Insurance Management System for Fresh Graduates Using Web Based Decision Support System (DSS)

By

Woon Kun Shum

Final Dissertation submitted in partial fulfilment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information System)

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CERTIFICATION OF APPROVAL

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Approved by,

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(Dr P.D.D Dominic)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

SEPTEMBER 2012

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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WOON KUN SHUM

ABSTRACT

Buying an insurance is not as easy as it seems because it involves measurements of personal lifestyles, preferences, needs, and financial condition. One of the problem is that even insurance information is everywhere, seldom there are people who can adequately make use of the information to purchase a suitable policy. Furthermore, high similarity of different insurance products and services compress the scope of buying a really differentiated and suitable insurance policy for an individual. In this study, integration of Web Based and decision support system are employed to develop an Insurance Management System for enabling all fresh graduates from all states of Malaysia to use it for facilitating insurance buying process. Its main target users are fresh graduates between the age of 23 and 30 who are found lacking of insurance literacy. Of all types of insurance in the market, the system will focus specifically in helping the fresh graduates to buy individual personal accident, private car and private motorcycle insurance policies offered by insurance companies in Malaysian insurance market. The Insurance Management System is a system that is able to capture user's information such as income, lifestyle, travel preferences, family members, age of car or motorcycle owned and others factor by prompting three different and separate set of questions for the respective insurance categories of personal accident, car and motorcycle. The user will need to fill in the questions for the category(ies) of insurance he/ she wishes to purchase in relevant web pages. Subsequently, after all the questions from personal accident, car or motorcycle are submitted to the system, the system will suggest and display the insurance product(s) which best meets the user's demands and requirements. Apart from that, comparative tables can also be found in the web system to allow the user to compare personal accident, car and motorcycle insurance benefits offered by different companies at one glance. The system will be developed according to prototype methodology where user participation in designing the system is maximum to continuously refine the system. In capturing users' satisfactions after using the system, user acceptance survey and usability testing survey were adopted. It is said that the proposed web system received positive feedbacks as demonstrated in both the surveys with a 92.5 System Usability Scale (SUS) score which signified that users are convinced by both the look and performance of the proposed system and they are keen to use the system frequently in the future.

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Firstly, I would want to thank the Almighty God for giving me the strength and wisdom to complete my project. My greatest acknowledgement and my upmost gratitude goes to my supervisor, Dr. P.D.D. Dominic for his commitments in helping, guiding, commenting and motivating me throughout the project.

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Last but not least, I would like to thank my family and friends, in which they are always with me through thick and thin during the development of this project. Without their advice, assistance, supports and also encouragements, my project development would not have been successful.

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TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND NOMENCLATURES

DSS	Decision Support System
FYP I CIS	Final Year Project I for Computer Information Sciences
FYP II CIS	Final Year Project II for Computer Information Sciences
BNM	Bank Negara Malaysia
GUI	Graphical User Interface
GPS	Global Positioning System
SPM	Sijil Pelajaran Malaysia (The Malaysian Certificate of Education)
STPM	Sijil Tinggi Persekolahan (the Malaysian Higher School Certificate)

CHAPTER 1
INTRODUCTION

1.1 Background of study

Generally, there are two (2) types of insurance offered in Malaysia, namely life insurance and general insurance which covers different aspects in life. Life insurance is an insurance coverage that pays a specified amount of money to the insured or their beneficiaries upon the occurrence of certain event such as death of the insured. Similar main products offered include whole life, endowment, term, investment-linked, life annuity plan, medical and health. On the other hand, general insurance basically protects the insured against losses and damages other than those covered by life insurance. The main product of general insurance include motor insurance, householders insurance, personal accident insurance and travel insurance.

On the other hand, a basic DSS is made up of several components. Model management oversees the architecture, structure and framework of the decision support system. Data management, with one or more databases, stores and maintains internal and external data that the system will use successively. Knowledge management is the full utilization of data and information inputted into the system that govern the creation and dissemination of knowledge in order to present information to users in a manner that they can make informed decisions more easily. Finally, dialog management includes GUI-based data entry and viewing forms to interact with the user and subsequently retrieve information needed.

Figure below showed a Conceptual Model of a DSS.

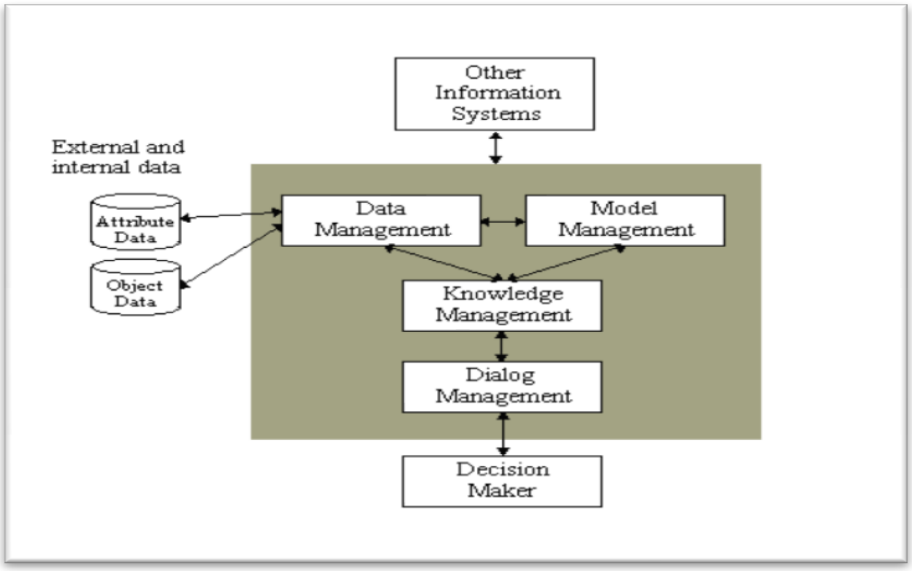

Figure 1.1: A Conceptual Model of a DSS

Retrieved from : http://publish.uwo.ca/~jmalczew/gida_1/Mennecke/Mennecke.htm, by E.Mennecke, n.d., Understanding the Role of Geographic Information Technologies in Business: Applications and Research Directions.

Broadly defined, DSS is a highly interactive and flexible computer based system that help the decision makers in gathering and analyzing useful and practicable information from raw data, documents, business models and workflows to create referencing points for them to solve a problem or to make a decision.

1.2 Problem Statement

- Malaysian insurance market is saturated with similar personal accident, car and motorcycle insurance products offered by different general and life insurance businesses, making it difficult for individuals to choose suitable one(s) that meet(s) their own personal priorities, preferences and needs.
- Many young fresh graduates who are aged between 23 and 30 are not insurance smart, that is they are not aware, or to certain extent, do not cognize at all the importance of insurance in their lives.

1.3 Objective of study

- To develop an Insurance Management System for Fresh Graduates Using Web Based Decision Support System which is able to help young fresh graduates in choosing the suitable insurance policy(ies) for personal accident, car and motorcycle.

1.4 Scope of study

The study focused particularly on personal accident insurance and motor insurance in Malaysia. For motor insurance, only private car and motorcycle are studied.

While many insurance companies used the term "motor vehicle" in most of their motor insurance policies, it is ambiguous to some people that motor insurance and car insurance are the same products with different name where both covers for car only, be it private or commercial. In fact, car insurance can be a subset of motor insurance or a completely separate product depending on how the insurance companies offered it. Basically, motor insurance covers not only car, but motorcycle as well. If insurance companies offers car insurance as separate product, they may use the term "car" or "auto" instead of "motor" to represent the insurance. Therefore, it is said that the term "motor" is a representation of name for both car and motorcycle combined or motorcycle only.

Apart from that, the study also examine the relationship established between insurance and society as it can be seen as inevitable because insurance provide dual benefits of savings and security to the society. In view of that, the study pay attention to the policies and schemes outlined by Malaysian government in fields such as health care and private transportation modes from time to time as any changes on these policies and schemes may affect the personal accident and motor insurance offered by insurance companies to the people.

Furthermore, the study concentrates on developing a DSS prototype with prototyping methodology. This prototyping methodology ensures the DSS prototype always run in "system test" mode where the developer working with the prototype consistently modify and add features to it according to comments from the end

users who are project supervisor and targeted respondents until completing the design of the system.

1.5 Relevancy of the Project

Insurance, people, society and economy live as whole. They are the key to best interests. There has been a huge rise in the quantity of improvements in insurance fields. Government authorities in Malaysia have got techniques in place which make certain the financial help to aid and to ensure each of its citizens has the capacity to pay for his/ her insurance coverage.

Like any other business, insurance companies are looking for reliable ways to retain customer loyalty, and at the same time constantly offer and promote new value added insurance products and services, through various distribution channels such as television, web, radio and advertising to attract new customers while customers constantly choosing insurance that best suit them in terms of preferences and needs from the saturated insurance market which offers similar products and services.

The project aims at addressing to this particular perspective, thus project pathways are centered on effective web based decision support system, as tools to produce a less fragmented insurance oriented system.

1.6 Feasibility of the Project within the Scope and Time Frame

Students who enrolled to FYP I CIS will have 11 weeks for completing documentation for the chosen and approved project title. It is a two (2) credit hour core subject compulsory for students pursuing final year in Bachelor Degree of Business Information System (BIS) and Information Communication Technology (ICT) to finish in one (1) semester. Within the 11 weeks, students have to make title selection at Week 1, submit approved proposal to research cluster at Week 3, submit Extended Project Proposal at Week 6, attend Viva proposal defense at Week 9 and submit interim report at Week 12. Upon submission of interim report, a student is considered completed FYP I CIS.

FYP II CIS is a continuation of FYP I CIS. It is a core subject of four (4) credit hours where students have to realize the project idea in FYP I CIS into a working prototype. Similar to FYP I CIS, FYP II CIS is to be completed in one (1) semester of fourteen (14) weeks. At Week 4, students will have to submit progress report. At Week 11, student need to submit project dissertation and present the prototype at Pre Science and Engineering Design Exhibition (Pre-SEDEX). Then, students need to attend Viva proposal defense at Week 12 and subsequently submit final dissertation and technical paper at Week 14

For the proposed topic of Insurance Management System for Fresh Graduates Using Web Based Decision Support System, it will follow the timeline as mentioned above. Within twenty-four (24) weeks, it is possible to complete the documentation and working prototype of the system with required tools in order to pass both FYP I CIS and FYP II CIS for graduation.

CHAPTER 2
LITERATURE REVIEW

2.1 Definitions and Concepts

According to Oxford Dictionaries Online, the word 'Insurance' has two meanings. First, it is an arrangement by which a company or the state undertakes to provide a guarantee of compensation for specified loss, damage, illness, or death in return for payment of a specified premium. Second, it is a thing providing protection against a possible eventuality. Cambridge Dictionaries Online explained insurance as the agreement in which you pay a company money and the company pays the cost of you have accident, injury, or loss. Simply say, insurance is protection against possible financial loss.

Insurance premium is the money paid to the insurance companies periodically depending on term in exchange for compensation upon occurrence of some events such as death or injury. Conversely, insurance policy is a legal written contract detailing the terms and conditions of insurance such as premiums, coverage and term.

The insurance industry in Malaysia was brought under the supervision of BNM in 1988. The close supervision of solvency and market conduct and the strengthened regulatory framework enforced in the 1990s were aimed to enhance the professional standards in the industry and consumer confidence.

Forss, Kalimo and Purola (2000) stated that the concept of insurance is often understood in terms of commercial insurance or market insurance. This is because the level of benefit is approximate to the payment of contributions (premium) one wish to make. A higher payment of contributions can be able to get an exchange of equal value which is a higher level of benefit and vice versa. Additionally, Dworkin's study (as cited in White, 2004) found that most young

people in developing countries on reflection would not think it is prudent to buy insurance that could keep them alive with expensive medical treatment for at most four or five months at old age. Instead they prefer to spend the monies earlier on health care, education, investment or training that could offer greater protection.

Another question increasingly faced by the customers and insurance decision-makers is not how one can get more information or design better information systems but to make use of the information and systems already in place. The explosive growth in computer, telecommunication, E-mobile service and intelligent information technology has had a major impact on the ways companies bring value to their customers and customers obtain information perceived useful to them.

Turban's framework (cited in Mennecke, n.d.) showed that a DSS includes various subsystems including data management, model management, knowledge management subsystem, and dialog management subsystems.

Mennecke (n.d.) in his Geographic Information System (GIS) study found the following:

A typical aspatial DSS will include a data management subsystem designed to manage textual or, in some cases, object-oriented data. Similarly, a GIS must have a model manager that includes the typical functions, models, and statistical operations present in a DSS, but it also must provide the user with spatial models and capabilities that can be used to perform spatial modeling and spatial statistical calculations. To help the user manage the complexity involved in integrating these models with attribute and spatial data, several developers have incorporated knowledge management facilities within GIS. Finally, a GIS has a dialog management subsystem that enables users to query and output attribute data, but it also includes spatial query and output capabilities. (p.44-68).

Alavi and Henderson (1980) claimed that a DSS is not a computer-based system primarily designed to collect, manipulate, and distribute information. Rather, it is a system linked to the process by which managers arrive at decisions. Its role is not to replace the decision maker, but to enhance his or her

effectiveness. Sharda, Barr and McDonnell (1985) agreed with the statement made by Alavi and Henderson (1980) after completing an experiment of a business strategy course given one side of the decision makers with DSS aided and another side without DSS aided over a period of eight (8) weeks. The side of decision makers with DSS aided is made up of three (3) persons while the teams with the same amount of people in another sections are without a DSS aid. As a result, the (3) persons made substantially more effective decisions than the other teams without a DSS aid. The result was an indication of increasingly human dependency on DSS to make complicated decisions in real world.

A web based system refer to systems that are easily accessible with web browsers such as Internet Explorer, Mozilla Firefox, Google Chrome, Opera and Safari. A web based system will reside on a web server before deploying for use. Unlike a software based application or system where updates and added features will always require the user to download them from source link or buy a newer version in market, web based system enables updating and maintaining on the web server itself and the changes are reflected immediately on the web. Therefore, with web browsers available for a multitude of operating system and mobile platforms, the contents on the web pages can be accessed easily from geographically different and far locations as long as website address is given to the users. Wikipedia (2007) stated that a web based application is an application that is accessed with a web browser over a network such as the Internet or an intranet. The web based or automated system provides a far more efficiency in processing any tasks domain especially for a system that involves a lot of data collections and retrievals (Samsudin, 2006).

The World Wide Web (WWW) can be used as a platform to build DSS to solve problems for a wide range of users (Dong and Loo, 2001). Their paper proposed a framework for the architecture of a Web DSS Generator using different software agents to enhance the functionalities of existing DSS. There are multiple agents in the authors' framework of Web Based DSS and these multiple agents are further classified into subcategories of (i) Interactive agent: (a) Communication agent and (b) Reactive agent; (ii) Intelligent agent: (a) Learning agent and (b) Rational agent and (iii) Task specific agent: (a) Negotiation agent and (b) Information agent. These agents possess the characteristics of delegacy, competency and amenability. They are

responsible for data collection and filtering, data presentation, information transferring, event notification and planning between the DSS, web server, user computer or among the agents itself. Meaning to say, when an agent transfers information to another agent directly, another agent may utilize the information received from the earlier agent to make decision complying with pre-defined set of goals, otherwise, the information is presented to the users for the users to decide and discuss.

Mobile agents are self-contained and identifiable computer programs that can move within the network and act on behalf of the user or another entity. (Pham et al., 1998, as cited in Dong and Loo, 2001). Intelligent agents (or intelligent software agents are different from traditional software programs in that they make decisions, interact with other agents, and act autonomously and rationally (Muller, 1996, as cited in Dong and Loo, 2001). The characteristics of intelligent agents are reactivity, proactivity, goal-orientation, reasoning, learning, autonomy, and mobility (Brenner et al., 1998, as cited in Dong and Loo, 2001).

The authors further proposed the usage of DSS components and leverage the power of software agents to create a framework known as Flexible Web DSS Generator (FWDSSG). The multiple agents described earlier are to work out the flexibility. Some examples are user interface agent which is stationary and interactive in performing systematic presentation of the system and user agent which is stationary and intelligent which represents the user on the client computer to coordinate agent manager on the server computer.

Figure below showed the FWDSSG framework.

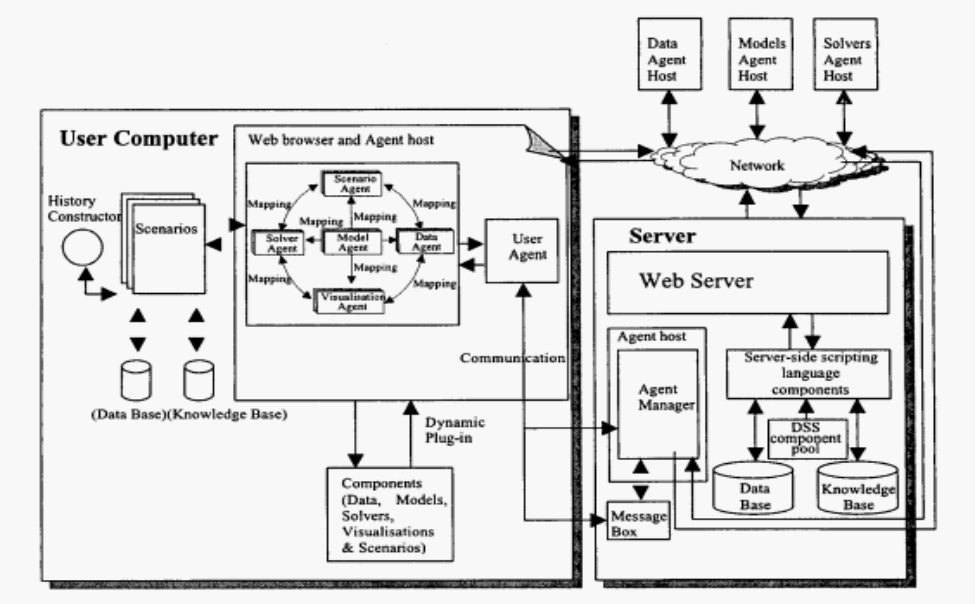

Figure 2.1: FWDSSG framework

Retrieved from: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=953168, by Dong and Loo, 2001, Flexible Web-Based Decision Support System Generator (FWDSSG) Utilising Software Agents.

Another figure below showed the software agents working in FWDSSG

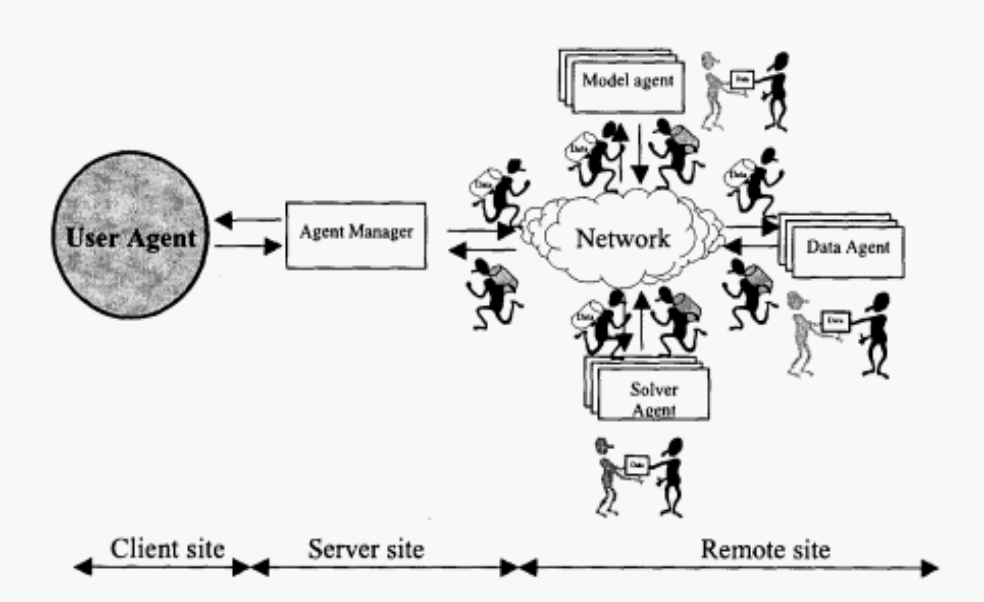

Figure 2.2: Agents working in FWDSSG

Retrieved from: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=953168, by Dong and Loo, 2001, Flexible Web-Based Decision Support System Generator (FWDSSG) Utilising Software Agents.

Data, Models and User Interface are the DSS building blocks and components. The agent paradigm suggested by Dong and Loo (2001) is to raise the usability, extensibility and standard of DSS components. Some of the project activities has began while the authors ought to report the details in another research paper.

2.2 Related Research Works

Xu (2009) claimed that information problems are particularly relevant and inherent for insurance market, thereby it is especially important to implement information management in insurance marketplace. The author identified that in today's insurance markets, especially China, are beleaguered with relentless information problems. Thus, Xu (2009) regarded this situation as information asymmetry in which asymmetries ex ante and asymmetries ex post mean 'before exchange' and 'after exchange' respectively. The primary reason for the existence of these information problems is the failure of market participants to access 'risk' and subsequently lead to undesirable insurance market outcomes.

Simply to say, it leads to two (2) possible scenarios. The first one is asymmetries ex ante or adverse selection where one accepts contract favor to himself with the information the other do not know which makes the other to be information disadvantage. For example, customers who can more accurately assess their own probabilities of incurring accident seek insurance and companies have difficulties in making reliable assessments because the task of an insurance company is to select individuals whose probabilities of accident are similar to that of the risk group as a whole. Unless the insurer can identify the risk it is assuming accurately, otherwise adverse selection will incur great loses to the insurer.

The second one would be asymmetries ex post or moral hazard where one damages the agreement to benefit from his information advantage for his utility

maximization. An example would be deception to obtain insurance compensation from insurance companies to achieve personal intentions and it violates the insurance coverage policy of not intending to cheat. Therefore, Xu (2009) concluded that an insurance information management is a must because it is one of the solutions to asymmetries.

On the other hand, Bodendorf and Schobert (2005) in their research paper revealed that insurance companies are more and more forced to continuously upgrade their portfolio of products and services due to sophisticated demands from customers. This is especially true in the insurance industry where long term relationship between the insurance companies and the customers is not established. Moreover, insurance is an intangible product so it would be hard to determine a 'good' insurance. Apart from that, it is difficult for insurance companies to deal with loyalty of customers as the market is no longer one single insurance company and customers always maintain contacts with several of them. Once customers are not satisfied with the products and services of one, they will switch to another insurance products and services easily. For this reason, the authors studied and introduced the possibility of using mobile technology presenting services or known as Mobile E-Services as value added service to build a good customer relationship management. Bodendorf and Schobert (2005) explained the Mobile E-Services as below:

The following simple example shall illustrate the approach of enhancing customer contracts by managing added-value mobile e-services. In the first scenario the contact roadmap includes the information that a registered customer will probably buy a new car and already visited web pages of the company related to automobile insurances. As soon as the customer visits a car dealer, a monitor for location based services sends a trigger signal. The location monitor may be a special service of the mobile communication provider. In the next step the insurance company offers specific products (collision damage and casualty insurance) as well as additional e-services (e.g. an application to support the registration of the car). In a second scenario the starting point is the birthday information of the customer in the contact roadmap. If the customer enters a restaurant on his birthday, the insurance company sends a voucher for a free

drink by sms. The voucher can be cashed by transmitting the voucher key to the cash point of the restaurant. A third scenario is the event of a car damage or loss. The customer submits a loss message using his or her cellular phone. The system looks up the contact roadmap and finds that the person is married and there is a high possibility that he/ she was driving with family. For this reason, the system not only sends an online receipt confirmation of the loss message and suggests to automatically inform the police but also offers a service to take the family home by a pickup service.

Another research by Jin and Li (n.d.) focused on the application of mobile information system in vehicle insurance claims. The authors claimed that some of Chinese domestic insurance companies are still using the traditional "huge-crowd" strategy which results in higher cost of management, lower operational efficiency and higher error rate.

Due to the discrepancies in the system, policyholders have to undergo complicated and time consuming procedures from accident happening until getting compensation. Not to mention also the job overlapping of accident scene adjustor and damage estimator where accident scene adjustor is only responsible for taking scene photographs and damage estimator calculate premium compensation. In certain situation, damage estimator cannot accurately estimate the losses of the policyholders in accidents unless he goes to the accident scene personally. This contributes to low work efficiency. Also, there are other problems arising from the information system adopted by some domestic Chinese insurance companies in China such as vehicle insurance deception, inexperienced damage estimator, inconsistency of the cost of maintenance and the premium from the insurance company.

Mobile information system for vehicle insurance claims is convenient in the sense that it allows the damage estimator to investigate the accident scene with a smart phone and able to immediately input the policyholder's name, insurance ID and number plate to the smart phone and connects to the native xml database or accessing remote center database through wireless Internet. Meanwhile, the

estimator can query the cost of maintenance including the updated market price of spare parts to give out compensation at the same time. This solves the problem of job overlapping and replaced low efficiency work with more effective human resource that even inexperienced new staffs are able to work with smart phones to transfer data and pictures from the accident scene.

Furthermore, Lin et al. (2004) found out that many property insurance companies and research organizations in China have ventured into the technologies of disaster prevention and reduction. The authors, with the assistance from Chinese Ministry Science and Technology under the tenth five year's plan, developed a DSS of flood disaster based on the application of RS (Remote Sensing), GIS (Geographical Information System) and GPS (Global Positioning System). The authors pointed out that the urban flood is disastrous and property insurance companies incurred tremendous losses annually to compensate it. Therefore, the purposes of the DSS are to decrease the damage of urban flood, improve economic benefit and international competence of these property insurance companies. Similar to any other DSS, this DSS is divided into five (5) framework where it has data management to contain information about roads, insurance clients and submersed areas, an insurance analysis to connect the DSS to the operational system of insurance companies to visualize insurance information, a flood disaster prediction to assume and forecast a possible flood occurrence in the forms of graphs, images and tables according to rainfall and the effects of environmental factors such as vegetable distribution, land use and pipe drainage, a loss assessment to measure the rate of total damage, and lastly a decision making to create a table of report according to the overall predictions. It will take proper measures to reach insurance client in case of potential disaster in order to minimize the loss. In urgency, GPS is used to locate cars and measure the loss on spot.

In addition, Dutta and Sengupta (2010) in their recent research paper stated that India has initiated reforms in the insurance sector with the passage of Insurance Regulatory Development Authority Bill by the Parliament in December 1999 and open up its insurance market to private competitors by the year 2000. With that initiative, new private companies have invested millions of money on

information technology for the automation of the branches, bringing new technological innovative dimension to improve their efficiency through reducing the operational time and expenditure.

Continuous improvement of the efficiency of these new private companies is an indicator of whether increasing IT investment on them has a significant impact. It is shown that bringing the technological changes in business, organizations are able to reduce their operational cost, increase the sale of policy directly through the website and payment of premiums through electronic payment system. However, the authors also realized that a continuous investment on IT may not increase efficiency for a longer period as competitors in the Indian insurance market imitate each other's efforts in technological innovation and thus tied up the possibility of each other setting the pace ahead of others.

Nevertheless, Mohamad Noor and Mohemad (n.d.) in their research argued that web-based technology still has increasing usage and influence for DSS applications nowadays. The authors admitted that developing a Web Based DSS for specific application is difficult because evaluation of DSS criteria and quality such as usefulness and performance vary from person to person. Likewise, a Web Based DSS has been developed to support construction tendering where tender information from Malaysian government, semi-government and private repository are merged and analyzed. In order to test the usability and applicability of the Web Based DSS, online survey is adopted where questionnaire is distributed to the targeted respondents in the field of construction tendering. Before answering the survey, each respondent is given login names and password to log in to the real Web Based DSS for tendering processes and is given unlimited time to test each component in the system.

The results obtained from the study showed that ease of learning and user-friendliness are the most important criteria in a Web Based DSS while performance, usefulness, efficiency and effectiveness indicate the sustainability of a Web Based DSS. The results also showed that by using the Web Based DSS for tendering processes, it increases the efficiency of decision making, improves understanding and confidence in the decisions taken.

Comparatively, Mohamad Noor et al. (2008) found out that tendering processes in Malaysia need improvements as it is a complex process which involves government and private sector. A typical manual tender process will take as long as three (3) months and above where a client will hire a consultancy team comprised of experts, designers, project manager and others while preparing tender specification, advertising tender, consolidating tender, and evaluating tender before awarding the construction to the selected contractors accordingly. Then contract monitoring will be taken up as follow-up measures. More problems identified throughout the manual process are incomplete information and documents, mixing up of documents, documents delay due to corrections and amendments, lacking information for decision making and inconsistency in tender evaluation. Thus, the authors introduced PreQTender to transform manual tendering processes to electronic tendering processes. The Web Based application is adopted to process all tenders submitted by interested contractors and subsequently combine Web Based and DSS to develop an efficient Web application for prequalification tendering processes. The Web application is used to help decision maker in short listing the best contractors in Malaysia and assess them on evaluation phase as contractor selection is most vital to the success of construction project.

In PreQTender, some examples of decision making models are Artificial Neural Networks (ANN), Knowledge Based System and Case- Based Reasoning (CBR). Apart from that, PreQTender requires user registration for contractors and clients. After registration, each contractor and client will be given an online account. With the account, obtaining and submitting tender between clients and contractors can be done easily with Web Based user interface. This user interface allows users to register, submit, retrieve process and manipulate data depending on needs. Contactors and clients can log in to the system to submit tender documents and view tender submitted respectively. All the documents are stored safely and separately in the databases according to tender, eliminating the problem of mixing up documents, incomplete and delay of documents from contractors as the contractors can easily submit the documents via Internet to the system. Finally, contractor selection process with PreQTender can be carried out with shorter time at any location. The productivity on the client is enhanced.

To put it differently, it is believed that any information system or DSS, be it mobile, web based or software based, will have broad application and market prospects in the future as there seen to be an urge for companies worldwide to capitalize on Information Technology and Internet to achieve competitive edge, improve decision making, and to enhance operational processes.

CHAPTER 3
METHODOLOGY

3.1 Research Methodology

Two (2) research methodology are adopted to develop the system. First would be prototyping methodology, and the second are user acceptance survey and usability testing survey.

Figure below is the prototyping methodology.

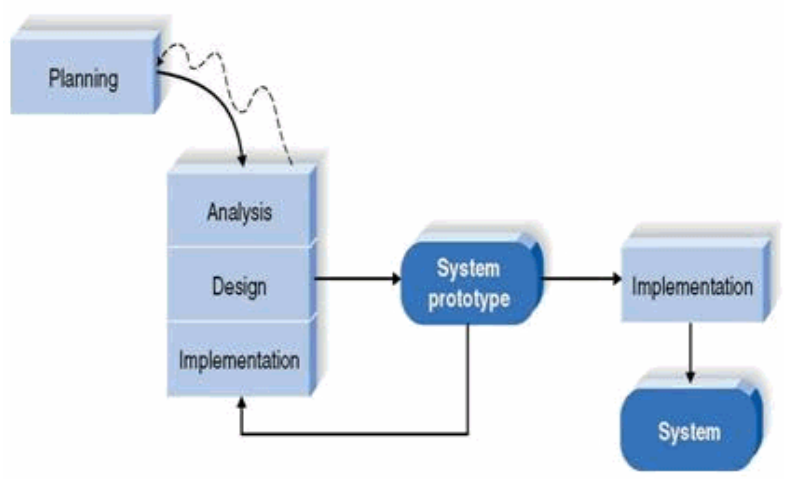

Figure 3.1: Prototyping Methodology

In completing the system, the methodology to be used is the Prototyping Methodology. Prototyping is a scaled down model or working version of product. It is the process of developing "prototypes". Prototyping consists of building an experimental system rapidly and inexpensively for the end user to make necessary refinements before developing the final solution.

The main reason for using this methodology is because prototyping requires user involvement and allows them to see and interact with a prototype to provide better and more complete feedback and specifications by noting its strengths and

weaknesses, what needs to be added, and what should be removed. The first prototype is modified, based on the comments by the users and a second prototype of the new system is constructed. The second prototype is evaluated in the same manner as was the first prototype. Then, the final product is likely to satisfy the user's desire for look, feel and performance.

Moving to user acceptance survey, its purpose is to help the developer to identify the factors that affect the acceptance level among the targeted respondents of a Web Based DSS that will guide them through buying suitable personal accident, car or motorcycle insurance policy(ies). The measures of the survey include what users expect from the proposed web system such as reliableness, efficiency and effectiveness. On the other hand, usability testing survey is to find out the level of usability of Insurance Management System for Fresh Graduates Using Web Based DSS. This survey will determine the degree of likeliness of target respondents towards the proposed web system's overall layout and look. Apart from that, this survey also contains System Usability Scale (SUS) score which will find out the sustainability of the proposed web system.

3.2 Project Activities

At planning stage, project activities include conducting a feasibility study and background study for the Insurance Management System for Fresh Graduates using Web Based DSS. Data gathering is done through surveys to understand users' understanding, buying behaviors, affordability and perception of insurance. Target candidates are fresh graduates between the age of 23 and 30 in all states of Malaysia.

Next, on the analysis, design and implementation stage, project activities include identifying potential problems that may arise in the future regarding the system, analyze deliverables, and developing interface of the system. Within these phases, a prototype is produced. This prototype has to undergo several systems testing for enhancements, modifications and evaluation by the developer and project supervisor until the entire system requirements are fulfilled. There are two (2) types of testing that will be carried out. The first one is the alpha testing in which the system developer will test the system functionality and fix any errors encountered. Secondly,

the beta testing where it includes the collaborators who are the fresh graduates with age between 23 and 30 to test on the system usability and functionality. During this stage, user acceptance survey with eight (8) questions will also be distributed through hardcopy and Google Form to collect data on acceptance level among targeted respondents. Additionally, usability testing survey will also be distributed to the respondents. What is different in this distribution is that the developer will meet with these targeted respondents and they will be given some time to test the proposed web system before answering this survey. Throughout the whole testing process, the developer will explain and guide the tester if necessary.

Once the prototype passes all the testing and is ready to be implemented as the final system, user training maybe required to educate the user on how to use the system.

After that, the final system has to experience regular maintenance and update in order to achieve its objective. Suitable project activities will still be undertaken from time to time to complete the project.

The interpretation and analysis of the data collected will be presented in Results and Discussion (see Chapter 4).

3.3 Key Milestone

Key milestone for FYP II CIS are illustrated as per figure below.

		FYP 2													
No.	Detail/Week	1	2	3	4	5	6	7		8	9	10	11	12	13	14
1	Submission of Progress Report															
2	Pre-EDX															
3	Submission of Dissertation (Soft bound)															
4	Viva Proposal Defence															
5	Submission of Technical Paper															
6	Submission of Project Dissertation (Hard bound)															

Mid-semester break

Figure 3.2: Key Milestone for FYP II CIS

3.4 Gantt Chart

Key milestone for FYP II CIS are illustrated as per figure below.

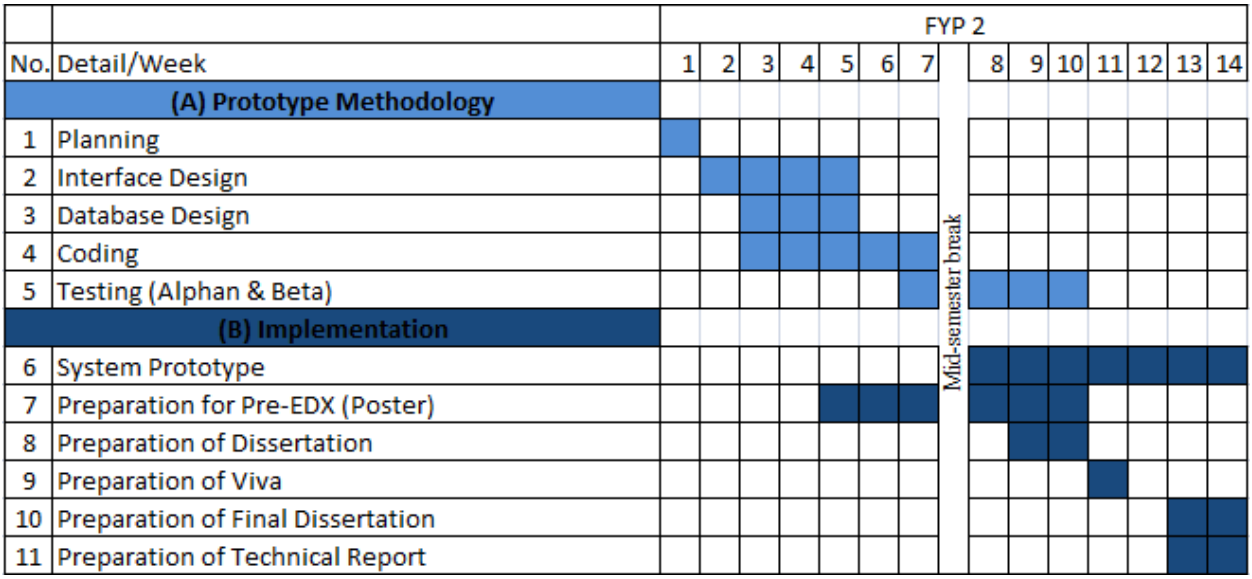

Figure 3.3: Gantt Chart for FYP II CIS

3.5 Tools Required

The table below showed the necessary software/ programming languages to develop the Web Based DSS.

Elements	Software/ Platform
System Development Tool	Adobe Dreamweaver CS3
Web Programming Language	PHP, CSS, JavaScript, HTML
Database	phpMyAdmin, MySQL
Web Server	WampServer 2.2

Table 3.1: Necessary Software/ Programming Languages to Develop the Web Based DSS

Adobe Dreamweaver CS3 is a web development software by Adobe. Being a html editor which is the main markup language for displaying content in web pages, Adobe Dreamweaver CS3 is able to produce and publish a highly interactive web site which can be accessed with common web browsers such as Internet Explorer, Google Chrome, Mozilla Firefox and others. CSS which is a style sheet language in Adobe Dreamweaver CS3 also allows the developer to define the layout, size and colour of fonts, links, footers, and headers in web pages. While html and CSS are

used to create and align objects in web pages of the proposed system respectively, Java Script is used to add functions to these objects. These functions may include redirecting of URL after users click on the "Submit" button or displaying error message on a web contact form when certain required fields of the form are not filled in properly.

On the other hand, phpMyAdmin is used to store user inputs and insurance results that meet the requirements of the inputs. phpMyAdmin is a free software tool to host MySQL which is well known as a relational database management system to provide access to databases over the world wide web. To retrieve results for insurance product(s) from both phpMyAdmin and MySQL and display it (them) on web pages, PHP, which is a server-side scripting language in Adobe Dreamweave CS3 is used. The codes written in PHP will be processed with WamServer 2.2, a Web Server with PHP processor module which generates the resulting web pages. Apart from that, WampServer 2.2 also allows develop to create a local testing server called localhost to test the web system. This is as easy as clicking the previewing button on each web page to see if it displays and works correctly in different web browsers.

The table below showed the minimum hardware requirements to develop the Web Based DSS.

Hardware	Requirements
CPU	Intel Centrino 1.6 Ghz Processor or higher
Memory (RAM)	1 GB or higher
Hard Disk	500 MB
Thumb Drive	2 GB

Table 3.2: Minimum Hardware Requirements to Develop the Web Based Decision DSS

Better CPU with higher Ghz processor and higher RAM ensures software like Abode Dreamweaver CS3 and phpMyAdmin can operate smoothly without crash or lagging. Furthermore, installation of web server and Adobe Dreamweaver CS3 on the working computer may need several hundreds of storage in the hard disk. A hard disk with 500 MB or more than 500 MB would provide sufficient space for the developer to install, code, and test the web system simultaneously. In addition, the

hard disk will be the primary backup location while thumb drive will serve as the secondary.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Findings/ Data Gathering for User Acceptance Survey

Of the study population, 20 respondents completed and returned the questionnaire. Table and figure below showed the gender proportion of respondents.

Table 4.1: Gender Proportion of Respondents

Gender	Number	%
Male	10	50%
Female	10	50%

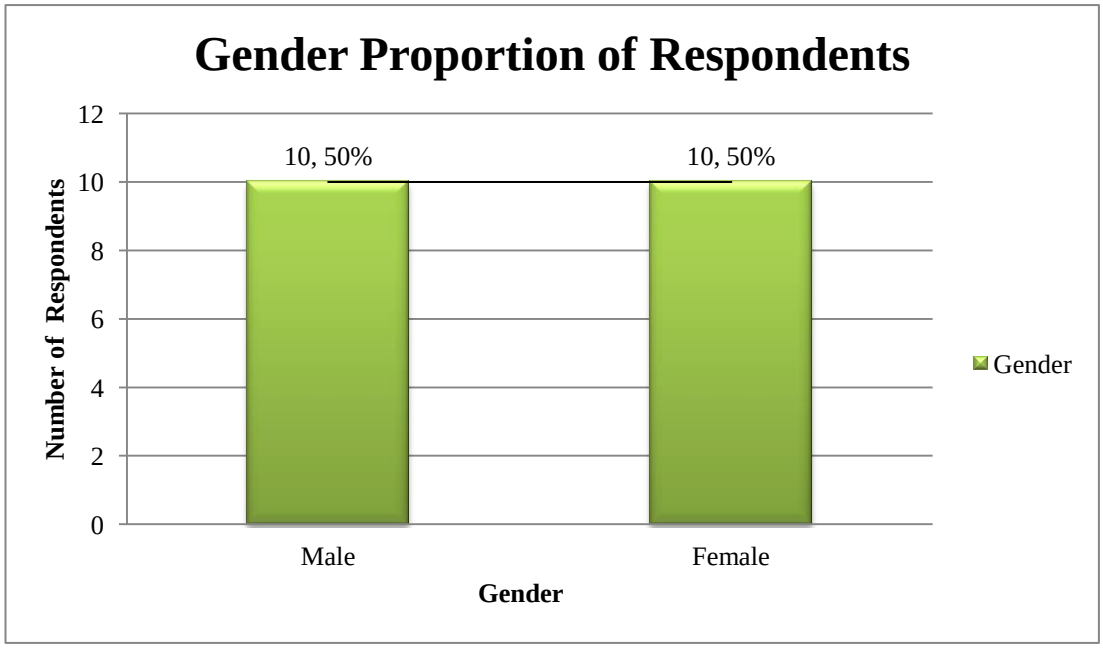

Figure 4.1: Gender Proportion of Respondents

It can be seen from the data above that there are equal number of 10 male and 10 female who participated in the survey, thus making up a total of 100% with each 50% from both the categories.

Table and figure below showed the age range of respondents.

Table 4.2: Age Range of Respondents

Age Range	Number	%
23-26	12	60%
27-30	8	40%

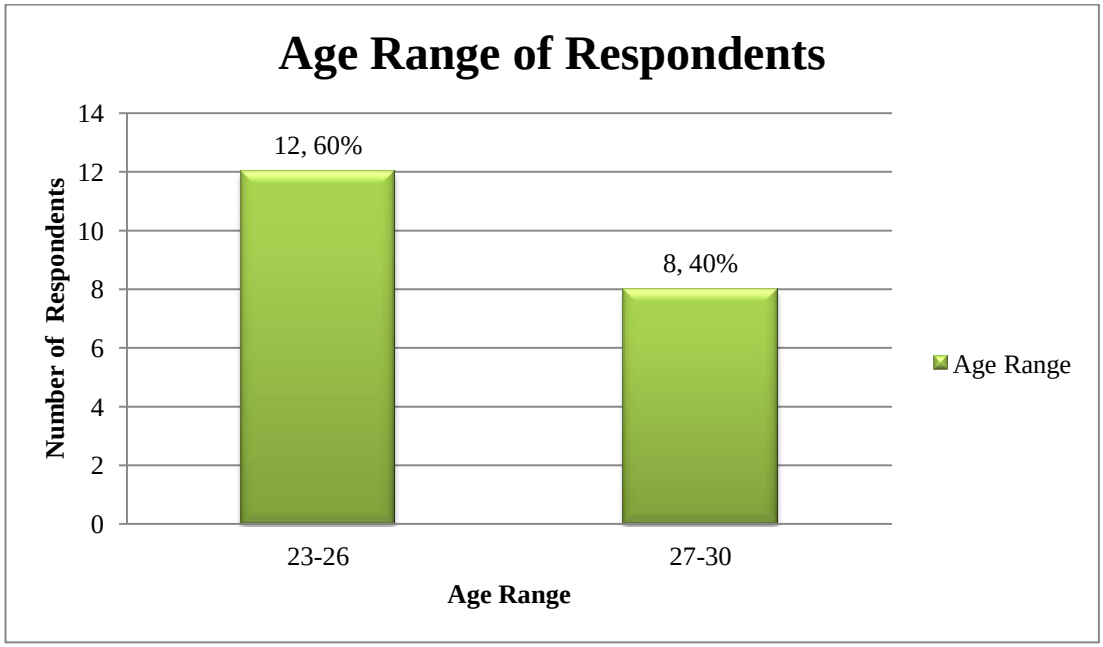

Figure 4.2: Age Range of Respondents

Of the 20 respondents who completed the questionnaire, 60% or equivalent to 12 of them fall in into the age group of 23-26 while the other 40% or 8 respondents are between the age of 27 and 30.

Table and figure below showed the level of acquaintance of respondents with web systems/ applications.

Table 4.3: Level of Acquaintance of Respondents with Web Systems/ Applications

Level of Acquaintance	Number	%
Low	0	0%
Medium	2	10%
High	18	90%

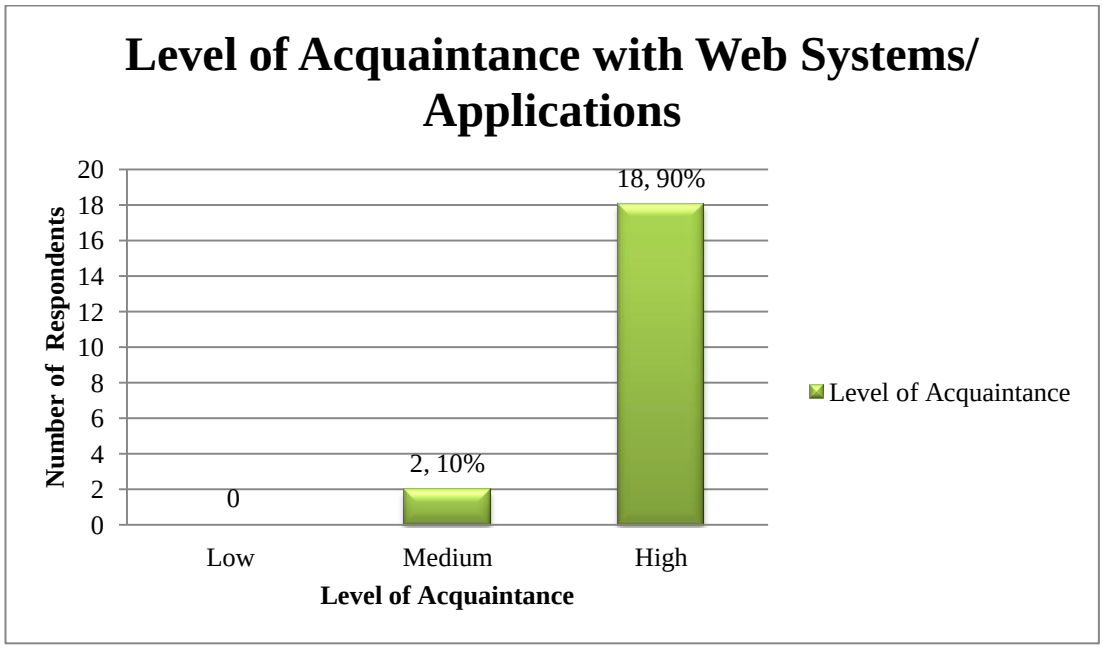

Figure 4.3: Level of Acquaintance of Respondents with Web Systems/ Applications

In response to Question 3, 18 respondents viewed themselves as having high level of acquaintance with web systems/ applications. This made up 90% of the total respondents. On the other hand, 2 respondents claimed that they have medium level of acquaintance with web system/ application, made up the remaining 10%. None of the respondents expressed themselves as having low acquaintance with web systems/ web applications.

Table and figure below showed the average time respondents took for process to look for reference source(s) and compare insurance product(s) when deciding to buy insurance product(s) for personal accident, car or motorcycle.

Table 4.4: Average Time Respondents Took for Process to Look for Reference Source(s) and Compare Insurance Product(s) when Deciding to Buy Insurance Product(s) for Personal Accident, Car or Motorcycle

Average Time	Number	%
Less than 1 hour	0	0%
1 to 3 hours	4	20%
3 to 6 hours	4	20%
More than 6 hours	12	60%

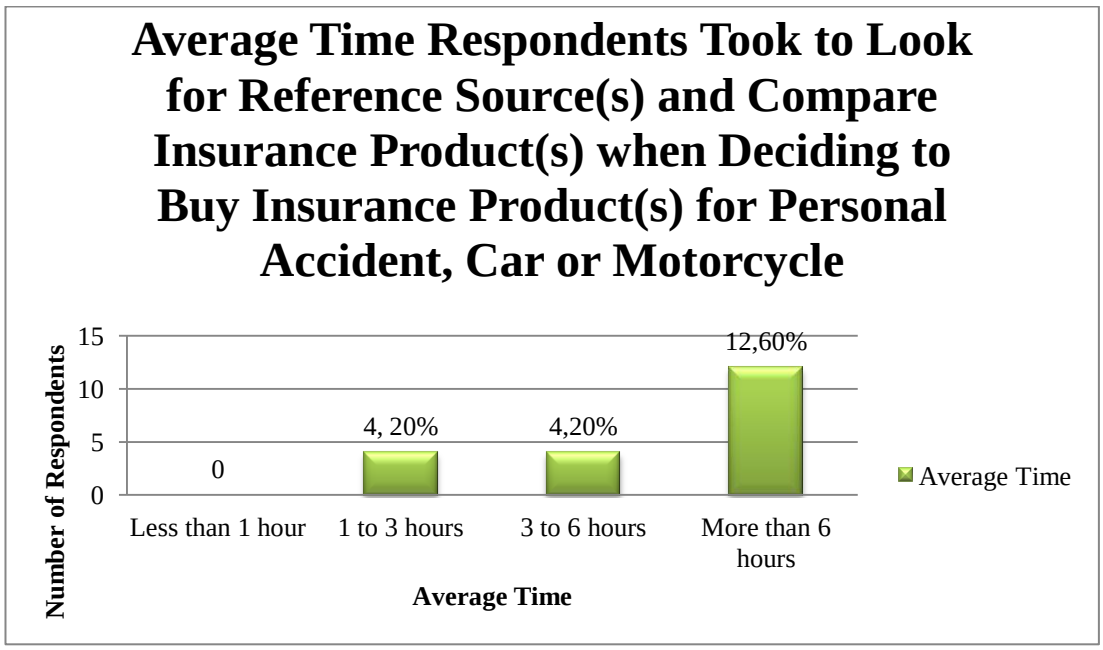

Figure 4.4: Average Time Respondents Took for Process to Look For Reference Source(s) and Compare Insurance Product(s) when Deciding to Buy Insurance Product(s) for Personal Accident, Car or Motorcycle

From the table and figure above, 4 respondents or equivalent to 20% of the total respondents took 1 to 3 hours to approach their reference source(s) and compare insurance product(s) before deciding which insurance product(s) to buy for personal accident, car or motorcycle. On the other hand, another same amount of respondents claimed that they need 3 to 6 hours to look for their reference source(s) and compare insurance product(s). While none of the respondents took less than 1 hour to

complete the process, 12 respondents or 60% out of the total respondents will take more than 6 hours to look for reference source(s) and compare insurance products(s).

Table and figure below showed the perceptions of respondents towards improvements in the process of looking for reference source(s) and comparing insurance product(s).

Table 4.5: Perceptions of Respondents towards Improvements in the Process of Looking for Reference Source(s) and Comparing Insurance Product(s)

Perceptions	Number	%
Very Important	11	55%
Important	5	20%
Not So Important	1	5%
Irrelevant	1	5%
Can't Say	2	10%

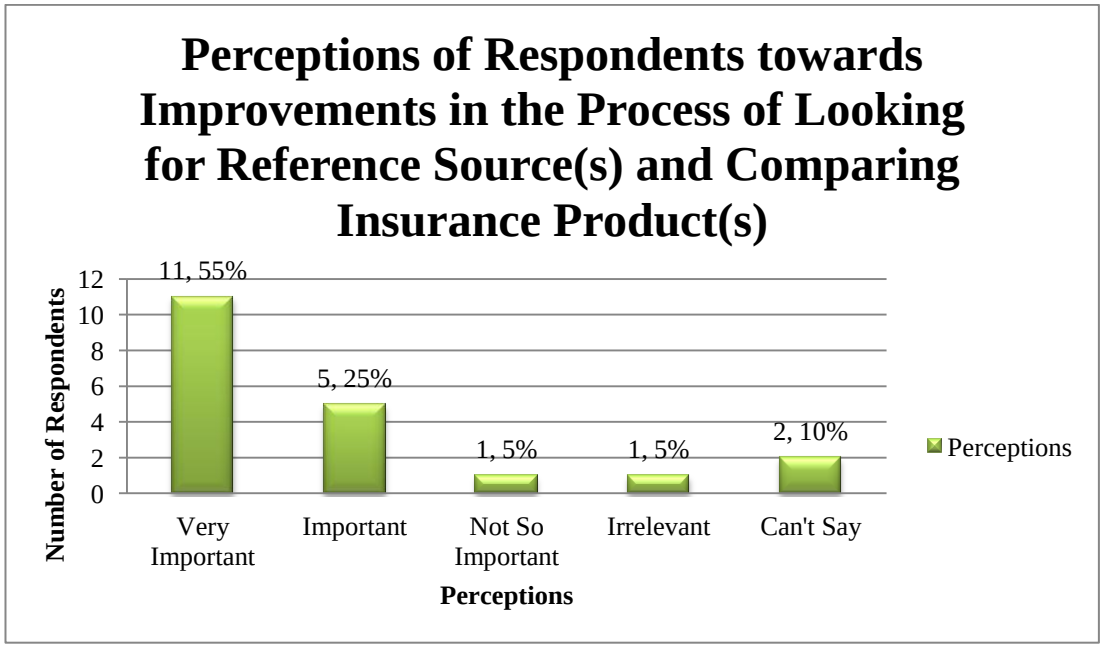

Figure 4.5: Perceptions of Respondents towards Improvements in the Process of Looking for Reference Source(s) and Comparing Insurance Product(s)

55% of the total respondents believed that it is very important to improve the current process of looking for reference source(s) and comparing insurance product(s). 5 respondents or 25% of the respondents claimed that improvements for the process is important. Only 1 respondent reckoned that it is not so important for improvements

in the process. There is also 1 respondent who thinks that there is no relevant relationship between the process and improvements. The remaining 10% of the respondents or equivalent to 2 respondents are uncertain of the improvements that could be done to the process.

Table and figure below showed the level of significance from respondents towards simplified insurance buying process for personal accident, car and motorcycle with proposed web system.

Table 4.6: Level of Significance from Respondents towards Simplified Insurance Buying Process for Personal Accident, Car and Motorcycle with Proposed Web System

Level of Significance	Number	%
Low	0	0%
Medium	4	20%
High	16	80%

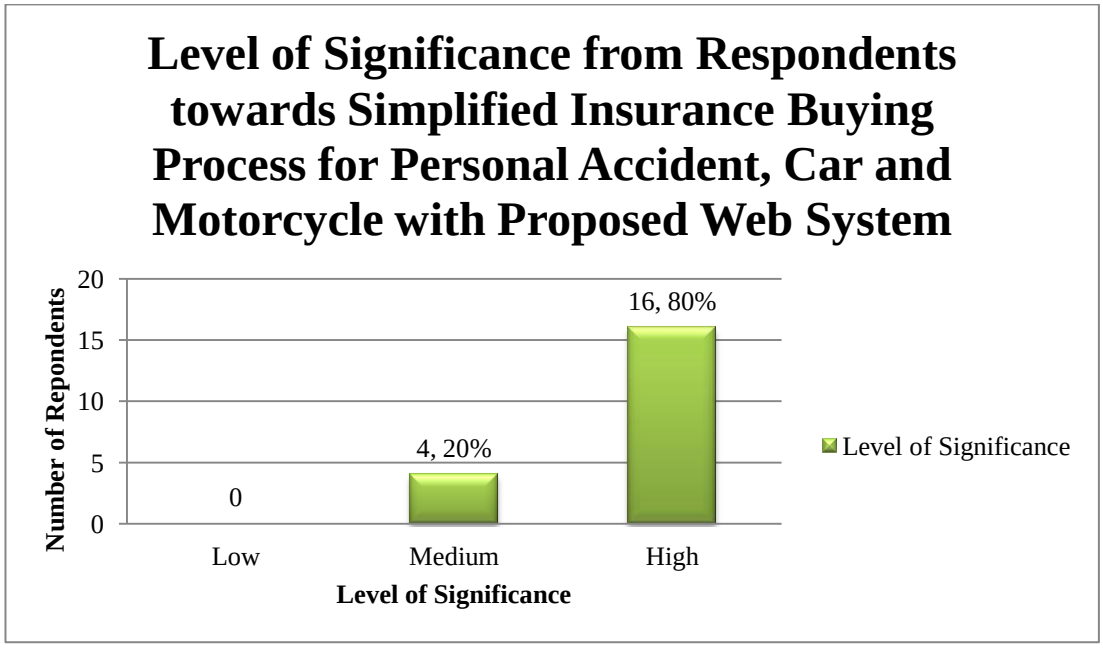

Figure 4.6: Level of Significance from Respondents towards Simplified Insurance Buying Process for Personal Accident, Car and Motorcycle with Proposed Web System

What is interesting in the data above is that 16 respondents out of the 20 respondents felt high level of significance for the proposed web system in simplifying insurance

buying process for personal accident, car and motorcycle. This made up of 80% as compared to 20% or 4 respondents who felt medium level of significance.

Table and figure below showed the indications of respondents of whether previous experience of buying insurance is a large factor in motivating them to use the proposed web system.

Table 4.7: Indications of Respondents of whether Previous Experience of Buying Insurance is a Large Factor in Motivating Them to Use the Proposed Web System

Indications	Number	%
Yes	16	80%
No	4	20%

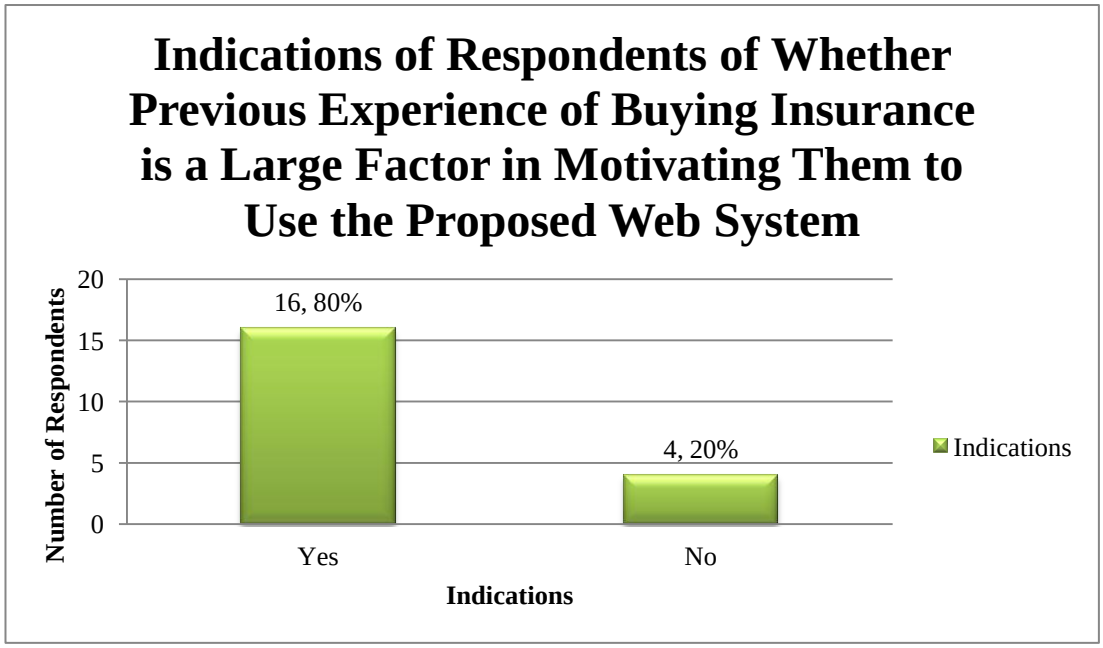

Figure 4.7: Indications of Respondents of whether Previous Experience of Buying Insurance is a Large Factor in Motivating Them to Use the Proposed Web System

As shown in table and figure above, 16 respondents or equivalent to 80% of the respondents claimed that their previous experience of buying insurance are a large factor in motivating them to use the proposed system. The other 4 respondents or 20% of the total respondents stated that their motivation to use the proposed system are not based on their previous insurance buying experience.

Table below showed the level of significance of convenience in influencing respondents' acceptance of the proposed web system.

Table 4.8: Level of Significance of Convenience in Influencing Respondents' Acceptance of the Proposed Web System

Level of Significance	Number	%
Low	0	0%
Medium	0	0%
High	20	100%

As shown above, all of the respondents demand high level of convenience in the proposed web system.

Table below showed the level of significance of easiness in influencing respondents' acceptance of the proposed web system.

Table 4.9: Level of Significance of Easiness in Influencing Respondents' Acceptance of the Proposed Web System

Level of Significance	Number	%
Low	0	0%
Medium	0	0%
High	20	100%

Similarly, all of the respondents prefer high level of easiness to be found in the proposed web system.

Table and figure below showed the level of significance of conciseness in influencing respondents' acceptance of the proposed web system.

Table 4.10: Level of Significance of Conciseness in Influencing Respondents' Acceptance of the Proposed Web System

Level of Significance	Number	%
Low	0	0%
Medium	5	25%
High	15	75%

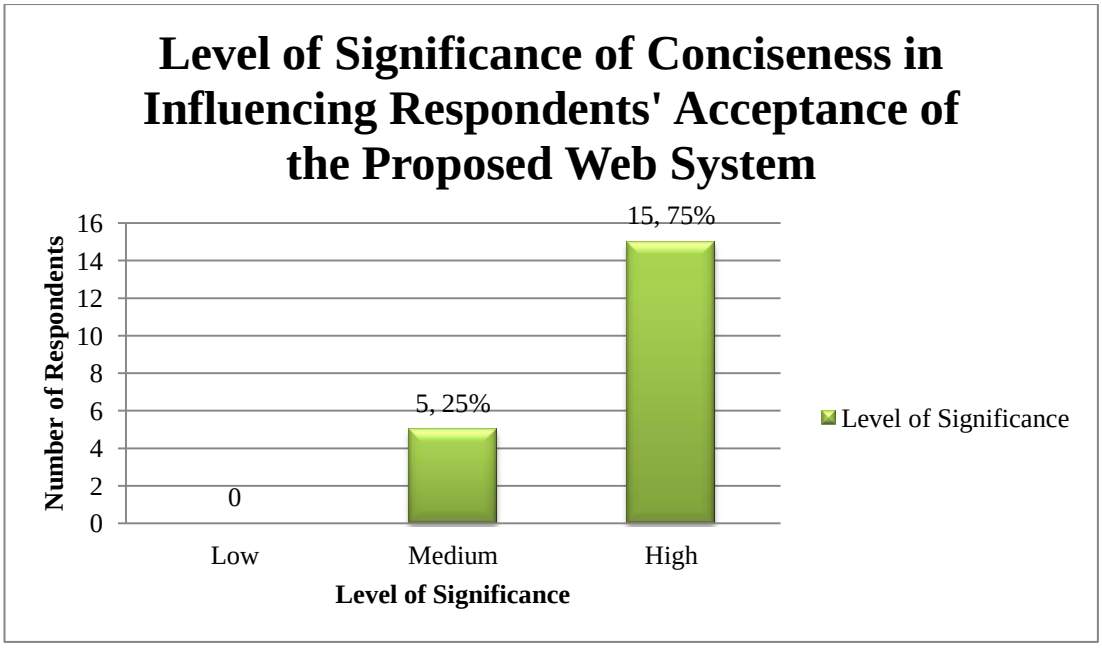

Figure 4.8: Level of Significance of Conciseness in Influencing Respondents' Acceptance of the Proposed Web System

Based on the data collected, only 5 respondents or 25% of the total respondents feel that medium level of significance of conciseness in the proposed web system is sufficient. On the other hand, another 15 respondents or 75% of the total respondents still need high level of significance of conciseness in the proposed web system.

Table below showed the level of significance of reliableness in influencing respondents' acceptance of the proposed web system.

Table 4.11: Level of Significance of Reliableness in Influencing Respondents' Acceptance of the Proposed Web System

Level of Significance	Number	%
Low	0	0%
Medium	0	0%
High	20	100%

It is obvious that all the respondents demand a highly reliable system in helping them to choose the most suitable insurance policy(ies) for personal accident, car and motorcycle.

Table and figure below showed the level of significance of effectiveness and efficiency in influencing respondents' acceptance of the proposed web system.

Table 4.12: Level of Significance of Effectiveness and Efficiency in Influencing Respondents' Acceptance of the Proposed Web System

Level of Significance	Number	%
Low	0	0%
Medium	6	30%
High	14	70%

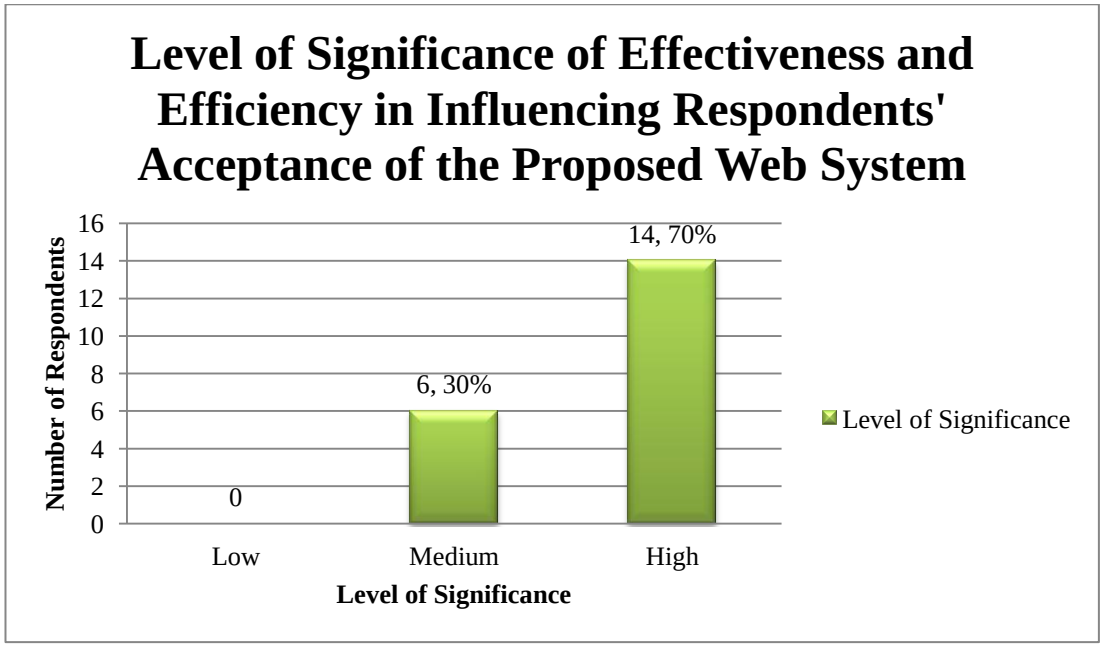

Figure 4.9: Level of Significance of Effectiveness and Efficiency in Influencing Respondents' Acceptance of the Proposed Web System

The effectiveness and efficiency of the proposed web system gained medium level of significance from 6 respondents, which is 30% of the total respondents. Nevertheless, there are 14 respondents who hope to see the proposed web system delivers high level of effectiveness and efficiency.

Table below showed the level of significance of accuracy of input in influencing respondents' acceptance of the proposed web system.

Table 4.13: Level of Significance of Accuracy of Output in Influencing Respondents' Acceptance of the Proposed Web System

Level of Significance	Number	%
Low	0	0%
Medium	0	0%
High	20	100%

It is shown clearly that all respondents want a proposed web system which can deliver the most accurate output of insurance product(s) to the users.

4.2 Data Analysis for User Acceptance Survey

Male and female fresh graduates at different age have different perspective on insurance buying.

In this context, fresh graduates refers to one who has successfully been granted a bachelor's degree or diploma within one (1) year of graduation from Malaysian public and private universities, colleges and polytechnics accredited by Minster of Higher Education (MOHE) and are starting to work.

Generally, In Malaysia, upon completion of SPM at the age 17 and 18 for those who have to serve pre-secondary school class, students can choose to continue pursuing STPM which is a pre university course and examination similar to foundation courses offered by university and college. Otherwise, the student have the option to enter university or college directly by enrolling to foundation courses.

Nevertheless, the pathway to higher education is very much depending on personal plan to consider working first before resuming study again, attach to work-study regime or continue study once completed SPM or STPM. Therefore, it can be said that these individual plan resulted in individuals with different graduating period.

The purpose of converting continuous age values of 23 to 30 to two (2) discrete categorical label of 23-26 and 27-30 is to study the perception of both male and female fresh graduates on insurance at different post-graduating stages.

Research found out that both male and female fresh graduates with age of 23 to 25 are more technological concern, that is they prefer single mouse click over excess human interaction. This group of respondents are found to be less prudent and significance in managing wealth and demonstrating financial planning ability. On the other hand, both male and female fresh graduates with age ranging from 26 to 30 are more future oriented, though they are also as interested in technology engagement as the earlier group, but possess better planning ability and undertakes greater responsibilities in life. This could be due to possible marriage to another individual and potential promotion to hold higher post in career in these ages. Brink (2003) supported the statement by stating that people's values and ideals often change over time especially during parenthood or times when someone are growing towards middle age. In this stage, individuals tend to subordinate his/ her current ideals to her future ones or at least to moderate pursuit of current ideals in light of future ones.

Furthermore, it is no surprise that most respondents have high level of acquaintance with web systems/ applications due to the fact that they are classified as Generation Y who grew up with technology. These respondents normally communicate through e-mail and text messaging with laptops and smart phones rather than face-to-face contacts. However, due to them being attention-craving and vibrant, they demonstrated high level of involvement in social networking sites such as Facebook, Youtube and Twitter, setting their foot on trends of web systems/ applications with advanced Internet and IT technology development covering expanded bandwidth and intensified speed.

However, even if information is easily accessible everywhere, the average time for the respondents to look for reference source(s) and compare insurance product(s) in deciding which insurance product(s) for personal accident, car and motorcycle best suit them is different. This is due to different personal preferences, needs and priorities that need to be synchronized with time. Some respondents may need longer time of more than 6 hours to approach different source(s) so that they could gather

more information that could help them in making a better decision while others may require 1 to 3 hours or 3 to 6 hours, which are depending very much on their own assessment of resources and information obtained.

Nonetheless, there are still significant amount of respondents who think that the current process of looking for reference source(s) and comparing insurance product(s) need improvements. The reason behind could be the superabundant of insurance information and products where the respondents are unable to capture those perceived useful and differentiated to them. This scenarios can be related to the saturated Malaysian insurance market where all the products are almost similar and the respondents need to allocate more time to find out the differences between them by approaching different sources to see if these differences between insurance products can suit them. The process could be a loop and thus the insurance buying process could take relatively long. Another reason would be for those fresh graduates who already started working, they may not have that amount of time for the process. While another group of respondents is unsure what improvements could be done, there are respondents who thinks that improvements are not so important or irrelevant as they actually prefer the traditional way of meet-and-talk to find out any relevant information themselves.

As a result, most of the respondents expressed medium or high level of significance to the proposed web system in simplifying their insurance buying process for personal accident, car and motorcycle. They treated the proposed system to be the "improvements" in the previous question.

Moreover, some of these respondents may have experience buying insurance before hand and come across some issues or difficulties, giving most of them the motivation to try out the proposed web system to see if the system helps solving their problems.

Overall, the respondents demand high level of convenience in the proposed system in the sense that it can be used anytime at anywhere with the presence of Internet connection. Furthermore, they also prefer a proposed web system that is extremely easy to use in such a way that the benefits and functions of the proposed system are straightforward and apparent. On the other hand, the respondents demand medium

and high level conciseness in the proposed system where all necessary insurance information are displayed. Additionally, all respondents will tend to rely heavily on the proposed web system in helping them to choose suitable insurance product(s) for personal accident, car and motorcycle. Most importantly, the respondents want the proposed web system to help them to enhance efficiency and effectiveness in the insurance buying process for personal accident, car and motorcycle. The efficiency measures include time saved in comparing insurance product(s) from different insurance companies and visits per prospect to each reference source while the effectiveness measure is the output of the system which displays the insurance product(s) correctly for personal accident, car and motorcycle. Lastly, what the respondents are most concerned about is the accuracy of output in the proposed system, particularly if the insurance product(s) suggested by the system really meet(s) users' inputs, demands and preferences.

4.3 Findings/ Data Gathering for Usability Testing Survey

Of the study population, 20 respondents completed and returned the questionnaire. Usability testing survey is divided into two (2) parts, where the first part is system design interface survey and the second part is system usability scale (SUS).

4.3.1 System Design Interface

Table and figure below showed the respondents' replies on navigation and the effect of layout on information and functions of the proposed web system.

Table 4.14: Respondents' Replies on Navigation and the Effect of Layout on Information and Functions of the Proposed Web System

Navigation is Easy	Number	%
Yes	18	90%
No	2	10%

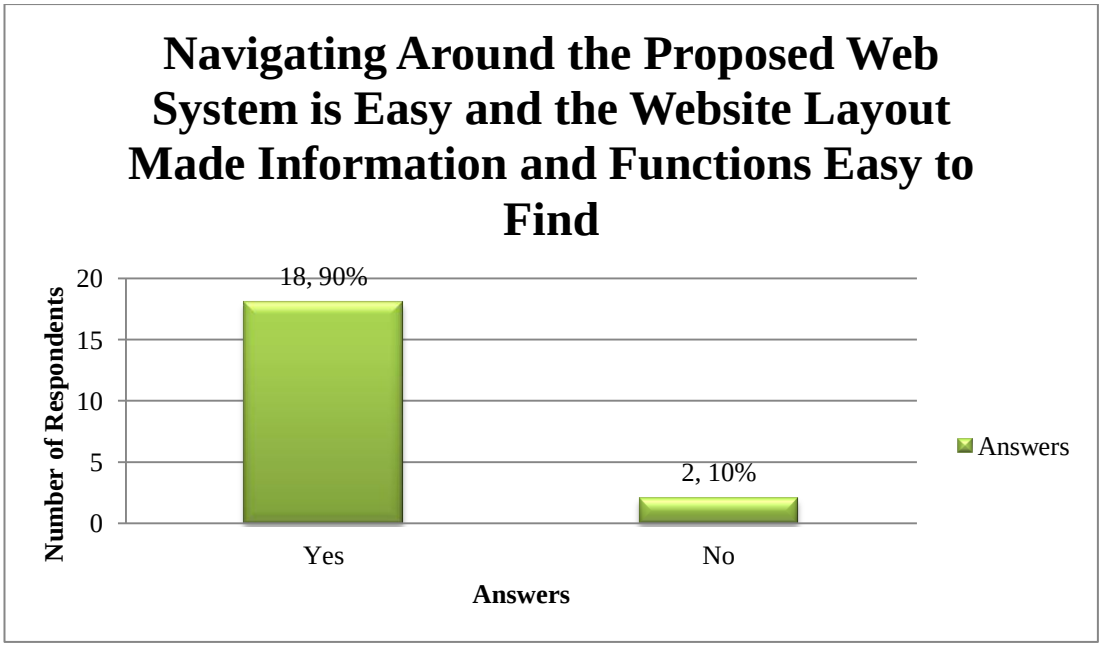

Figure 4.10: Respondents' Replies on Navigation and the Effect of Layout on Information and Functions of the Proposed Web System

As shown in table and figure above, 18 respondents or equivalent to 90% of the total respondents agreed that navigating around the proposed web system is easy and the website layout made information and functions easy to find. However, there are also 2 respondents who claimed that the navigation on the proposed web system is not easy and found it difficult to look for information and functions under the website layout, comprised the remaining 10% of the total respondents.

Table and figure below showed the respondents' replies on the functions of radio buttons, buttons and links of the proposed web system.

Table 4.15: Respondents' Replies on the Functions of Radio Buttons, Buttons and Links of the Proposed Web System

All Functions Worked Properly	Number	%
Yes	17	85%
No	3	15%

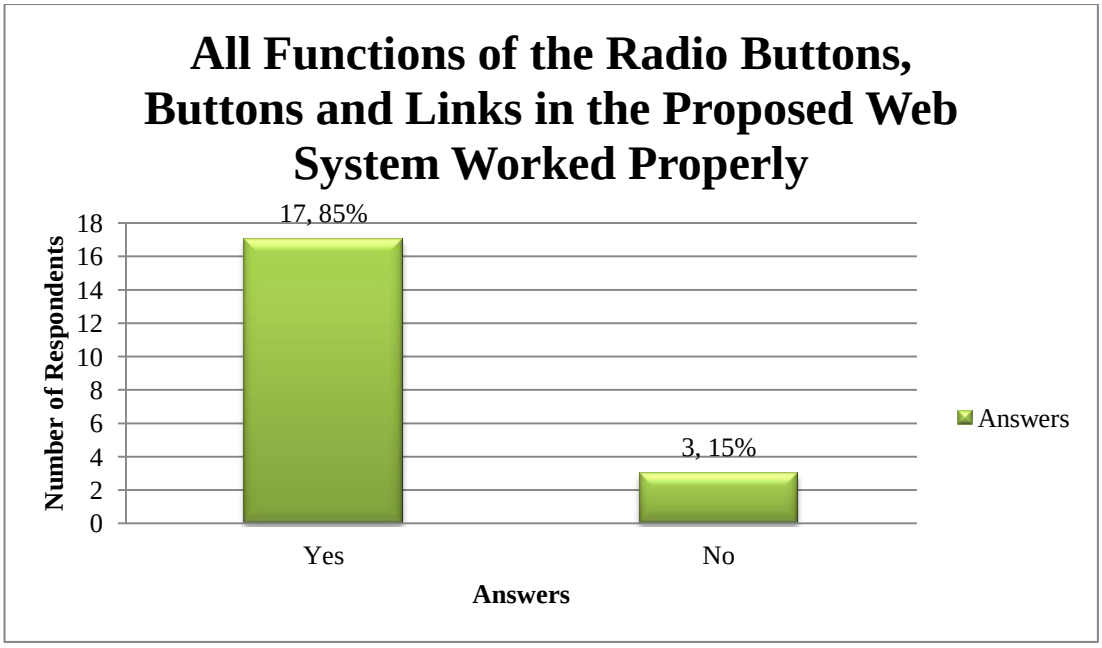

Figure 4.11: Respondents' Replies on the Functions of Radio Buttons, Buttons and Links of the Proposed Web System

The data above showed that 17 out of 20 respondents who tested the web system felt that all functions of the radio buttons, buttons and links in the proposed web system worked properly. They incorporated 85% out of the total respondents. On the other hand, 3 respondents who constituted the remaining 15% found some broken links or buttons in the proposed web system.

Table below showed the respondents' replies on both the font size and style of the proposed web system.

Table 4.16: Respondents' Replies on Both the Font Size and Style of the Proposed Web System

The Font Size and Style were Suitable for Reading	Number	%
Yes	20	100%
No	0	0%

As illustrated clearly above, all the respondents who tested the proposed web system felt that both the font size and style used in the web system were suitable for reading.

Table below showed the respondents' replies on the terminology of insurance of the proposed web system.

Table 4.17: Respondents' Replies on the Terminology of Insurance of the Proposed Web System

The Terminology of Insurance was clear and precise	Number	%
Yes	20	100%
No	0	0%

Similarly, there are no respondent who claimed that the terminology of insurance in the proposed web system was not clear and precise.

Table below showed the respondents' replies on the sequence of web pages after button clicks on the proposed web system.

Table 4.18: Respondents' Replies on the Sequence of Web Pages after Button Clicks on the Proposed Web System

Sequence of Web Pages after Button Clicks	Number	%
Clear	20	100%
Confusing	0	0%

All respondents found out that the sequence of web pages is clear where they are being directed to the correct and relevant web pages after clicking on certain buttons or links on the system.

Table below showed the respondents' replies on the adequacy of the amount of explanation found on the proposed web system for performing tasks.

Table 4.19: Respondents' Replies on the Adequacy of the Amount of Explanation found on the Proposed Web System

The Amount of Explanation was Adequate for Performing Tasks	**Number**	**%**
Yes	20	100%
No	0	0%

All respondents also believed that the commands on the proposed web system are sufficient to guide the users in carrying out the necessary functions

4.3.2 System Usability Scale (SUS)

To calculate the SUS Score, first sum the score contributions from each item. Each item's score contribution will range from 0-4. For items 1,3,5,7 and 9 the score contribution is the scale position minus 1. For items 2,4,6,8 and 10, the contribution is 5 minus the scale position. (Brooke, n.d)

The table below showed the average and total score contributions obtained from 20 respondents.

Items	Average Score Contributions
1. I think that I would like to use this system frequently	4 - 1 = 3
2. I found the system to be unnecessarily complex	5 - 1 = 4
3. I thought the system was easy to use	4.75 - 1 = 3.75
4. I think that I would need the support of a technical person to be able to use this system	5 - 1 = 4
5. I felt the system was well integrated and responded in a consistent and predictable way	5 - 1 = 4
6. I thought there was too much inconsistency in this system	5 - 1.5 = 3.5
7. I would imagine that most people would learn to use this module very quickly	4.75 – 1 = 3.75
8. I found the module is very cumbersome to use	5 - 1 = 4
9. I felt secure and comfortable using the system	4 – 1 = 3
10. I needed to learn a lot of things before I could get going using the module	5 - 1 = 4
Total Score Contributions	**37.0**

Table 4.20: Average and Total Score Contributions for SUS

Next multiply the total average score contributions by 2.5 to obtain the overall value of system usability. It yielded: 2.5 x 37.0 = 92.5.

4.4 Data Analysis for Usability Testing Survey

Based on the statistical data obtained for usability testing survey on system interface design, it can be seen that all respondents who took part in testing it believed that the proposed web system is informative and interactive. Furthermore, it is easy to use and will be able to suggest to users the accurate insurance product(s) based on their inputs to the system. In addition, it simplifies the process of users comparing insurance product(s) offered by different insurance companies one by one and thus is proven to save significant time and efforts of users. However, there are still defects identified during system testing where there are some broken links and buttons in some web pages of the system. In view of that, the developer will fix the them accordingly.

On the other hand, Sauro (2003) stated that a SUS score above a 68 would be considered above average and anything below 68 is below average. Scoring at the mean score of 68 gets the system a C and anything below a 51 is an F. Therefore, the SUS score of 92.5 indicated that the proposed web system has an A and possessed high level of usability . Thus, users are more likely to use the system once it is implemented.

4.5 How the System Works

Figure below showed how the proposed web system suggests insurance product(s) for personal accident to users.

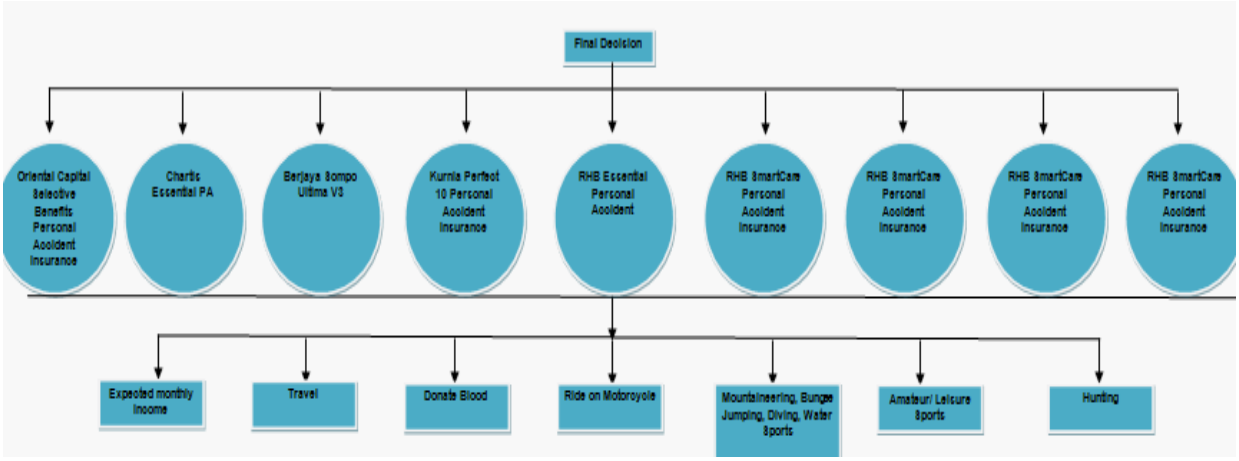

Figure 4.12: How Proposed Web System Suggests Insurance Products(s) for Personal Accident to Users

As shown in figure above, to obtain the final decision which is the suggested personal accident insurance product(s), combination of inputs at the bottom of the figure are tested with the nine (9) insurance products from different companies found at the middle of the figure by the system. The more combination of inputs are found or coincided in certain insurance products, then the insurance products will be selected as the final decision and said to satisfy most of the users' inputs, needs and requirements. For example, if Chartis Essential PA offers protection for travelling, donating blood, riding on motorcycle, sports and hunting (It already satisfy five (5) out of the seven (7) inputs) while the others do not or offer lesser protection than Chartis's, then Chartis Essential PA will be selected as the suggested insurance product. If there is another product, said RHB Essential Personal Accident also offers all the protections offered by Chartis Essential PA, then both Chartis Essential PA and RHB Essential Personal Accident will be selected by the system as the suggested insurance products. The role of DSS is just to enhance user's effectiveness and making a decision often involves opportunity cost. Therefore, the final insurance product decision still lies on users.

Figure below showed how the proposed web system suggests insurance product(s) for car to users.

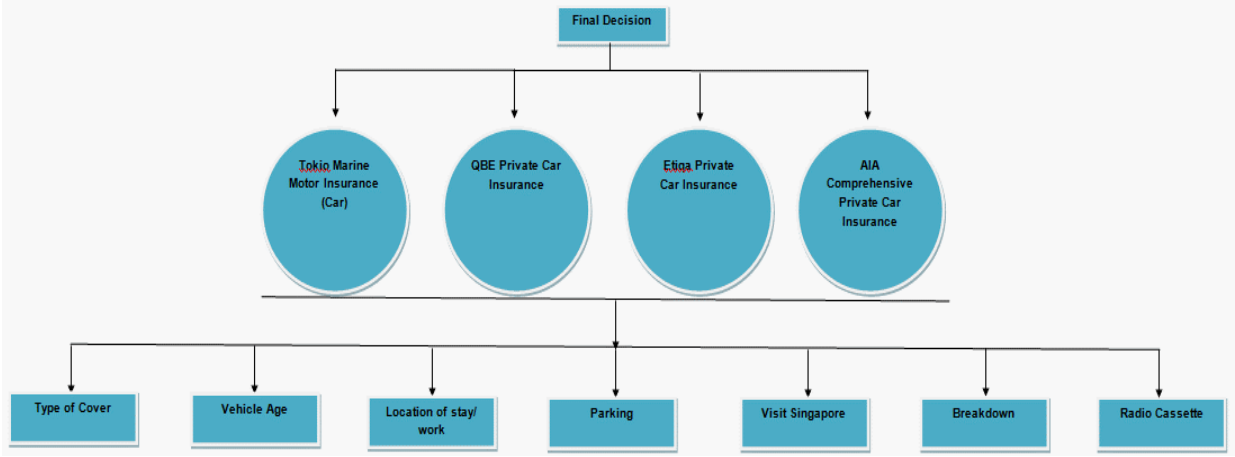

Figure 4.13: How Proposed Web System Suggests Insurance Products(s) for Car to Users

Similarly, to obtain the final decision which is the suggested car insurance product(s), combination of inputs at the bottom of the figure are tested with the four (4) insurance products from different companies found at the middle of the figure by the system. The more combination of inputs are found or coincided in certain insurance products, then the insurance products will be selected as the final decision and said to satisfy most of the users' inputs, needs and requirements. For example, if QBE Private Car Insurance offers protection for parking, breakdown and radio cassette (It already satisfy three (3) out of the seven (7) inputs) while the others do not or offer lesser protection than QBE's, then QBE Private Car Insurance will be selected as the suggested insurance product. If there is another product, said Etiqa Private Car Insurance also offers all the protections offered by QBE Private Car Insurance, then both QBE Private Car Insurance and Etiqa Private Car Insurance will be selected by the system as the suggested insurance products. The role of DSS is just to enhance user's effectiveness and making a decision often involves opportunity cost. Therefore, the final insurance product decision still lies on users.

Figure below showed how the proposed web system suggests insurance product(s) for motorcycle to users.

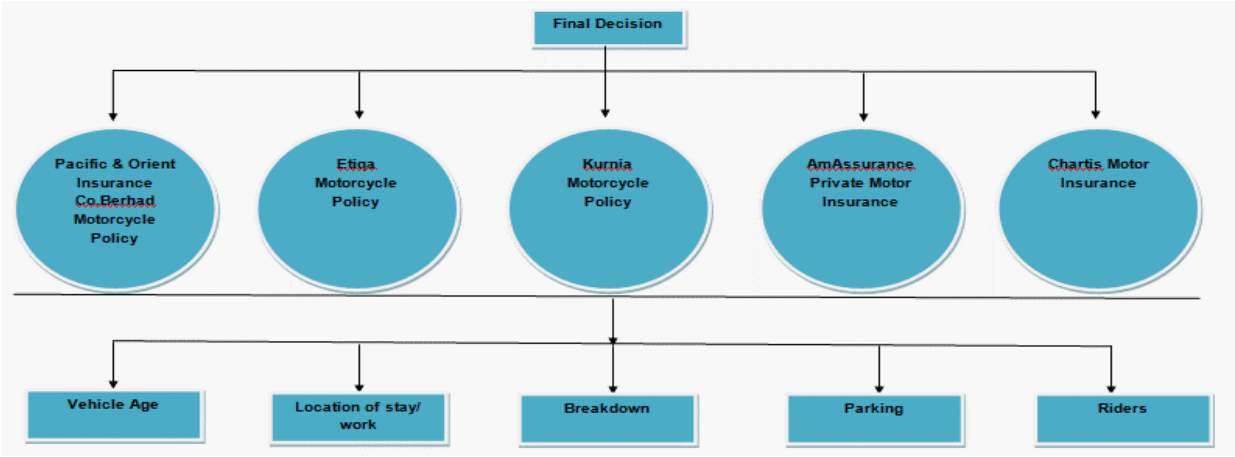

Figure 4.14: How Proposed Web System Suggests Insurance Products(s) for Motorcycle to Users

Similar to how personal accident and car insurance product(s) is (are) selected, to obtain the final decision which is the suggested motorcycle insurance product(s), combination of inputs at the bottom of the figure are tested with the five (5) insurance products from different companies found at the middle of the figure by the system. The more combination of inputs are found or coincided in certain insurance products, then the insurance products will be selected as the final decision and said to satisfy most of the users' inputs, needs and requirements. For example, if Etiqa Motorcycle Policy offers protection for parking, breakdown and riders (It already satisfy three (3) out of the five (5) inputs) while the others do not or offer lesser protection than Etiqa's, then Etiqa Motorcycle Policy will be selected as the suggested insurance product. If there is another product, said AmAssurance Private Motor Insurance also offers all the protections offered by Etiqa Motorcycle Policy, then both Etiqa Motorcycle Policy and AmAssurance Private Motor Insurance will be selected by the system as the suggested insurance products. The role of DSS is just to enhance user's effectiveness and making a decision often involves opportunity cost. Therefore, the final insurance product decision still lies on users.

4.6 System Flow Diagram

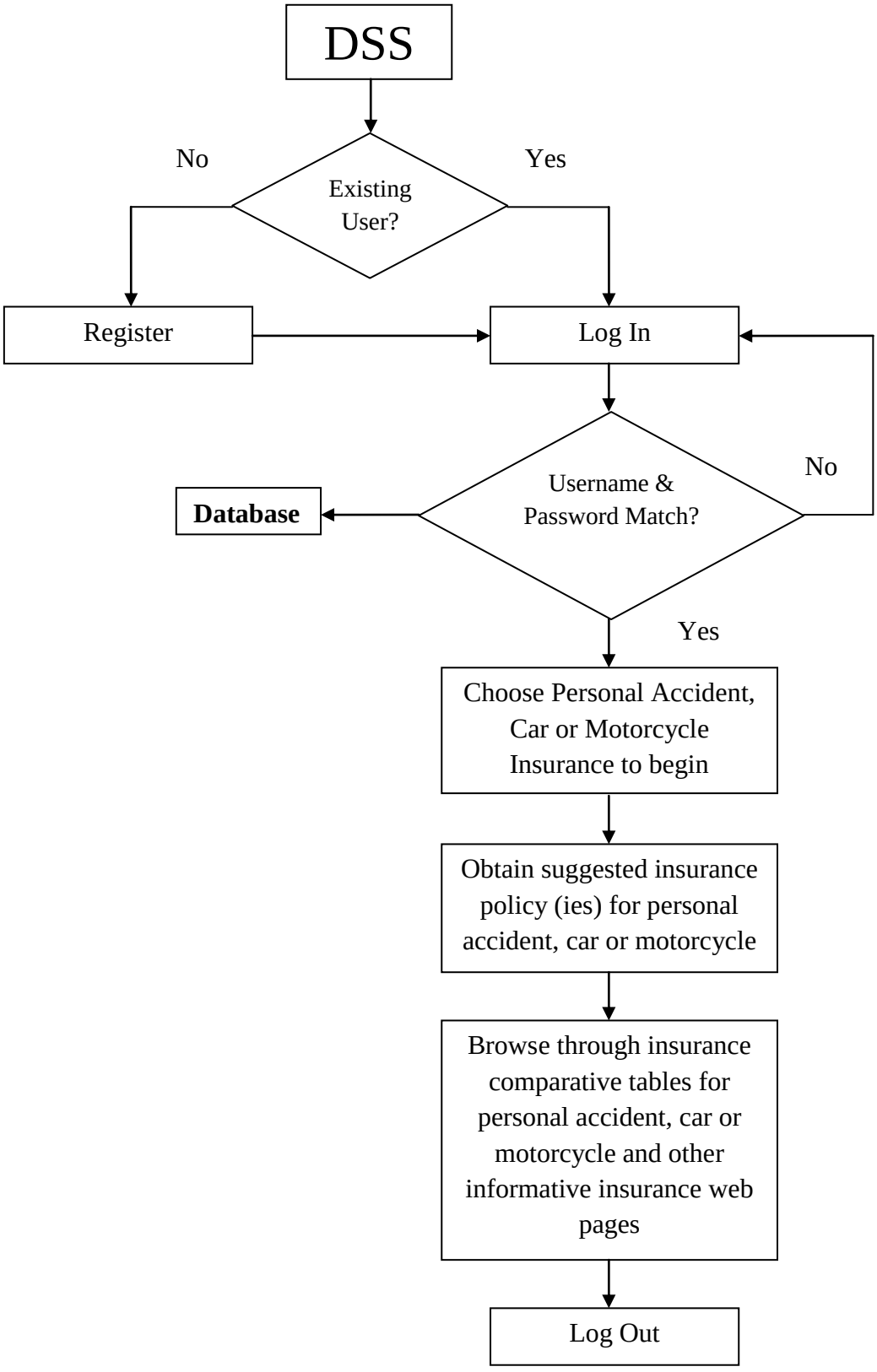

Figure 4.15: System Flow Diagram for Insurance Management System for Fresh Graduates Using Web Based DSS

4.7 Use Case Diagram

Figure below showed the use case diagram for system administrator.

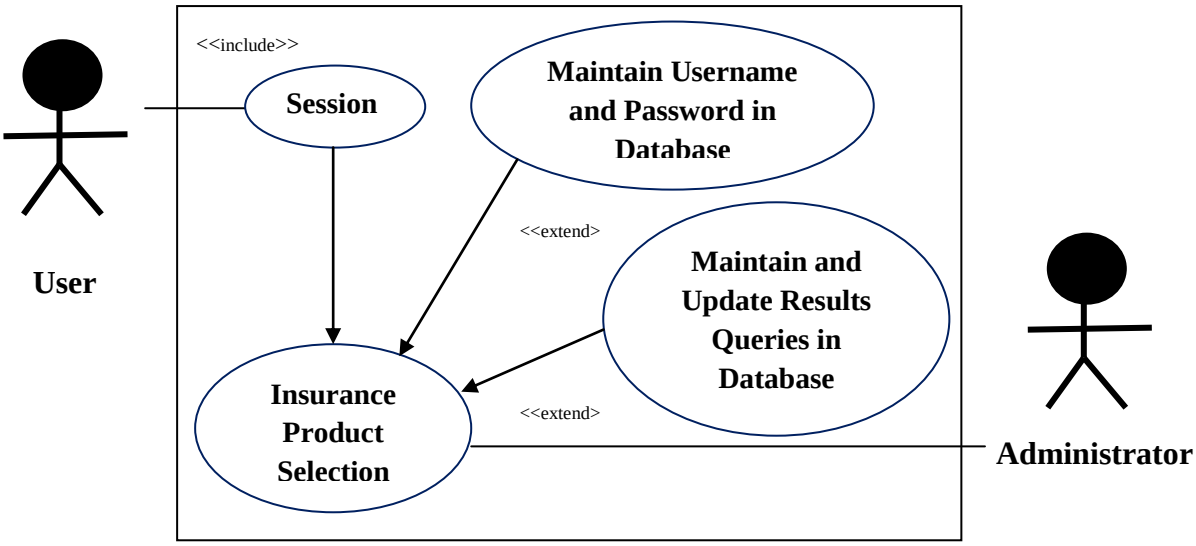

Figure 4.16: Use Case Diagram for System Administrator

Administrator has two (2) jobs which are : -

1) Maintain user's username and password in Database
2) Maintain and update results queries in Database. The result queries refer to insurance products for personal accident, car and motorcycle of many different companies.

Figure below showed the use case diagram for users.

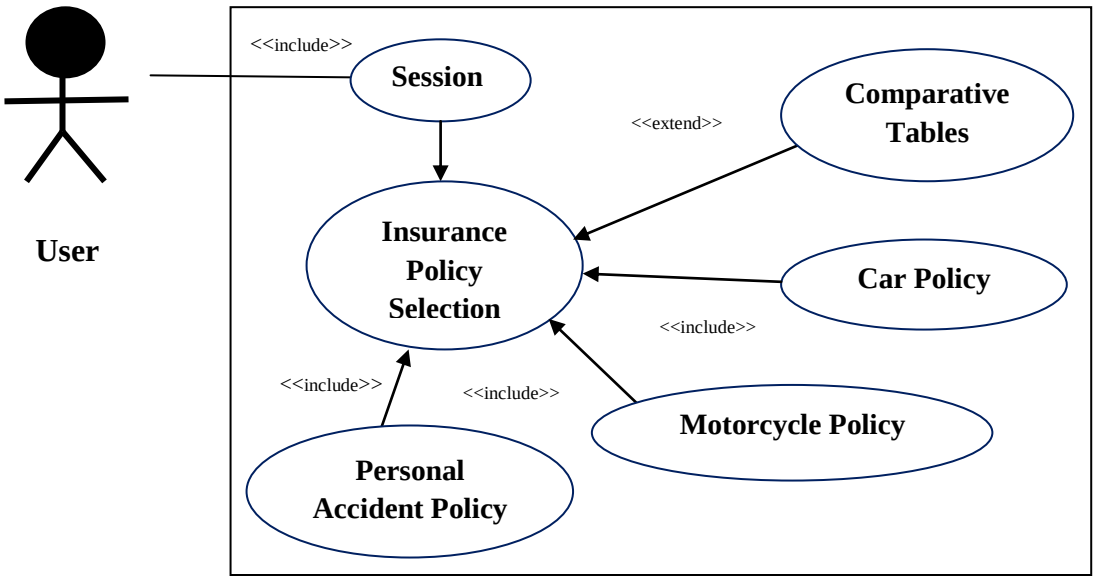

Figure 4.17: Use Case Diagram for Users

As shown above, user can enjoy two (2) functions in the proposed web system. The first one is insurance policy selection where the user can choose whether he/ she want to buy personal accident, car or motorcycle insurance product(s). Apart from that, they can also browse through the comparative tables for personal accident, car and motorcycle to view the insurance benefits offered by different companies at one glance.

4.8 Sequence Diagram

Figure below showed the use case diagram for system administrator.

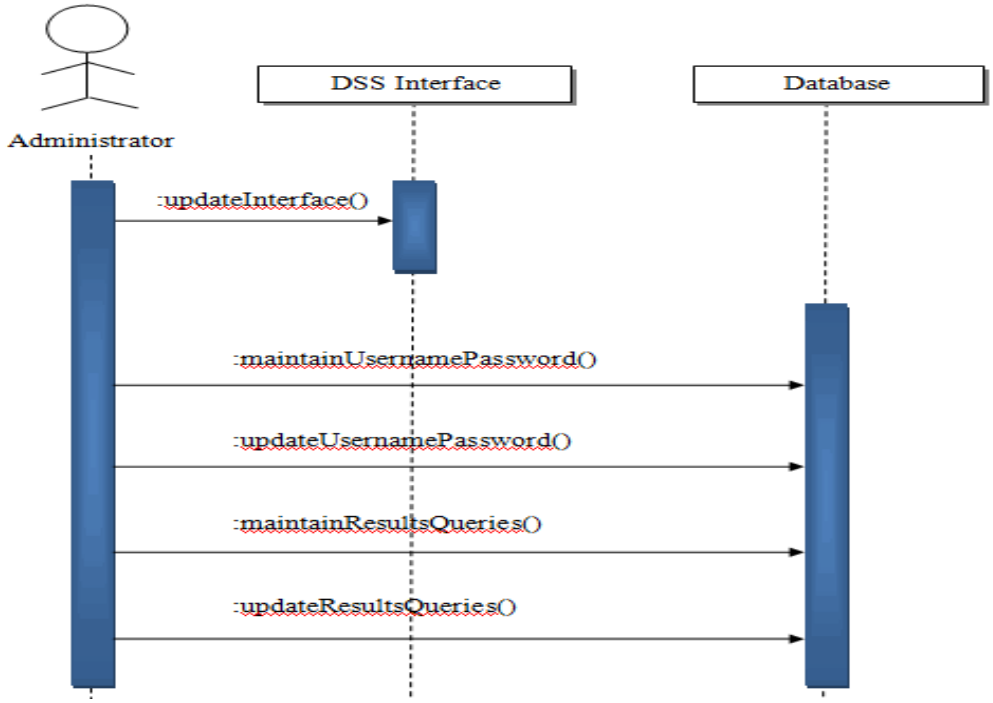

Figure 4.18: Sequence Diagram for System Administrator

Figure below showed the use case diagram for users.

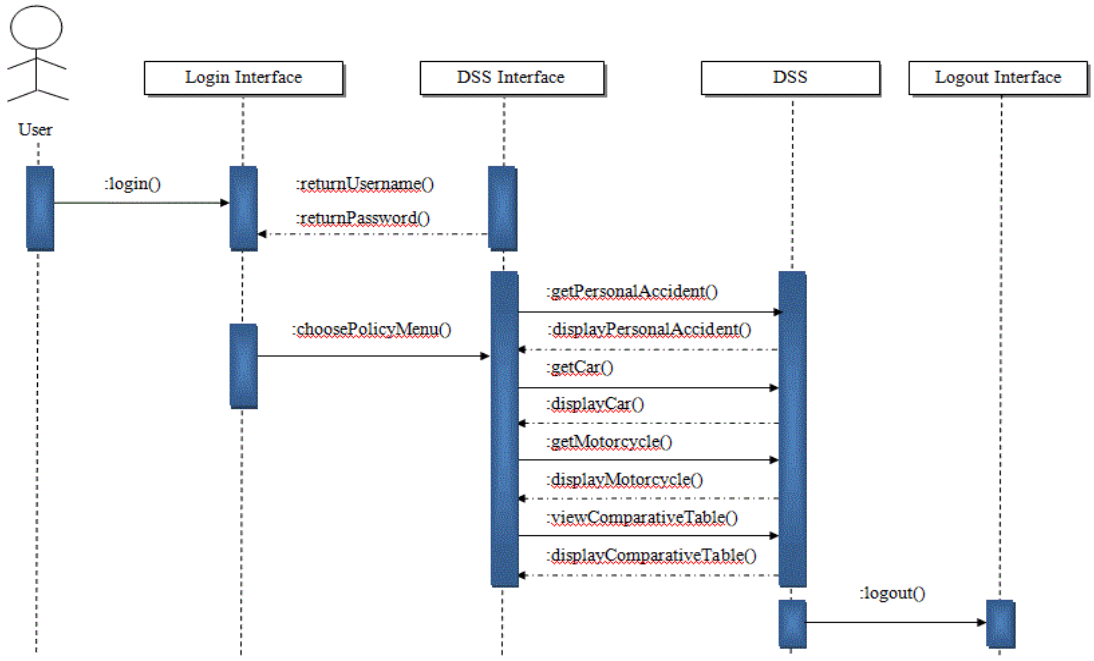

Figure 4.19: Sequence Diagram for Users

4.9 System Deliverables

Figure below is the home page after user login successfully.

Figure 4.20: Home Page after User Login

Figure below showed the page after users click on "Motor" in the home page above.

Figure 4.21: Motor Insurance Page to Select Private Car or Private Motorcycle

Figure below showed the questions page (input page) and result page if users choose personal accident.

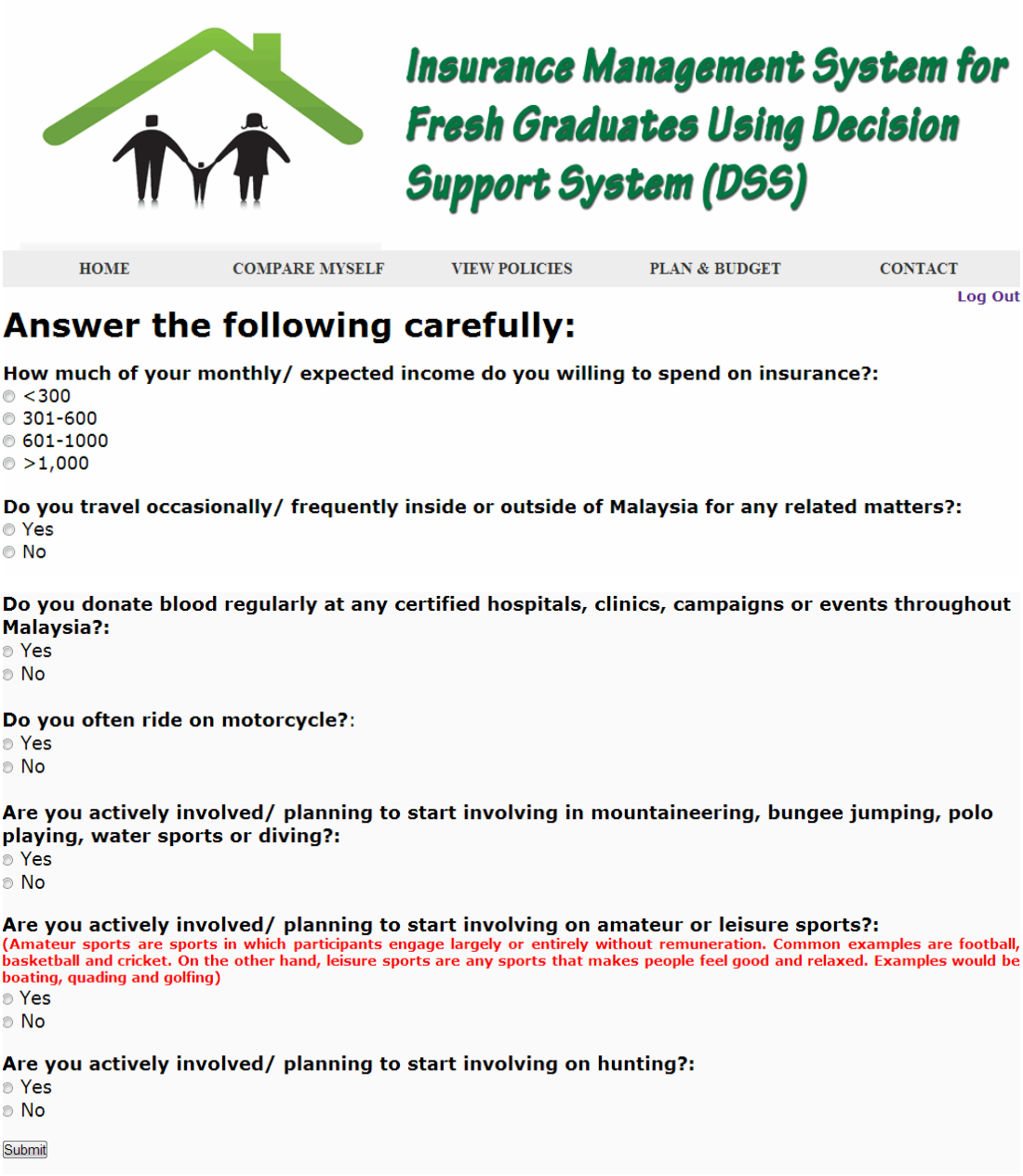

Figure 4.22: Questions Page (Input Page) for Personal Accident

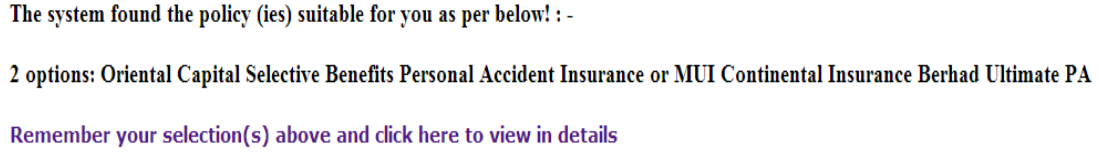

Figure 4.23: Result Page for Personal Accident

Figure below showed the questions page (input page) and result page if users choose private car.

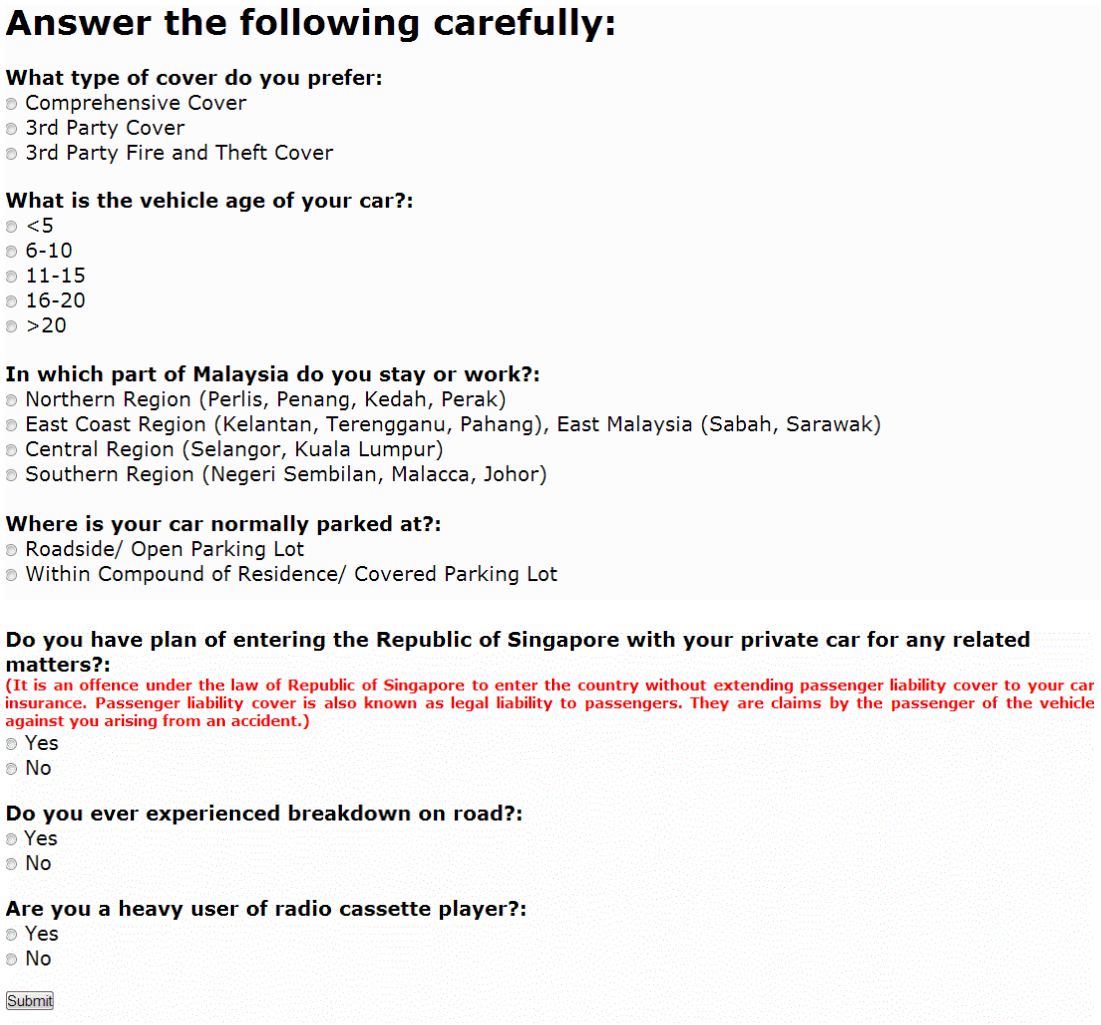

Figure 4.24: Questions Page (Input Page) for Car

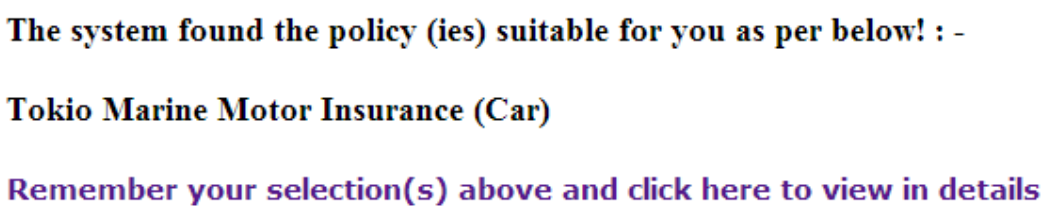

Figure 4.25: Result Page for Car

Figure below showed the questions page (input page) and result page if users choose private motorcycle.

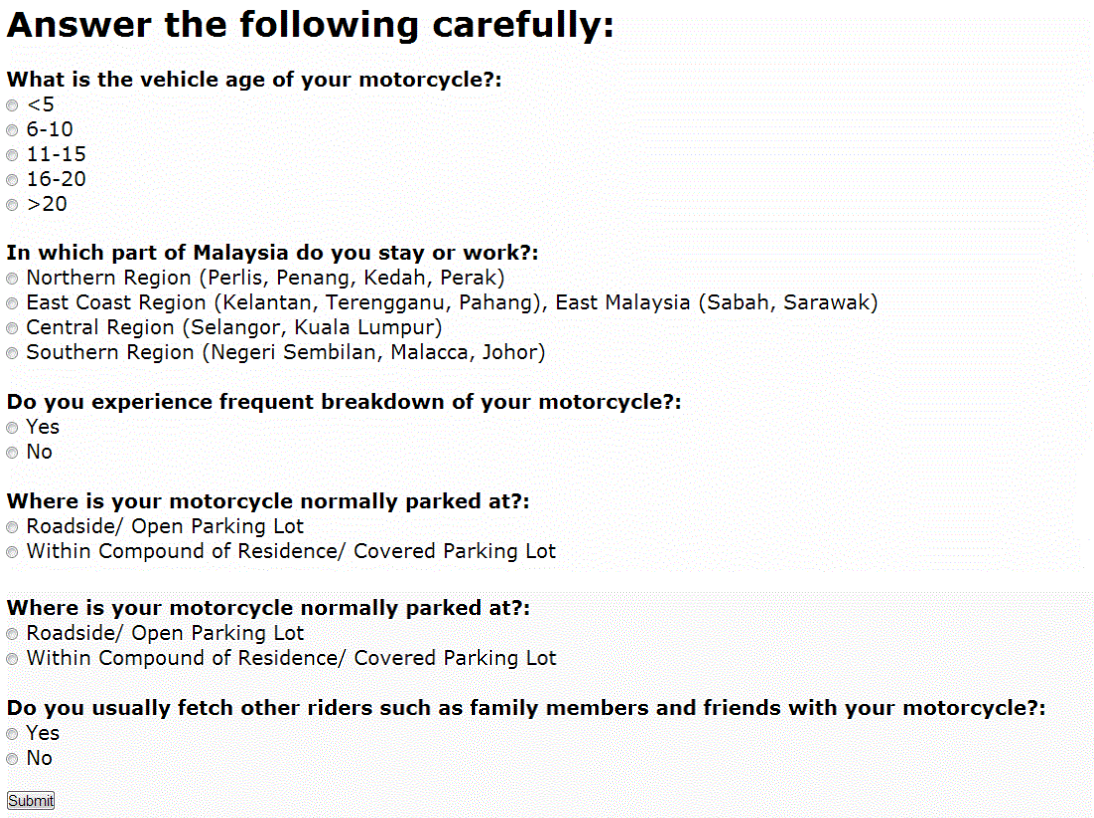

Figure 4.26: Questions Page (Input Page) for Motorcycle

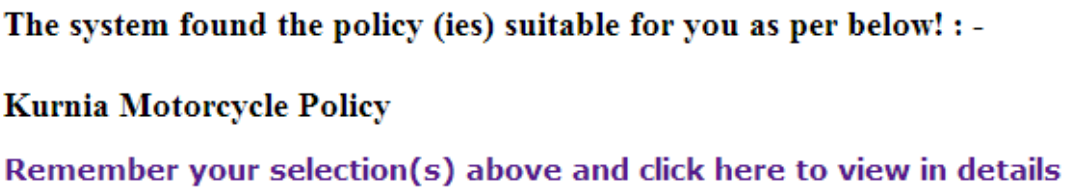

Figure 4.27: Result Page for Motorcycle

Figure below showed the comparative table for personal accident.

Y - Available for coverage , N - Not Available for coverage

Individual Personal Accident Insurance Policies

Insurance Coverage	Oriental Capital Selective Benefits Personal Accident Insurance	Chartis Essential PA	Berjaya Sompo Ultima V3	Tokio Marine Premier Partner Personal Accident Insurance	Kurnia Perfect 10 Personal Accident Insurance	RHB Essential Personal Accident	RHB SmartCare Personal Accident Insurance	Etiqa Personal Protection Plan	MCIS Zurich Care PA	MCIS Zurich Supreme PA	MU Contin Insur Berh Ultim PA Prote
Accidental Death	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Advance Payment of Accidental Death Benefit	N	N	N	N	N	Y	N	N	N	N	N
Permanent Disablement	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Temporary Total Disablement	Y	N	Y	N	N	N	N	N	N	N	N
Temporary Partial	Y	N	N	N	N	N	N	N	N	N	N

Figure 4.28: Comparative Table for Personal Accident

Figure below showed the comparative table for car.

Y - Available for coverage , N - Not Available for coverage

Private Car Policies

Insurance Coverage	Tokio Marine Motor Insurance (Car)	QBE Private Car Insurance	Etiqa Private Car Insurance	AIA Comprehensive Private Car Insurance
Comprehensive Cover				
Accidental Collision or Overturning	Y	Y	Y	Y
Collision or Overturning Caused by Mechanical Breakdown	Y	N	Y	N
Collision or Overturning Caused by Wear and Tear	Y	N	Y	N
Impact Damage Caused by				

Figure 4.29: Comparative Table for Car

Figure below showed the comparative table for motorcycle

Y - Available for coverage , N - Not Available for coverage

Private Motorcycle Policies

Insurance Coverage	Pacific & Orient Insurance Co.Berhad Motorcycle Policy	Etiqa Motorcycle Policy	Kurnia Motorcycle Policy	AmAssurance Private Motor Insurance	Chartis Motor Insurance
Loss or Damage to Vehicle					
Accidental Collision or Overturning	Y	Y	Y	Y	Y
Collision or Overturning Caused by Mechanical Breakdown	N	Y	Y	Y	N
Collision or Overturning Caused by Wear and Tear	N	Y	Y	Y	N
Impact Damage Caused by Falling Objects Provided No	N	Y	Y	Y	N

Figure 4.30: Comparative Table for Motorcycle

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CHAPTER 5
CONCLUSIONS

5.1 Relevancy to the Objective

The proposed Insurance Management System for Fresh Graduates Using Web Based Decision Support System is a web integrated decision support system that help fresh graduates who are in the range of 23 and 30 to buy the most suitable insurance policy for personal accident, car and motorcycle. An additional feature of the system would be comparative tables for personal accident, car and motorcycle that allows the user to compare insurance benefits offered by different insurance companies in table form at fast glance. As discussed in Chapter 4, it can be said that the proposed system has achieved its objective successfully. Users can now use the web system to look for suitable insurance product(s) in personal accident, car and motorcycle without having to waste time and efforts in approaching the reference source(s) and comparing insurance product(s) one by one.

5.2 Suggested Future Work for Expansion and Continuation

The outcome and performance of the Insurance Management System using Web Based DSS is remarkable. However, for personal accident, it only includes suggestions of insurance products from nine (9) insurance companies currently operating in Malaysia, while for car, four (4) and motorcycle, five (5). In order to increase the usability of the web system, the future work that can be done includes increasing the number of insurance companies in the system for personal accident, car and motorcycle. This enables the users to have more options to choose from. Furthermore, the web system can be extended to offer users to choose suitable insurance products for their housing, travelling, retirement planning, education and many others.

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APPENDICES

(a) User Acceptance Survey

This survey is designed to identify the factors that affect the acceptance of user towards the implementation of Insurance Management System for Fresh Graduates Using Web Based Decision Support System. All results will be kept confidential and will be used solely for final year research purposes.

* Required

1. Please indicate your gender. *

- ○ Male
- ○ Female

2. What is your age range? *

- ○ 23-26
- ○ 27-30

3. Please state your level of acquaintance with web systems/ applications. *
Examples of web systems/ applications may include Gmail, Yahoo! Mail, Facebook, Twitter, Youtube and many others.

	1	2	3	
Low	○	○	○	High

4. How long is your average time for process to look for reference source(s) and compare insurance product(s) to decide which insurance product(s) to buy for personal accident, car and motorcycle before using the proposed system? *
Reference sources may include parents and family, friends, insurance agents and insurance companies' websites.

- Less than 1 hour
- 1 to 3 hours
- 3 to 6 hours
- More than 6 hours

5. Please select how important you feel improvements should happen in the process mentioned above? *

- Very important
- Important
- Not so important
- Irrelevant
- Can't say

6. How would you rate the level of significance if the insurance buying process for personal accident, car and motorcycle is simplified with the proposed web system? *

	1	2	3	
Low				High

7. Is previous experience of buying insurance for personal accident, car and motorcycle a large factor in motivating you to use the proposed web system? *

- Yes
- No

8. How would you rate the level of significance of the following in influencing your acceptance when implementing the proposed web system? * 1 - Low 5 - High

	1	2	3
Convenience			
Easiness			
Conciseness			
Reliableness			
Efficiency and Effectiveness			
Accuracy of output			

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(b) Usability Testing Survey - i) System Interface Design

This survey is designed to find out the level of usability of Insurance Management System for Fresh Graduates Using Web Based Decision Support System. Respondents are required to test the system before filling this survey.

* Required

Please rate the system by checking the appropriate word that most closely reflects your opinion.

1. Navigating around the proposed web system is easy and the website layout made information and functions easy to find. *

- Yes
- No

2. All functions of the radio buttons, buttons and links in the proposed web system worked properly. *

- Yes
- No

3. Both the font size and style used in the proposed web system were suitable for reading. *

- Yes
- No

4. The terminology of insurance in the proposed web system was clear and precise. *

- Yes
- No

5. Sequence of web pages * Sequence refers to a series of screens that are displayed one after the other which is controlled by events and will occur in fixed order with button clicks.

- Clear
- Confusing

6. The amount of explanation in the proposed web system was adequate for performing the tasks. *

- Yes
- No

(b) Usability Testing Survey - ii) SUS

Please tick whichever applicable and rate the level of usability.

1. I think that I would like to use this system frequently

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

2. I found the system to be unnecessarily complex

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

3. I thought the system was easy to use

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

4. I think that I would need the support of a technical person to be able to use this system

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

5. I felt the system was well integrated and responded in a consistent and predictable way

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

6. I thought there was too much inconsistency in this system

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

7. I would imagine that most people would learn to use this system very quickly

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

8. I found the system very cumbersome to use

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

9. I felt secure and comfortable using the system

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

10. I needed to learn a lot of things before I could get going with this system

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

Insurance Management System for Fresh Graduates Using Web Based Decision Support System (DSS)

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ABSTRACT

Buying a an insurance is not as easy as it seems because it involves measurements of personal lifestyles, preferences, needs, and financial condition. One of the problem is that even insurance information is everywhere, seldom there are people who can adequately make use of the information to purchase a suitable policy. Furthermore, high similarity of different insurance products and services compress the scope of buying a really differentiated and suitable insurance policy for an individual. In this study, integration of Web Based and decision support system (DSS) are employed to develop an Insurance Management System for enabling all fresh graduates from all states of Malaysia to use it for facilitating insurance buying process. Its main target users are fresh graduates between the age of 23 and 30 who are found lacking of insurance literacy. Of all types of insurance in the market, the system will focus specifically in helping the fresh graduates to buy individual personal accident, private car and private motorcycle insurance policies offered by insurance companies in Malaysian insurance market. The Insurance Management System is a system that is able to capture user's information such as income, lifestyle, travel preferences, family members, age of car or motorcycle owned and others factor by prompting three different and separate set of questions for the respective insurance categories of personal accident, car and motorcycle. The user will need to fill in the questions for the category(ies) of insurance he/ she wishes to purchase in relevant web pages. Subsequently, after all the questions from personal accident, car or motorcycle are submitted to the system, the system will suggest and display the insurance product(s) which best meets the user's inputs, demands and requirements. Apart from that, comparative tables can also be found in the web system to allow the user to compare personal accident, car and motorcycle insurance benefits offered by different companies at one glance. The system will be developed according to prototype methodology where user participation in designing the system is maximum to continuously refine the system. In capturing users' satisfactions after using the system, user acceptance survey and usability testing survey were adopted. It is said that the proposed web system received positive feedbacks as demonstrated in both the surveys with a 92.5 System Usability Scale (SUS) score which signified that users are convinced by both the look and performance of the proposed system and they are keen to use the system frequently in the future.

Keywords: *Insurance Management System, Decision Support System (DSS), Fresh Graduates aged between 23 to 30, Individual Personal Accident, Private Car, Private Motorcycle, Comparative Tables, Insurance Policy*

I. INTRODUCTION

Generally, there are two (2) types of insurance offered in Malaysia, namely life insurance and general insurance which covers different aspects in life. Life insurance is an insurance coverage that pays a specified amount of money to the insured or their beneficiaries upon the occurrence of certain event such as death of the insured. Similar

main products offered include whole life, endowment, term, investment-linked, life annuity plan, medical and health. On the other hand, general insurance basically protects the insured against losses and damages other than those covered by life insurance. The main product of general insurance include motor insurance, householders insurance, personal accident insurance and travel insurance.

Malaysian insurance market is saturated with similar personal accident, car and motorcycle insurance products offered by different general and life insurance businesses, making it difficult for individuals to choose suitable one(s) that meet(s) their own personal priorities, preferences and needs. In order for them to differentiate these products one by one, a great deal of efforts and time are required. For fresh graduates who already started working, they may not have time to do so. Furthermore, many young fresh graduates who are aged between 23 and 30 are not insurance smart. They do not know what benefits are covered under certain personal accident, car and motorcycle policies and what events can trigger these benefits and insurance claims. Moreover, they are not aware, or to certain extent, do not cognize at all the importance of insurance in their lives not until something happen to themselves, their car or motorcycle.

Therefore, the main objective of this project is to develop an Insurance Management System for Fresh Graduates Using Web Based Decision Support System which is able to help young fresh graduates in choosing the suitable insurance policy(ies) for personal accident, car and motorcycle.

On the other hand, the scope of this study concentrates on the conceptual model of a decision support system which comprises of data management which stores and maintains data that the system will use, model management which oversees the framework and structure of the system, knowledge management which governs the creation and dissemination of knowledge to present them to the users in a manner that they make informed decisions more easily and lastly, dialog management which includes graphical user interface for users to interact with the system. Thus a decision support system prototype will be developed within fourteen (14) weeks with prototyping methodology. This prototyping methodology ensures the prototype always run in "system test" mode where the developer working with the prototype consistently modify and add features to it according to comments from the end users until completing the design of the system.

II. RELATED WORKS

A. Insurance: Definition and Concepts

According to Oxford Dictionaries Online, the word 'Insurance' has two meanings. First, it is an arrangement by which a company or the state undertakes to provide a guarantee of compensation for specified loss, damage, illness, or death in return for payment of a specified premium Second, it is a thing providing protection against a possible eventuality. Cambridge Dictionaries Online explained insurance as the agreement in which you pay a company money and the company pays the cost of you have accident, injury, or loss. Simply say, insurance is protection against possible financial loss.

Insurance premium is the money paid to the insurance companies periodically depending on term in exchange for compensation upon occurrence of some events such as death or injury. Conversely, insurance policy is a legal written contract detailing the terms and conditions of insurance such as premiums, coverage and term.

The concept of insurance is often understood in terms of commercial insurance or market insurance [1]. This is because the level of benefit is approximate to the payment of contributions (premium) one wish to make. A higher payment of contributions can be able to get an exchange of equal value which is a higher level of benefit and vice versa.

B. Decision Support System

A decision support system (DSS) is not a computer-based system primarily designed to collect, manipulate and distribute information [2]. Rather it is a system linked to the process by which managers arrive at decisions. Its role is not to replace the decision maker, but to enhance his or her effectiveness. An experiment of a business strategy course given one side of the decision makers with DSS aided and another side without DSS aided was conducted. The side of decision makers with DSS aided is made up of three (3) persons while the teams with the same amount of people in another sections are without a DSS aid. As a result, the (3) persons made substantially more effective decisions than the other teams without a DSS aid [3]. The result

was an indication of increasingly human dependency on DSS to make complicated decisions in real world.

C. WWW Technologies and Web Based System

The World Wide Web (WWW) can be used a platform to build DSS to solve problems for a wide range of users [4]. A web based application is an application that is accessed with a web browser over a network such as the Internet or an intranet [5]. With web browsers such as Mozilla Firefox, Google Chrome, Internet Explorer, Opera and Safari available for a multitude of operating system and mobile platform, the contents on the web pages can be accessed easily from geographically different and far locations as long as website address is given to users. The web based or automated system provides a far more efficiency in processing any tasks domain especially for a system that involves a lot of data collections and retrievals [6].

D. Research Works

Information problems are relevant and inherent for insurance market, thereby it is especially important to implement information management in insurance marketplace [7]. In today's insurance markets, especially China, are beleaguered with relentless information problems. This situation is known as information asymmetry in which asymmetries ex ante and asymmetries ex post mean 'before exchange' and 'after exchange' respectively. The primary reason for the existence of these information problems is the failure of market participants to access 'risk' and subsequently lead to undesirable insurance market outcomes. Simply to say, it leads to two (2) possible scenarios. The first one is asymmetries ex ante or adverse selection where one accepts contract favor to himself with the information the other do not know which makes the other to be information disadvantage. For example, customers who can more accurately assess their own probabilities of incurring accident seek insurance and companies have difficulties in making reliable assessments because the task of an insurance company is to select individuals whose probabilities of accident are similar to that of the risk group as a whole. Unless the insurer can identify the risk it is assuming accurately, otherwise adverse selection will incur great loses to the insurer. The second one would be asymmetries ex post or moral hazard where one damages the agreement to benefit from his information advantage for his utility maximization. An example would be deception to obtain insurance compensation from insurance companies to achieve personal intentions and it violates the insurance coverage policy of not intending to cheat. Therefore, an insurance information management is a must because it is one of the solutions to asymmetries.

On the other hand, insurance companies are more and more forced to continuously upgrade their portfolio of products and services due to sophisticated demands from customers [8]. This is especially true in the insurance industry where long term relationship between the insurance companies and the customers is not established. Moreover, insurance is an intangible product so it would be hard to determine a 'good' insurance. Apart from that, it is difficult for insurance companies to deal with loyalty of customers as the market is no longer one single insurance company and customers always maintain contacts with several of them. Once customers are not satisfied with the products and services of one, they will switch to another insurance products and services easily. For this reason, mobile technology presenting services or known as Mobile E-Services are introduced as value added service to build a good customer relationship management.

India has initiated reforms in the insurance sector with the passage of Insurance Regulatory Development Authority Bill by the Parliament in December 1999 and open up its insurance market to private competitors by the year 2000. With that initiative, new private companies have invested millions of money on information technology for the automation of the branches, bringing new technological innovative dimension to improve their efficiency through reducing the operational time and expenditure. Continuous improvement of the efficiency of these new private companies is an indicator of whether increasing IT investment on them has a significant impact. It is shown that bringing the technological changes in business, organizations are able to reduce their operational cost, increase the sale of policy directly through the website and payment of premiums through electronic payment system. However, a continuous investment on IT may not increase efficiency for a longer period as competitors in the Indian insurance market imitate each other's efforts in technological innovation and thus tied up the possibility of each other setting the pace ahead of others [9].

III. METHODOLOGY

A. Research Methodology

Two (2) research methodology are adopted to develop the system. First would be prototyping methodology, and the second are user acceptance survey and usability testing survey.

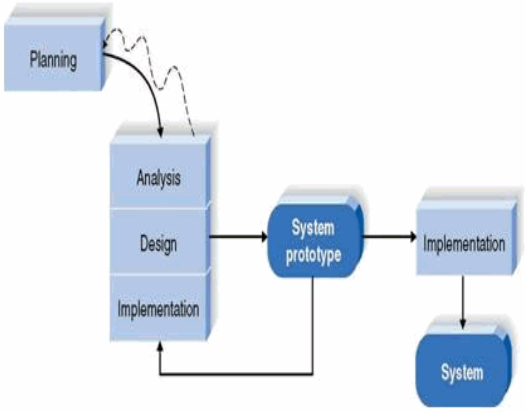


Figure 1: Prototyping Methodology

The main reason for using this methodology is because prototyping requires user involvement and allows them to see and interact with a prototype to provide better and more complete feedback and specifications by noting its strengths and weaknesses, what needs to be added, and what should be removed. The first prototype is modified, based on the comments by the users and a second prototype of the new system is constructed. The second prototype is evaluated in the same manner as was the first prototype. Then, the final product is likely to satisfy the user's desire for look, feel and performance.

Moving to user acceptance survey, its purpose is to help the developer to identify the factors that affect the acceptance level among the targeted respondents of a Web Based DSS that will guide them through buying suitable personal accident, car or motorcycle insurance policy(ies). The measures of the survey include what users expect from the proposed web system such as reliableness, efficiency and effectiveness. On the other hand, usability testing survey is to find out the level of usability of Insurance Management System for Fresh Graduates Using Web Based DSS. This survey will determine the degree of likeliness of target respondents towards the proposed web system's overall layout and look. Apart from that, this survey also contains System Usability Scale (SUS) score which will find out the sustainability of the proposed web system.

B. Project Activities

Planning Stage

- Conduct feasibility study and background study for the proposed web system
- Data gathering through online surveys

Analysis, Design and Implementation Stage

- Identify potential problems that may arise in the future regarding the web system
- Analyze deliverables
- Develop interfaces of the web system
- Produce a prototype
- Testing the prototype
- Enhance the prototype
- Conduct User Acceptance Survey
- Conduct Usability Testing Survey

Implementation Stage

- User training to educate users on how to use the system

System Stage

- Regular maintenance and update of insurance information

C. Tools Required

Elements	Software/ Platform
System Development Tool	Adobe Dreamweaver CS3
Web Programming Languages	PHP, CSS, JavaScript, HTML
Database	phpMyAdmin, MySQL
Web Server	WampServer 2.2

Table 1: Necessary Software/ Programming Languages to Develop the Web Based DSS

Hardware	Requirements
CPU	Intel Centrino 1.6 Ghz Processor or higher
Memory (RAM)	1 GB or higher
Hard Disk	500 MB
Thumb Drive	2 GB

Table 2: Minimum Hardware Requirements to Develop the Web Based DSS

IV. RESULTS AND DISCUSSION

A. *User Acceptance Survey*

Of the study population, 20 respondents completed and returned the questionnaire. Out of the 20 respondents, 15 of them are fresh graduates between the age of 23 to 30 and the remaining 5 of them are insurance agents from different insurance companies.

Level of Significance / Factors	No. and % of respondents chosen low	No. and % of respondents chosen medium	No. and % of respondents chosen high
Convenience	0	0	20, 100%
Easiness	0	0	20, 100%
Conciseness	0	5, 25%	15, 75%
Reliableness	0	0	20, 100%
Efficiency and Effectiveness	0	6, 30%	14, 70%
Accuracy of Output	0	0	20, 100%

Table 3: Summary of User Acceptance Survey from 20 Respondents

Overall, it can be seen from figure above that the respondents demand high level of convenience in the proposed system in the sense that it can be used anytime at anywhere with the presence of Internet connection. Furthermore, they also prefer a proposed web system that is extremely easy to use in such a way that the benefits and functions of the proposed system are straightforward and apparent. On the other hand, the respondents demand medium and high level conciseness in the proposed system where all necessary insurance information are displayed. Additionally, all respondents will tend to rely heavily on the proposed web system in helping them to choose suitable insurance product(s) for personal accident, car and motorcycle. Most importantly, the respondents want the proposed web system to help them to enhance efficiency and effectiveness in the insurance buying process for personal accident, car and motorcycle. The efficiency measures include time saved in comparing insurance product(s) from different insurance companies and visits per prospect to each reference source such as friends and family while the effectiveness measure is the output of the system which displays the insurance product(s) correctly for personal accident, car and motorcycle. Lastly, what the respondents are most concerned about is the accuracy of output in the proposed system, particularly if the insurance product(s) suggested by the system really meet(s) users' inputs, demands and requirements.

B. *Usability Testing Survey*

Of the study population, 20 respondents completed and returned the questionnaire. Out of the 20 respondents, 15 of them are fresh graduates between the age of 23 to 30 and the remaining 5 of them are insurance agents from different insurance companies. Usability testing survey is divided into two (2) parts, where the first part is system design interface survey and the second part is SUS.

Indications / Questions	No. and % of respondents chosen Yes	No. and % of respondents chosen No
Navigation of the system is easy.	18, 90%	2, 10%
All functions of the system worked properly.	17,85%	3, 15%
The font size and style in the system were suitable for reading.	20, 100%	0
The terminology of insurance in the system was clear and precise.	20, 100%	0
The amount of explanation was adequate for performing tasks.	20, 100%	0
Indications / Questions	**No. and % of respondents chosen Clear**	**No. and % of respondents chosen Confusing**
Sequence of Web Pages after Button Clicks	20, 100%	0

Table 4: Summary of System Design Interface Survey from 20 Respondents

As shown in table above, 18 respondents or equivalent to 90% of the total respondents agreed that navigating around the proposed web system is easy and the website layout made information and functions easy to find. However, there are also 2 respondents who claimed that the navigation on the proposed web system is not easy and found it difficult to look for information and functions under the website layout, comprised the remaining 10% of the total respondents. Apart from that, 17 out of 20 respondents who tested the web system felt that all functions of the radio buttons, buttons and links in the proposed web system worked properly. They incorporated 85% out of the total respondents. On the other hand, 3 respondents who constituted the remaining 15% found some broken links or buttons in the proposed web system. All the respondents who tested the proposed web system also felt that both the font size and style used in the web system were suitable for reading. Similarly, there are no respondent who claimed that the terminology of insurance in the proposed web system was not clear and precise. In addition, all respondents also believed that the commands on the proposed web system are sufficient to guide the users in carrying out the necessary functions. Lastly, all respondents found out that the sequence of web pages is clear where they are being directed to the correct and relevant web pages after clicking on certain buttons or links on the

system. Therefore, it is said that the respondents believed that the proposed web system is informative and interactive. They also believed that the system simplifies the process of users comparing insurance product(s) offered by different insurance companies one by one and thus save significant time and efforts of theirs.

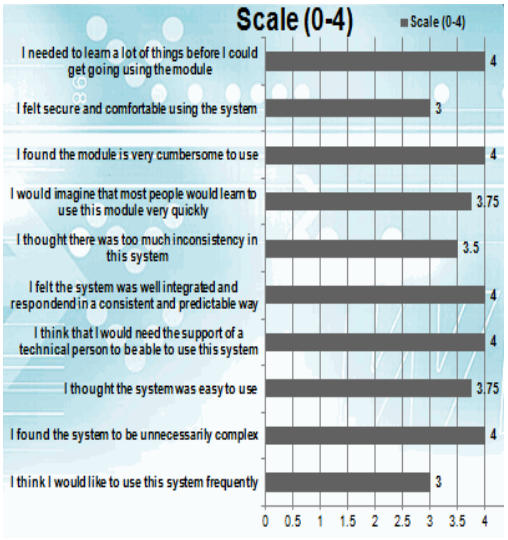


Figure 2: Summary of System Usability Scale (SUS)

To calculate the SUS Score, first sum the score contributions from each item. Each item's score contribution will range from 0-4. For items 1,3,5,7 and 9 the score contribution is the scale position minus 1. For items 2,4,6,8 and 10, the contribution is 5 minus the scale position. Next multiply the total average score contributions by 2.5 to obtain the overall value of system usability [10]. The proposed web system obtained a total score of 37.0. Multiply 37.0 with 2.5 would yield a SUS score of 92.5.

A SUS score above a 68 would be considered above average and anything below 68 is below average. Scoring at the mean score of 68 gets the system a C and anything below a 51 is an F [11]. Therefore, the SUS score of 92.5 indicated that the proposed web system has an A and possessed high level of usability . Thus, users are more likely to use the system once it is implemented.

C. How the System Works

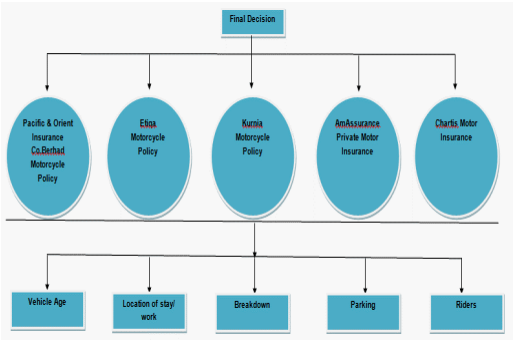


Figure 3: How Proposed Web System Suggests Motorcycle Insurance Products to Users

As shown in figure above, to obtain the final decision which is the suggested motorcycle insurance product(s), combination of inputs at the bottom of the figure are tested with the five (5) insurance products from different companies found at the middle of the figure by the system. The more combination of inputs are found or coincided in certain insurance products, then the insurance products will be selected as the final decision and said to satisfy most of the users' inputs, needs and requirements. For example, if Etiqa Motorcycle Policy offers protection for parking, breakdown and riders (It already satisfy three (3) out of the five (5) inputs) while the others do not or offer lesser protection than Etiqa's, then Etiqa Motorcycle Policy will be selected as the suggested insurance product. If there is another product, said AmAssurance Private Motor Insurance also offers all the protections offered by Etiqa Motorcycle Policy, then both Etiqa Motorcycle Policy and AmAssurance Private Motor Insurance will be selected by the system as the suggested insurance products. The role of DSS is just to enhance user's effectiveness and making a decision often involves opportunity cost. Therefore, the final insurance product decision still lies on users. The exactly same concept is used by the system to suggest car and personal accident insurance products to users.

D. Use Case Diagram

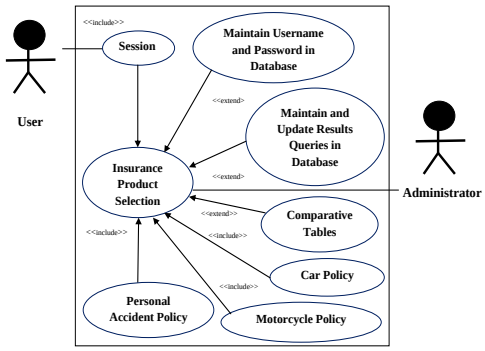


Figure 4: Use Case Diagram of System Administrator and Users

As shown above, administrator has two (2) jobs which are : -

- Maintain user's username and password in database
- Maintain and update results queries in database. The results queries refer to insurance products for personal accident, car and motorcycle of many different companies

On the other hand, users can enjoy two (2) functions in the proposed web system. The first one is insurance policy selection where the user can choose whether he/ she want to buy personal accident, car or motorcycle insurance product(s). Apart from that, they can also browse through the comparative tables for personal accident, car and motorcycle to view the insurance benefits offered by different companies at one glance.

E. System Deliverables

Figure 5: Home Page after User Login

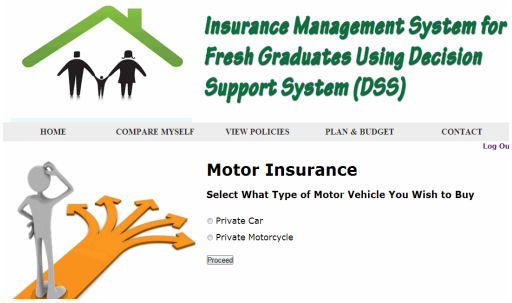


Figure 6: Motor Insurance Page to Select Private Car or Private Motorcycle

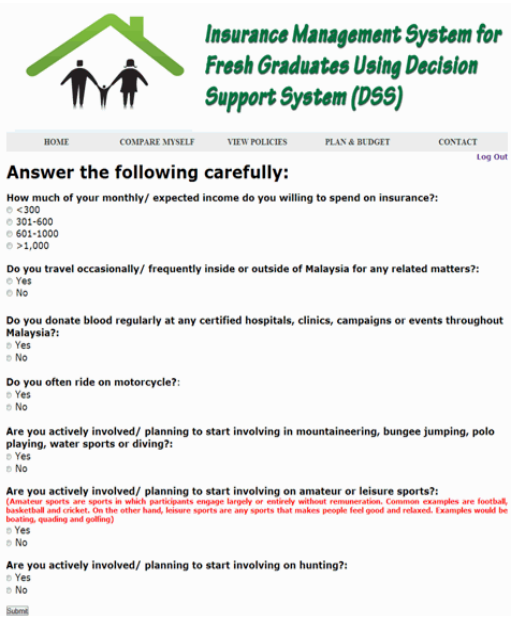


Figure 7: Questions Page (Input Page) for Personal Accident

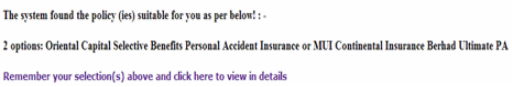


Figure 8: Result Page for Personal Accident

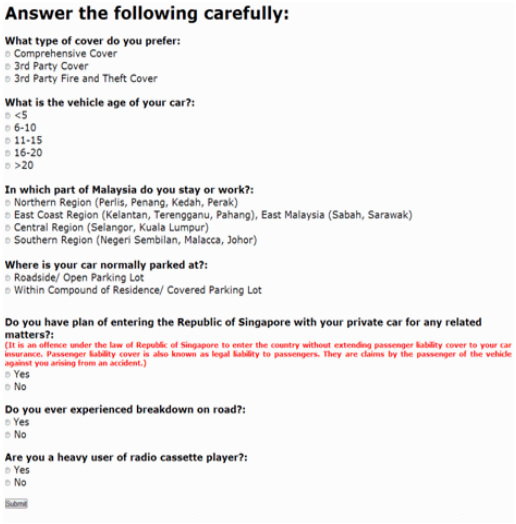


Figure 9: Questions Page (Input Page) for Car

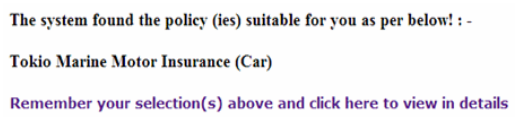


Figure 10: Result Page for Car

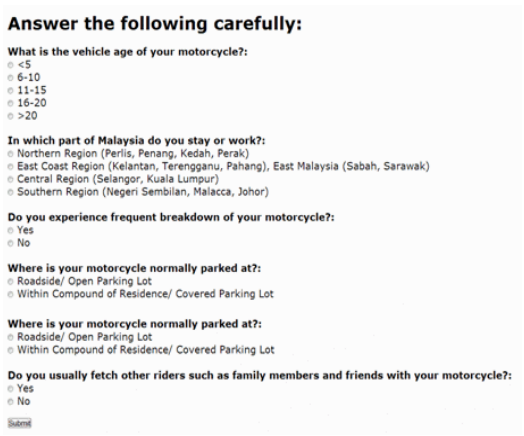


Figure 11: Questions Page (Input Page) for Motorcycle

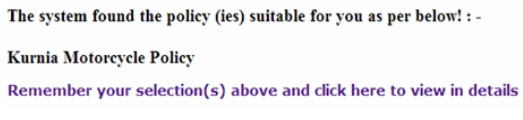
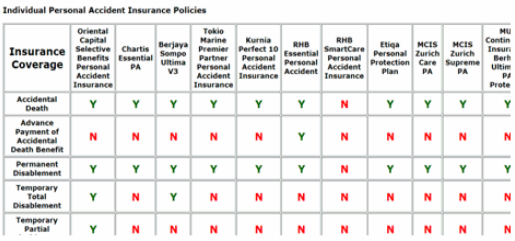


Figure 12: Result Page for Motorcycle



Y - Available for coverage , N - Not Available for coverage

Individual Personal Accident Insurance Policies

Insurance Coverage	Oriental Capital Selective Benefits Personal Accident Insurance	Chartis Essential PA	Berjaya Sompo Ultima V3	Tokio Marine Premier Partner Personal Accident Insurance	Kurnia Perfect 10 Personal Accident Insurance	RHB Essential Personal Accident	RHB SmartCare Personal Accident Insurance	Etiqa Personal Protection Plan	MCIS Zurich Care PA	MCIS Zurich Supreme PA	MU Contin Insur Berh Ultim PA Prote
Accidental Death	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Advance Payment of Accidental Death Benefit	N	N	N	N	N	Y	N	N	N	N	N
Permanent Disablement	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Temporary Total Disablement	Y	N	Y	N	N	N	N	N	N	N	N
Temporary Partial	Y	N	N	N	N	N	N	N	N	N	N

Figure 13: Comparative Table for Personal Accident

Y - Available for coverage , N - Not Available for coverage

Private Car Policies

Insurance Coverage	Tokio Marine Motor Insurance (Car)	QBE Private Car Insurance	Etiqa Private Car Insurance	AIA Comprehensive Private Car Insurance
Comprehensive Cover				
Accidental Collision or Overturning	Y	Y	Y	Y
Collision or Overturning Caused by Mechanical Breakdown	Y	N	Y	N
Collision or Overturning Caused by Wear and Tear	Y	N	Y	N
Impact Damage Caused by				

Figure 14: Comparative Table for Car

Y - Available for coverage , N - Not Available for coverage

Private Motorcycle Policies

Insurance Coverage	Pacific & Orient Insurance Co.Berhad Motorcycle Policy	Etiqa Motorcycle Policy	Kurnia Motorcycle Policy	AmAssurance Private Motor Insurance	Chartis Motor Insurance
Loss or Damage to Vehicle					
Accidental Collision or Overturning	Y	Y	Y	Y	Y
Collision or Overturning Caused by Mechanical Breakdown	N	Y	Y	Y	N
Collision or Overturning Caused by Wear and Tear	N	Y	Y	Y	N
Impact Damage Caused by Falling Objects Provided No	N	Y	Y	Y	N

Figure 15: Comparative Table for Motorcycle

V. CONCLUSIONS

A. Relevancy to the Objective

The proposed Insurance Management System for Fresh Graduates Using Web Based Decision Support System is a web integrated decision support system that help fresh graduates who are in the range of 23 and 30 to buy the most suitable insurance policy for personal accident, car and motorcycle. An additional feature of the system would be comparative tables for personal accident, car and motorcycle that allows the user to compare insurance benefits offered by different insurance companies in table form at fast glance. As discussed in Results and Discussions, it can be said that the proposed system has achieved its objective successfully. Users can now use the web system to look for suitable insurance product(s) in personal accident, car and motorcycle without having to waste time and efforts in approaching the reference source(s) such as friends, family and insurance companies and comparing insurance product(s) one by one.

B. Suggested Future Work for Expansion and Continuation

The outcome and performance of the Insurance Management System using Web Based DSS is remarkable. However, for personal accident, it only includes suggestions of insurance products from nine (9) insurance companies currently operating in Malaysia, while for car, four (4) and motorcycle, five (5). In order to increase the usability of the web system, the future work that can be done includes increasing the number of insurance companies in the system for personal accident, car and motorcycle. This enables the users to have more options to choose from. Furthermore, the web system can be extended to offer users to choose suitable insurance products for their housing, travelling, retirement, planning, education and many others.

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