -> PI	0.125	0.08	0.015	Not Acceptable
PSB -> TTI	-0.067	0.03	0.123	Not Acceptable
PEU -> TTI	0.497	0.33	<0.001	Acceptable
PEU -> PI	-0.104	0.05	0.035	Not Acceptable
TTI -> PI	0.001	0.00	0.496	Not Acceptable
PUBI -> PI	0.146	0.09	0.005	Not Acceptable
PUBI -> TTI	-0.086	0.04	0.067	Not Acceptable
PEU -> PIB	-0.282	0.14	<0.001	Not Acceptable
PEU -> PSB	-0.313	0.14	<0.001	Not Acceptable

Hypothesis 1 (H1): Concerns regarding the traditional premium calculation method have a positive effect on the intention of accepting a UBI policy.

According to the value retrieved for path coefficient, it can be concluded that, concerns regarding the traditional premium calculation method have a positive effect on the strength of medium on intention of accepting a UBI policy.

Hypothesis 2 (H2): Concerns regarding the traditional premium calculation method have a positive effect on trust towards the insurer regarding UBI

According to the value retrieved for path coefficient and P value, it can be concluded that, concerns regarding the traditional premium calculation method have no positive effect on trust towards the insurer regarding UBI

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Hypothesis 3 (H3): Concerns regarding the traditional premium calculation method have a positive effect on perceived personal benefits

Based on the analytical result obtained it can be concluded that concerns regarding the traditional premium calculation method have a significant positive effect on perceived personal benefits.

Hypothesis 4 (H4): Concerns regarding the traditional premium calculation method have a positive effect on perceived social benefits

Based on the analytical result obtained it can be concluded that concerns regarding the traditional premium calculation method have a moderate positive effect on perceived personal benefits.

Hypothesis 5 (H5): Concerns regarding the traditional premium calculation method have a positive effect on perceived ease of use

Due to the negative value retrieved for the path coefficient, it can be concluded that, Concerns regarding the traditional premium calculation method have no positive effect on perceived ease of use

Hypothesis 6 (H6): Perceived personal benefits have a positive effect on the intention of accepting a UBI policy.

Based on the analytical result obtained it can be concluded that perceived individual benefits have a strong positive effect on intention of accepting a UBI policy.

Hypothesis 7 (H7): Perceived personal benefits have a positive effect on trust towards the insurer regarding UBI

Due to the negative value retrieved for the path coefficient, it can be concluded that, perceived personal benefits have no positive effect on trust towards the insurer regarding UBI

Hypothesis 8 (H8): Perceived social benefits have a positive effect on the intention of accepting a UBI policy.
Since the beta value is a lower value, it can be concluded that perceived social benefits have no positive effect on the intention of accepting a UBI policy.

Hypothesis 9 (H9): Perceived social benefits have a positive effect on trust towards the insurer regarding UBI
Due to the negative value retrieved for the path coefficient, it can be concluded that, perceived social benefits have no positive effect on trust towards the insurer regarding UBI

Hypothesis 10 (H10): Perceived ease of use has a positive effect on trust towards the insurer regarding UBI
Based on the analytical result obtained it can be concluded that Perceived ease of use has a large positive effect on trust towards the insurer regarding UBI.

Hypothesis 11 (H11): Perceived ease of use has a positive effect on the intention of accepting a UBI policy.
Due to the negative value retrieved for the path coefficient, it can be concluded that, perceived ease of use has no positive effect on acceptance intention of UBI

Hypothesis 12 (H12): Trust towards the insurer regarding UBI has a positive effect on the intention of accepting a UBI policy.
Due to low path coefficient and high P value, it can be concluded that there is no positive effect by trust towards the insurer regarding UBI on accepting a UBI policy.

Hypothesis 13 (H13): Presentation of UBI has a positive effect on intention of accepting a UBI policy.
Because the path coefficient is week, it can be concluded that presentation of UBI has no positive effect on the intention of accepting a UBI policy.

Hypothesis 14 (H14): Presentation of UBI has a positive effect on trust towards the insurer regarding UBI

Because the path coefficient is a negative value, it can be concluded that presentation of UBI has no positive effect on trust towards the insurer regarding UBI

Hypothesis 15 (H15): Perceived ease of use has a positive effect on perceived personal benefits.

Since path coefficient is a negative value, it can be concluded that perceived ease of use has no positive effect on perceived personal benefits.

Hypothesis 16 (H16): Perceived ease of use has a positive effect on perceived social benefits.

Since path coefficient is a negative value, it can be concluded that perceived ease of use has no positive effect on perceived social benefits.

4.10. Correlation Analysis

Because the demographic information is also captured from the questionnaire, correlation analysis also was conducted to identify the relationships that may exist between them and the indicators used for LVs.

As the indicators of the LV "Intention of accepting a UBI Policy" following questions were used.

- PI1: I feel the concept is relevant and worth trying.
- PI2: Sri Lankan Motor Insurance Industry needs such innovations.
- PI3: UBI will lead to better customer satisfaction.
- PI4: UBI premium calculation method is better than the traditional method of premium calculation.

To determine the strengths of the correlations values listed in Table 4.8 was used.

Table 4.8: Interpretation of the correlation coefficient values.

Size of Correlation	Interpretation
0.90 to 1.00 (-0.90 to -1.00)	Very high positive (negative) correlation
0.70 to 0.90 (-0.70 to -0.90)	High positive (negative) correlation
0.50 to 0.70 (-0.50 to -0.70)	Moderate positive (negative) correlation
0.30 to 0.50 (-0.30 to -0.50)	Low positive (negative) correlation
0.00 to 0.30 (0.00 to -0.30)	Negligible correlation

(Source: Mukaka, 2012)

As a demographic question, participants were asked about the number of accidents they were faced in last five years. Correlation coefficient values calculated based on the survey responses listed in Table 4.9. It is apparent that all four indicators have negative correlation coefficients. PI 1 and PI 3 have weak negative correlations to the number of accidents. PI 2 and PI 4 have negative, but no significant correlation between the number of accidents faced in the last five years. Therefore, it can be concluded that with the increase in the number of accidents, the likelihood of obtaining a UBI policy decreases. However, the belief that UBI will lead to better customer satisfaction and Sri Lankan insurance industry requires to offer innovative products similar to UBI, have no significant impact from the number of accidents faced in last five years.

Table 4.9: Correlation analysis

	PI 1	PI 2	PI 3	PI 4
No. of accidents	-0.3365	-0.2056	-0.4170	-0.2513
Driving Rating	-0.4018	-0.1986	-0.3613	-0.3641
Belief that privacy will be violated (TTI4)	-0.2444	-0.0453	-0.3511	-0.2088
Offering a trial period (PUB1)	0.4899	0.4034	0.3065	0.3951
Value-added services (PIB4)	0.5787	0.4788	0.4988	0.5059

It was asked from the responders to self-rate their driving. Participants could select a value based on a Likert scale of 1-5 to rate their driving, where one being Very Cautious and five being Very Aggressive.

For this aspect too all the correlations are negative. PI 1, PI 3 and PI 4 have a weak negative correlation to the rating of the participants had given for their driving. PI 2 has no significant correlation with driving rating. These results indicate that, with the increase of the aggressiveness in driving, the likelihood of obtaining a UBI policy decreases. However, because the correlation is weak, the effect that the way a person drives to the likelihood of obtaining a UBI is weak.

In addition to the demographic data, following indicator questions were also analyzed for correlations.

As presented in Chapter 02, several studies indicate that privacy concern is one of the major aspects that prevent customers from adopting UBI policies. Therefore, it is included in the in the questionnaire under the section trust towards the insurer (TTI). Due to its significance, correlation analysis is conducted to examine the Sri Lankan customers' perspective with regards to accepting UBI policy schemes.

The indicator question TTI4 stated that "I'm worried that my privacy will be violated as my insurer will have my personal and driving information". With all the indicator questions of the LV "Intention of accepting a UBI Policy", the question TTI4 has negative correlations as anticipated. However, expect for PI 3, for all the other questions the correlations were weak, indicating that privacy concerns have no impact on the intention of accepting a UBI policy.

A study conducted by LexisNexis (2013) indicated that by providing a trial period to customers, the acceptability of UBI policies could be increased by 61%. Since UBI will be a new concept to the Sri Lankan customers, it is important to provide customers an opportunity to be familiarized, to encourage them to adopt UBI. Therefore, an indicator question inquiring the customers' likelihoods of accepting a UBI policy, if a trial period is given, is included in the LV, "Presentation of UBI".

PUB1: If I am given a trial period, I would be more comfortable in obtaining a UBI policy.

As suggested by the mentioned study, there are positive correlations among them. However, they all have a weak correlation with the intention of accepting UBI. Therefore, these results indicate that offering a trial period will increase the likelihood of obtaining UBI policies.

In addition to the financial benefits, value-added services are one of the drivers that persuade customers to switch to UBI policies. Therefore, correlation analysis was conducted with customers' perception of value-added services as a motivator to adopt UBI.

PIB4: I would be encouraged to obtain a UBI policy because of value-added services like roadside assistance, vehicle theft recovery, emergency assistance, and vehicle fault notification.

According to retrieved correlation coefficients, value-added services have a moderate positive correlation with the intention to accept UBI, indicating that, by offering values-added services, the likelihood of accepting UBI policies can be increased.

Because the survey had inquired demographic information of the participants, following analysis was conducted to examine whether there are any relationships between demographic information and intention to accept UBI policies.

The questionnaire consisted of six age groups varying from Less than 18 years to More 55 years. Because the responses made by participants that are less than 18 years old, hold no value to the study as they cannot be policyholders, those responses were removed from the analysis during the data cleansing stage. To explore whether there is a relationship between age and acceptance intention correlation analysis cannot be conducted, as the age ranges are not similar among the groups. Therefore, a simple line chart is generated with the means of the indicator questions PI1 and PI4, which are under the LV, the intention of accepting UBI.

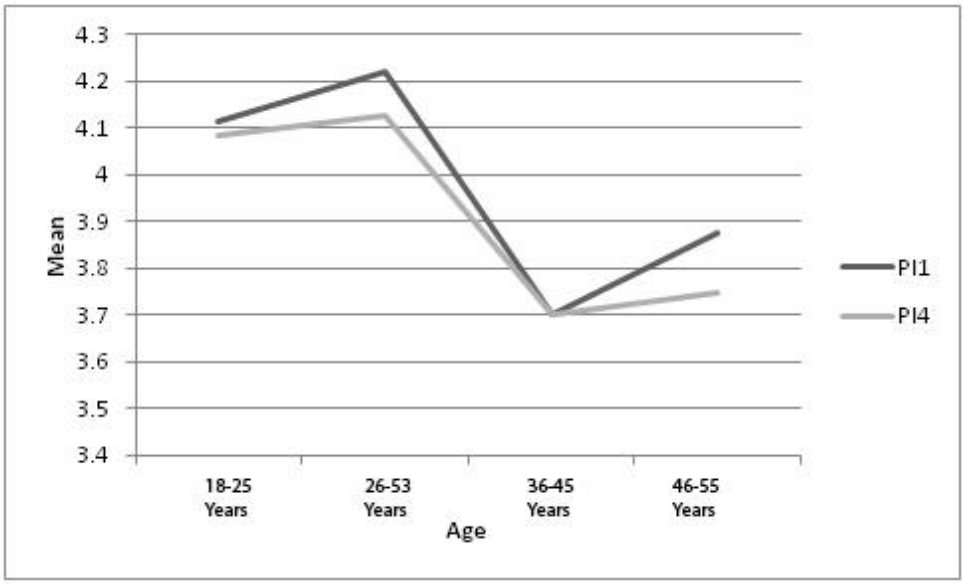

Figure 4.11: Acceptance of UBI against age

According to the line chart in Figure 4.11 it can be identified that age groups 18-25 and 25-35 have a higher likelihood of accepting UBI than higher age ranges. Hence, similar to the studies conducted elsewhere, even in the Sri Lankan context, the younger generation is more interested in UBI. This could be attributed to younger drivers being more tech-savvy and cost-conscious.

Because the number of driving hours is one of the determinants of the premium in UBI, it is important to analyze the likelihood of accepting UBI against the number of driving hours. According to the chart in Figure 4.12, as expected, participants who drive more are less interested in accepting UBI policies.

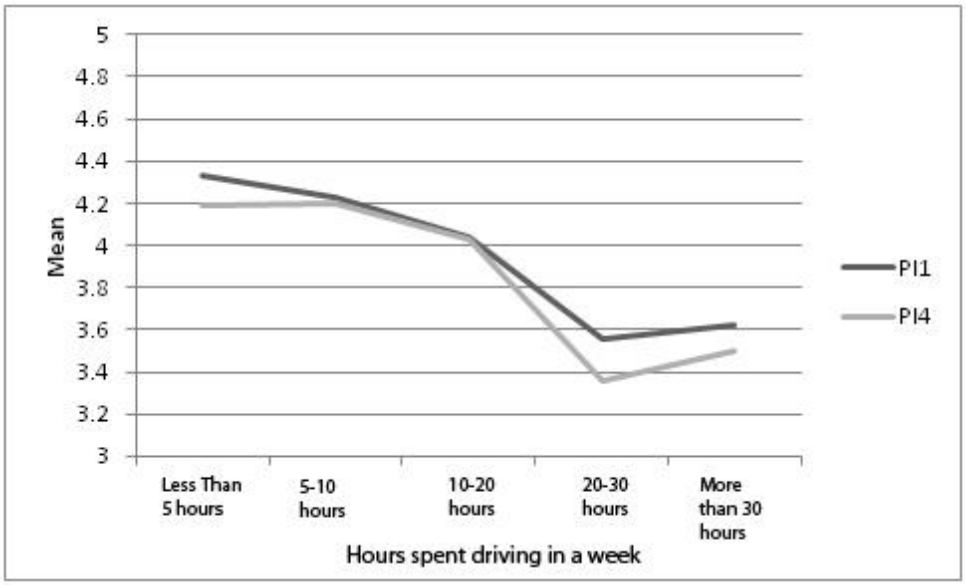

Figure 4.12: Acceptance of UBI against a number of driving hours

As demographic information, the price of the vehicle was also inquired. The participants were given an option to choose from a range of options from Less than LKR 2.0 million to more than LKR 8.0 million. Although it was anticipated that customers with more expensive vehicles are more likely to adopt UBI, as the value of the vehicle is a primary determinant of the premium of the traditional motor policies, the analysis indicates otherwise as seen in Figure 4.13. As the vehicle value increases, the interest towards UBI gets decreased. This is possibly due to the owners of the more expensive vehicles are not price sensitive compared to the participants who own less expensive vehicles. Alternatively, this may also indicate that vehicle owners are not aware of substantial potential savings UBI could bring, as the discount can be as high as 20% in certain cases.

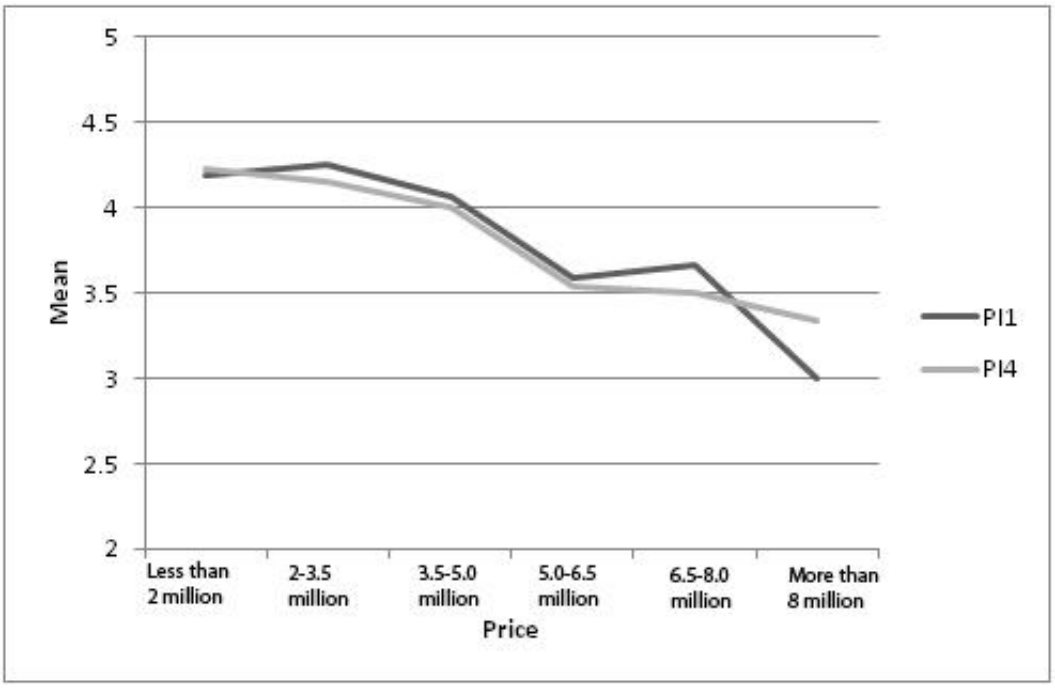

Figure 4.13: Acceptance of UBI against the price of the vehicle

As a way of determining the driver's experience it was inquired about the total distance driven by the drivers ranging from Less than 5,000 km to More than 50,000 km. As illustrated in Figure 4.14 this analysis also suggests that the less experienced or drivers who drive less prefer UBI more than the experienced drivers who tend to drive more.

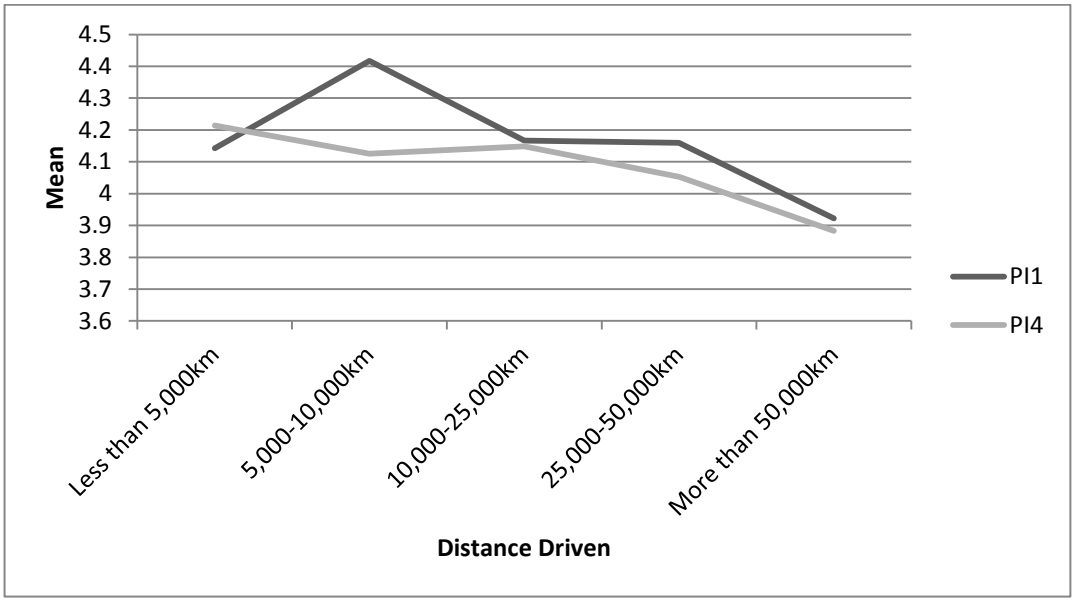

Figure 4.14: Acceptance of UBI against distance driven

4.11. Summary

The main focus of this chapter was to analyze the collected data to achieve the objectives of the study. To assure the dataset is reliable, data cleansing, reliability analysis and testing for normality of the data were conducted. Moreover, the hypothesis generated from the conceptual framework found in the previous chapter, was tested using the SEM. It was derived that, only "concerns regarding the traditional premium calculation methods" and "perceived individual benefits" have an effect on "Intention of accepting a UBI policy". Furthermore, correlation analysis was conducted for several indicator questions against the questions found under "Intention of accepting a UBI policy". Value-added services and offering a trial period found to have positive correlations with the intention to accept UBI policies.

5. DISCUSSION AND CONCLUSION

The objective of the study is to empirically evaluate customers' perception of UBI to examine the possibility of launching UBI policy scheme in Sri Lanka. This chapter discusses the survey findings and their relationships to related work, recommendations, limitations of the study and recommended future work. We elaborate the insights retrieved from the previous chapter. Furthermore, based on them, practical and theoretical implications are recommended to understand customers' perspective of UBI policies and persuade them to adopt UBI policies.

5.1. Sri Lankan Insurance Industry and implications of UBI

In Sri Lanka still lump-sum based traditional premium calculation model is being practiced by all the motor insurers. Similar to the western countries, the competition is found to be intense in the local market as well. Rather than product differentiation, the Sri Lankan insurers are mainly concentrating on premium reductions to obtain a competitive advantage which results in increased claims ratio. However, services such as road-side assistance and on-the-spot claim settlements are offered by several insurers to differentiate themselves from others.

On-the-spot claim settlement is a concept of settling the claim at the site of an accident by the customer relationship officer. This process opts out the claims underwriting process and salvage collection process, reducing the time taken to make the payment to the customer. However, the customer will have to rely on the assessment done by the customer-relationship officer. If the customer is not satisfied with the offered amount, he/she can proceed with the conventional process of claims settlement.

At the moment the only motivator for the customers to use their vehicles carefully, is the premium discount scheme of No Claim Bonus (NCB). The idea behind this concept is to reward the customer with premium discounts for not claiming. There are two types of discounts given to the customers under NCB. They are upfront NCB and earned NCB. Typically, upfront NCB is given at the time of the policy purchase, while the earned NCB is accumulated for each year that the

policyholder does not make claims. Typically, 5% of earned NCB is offered for each year without claims. There is a maximum limit that a customer can have for a total of both NCB types. However, if a claim is made by the customer, both upfront NCB and earned NCB will not be offered in the subsequent year. IBSL has enabled customers to even carry the earned NCB to another insurer, decreasing the switching cost. Though this scheme appears to be encouraging safe driving to reduce the claims ratio, several issues can be identified.

When a claim is made, the insurer will not consider the party that is guilty for the accident. Hence, when even a third-party causes an accident, the policyholder will have to bare the increased premium. Moreover, to save the NCB, customers tend not to claim from the insurer for accidents, making the insurer unaware of the level of risk involved by the policyholder. Furthermore, when a claim is made, the policyholder loses even the upfront NCB. Therefore he/she may switch to another insurer in the subsequent year. Thus, NCB is not completely responsive to the level of risk the insured vehicles are involved with and it is also found not to be fair to the policyholders when accidents are caused by third-parties. Therefore, a premium calculation model that is fair to the customers and ensuring the sustainability and profitability of the industry should be introduced to the Sri Lankan market.

In Sri Lanka there are two main motor insurance policy types, namely comprehensive insurance, and third-party insurance. Comprehensive insurance covers the insured vehicle, passengers, other vehicles, and personals got affected, as well as property damages in an event of an accident. However, in third-party insurance policies cover only the damages done to the third-party and properties. Because of the significant difference in premium amount, the majority of the customers in Sri Lanka have chosen third-party insurance which is not only the least expensive policy model but also the minimum insurance requirement mandated by the law (IBSL, 2015). Hence, when a third-party policyholder meets with an accident, his/her vehicle and the passengers will not be covered by his/her insurer.

However, the concept of UBI can be used to address most of the challenges mentioned above. Instead of NCB discount scheme, the insurers can offer their customers UBI policy schemes enabling the customers to obtain discounts while encouraging them to use their vehicles more safely, making a comprehensive policy

more affordable. Unlike with NCB, the insurer will be informed of all the risks the insured vehicle is involved with real-time. As long as the insured vehicle is driven in a manner that is less prone to accidents, the premium will not be increased. Even the insurer had to settle the claim for an accident caused by another driver; the premium will not be increased. Most importantly the insurers could notify the customer whenever they engage in risky driving behavior in real-time, encouraging them to be careful and more responsible on the road. Moreover, with value-added services insurers can increase the switching cost indirectly. However, financial benefits being a key determinant in choosing the policy type, the customers who have higher NCB value might be reluctant to subscribe to UBI policy schemes, as often in western countries the maximum premium discount given is 30%, where as in Sri Lanka total NCB can be high as 70%.

On-the-spot claim settlement has become popular because of the time taken in the current claim underwriting process, that validate and asses the damages caused, is reduced. Because with the sensors used in UBI, the insurers are capable of identifying when an insured vehicle is met with an accident, the claim intimation process could be initiated instantly. Furthermore, the insurer can get an assessment of the damages based on the driving information and vehicles information before the customer handover documents for the claim. Therefore the claim underwriting process could be made more efficient as the information will be more accurate and reliable, making it is possible to settle the claims in a shorter period.

5.2. Discussion

According to the findings, UBI policy schemes are not ideal for the policyholders who drive long distances or spend more time driving, as these factors increase the level of risk involved and subsequently the premium. Our findings also indicate the same. With the increase of the time spent in driving, the intention of accepting a UBI policy declines. We requested drivers to rate their driving. It is also apparent with the increase of aggressiveness in driving, the tendency of accepting UBI policies is declined as anticipated, since the risky maneuvers will be captured from sensors that observe various dynamics of driving and will cause increased premium. Another measure we focused is the number of accidents involved during

the last five years. It gives an idea the of risk levels that the participants are involved with. Confirming the previous conclusions, the correlation between the number of the accidents and the indicator variables of acceptance of UBI have negative, moderate correlations, which indicated with the increase of a number of accidents, the likelihood of accepting a UBI policy decreases.

This trend might raise challenges to the local insurance companies, as their policyholders who drive carefully and claim less will adopt UBI. Moreover, those who are more prone to accidents and claim more will remain using the traditional policies mainly because they may fear that their premium will be increased due to their driving behavior if they get enrolled to a UBI policy scheme. This trend might result in reduced premium income of the company, as the safe drivers will obtain discounts from UBI, and they will no longer subsidize for the claims made by those who claim more. Nevertheless, for the companies who will launch UBI products early to the market, might have an advantage as almost half of the participants have expressed that they are willing even to change their insurer to obtain UBI policies. Moreover, 15% has marked as neutral. With the rapidly increasing number of new vehicles and younger drivers in the Sri Lankan market, the potential customer base for UBI could increase. Hence, UBI policies could be used to expand the market share of a company. There is a higher possibility of newly attracted customers being safe drivers as they will purchase UBI policies with the intention of obtaining individual benefits, by being safe drivers, and more responsible on the road. To include both risky and safe drivers to UBI policy schemes, the insurers can introduce UBI as a discount scheme, which offers a certain percentage of discounts to the calculated premium assuring there will be no premium increase. However, the insurers will have to calculate the premium in a way their claims ratio will not be increased.

According to the analysis, the young drivers are more interested in subscribing to UBI policy schemes than the older ones. It indicates that, the segment of the customers who are more prone to accidents due to being inexperienced and careless in driving, according to various studies, will be enrolling to a policy scheme which encourages them to drive safely. Hence, it can be expected they too will adhere to safe driving practices that will cause reduced risks involved, making the insurer's

total number of claims reduced and subsequently the claims ratio. This tendency is common in several studies conducted overseas as well. The main reason could be the younger generation is more exposed to IT, making them encouraged to adopt this concept. Moreover, they might be more price sensitive than the older customers, as Awan and Fatima have indicated in their study in 2014.

One of the interesting trends found from the data analysis is, with the increase of value of the vehicle, the acceptability of UBI policies is declining. Most of the customers are motivated by individual benefits which are mainly financial. Thus, those who are not price sensitive maybe not be intrigued by the concept. Therefore, UBI products should not be introduced as a niche market product. However, all the segments of the customers should be approachable through value-added services that could be bundled with a UBI policy scheme.

The disadvantages and shortcomings of the traditional motor premium calculation methods demand a transparent and fair concept to all the motor policyholders. UBI was introduced as a solution to address this issue and several more. In this study, under Hypothesis H1 it was tested whether the concerns of the traditional premium calculation methods have a positive effect on acceptance intention of UBI policies. According to the proposed theoretical framework those concerns, in fact have a positive effect on the customers intention of accepting UBI policies. Therefore, it can be concluded that the Sri Lankan customers perceive the traditional motor insurance premium calculation method as ineffective, and UBI insurance concept has the potential to resolve some of the issues found with the current motor insurance premium calculation method. This also indicates that the participants of the study have a relatively good level of experience and understanding of the current motor policy procedures as customers.

In addition to the purchase intention, concerns regarding the traditional motor insurance policies have a positive effect to perceived individual benefits and perceived social benefits, which indicate that the participants believe that by adopting UBI policy scheme, they will be able to obtain individual and societal benefits. Under individual benefits, financial gains and conveniences were the major aspects addressed in the questionnaire. For social benefits, manly environmental benefits and road safety were addressed.

As expected, individual benefits have a positive effect on acceptance of UBI, meaning that the customers will be encouraged to purchase UBI policies with the objective of obtaining individual benefits. This aspect was examined by the Hypothesis H6. Hence, the insurance companies will be able to emphasize on the possible individual benefits, mainly reduced premium rates, and an array of value-added services, as encouragements to persuade the customers to choose UBI policies over traditional policies. Typically, usage-based pricing models encourage users to limit unnecessary usages and use the facilities more responsibly (Bauer and Wildman, 2012). Therefore, it can be expected that if customers adopt UBI policies, they will use their vehicles lesser and more carefully, leading to decreased accident rates. On average, the customers of "Progressive Insurance", the USA's first company to offer UBI policies, are obtaining a premium reduction of 10-15% (Mirani, 2014).

H7 evaluated the relationship between perceived social benefits and acceptance of UBI. According to the analysis there is no significant level of a relationship. Hence, it can be concluded that Sri Lankan customers are not motivated to obtain UBI policies by the potential social benefits that can be obtained. This could be because policyholders who have claimed less have subsidized for the claims made by those who have claimed more. Hence, he/she might be convinced that he/she is already contributing to the society and in need of a system that is solely focused on him/her. Nevertheless, William Vickrey, who introduced UBI concept has emphasized on the fact that UBI will benefit the society by reducing environmental pollution caused by motor vehicles.

Similarly, perceived ease of use also has no significant level of relationship with the acceptance intention, meaning that, user-friendliness is not a factor that determines the acceptability of UBI. However, a significant relationship could be found between the perceived ease of use and trust towards the insurer, meaning that trust towards the insurer is influenced by perceived ease of use. This could be because if a customer trusts the insurers, he/she also believes that the insurer will not introduce a product that is not user-friendly and hinder the efficiency of day-to-day activities.

However, no significant relationship was found between trust towards the insurer and the acceptance intention which was tested under H11. In fact, an indicator question about the privacy concerns was included under this construct as many of the studies conducted elsewhere indicate that privacy concerns are the main reason customers refuse UBI policies. However, when correlation analysis was conducted, it was found that there was no significant correlation. It maybe because participants are more concerned about individual benefits rather their trustworthiness of the insurer or the privacy concerns. In addition to that, Sri Lankan customers may not be aware of the damages that could be caused by violation of privacy. Due to this lack of awareness, when benefits are presented, they may have overlooked the risks and expressed their willingness to adopt the concept.

Several studies indicate that presentation of UBI products holds a significant influence in encouraging customers to accept UBI policies. Hence, this study also explored the impact of presentation of the UBI policies on acceptance of UBI. However, based on our findings hypothesis H13 indicates that presentation of UBI has no significant level of influence to the customers' intention of accepting a UBI policy. Nevertheless, an indicator question measuring the influence of having a trial period before actual purchase of the policy has a moderate, positive correlation. The main reason could be, UBI being a novel concept to the Sri Lankan market, the customers could be skeptical towards the various aspect of it. Therefore, by offering a try-before-you-buy nature of an opportunity to the customers, the insurers will be able to encourage them to get subscribed to UBI policy schemes. Moreover, the insurers will be able to collect the data which could be used to fine-tune the process of defining the characteristics of risky and safe driving, which will be used in risk profile creation and calculating the premium.

Figure 5.1 illustrates the findings of this study in graphical a manner. The two constructs that have a direct influence on the intention of purchasing a UBI policy, are the concerns that the customers have with the lump-sum based traditional premium calculation method and perceived individual benefits. Furthermore, with decrease of age, aggressive driving behavior, driving distance and time spent, number of accidents faced and price of the vehicle, the likelihood of accepting UBI policy schemes increases.

Therefore, the insurers can emphasize on financial gains, conveniences that can be obtained via value-added services and disadvantages of the current premium calculation method when introducing UBI policy schemes to the Sri Lankan market. Furthermore, insurers can focus on different customer segments and develop marketing strategies to each segment to attract the most number of customers.

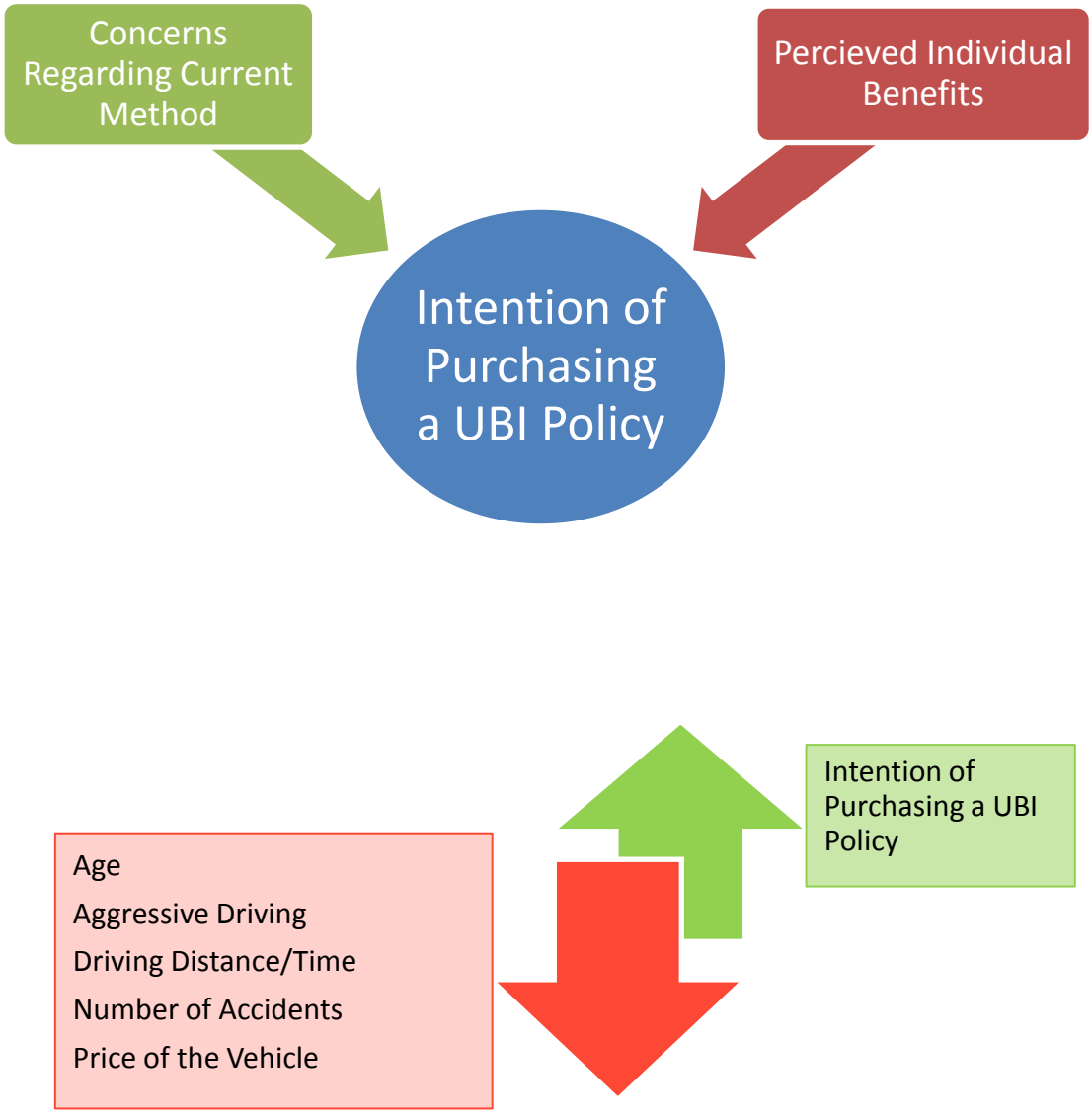

Figure 5.1: Influencers of Accepting UBI policies

The main reason this study was conducted, rather than relying on studies done in other countries, was because of the contextual difference. However, a similar study was conducted by Rejikumar (2013) in India where the contexts and the insurance models are fairly similar. Therefore it is important to compare the finding retrieved by both the studies to understand the behavior of the potential customers.

As findings of the mentioned study, it is presented that acceptance intention of UBI policy is influenced by perceived individual benefits, perceived easiness in understanding the policy terms and perceived values on acceptance. However, in this study, only the perceived individual benefits and concerns regarding the traditional policy types were found to have direct relationships with the acceptance of UBI. Easiness in understanding the policy terms was not identified as a construct in this study. However, presentation of UBI was identified as a construct. Moreover, it also was identified not to have a significant influence on the acceptance of UBI. In both the studies perceived social benefits were found to have no significant impact on the acceptance intention. Even though studies conducted in Western countries indicate that the privacy concerns have a strong negative impact on acceptance of UBI, both of these studies identified that privacy and information security concerns, have no significant influences on acceptance intention. Perceived ease of use and concerns regarding the current premium calculation method were not addressed in Rejikumar's study. While perceived ease of use has no significant effect on acceptance of UBI, concerns regarding the current premium calculation method have a strong effect on acceptance intention.

Considering the findings of both studies, it can be concluded that results of the common constructs are fairly identical. Given that the majority of the customers have expressed their willingness to adopt UBI if implemented, it can be concluded that, if the insurers emphasized on the aspects that the customers will be motivated to choose UBI policies over traditional policies, the insurers will be able to successfully attract customers to UBI policy schemes.

5.3. Research Limitations

This study was mainly conducted with the data collected from the professionals who work in the city of Colombo. Being a highly congested city, their traveling

experience in Colombo may have affected their perception, which could be vastly different from a perception of a person's who would often drive or travel in a different area of the country. Moreover, most of the participants of the survey were professionals. Their knowledge and experience in IT may affect the study.

Lack of awareness of the concept also may have affected the responses, as usage-based pricing is not commonly found in sectors other than utilities in Sri Lanka. Furthermore, solutions that adopt IoT technology is at early stages and rare in the context of Sri Lanka, making it is hard to imagine or understand the UBI concept. Lack of reliable literature was one of the major challenges during this study. Due to the novelty of the concept there is a shortage of reliable study materials to be found. In Sri Lankan context no study was found that researched any aspect of UBI. However, several institutes overseas have conducted survey's, mainly to specific regions and countries.

5.4. Future Research Directions

To overcome the issue that the majority of the participants were working in Colombo and their perception might not reflect the whole context of Sri Lankan insurance customers, instead of simple random sampling method, which was used in this study, could be omitted and quota or stratified sampling methods could be used considering the distribution of the vehicle population in Sri Lanka, across the provinces and districts. Furthermore, before obtaining responses, the survey participants should be more educated about the concept. Thus, in-person survey concept could be used to collect the responses, so that the participants could inquire about the concept and its proceedings, before answering the questionnaire.

The conceptual framework developed based on TAM under the assumption the costumers will perceive the concept of UBI as an IT solution, as it is. However, survey participant who lacks IT knowledge might perceive this concept as typical insurance solution which charges the customer based on usage, as similar usage-based pricing solutions that can be found widely in the telecommunication industry in Sri Lanka. Therefore, a theory such as Theory of Reasoned Action could be used as the base model to develop the conceptual framework.

This study only assesses customers' perception and their readiness towards UBI policy scheme. To examine the possibility of launching such scheme, the perceptions of all the stakeholders such as decision makers of insurance companies, insurance agents, technology experts and regulatory bodies should be considered. Moreover, a proper feasibility study should be conducted considering all the aspects of the micro and macro environments.

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APPENDIX A: RESEARCH QUESTIONNAIRE

Usage Based Insurance (UBI) is a concept of calculating the insurance premium, based on how a customer is using the insured item. In the context of motor insurance, if the insured vehicle is driven in a way that is less prone to accidents, the premium will be reduced. To determine one's driving, a sensory device is typically attached to the vehicle to collect data on mileage, speed, harsh braking, acceleration, and driving times. The insurer collects and uses this data to calculate the premium and offer value added services, such as road-side assistance and vehicle theft recovery. As the driver is in control of his/her driving and consequently the insurance premium, UBI is expected to reduce premium, as well as promote safe and less driving, leading to benefit both the driver and fellow drivers.

①: Strongly Disagree ②: Disagree ③: Neutral ④: Agree ⑤: Strongly Agree

Please answer each of the following questions, regarding potential benefits to the policy holder.						
1.	With an UBI policy, I will be able get my premium decreased.	①	②	③	④	⑤
2.	To keep my premium low, I would drive safely.	①	②	③	④	⑤
3.	To keep my premium low, I do not mind limiting my unnecessary usage.	①	②	③	④	⑤
4.	I would be encouraged to obtain a UBI policy because of value added services like roadside assistance, vehicle theft recovery, emergency assistance, and vehicle fault notification.	①	②	③	④	⑤
5.	UBI is more fair and justifiable because low and safe users will be paying low premium than those who drive more and carelessly.	①	②	③	④	⑤

①: Strongly Disagree ②: Disagree ③: Neutral ④: Agree ⑤: Strongly Agree

Next, let's focus on potential benefits for other drivers and the society.						
1.	UBI policy scheme would be an indirect solution for reducing traffic congestion.	①	②	③	④	⑤
2.	UBI policy scheme would increase the feeling of safety on the roads	①	②	③	④	⑤
3.	As the users will control their vehicle usage, UBI policy scheme would lead to lesser air pollution.	①	②	③	④	⑤

4.	UBI policy scheme would help to preserve the foreign exchange spent on importing fuel.	①	②	③	④	⑤
5.	UBI policy scheme would support to reduce carbon footprint.	①	②	③	④	⑤

①: Strongly Disagree ②: Disagree ③: Neutral ④: Agree ⑤: Strongly Agree

Now, let's consider whether UBI policy scheme will be easy to use.

1.	Attaching a sensory device to my vehicle would make driving difficult.	①	②	③	④	⑤
2.	Attaching a sensory device to my vehicle would make maintenance more difficult.	①	②	③	④	⑤
3.	I'm worried that sensory devices used to capture data may harm my vehicle.	①	②	③	④	⑤
4.	Knowing that my driving is being monitored, I would find it difficult/confusing to drive.	①	②	③	④	⑤
5.	I would anyway be enrolled, as it is involved with latest technologies.	①	②	③	④	⑤
6.	It would be fun to brag about how much I save from UBI.	①	②	③	④	⑤

①: Strongly Disagree ②: Disagree ③: Neutral ④: Agree ⑤: Strongly Agree

How well you know your insurer?

1.	I can trust my motor insurance provider.	①	②	③	④	⑤
2.	I have been misled by my insurance service provider.	①	②	③	④	⑤
3.	If I get enrolled to a UBI policy scheme, my premium is likely to be increased.	①	②	③	④	⑤
4.	I'm worried that my privacy will be violated as my insurer will have my personal and driving information.	①	②	③	④	⑤
5.	I'm worried that my insurer will use the collected information against me. For an example in determining a claim against an accident.	①	②	③	④	⑤
6.	I would enroll to UBI policy scheme as it would reduce my premium, even if the insurance company monitors and handles my personal information.	①	②	③	④	⑤

①: Strongly Disagree ②: Disagree ③: Neutral ④: Agree ⑤: Strongly Agree

What might tempt you to obtain a UBI policy?

1.	If I am given a trial period, I would be more comfortable in obtaining an UBI policy.	①	②	③	④	⑤
2.	I would prefer to get information about UBI policy from an insurance agent.	①	②	③	④	⑤
3.	I would prefer to get information about UBI policy from newspaper ads, websites, emails, and social media.	①	②	③	④	⑤

①: Strongly Disagree ②: Disagree ③: Neutral ④: Agree ⑤: Strongly Agree

What do you think about your insurer and current motor policy scheme?						
1.	I understand how my current motor insurance premium is calculated.	①	②	③	④	⑤
2.	With the current premium calculation method, I'm in control of my premium.	①	②	③	④	⑤
3.	Considering a driver who has claimed for accidents more than I have, but pays approximately the same premium that I pay, I do not believe that the premium I pay is fair.	①	②	③	④	⑤
4.	Considering a driver who is more prone to accidents (drives more, longer, in heavy traffic, and recklessly) but pays approximately the same premium that I pay, I do not believe the premium I pay is fair.	①	②	③	④	⑤
5.	Benefits of an UBI policy are greater than third-party insurance, though premium may be slightly higher.	①	②	③	④	⑤
6.	UBI is a better alternative than heavy fines, where risky drivers anyway pay higher with time.	①	②	③	④	⑤

①: Strongly Disagree ②: Disagree ③: Neutral ④: Agree ⑤: Strongly Agree

Let's focus on your thoughts of accepting an UBI policy.						
1.	I feel the concept is relevant and worth trying.	①	②	③	④	⑤
2.	Sri Lankan Motor Insurance Industry needs such innovations.	①	②	③	④	⑤
3.	UBI will lead to better customer satisfaction.	①	②	③	④	⑤
4.	UBI premium calculation method is better than the traditional method of premium calculation.	①	②	③	④	⑤

Demographic Information

* If a circle (○) given, please select only one answer. If a box (☐) given, you can select multiple if applicable.

1. What is your age group?

○ Less than 18 years	○ 18-25 years	○ 26-35 years
○ 36-45 years	○ 46-55 years	○ More 55 years

2. What is your gender?

○ Male	○ Female

3. Typically how many hours you spend driving in a week?

○ Less than 5 hours	○ 5-10 hours	○ 10-20 hours
○ 20-30 hours	○ More than 30 hours	

4. How many kilometers have you driven so far?

○ Less than 5,000 km	○ 5,000 – 10,000 km	○ 10,000 – 25,000 km
○ 25,000 – 50,000 km	○ More than 50,000 km	

5. Most of your time is spent driving in (if roughly equal, select multiple)?

☐ City	☐ Suburbs	☐ Rural areas

6. What type of a vehicle you drive?

☐ Motor Bicycle	☐ Car	☐ SUV / Jeep
☐ Van	☐ Bus	☐ Lorry
Other :		

7. What is the current price range of your vehicle?

☐ Less than Rs. 2.0 million	☐ Rs. 2.0 - 3.5 million	☐ Rs. 3.5 - 5.0 million
☐ Rs. 5.0 - 6.5 million	☐ Rs. 6.5 - 8.0 million	☐ More than 8.0 million

8. How many motor accidents you were involved in last 5 years? ☐

9. How would you define your driving?

○ Very cautious	○ Cautious	○ Moderate

○ Moderate	○ Very aggressive	

10. Please feel free to comment on any other aspect of UBI.

APPENDIX B: NORMALITY OF THE DATA.

Statistics

	N								
	Valid	Missing	Mean	Median	Mode	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
PIB1	295	0	3.84	4.00	4	-1.006	.142	1.710	.283
PIB2	295	0	3.91	4.00	4	-1.251	.142	2.761	.283
PIB3	295	0	3.27	3.00	4	-.394	.142	-.581	.283
PIB4	295	0	3.97	4.00	4	-1.067	.142	3.686	.283
PIB5	295	0	3.96	4.00	4	-1.113	.142	2.504	.283
PSB1	295	0	3.27	3.00	4	-.619	.142	-.580	.283
PSB2	295	0	3.87	4.00	4	-.742	.142	1.135	.283
PSB3	295	0	3.28	3.00	4	-.478	.142	-.435	.283
PSB4	295	0	3.01	3.00	3	-.148	.142	-.848	.283
PSB5	295	0	3.20	3.00	3	-.371	.142	-.574	.283
PEU1	295	0	2.34	2.00	2	1.028	.142	.708	.283
PEU2	295	0	2.63	2.00	2	.597	.142	-.715	.283
PEU3	295	0	2.38	2.00	2	.975	.142	.825	.283
PEU4	295	0	2.87	3.00	2	.369	.142	-.954	.283
TTI2	295	0	2.31	2.00	2	1.350	.142	2.090	.283
TTI3	295	0	2.58	2.00	2	.639	.142	-.504	.283
TTI4	295	0	3.17	3.00	4	-.058	.142	-1.192	.283
TTI5	295	0	3.35	4.00	4	-.336	.142	-.943	.283
PUBI1	295	0	4.28	4.00	4	-.350	.142	.579	.283
PUBI2	295	0	3.83	4.00	4	-.834	.142	1.659	.283
PUBI3	295	0	3.67	4.00	4	-.784	.142	1.129	.283
CTI3	295	0	3.93	4.00	4	-.972	.142	2.141	.283
CTI4	295	0	3.85	4.00	4	-1.000	.142	1.836	.283
CTI5	295	0	3.94	4.00	4	-1.366	.142	7.406	.283
CTI6	295	0	3.81	4.00	4	-.946	.142	1.408	.283
PI1	295	0	4.08	4.00	4	-.779	.142	1.664	.283
PI2	295	0	4.18	4.00	4	-.438	.142	2.137	.283
PI3	295	0	3.81	4.00	4	-.847	.142	1.417	.283
PI4	295	0	4.01	4.00	4	-.945	.142	2.066	.283

APPENDIX C: RELIABILITY TEST

Perceived Individual Benefits

Case Processing Summary

		N	%
Cases	Valid	295	100.0
	Excluded[a]	0	.0
	Total	295	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.829	.836	5

Perceived Social Benefits

Case Processing Summary

		N	%
Cases	Valid	295	100.0
	Excluded[a]	0	.0
	Total	295	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.891	.890	5

Perceived Ease of Use

Case Processing Summary

		N	%
Cases	Valid	295	100.0
	Excluded[a]	0	.0
	Total	295	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.776	.784	4

Trust towards the Insurer

Case Processing Summary

		N	%
Cases	Valid	295	100.0
	Excluded[a]	0	.0
	Total	295	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.703	.702	4

Presentation of UBI

Case Processing Summary

		N	%
Cases	Valid	295	100.0
	Excluded[a]	0	.0
	Total	295	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.715	.713	3

Concerns regarding the traditional premium calculation method

Case Processing Summary

		N	%
Cases	Valid	295	100.0
	Excluded[a]	0	.0
	Total	295	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.756	.749	4

Intention of Acceptance

Case Processing Summary

		N	%
Cases	Valid	295	100.0
	Excluded[a]	0	.0
	Total	295	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.847	.847	4

APPENDIX D: DISCRIPTIVE ANALYSIS

PIB1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	.7	.7	.7
	2	18	6.1	6.1	6.8
	3	44	14.9	14.9	21.7
	4	193	65.4	65.4	87.1
	5	38	12.9	12.9	100.0
	Total	295	100.0	100.0	

PIB2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	1.0	1.0	1.0
	2	16	5.4	5.4	6.4
	3	30	10.2	10.2	16.6
	4	202	68.5	68.5	85.1
	5	44	14.9	14.9	100.0
	Total	295	100.0	100.0	

PIB3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	1.7	1.7	1.7
	2	58	19.7	19.7	21.4
	3	95	32.2	32.2	53.6
	4	127	43.1	43.1	96.6
	5	10	3.4	3.4	100.0
	Total	295	100.0	100.0	

PIB4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.3	.3	.3
	2	8	2.7	2.7	3.1
	3	29	9.8	9.8	12.9
	4	217	73.6	73.6	86.4
	5	40	13.6	13.6	100.0
	Total	295	100.0	100.0	

PIB5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	.7	.7	.7
	2	14	4.7	4.7	5.4
	3	30	10.2	10.2	15.6
	4	197	66.8	66.8	82.4
	5	52	17.6	17.6	100.0
	Total	295	100.0	100.0	

PSB1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	1.4	1.4	1.4
	2	53	18.0	18.0	19.3
	3	98	33.2	33.2	52.5
	4	138	46.8	46.8	99.3
	5	2	.7	.7	100.0
	Total	295	100.0	100.0	

PSB2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.3	.3	.3
	2	14	4.7	4.7	5.1
	3	52	17.6	17.6	22.7
	4	183	62.0	62.0	84.7
	5	45	15.3	15.3	100.0
	Total	295	100.0	100.0	

PSB3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	1.7	1.7	1.7
	2	52	17.6	17.6	19.3
	3	100	33.9	33.9	53.2
	4	130	44.1	44.1	97.3
	5	8	2.7	2.7	100.0
	Total	295	100.0	100.0	

PSB4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	2.7	2.7	2.7
	2	83	28.1	28.1	30.8
	3	105	35.6	35.6	66.4
	4	95	32.2	32.2	98.6
	5	4	1.4	1.4	100.0
	Total	295	100.0	100.0	

PSB5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	1.0	1.0	1.0
	2	53	18.0	18.0	19.0
	3	123	41.7	41.7	60.7
	4	113	38.3	38.3	99.0
	5	3	1.0	1.0	100.0
	Total	295	100.0	100.0	

PEU1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	3.7	3.7	3.7
	2	197	66.8	66.8	70.5
	3	62	21.0	21.0	91.5
	4	25	8.5	8.5	100.0
	Total	295	100.0	100.0	

PEU2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	1.7	1.7	1.7
	2	152	51.5	51.5	53.2
	3	85	28.8	28.8	82.0
	4	52	17.6	17.6	99.7
	5	1	.3	.3	100.0
	Total	295	100.0	100.0	

PEU3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	3.4	3.4	3.4
	2	187	63.4	63.4	66.8
	3	75	25.4	25.4	92.2
	4	22	7.5	7.5	99.7
	5	1	.3	.3	100.0
	Total	295	100.0	100.0	

PEU4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	1.7	1.7	1.7
	2	125	42.4	42.4	44.1
	3	78	26.4	26.4	70.5
	4	78	26.4	26.4	96.9
	5	9	3.1	3.1	100.0
	Total	295	100.0	100.0	

TTI2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	3.4	3.4	3.4
	2	206	69.8	69.8	73.2
	3	58	19.7	19.7	92.9
	4	19	6.4	6.4	99.3
	5	2	.7	.7	100.0
	Total	295	100.0	100.0	

TTI3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	2.4	2.4	2.4
	2	157	53.2	53.2	55.6
	3	84	28.5	28.5	84.1
	4	46	15.6	15.6	99.7
	5	1	.3	.3	100.0
	Total	295	100.0	100.0	

TTI4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.3	.3	.3
	2	88	29.8	29.8	30.2
	3	77	26.1	26.1	56.3
	4	117	39.7	39.7	95.9
	5	12	4.1	4.1	100.0
	Total	295	100.0	100.0	

TTI5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.3	.3	.3
	2	67	22.7	22.7	23.1
	3	70	23.7	23.7	46.8
	4	141	47.8	47.8	94.6
	5	16	5.4	5.4	100.0
	Total	295	100.0	100.0	

PUBI1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	.7	.7	.7
	3	14	4.7	4.7	5.4
	4	177	60.0	60.0	65.4
	5	102	34.6	34.6	100.0
	Total	295	100.0	100.0	

PUBI2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	10	3.4	3.4	3.4
	3	53	18.0	18.0	21.4
	4	209	70.8	70.8	92.2
	5	23	7.8	7.8	100.0
	Total	295	100.0	100.0	

PUBI3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.3	.3	.3
	2	11	3.7	3.7	4.1
	3	85	28.8	28.8	32.9
	4	185	62.7	62.7	95.6
	5	13	4.4	4.4	100.0
	Total	295	100.0	100.0	

CTI3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	14	4.7	4.7	4.7
	3	32	10.8	10.8	15.6
	4	211	71.5	71.5	87.1
	5	38	12.9	12.9	100.0
	Total	295	100.0	100.0	

CTI4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	16	5.4	5.4	5.4
	3	40	13.6	13.6	19.0
	4	210	71.2	71.2	90.2
	5	29	9.8	9.8	100.0
	Total	295	100.0	100.0	

CTI5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.3	.3	.3
	2	2	.7	.7	1.0
	3	31	10.5	10.5	11.5
	4	242	82.0	82.0	93.6
	5	19	6.4	6.4	100.0
	Total	295	100.0	100.0	

CTI6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	18	6.1	6.1	6.1
	3	46	15.6	15.6	21.7
	4	204	69.2	69.2	90.8
	5	27	9.2	9.2	100.0
	Total	295	100.0	100.0	

PI1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	10	3.4	3.4	3.4
	3	25	8.5	8.5	11.9
	4	192	65.1	65.1	76.9
	5	68	23.1	23.1	100.0
	Total	295	100.0	100.0	

PI2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	4	1.4	1.4	1.4
	3	13	4.4	4.4	5.8
	4	205	69.5	69.5	75.3
	5	73	24.7	24.7	100.0
	Total	295	100.0	100.0	

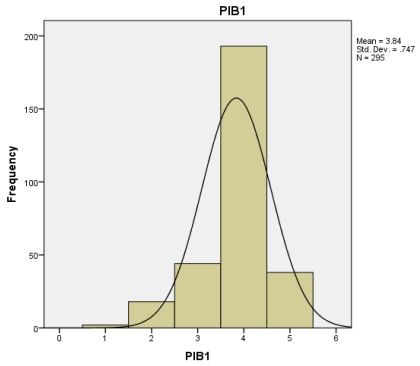
PI3

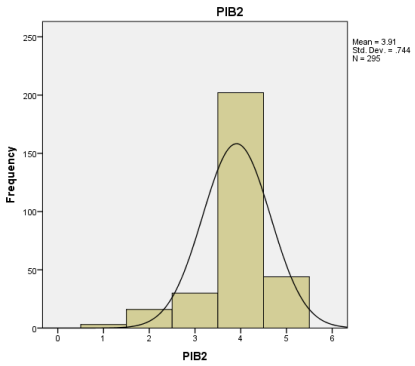
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	13	4.4	4.4	4.4
	3	54	18.3	18.3	22.7
	4	204	69.2	69.2	91.9
	5	24	8.1	8.1	100.0
	Total	295	100.0	100.0	

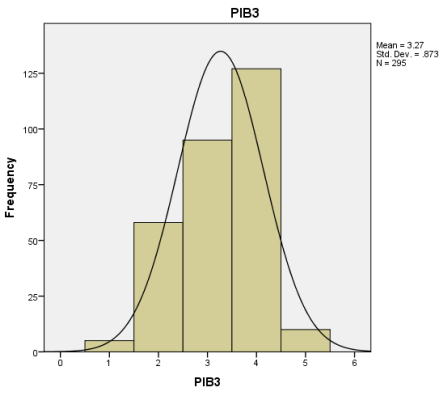
PI4

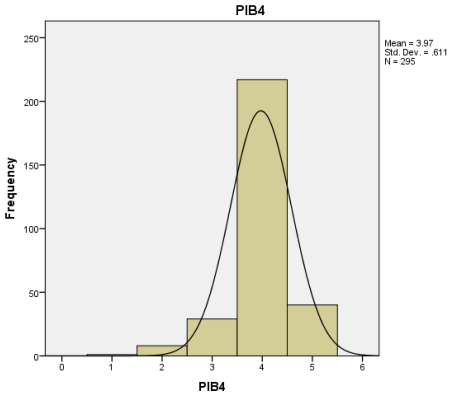
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.3	.3	.3
	2	12	4.1	4.1	4.4
	3	30	10.2	10.2	14.6
	4	192	65.1	65.1	79.7
	5	60	20.3	20.3	100.0
	Total	295	100.0	100.0	

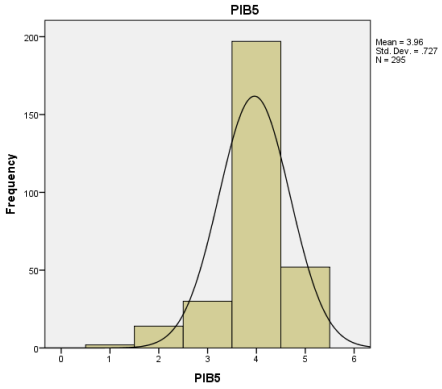
Histograms

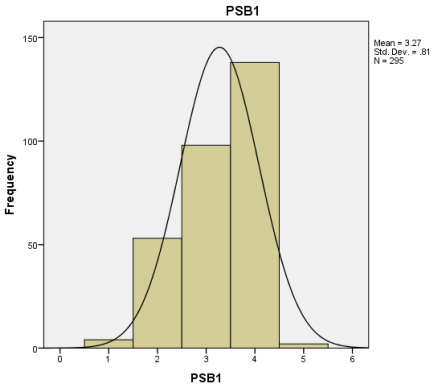


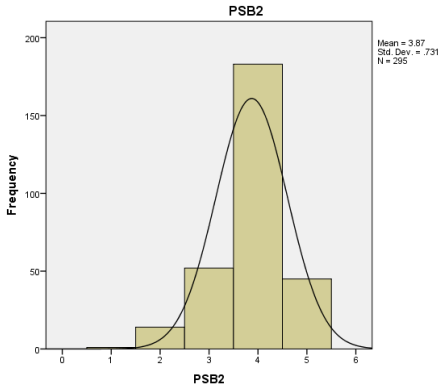


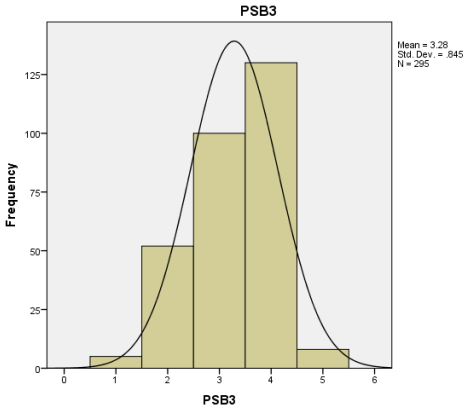

PIB3
Mean = 3.27
Std. Dev. = .873
N = 295
Frequency
PIB3

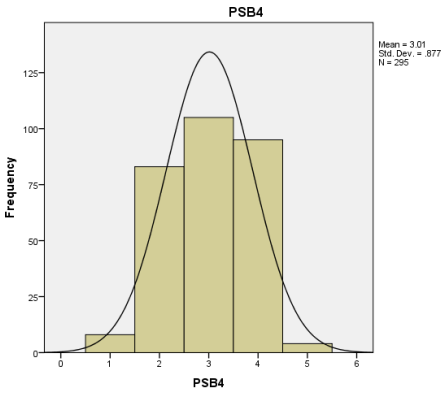

PIB4
Mean = 3.97
Std. Dev. = .611
N = 295
Frequency
PIB4

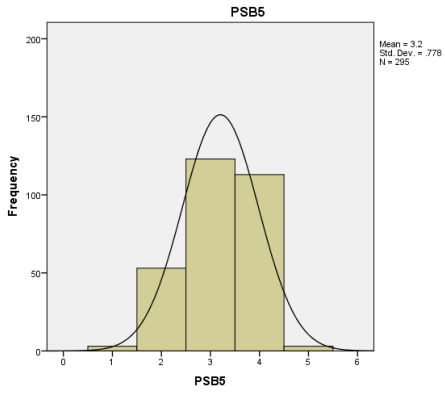

PIB5
Mean = 3.96
Std. Dev. = .727
N = 295
Frequency
PIB5

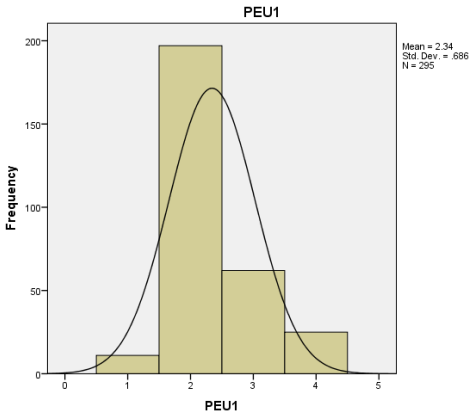

PSB1
Mean = 3.27
Std. Dev. = .81
N = 295
Frequency
PSB1

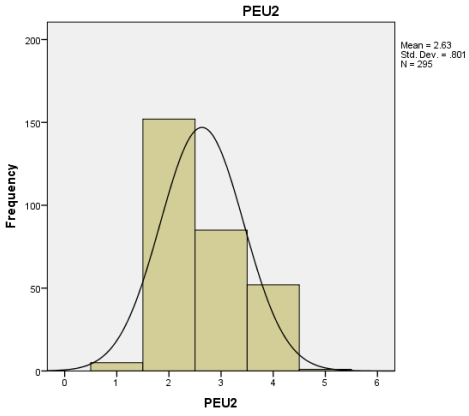

PSB2
Mean = 3.87
Std. Dev. = .731
N = 295
Frequency
PSB2

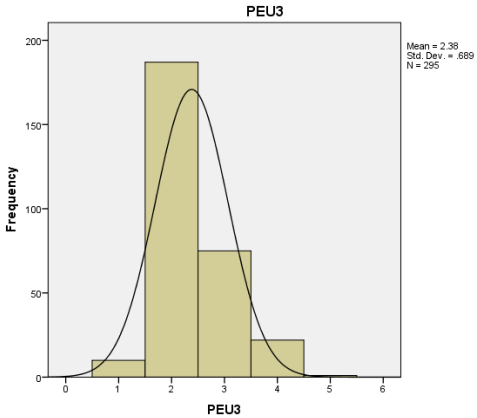

PSB3
Mean = 3.28
Std. Dev. = .845
N = 295
Frequency
PSB3

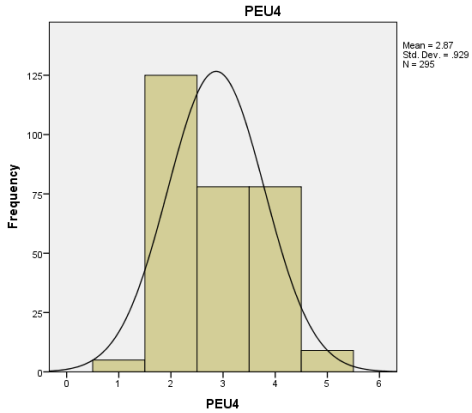

PSB4
Mean = 3.01
Std. Dev. = .877
N = 295
Frequency
PSB4

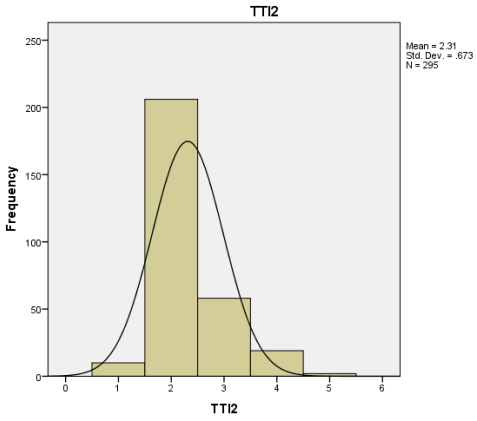

PSB5
Mean = 3.2
Std. Dev. = .778
N = 295
Frequency
PSB5

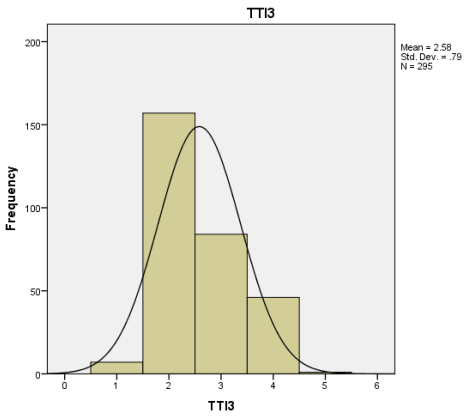

PEU1
Mean = 2.34
Std. Dev. = .686
N = 295
Frequency
PEU1

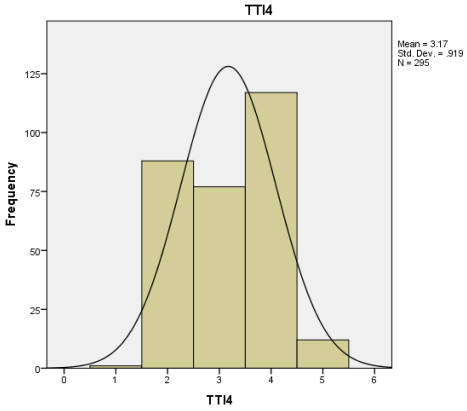

PEU2
Mean = 2.63
Std. Dev. = .801
N = 295
Frequency
PEU2

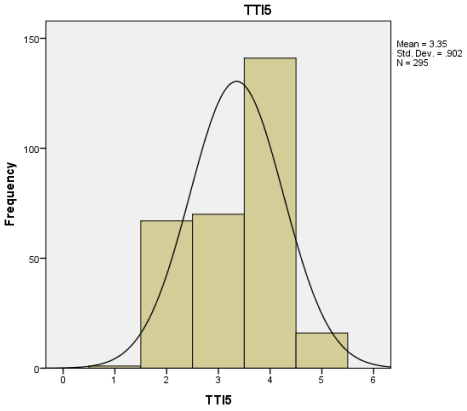

PEU3
Mean = 2.38
Std. Dev. = .689
N = 295
Frequency
PEU3

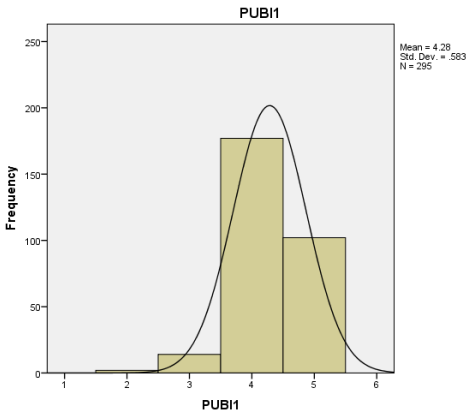

PEU4
Mean = 2.87
Std. Dev. = .929
N = 295
Frequency
PEU4

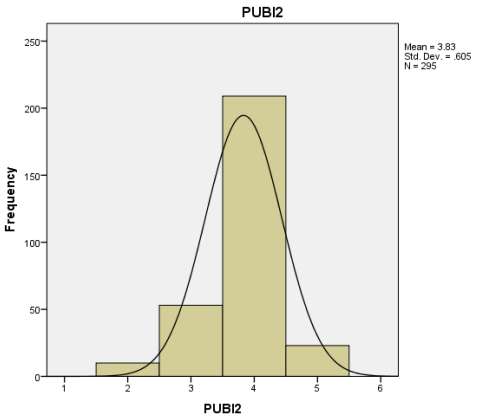

TTI2
Mean = 2.31
Std. Dev. = .673
N = 295
Frequency
TTI2

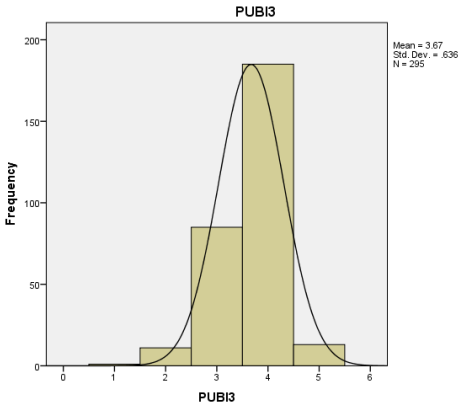

TTI3
Mean = 2.58
Std. Dev. = .79
N = 295
Frequency
TTI3

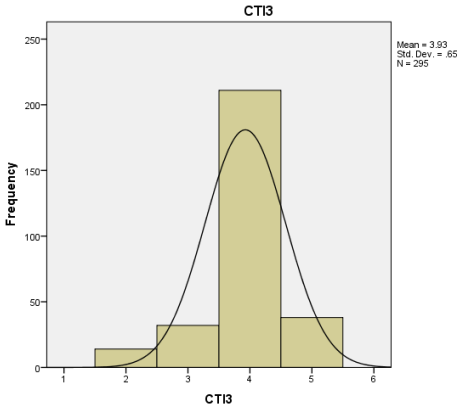

TTI4
Mean = 3.17
Std. Dev. = .919
N = 295
Frequency
TTI4

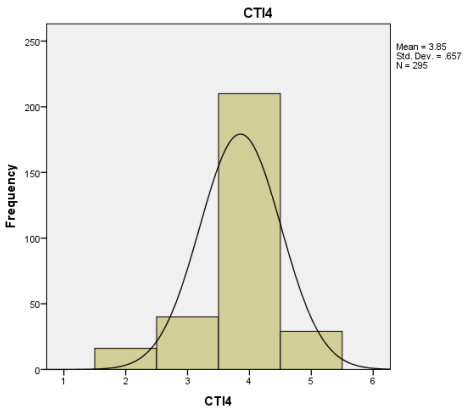

TTI5
Mean = 3.35
Std. Dev. = .902
N = 295
Frequency
TTI5

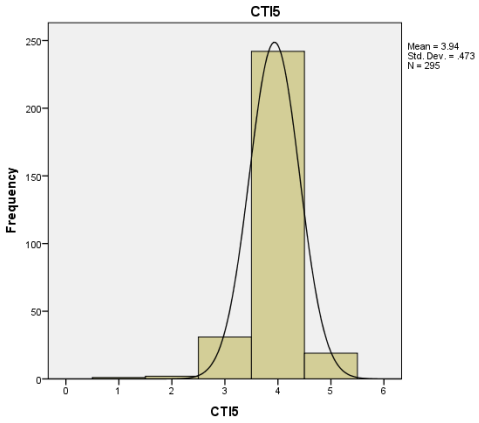

PUBI1
Mean = 4.28
Std. Dev. = .583
N = 295
Frequency
PUBI1

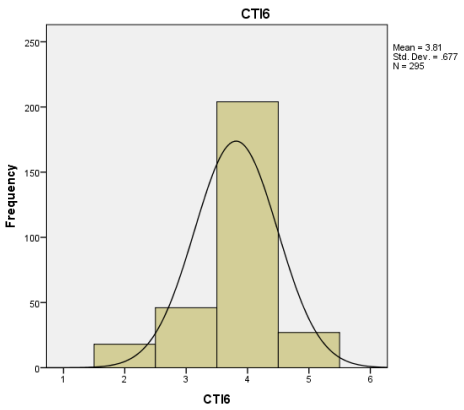

PUBI2
Mean = 3.83
Std. Dev. = .605
N = 295
Frequency
PUBI2

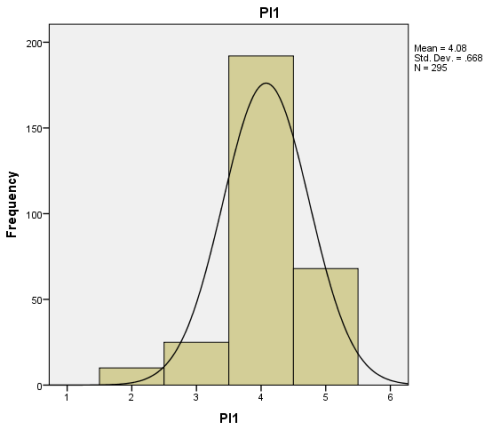

PUBI3
Mean = 3.67
Std. Dev. = .636
N = 295
Frequency
PUBI3

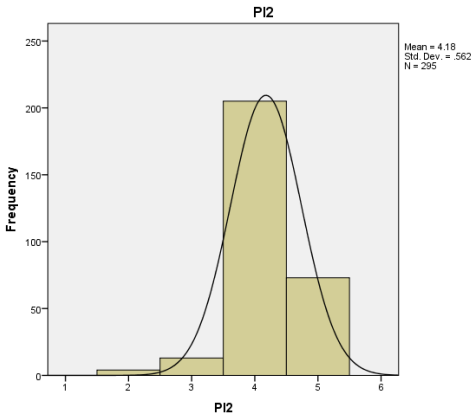

CTI3
Mean = 3.93
Std. Dev. = .65
N = 295
Frequency
CTI3

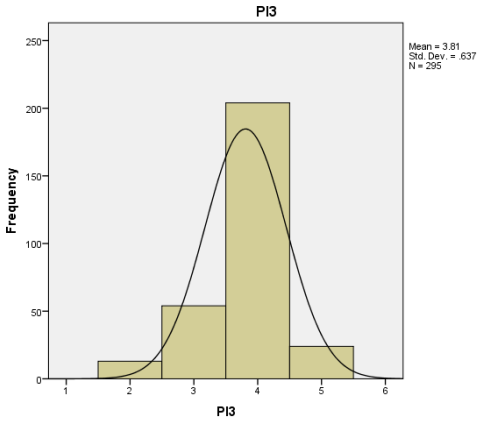

CTI4
Mean = 3.85
Std. Dev. = .657
N = 295
Frequency
CTI4

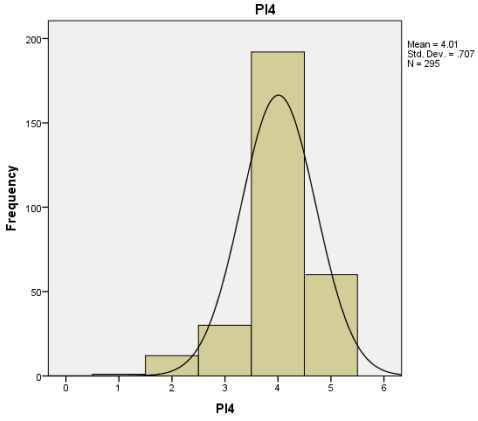

CTI5
Mean = 3.94
Std. Dev. = .473
N = 295
Frequency
CTI5


CTI6
Mean = 3.81
Std. Dev. = .677
N = 295
Frequency
CTI6


PI1
Mean = 4.08
Std. Dev. = .668
N = 295
Frequency
PI1


PI2
Mean = 4.18
Std. Dev. = .562
N = 295
Frequency
PI2


PI3
Mean = 3.81
Std. Dev. = .637
N = 295
Frequency
PI3


PI4
Mean = 4.01
Std. Dev. = .707
N = 295
Frequency
PI4

APPENDIX E: SEM ANALYSIS

Path Coefficients and P Values

Path coefficients

	PIB	PSB	PEU	TTI	PUBI	CTI	PI
PIB			-0.282			0.534	
PSB			-0.313			0.403	
PEU						-0.423	
TTI	-0.177	-0.067	0.497		-0.086	-0.047	
PUBI							
CTI							
PI	0.462	0.125	-0.104	0.001	0.146	0.163	

P values

	PIB	PSB	PEU	TTI	PUBI	CTI	PI
PIB			<0.001			<0.001	
PSB			<0.001			<0.001	
PEU						<0.001	
TTI	<0.001	0.123	<0.001		0.067	0.210	
PUBI							
CTI							
PI	<0.001	0.015	0.035	0.496	0.005	0.002	

Model Fit and Quality Indices

Model fit and quality indices

Average path coefficient (APC)=0.239, P<0.001
Average R-squared (ARS)=0.443, P<0.001
Average adjusted R-squared (AARS)=0.438, P<0.001
Average block VIF (AVIF)=1.720, acceptable if <= 5, ideally <= 3.3
Average full collinearity VIF (AFVIF)=2.204, acceptable if <= 5, ideally <= 3.3
Tenenhaus GoF (GoF)=0.515, small >= 0.1, medium >= 0.25, large >= 0.36
Sympson's paradox ratio (SPR)=0.938, acceptable if >= 0.7, ideally = 1
R-squared contribution ratio (RSCR)=1.000, acceptable if >= 0.9, ideally = 1
Statistical suppression ratio (SSR)=1.000, acceptable if >= 0.7
Nonlinear bivariate causality direction ratio (NLBCDR)=1.000, acceptable if >= 0.7

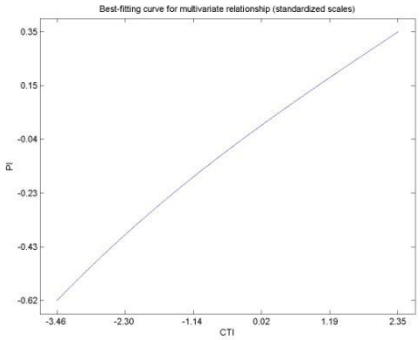
Latent Variable Coefficients

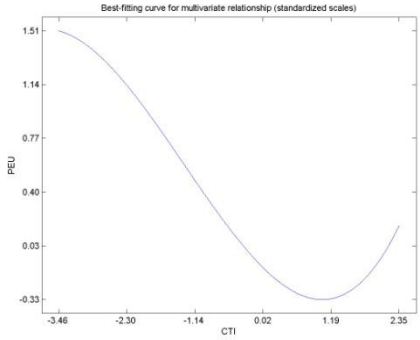
	PIB	PSB	PEU	TTI	PUBI	CTI	PI
R-squared	0.487	0.348	0.179	0.518			0.683
Adj. R-squared	0.484	0.343	0.176	0.510			0.677
Composite reliab.	0.885	0.920	0.861	0.817	0.718	0.844	0.898
Cronbach's alpha	0.836	0.890	0.784	0.702	0.713	0.749	0.847
Avg. var. extrac.	0.607	0.699	0.610	0.530	0.474	0.581	0.687
Full collin. VIF	2.948	1.763	1.885	1.972	1.787	2.019	3.057
Q-squared	0.491	0.349	0.182	0.520			0.685
Min	-4.122	-3.428	-2.556	-2.674	-4.655	-3.458	-3.807
Max	2.066	2.472	2.877	2.760	2.364	2.346	1.832
Median	0.307	0.089	-0.231	0.213	0.025	0.243	-0.048
Mode	0.307	0.997	-0.884	-1.408	0.025	0.243	-0.048
Skewness	-1.358	-0.454	0.731	0.243	-0.568	-0.992	-1.220
Exc. kurtosis	2.566	-0.289	-0.016	-0.378	1.952	1.553	2.725
Unimodal-RS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unimodal-KMV	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Normal-JB	No	No	No	Yes	No	No	No
Normal-RJB	No	No	No	Yes	No	No	No
Histogram	View	View	View	View	View	View	View

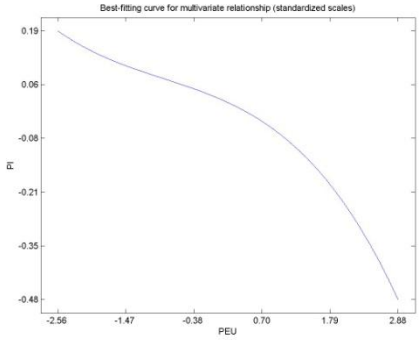
Casualty assessment coefficients: R-squared contributions

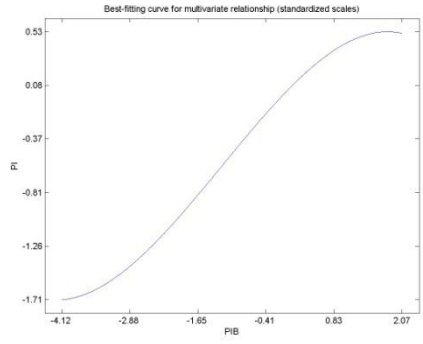
	PIB	PSB	PEU	TTI	PUBI	CTI	PI
PIB			0.141			0.346	
PSB			0.141			0.206	
PEU						0.179	
TTI	0.098	0.032	0.332		0.036	0.021	
PUBI							
CTI							
PI	0.361	0.075	0.053	-0.000	0.089	0.106	

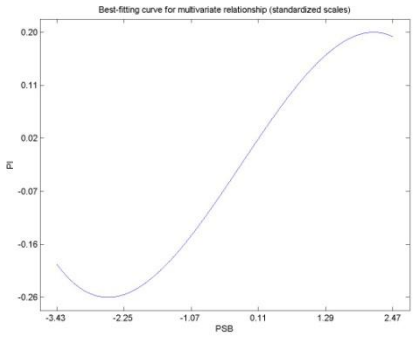
Curves generated in SEM: Relationships between latent variables

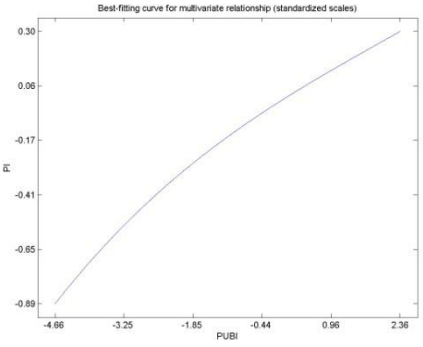


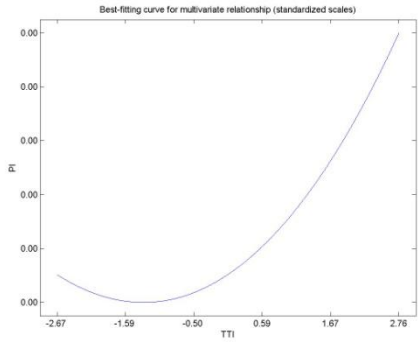


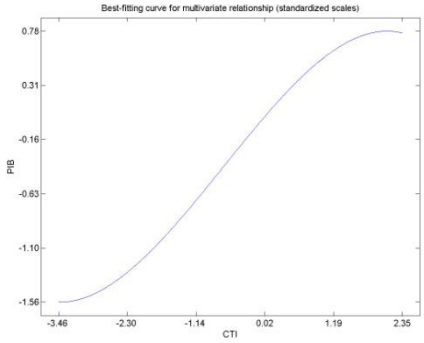


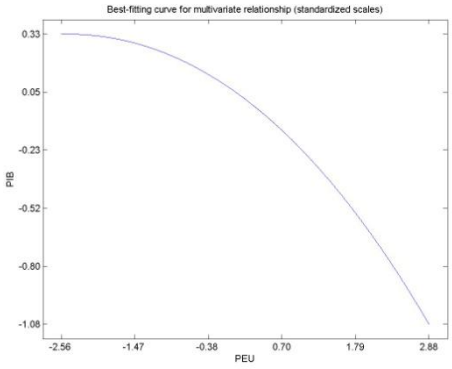


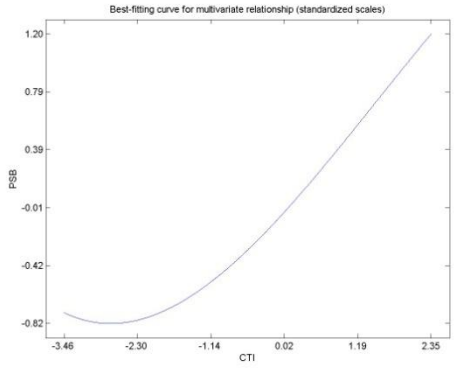


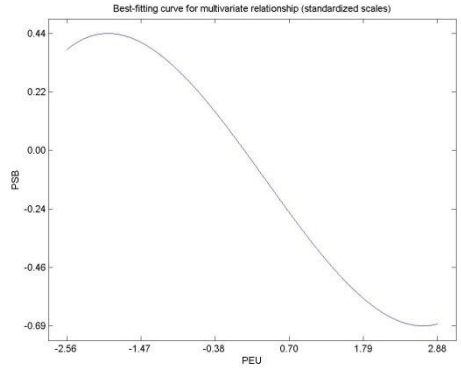


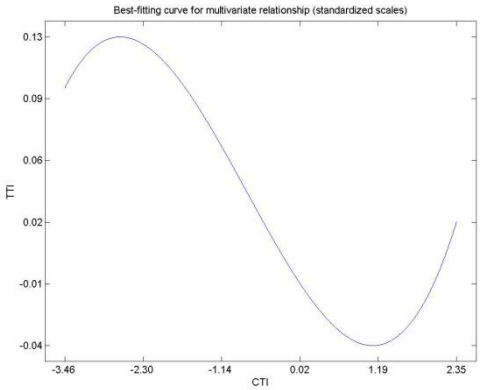


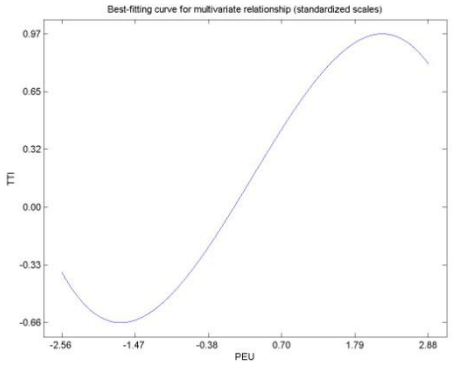


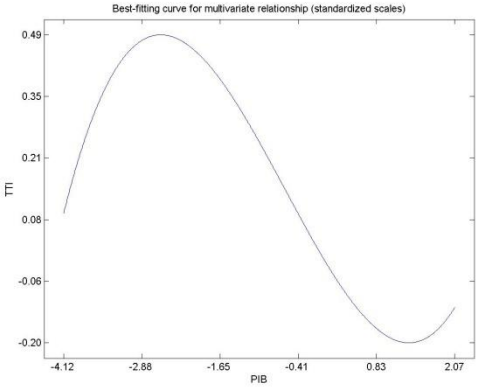

Best-fitting curve for multivariate relationship (standardized scales)
PIB
0.33
0.05
-0.23
-0.52
-0.80
-1.08
-2.56
-1.47
-0.38
0.70
1.79
2.88
PEU

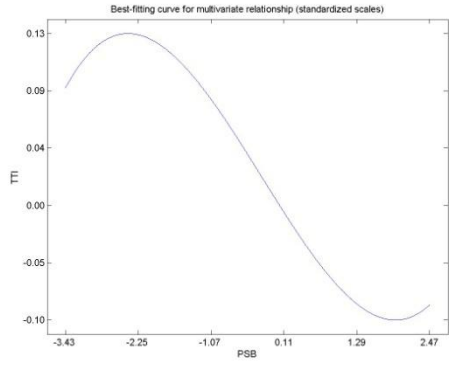

Best-fitting curve for multivariate relationship (standardized scales)
PSB
1.20
0.79
0.39
-0.01
-0.42
-0.82
-3.46
-2.30
-1.14
0.02
1.19
2.35
CTI

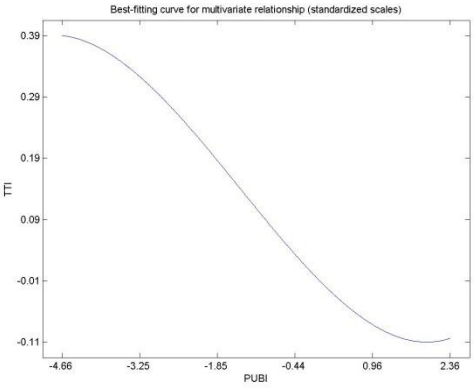

Best-fitting curve for multivariate relationship (standardized scales)
PSB
0.44
0.22
0.00
-0.24
-0.46
-0.69
-2.56
-1.47
-0.38
0.70
1.79
2.88
PEU


Best-fitting curve for multivariate relationship (standardized scales)
TTI
0.13
0.09
0.06
0.02
-0.01
-0.04
-3.46
-2.30
-1.14
0.02
1.19
2.35
CTI


Best-fitting curve for multivariate relationship (standardized scales)
TTI
0.97
0.65
0.32
0.00
-0.33
-0.66
-2.56
-1.47
-0.38
0.70
1.79
2.88
PEU


Best-fitting curve for multivariate relationship (standardized scales)
TTI
0.49
0.35
0.21
0.08
-0.06
-0.20
-4.12
-2.88
-1.65
-0.41
0.83
2.07
PIB


Best-fitting curve for multivariate relationship (standardized scales)
TTI
0.13
0.09
0.04
0.00
-0.05
-0.10
-3.43
-2.25
-1.07
0.11
1.29
2.47
PSB


Best-fitting curve for multivariate relationship (standardized scales)
TTI
0.39
0.29
0.19
0.09
-0.01
-0.11
-4.66
-3.25
-1.85
-0.44
0.96
2.36
PUBI