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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ABDUL WAFIY BIN ABDUL KARIM

CERTIFICATION OF APPROVAL

The Developemt of Business Ownership Selection System

(BOSS)

By

Abdul Wafiy Bin Abdul Karim

A project dissertation submitted to the
Business Information System Programme
Universiti Teknologi PETRONAS
in partial fulfilment of the requirement for the
BACHELOR OF TECHNOLOGY (Hons)
(BUSINESS INFORMATION SYSTEM)

Approved by,

_____

(DR. BAHARUM BIN BAHARUDIN)

UNIVERSITI TEKNOLOGI PETRONAS
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SEPTEMBER 2012

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ABSTRACT

Entrepreneurship has become the new trend in the world today and with a correct system may help foster the growth of the development of the entrepreneurship section of the economy. This paper will look at the problem face by new entrepreneur in choosing the forms of ownership and on how the development of the Business Ownership Selection System that is a kind of expert system could help in addressees those problems. This paper also will look like experts opinion and past research regarding what is that make an expert system a success and how to evaluate the success of implementation of an expert system and how the research could help in the development of the expert system. Furthermore, this paper will also explain the methodology that has been chosen in the development of the system. The criteria, and advantage of the chosen methodology and the activities and project framework that has been design based on the selected methodology. The Paper also will explain about the findings of the data gathered that proves the need of the ownership system. Furthermore the paper will go into details regarding each step of the design steps of completing the system from the planning until details regarding the designs of the interface of the system and the testing method that have been conducted throughout the process

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ABBREVIATION AND NOMENLECTURE

BOSS	Business Ownership Selection System
GUI	Graphical User Interface
GDP	Gross Domestic Products

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First and foremost, I would like to thank Allah S.W.T for giving me a chance and Strength to fulfill my final year project. Without His bless and guidance my effort are nothing. Alhamdulillah, He helps me and giving me chance to work with variety of people behaviors' and expose me with the real nature of system development.

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I also wish to express my sincere gratitude to my supervisor, Dr. Baharum bin Baharudin for the ideas shared. He was a fatherly like figure who always give his best in giving guidance and constructive feedback throughout the whole process. I believe, his knowledge sharing is not only a good investment here but also in here after.

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CHAPTER 1

PROJECT BACKGROUND

1.1. INTRODUCTION

With the global economic crisis that are rising, many people especially the young fresh graduate has feel insecure about their future and knowing that their dreams in getting a job after graduation may not be as bright as before. It is almost the same for people that are currently working in an organization. They also felt the tremors of the economic crisis when some companies had to reduce the company size to cope with the problem thus creating many corporate castoffs. Some of the employee also that is afraid of the downsizing of an organization has made major decision by leaving the company and being corporate dropouts. The effect of all these factors have encourage people to take on a new challenge that is becoming and entrepreneur and starts their own business.

According to (Thomas W.Zimmer, 2008) Entrepreneur can be define as one who creates a new business opportunity and having to face risk of ambiguity for the purpose of attaining profit and growth by detecting opportunities and gathering all the resources needed and capitalize on them. In being an entrepreneur one must possess qualities or characteristics that are well blend together as entrepreneur. Some of the characteristics are; desire for responsibility, preference on taking moderate risk, desire for feedback, high level of energy, and value achievement over money, and one that really stands out in all entrepreneur is Diversity. All of these characteristic needs to be consider for someone who wants to become an entrepreneur

Being an entrepreneur brings a lot of advantage. The advantage can be categorize into two, the first categories is the advantage to the entrepreneur itself. A person who successfully becomes an entrepreneur will enjoy many opportunities such as:

- **Entrepreneurs can create their own destiny in life**

  This means that when someone becomes and entrepreneur. They can achieve what is important to them whether its money, happiness, prosperity. It is theirs to partake.

- **Entrepreneur can reach their full potential**

  this advantage can be seen when the entrepreneur are from a working background where as a worker, they cannot do things that beyond their job scope because they had to do things that are ordered by the superiors to them. By being an entrepreneur, they are the boss and they can do things and express themselves in a way that they have never done before.

- **Entrepreneur can reap Impressive Reward**

  by becoming an entrepreneur, a person can have the opportunity in getting a huge financial profit and it has proven that entrepreneurs are four times likely to become a millionaire compared to people that are working. This shows that people who are self-employed can reach their full potential and as a result becoming a successful person

- **Entrepreneur can do what they enjoy and having fun while doing it**

  there is a quote saying :

  "*if you choose the job that you love, you don't have to work a single day in your life"* – Confucius

  From the quotes, we know that if we are enjoying what we do then it is not mean as work because it is fun. This is what happens to entrepreneur, they are the one that choose in being an entrepreneur and they are willingly to face all the challenges as an entrepreneur thus they have fun

facing it rather than feeling stress about it although sometimes they will but they knew that at the end, a huge rewards await them.

The second category of advantage is to the nation and the entrepreneur surrounding. In many world-leading countries, entrepreneurship has become one of the main branches in contributing to the economy of a country and has proven to increase the level of living of the people in the particular country. In South East Asia such as Malaysia, Thailand, Indonesia, the government have promote entrepreneurship industry by giving help by pointing governmental organization in giving either monetary help, advise and consultancy or both in assuring the people that wants to become an entrepreneur can get on their two-feet. Moreover, the results that these countries have seen are:

- **The increase of Gross Domestic Product (GDP)**

  According to the department of Statistics Malaysia, in 2005, the development of entrepreneurship in Malaysia has given positive effect where the GDP of Malaysia increases from 38.3 percent to 58.2 percent over a one-year period. That really shows on how much entrepreneurship can influence the development of a country

- **The increase of hired worker**

  The starting of one own business means that more opportunity of jobs vacancy because a company needs it workers. Therefor the needs of labors and white-collar laborers are needed to work in the company either full-time or contract basis.

- **The development of new products and service in particular country**

  As an entrepreneur, they might design, or make their own product or create their own services to satisfy the customer needs of a certain market segment or called *niche*. Therefore, this will eventually lead to new

development and findings that can maybe give benefit not just to the entrepreneur but also to the public.

A good entrepreneur must consider **four (4) P's** before opening a business. The factor are; product, price, place, and promotion. This four are interrelated and it is important for an entrepreneur to establish a good and design a well balance strategy based on the factor to ensure that the entrepreneur has a high chances of gaining success in the business that they venture to.

1.2. PROBLEM STATEMENT

For new people that are just planning in venturing into the entrepreneurial world, they know that they are putting everything on the line in becoming a full time entrepreneur. Therefore, they need to select the best form of business that are suitable for their geographical area that they want to open the business and also whether the business that they are opening suits them as a person based on the traits of an entrepreneur mention in the introduction. The form of business is in one of the 4P's stated that is in the product. Meaning that, by choosing the right form of business, the entrepreneur will know what kinds of product that he or she wanted to sell. Thus if they do not choose the best form of business form them, they are at risk of losing their capital which is not small, sometimes can cost up to a few thousands of dollars.

Moreover, the lack of data help that they are getting in choosing the business also can cost them to make a mistake in choosing the form of business thus will affect their strategy in determining the other 3P's that is price, place and promotion because of the wrong type of product that they have selected to sell or market.

1.3. OBJECTIVE

- To design an expert system that will help in choosing the best form of business based on the data collected by the entrepreneur
- To assist an entrepreneur in choosing the best possible form of business to be open on a particular area

- To increase the percentage of success for the entrepreneur regarding the business that he choose to enter.

1.4. SCOPE OF STUDY

The problem has well mention about future entrepreneur in needs of an expert ystem that helps in analyzing, calculating and produce the most possible form of business that the entrepreneur can open in the designated area based on a the data collected and a few question that needed to be answer by the person given by the system

In this case, the entrepreneur needs an expert system, which can help them with their data that have been collected by the entrepreneur such as the population, level of income, education background, etc. Although this looks simple but the complexity are in the algorithm and the logical decision that it has to make in calculating and deducing the best option to the user in opening its business.

Beside the data that they have collected, the system that will consider the attribute of the seller therefor considering the human attitude and personality as well before the system produce the result. Therefore, the result produce are not just a business that are suitable by the area of the entrepreneur but also by the entrepreneur preferences and personality.

Furthermore the development of the system require the proper study on the scope of the tools and software that are needed in order to produce the best expert system that can cater the requirement and its objection mention. The algorithm and logical reasoning needed to be identified in order to find the best solution in developing the system that are not easy for the user but also ease the programmers burden in developing the system. This is because of the consideration of constraint such as time, cost, skills and knowledge required and possesses.

1.5. RELEVANCY OF PROJECT

The expert system or called as Business Ownership Selection System (BOSS) that are develop is believed to be the first in the industry. This is because previously

every person that wishes to become an entrepreneur has to make studies and analyses manually their results. This can cause the person to make mistakes or error in the process.

Moreover, some person would have to spend a lot of money and time in getting professional help regarding advices and consultancy in opening the best form of business ownership that somehow would perform similar function to which the system does. By developing and implementing the system, it will help starting entrepreneurs to save cost and time but still getting the similar result that they can get by paying high prices for consultants and professional help

In addition, the relevance of the system design and implementation is to cater the business ownership that the entrepreneur wants to operate with the attribute and personal criteria of the entrepreneur. This is because, not every forms of business is suitable for everyone, sometimes an entrepreneur needs to cater both the surrounding and also himself because eventually he will be the one that have to spend all the money in developing the business and the success and failure of the business reast upon the entrepreneur shoulders.

1.6. FEASIBILITY OF THE PROJECT

After looking at the requirement and doing research on the method of developing the system and the requirement that are needed by the entrepreneur. It is decided that the Business Ownership Selection System (BOSS) that are being design suits the needs and criteria needed for the entrepreneur in selecting their own business ownership. This is based by the feasibility that is stated.

1.6.1. Operational Feasibility

In operational feasibility section, it measures on how BOSS will solve the problem for the entrepreneur regarding the analyzing of data and also the personal attributes of the entrepreneur and takes opportunities identified during the scope definition and the problem analysis phases that will be discuss more in chapter two of the

proposal. Besides that, it determines on how well it fulfill the requirement of the users.

In BOSS, the user that is the entrepreneur will have their set of data collected and then entered into the system via a user interface that are user-friendly and easy to navigate through. The system then will make the calculation and analyze the data, based on the data accepted from user and the algorithm that has been design. Then, the system will prompt a few questions that have to be answer to complete the process before the system will come out with the decision. This will give them much faster result and saving time and money but still maintaining the human interaction.

1.6.2. Cultural Feasibility

In cultural feasibility, it deals with the way the entrepreneur feel about BOSS. BOSS is expected to be use by new entrepreneur in choosing the most possible form of business ownership that is suitable to the surrounding and the owner. The expectation of BOSS is that the system will helps save the entrepreneur both time and money in order to accomplish the task. The system is expected to be simple to us as it will be guided by user-friendly interface and with proper training that will be given, they can adapt to the system fast and efficient.

1.6.3. Technical Feasibility

In developing BOSS, the most essential is that the developer needs to familiarize itself with the technology such as tools, hardware and software that will be use in the development of process of the system. After looking at the features needed for the system and the requirement of it, the shortlisted tools that are going to be use is using Microsoft Visual basic 2008. Microsoft Visual Basic 2008 is a console in developing graphical user interface applications that can support VB.net language. The advantage of using Microsoft Visual Basic are it has many tutorial online that can be easy to learn and also are also made by Microsoft itself thus there are many help online that are easy to search.

Nonetheless, there are candidate in developing the expert system such as the Exsys Corvid Expert System Tools by Exsys.Inc. this is a specialize tool in creating an expert system that give an easy way to build an interactive Web application that capture the logic and process that are used in the problem solving. But the constraint is the price that are quite high and it takes a proper practice for the developers to adapt with the system. But, nonetheless, it will ease the task of both the developer and the user in accomplishing the task.

1.6.4. Schedule Feasibility

In schedule feasibility, it is the issue of measurement of time allocated for the development of the project, from the planning phase until the implementation phase. Looking back on the scope of the project, the expectation of system, and other factors, the period that has been design and allocated is reasonable. The details for the schedule will be explained further inside this report.

1.6.5. Economics Feasibility

In economics feasibility, the important is to know any additional tools or equipment that are needed and if there will incur any cost to it or not. In the development of BOSS, it has stated that there are the consideration of using another expert system development tools that is the Exsys Corvid Expert System in the development of BOSS and thus require some amount to acquire it.

For the user that is the entrepreneur, the system will not cost them because the system will be available for free and can be downloadable to help the entrepreneur but in the future as the features increase, the possibility of putting a price is there because to cope with the cost.

CHAPTER 2

LITERATURE REVIEW

Malaysia has remained an attractive place for foreign investor and new business to open up in the country although has been tested with controversy around 1999.this is proven by the increase in the Gross Domestic Product (GDP) of the country in 2001 by 2% (International Entrepreneuship, 2001). This is also a factor for new entrepreneur to be encouraged to open their business, as the future seems bright for Malaysia. In 1995, The Malaysian government established a new department that is The Ministry of Entrepreneur Development to show that the country is confidence that entrepreneurship will be a great success in the Malaysia market and it has been proven by the increase in economy average of 4.7% during 1996-2000. Therefore, we can see that entrepreneurship are an important source in helping the country, and entrepreneur have to choose the right form of ownership to make it happen, Hence the development of an expert system that help an entrepreneur in choosing the right business is essential and needed. In this chapter it will look on three sections that is; the success factors in developing of an expert system , the related expert system that have been done related to entrepreneurship, and the evaluation on a good expert system.

2.1. SUCCESS FACTOR OF AN EXPERT SYSTEM

In developing, an expert system that gives the best option for entrepreneurship is not an easy task. Therefore as developer, we have to look on what are an expert system and what is the success factor that contributed to the success of an expert system. According to Guimareas, Yoon et al, and O'Neal (1995) they describe an expert

system to a system which comprises at least knowledge base, interface engine, an explanation module, and a user interface in order to simulate experts decision making. He added that the basis of an expert system is for the system to capture and use the knowledge from high-level experts to assist less proficient expert system users. Duda &Shortlife(1983) also states that an expert system focuses more on the knowledge and expertise rather than on transaction processing or computational method. The author stated from a prior research made by BARSANTI (1990) there are five (5) factors that related to the implementation of expert system. They are:

1. Top-Down corporate Support
2. Expert selection
3. Support group
4. Tool selection
5. Project selection

However, as time progresses more comprehensive list of determinants of a system was develop and the author listed eight(8) major variables that contributed to the success of en expert system implementation

1. Difficulty of problem
2. Domain expert characteristics
3. Developer skills
4. End user characteristics
5. Expert system impact on the end-user
6. Shell Characteristics
7. User involvement
8. Management Support

Therefore, it can be say that in developing an expert system, all of these characteristic have to be taken into account in order in assuring a success in the development of the system

According to Millet (1996) he quoted from Boynton and Zmud (1994) that define success factors as “those things that must go well to ensure success for an organization”. Millet approach is by using a senior management approach to find the success factors of implementation of an expert system by conducting a semi-structured interview and the result are that the factors that contributed to the success of expert system are:

1. The existing of a champion in ensuring IT projects are enacted are vital in an IT project.
2. The impact of past successful projects may affect the success of new expert system project.
3. The development tools that is suitable for the development is crucial for a crucial of a project.

According to Boehm.B and Bose.P (1994) they define a success of a success factors are divided into three (3) critical success factor. The factors are :

1. Can perform core decision and eliminates less critical aspect of the task
2. Can cater a sophisticated level of decision
3. Easy in interpreting the data

This shows that an expert system need to perform one or more of this function in order to be consider as a success.

According to Efrain.T (2001), in order to categorize a system as a success it needs to be able to perform two (2) major functions that is :

1. Giving knowledge acquisition to customer
2. Gave impact on the user that uses the expert system

2.2. VALIDATION OF AN EXPERT SYSTEM

Validation of an expert system is an important concern in expert system research and development to ensure that the system that has been develop was a success and can be use for more future modification and can be implemented for a more bigger scope

According to O'Keefe, Balci & Smith (1986) there are certain challenges in validating an expert system performance specifically stated are three (3) issues that is:

1. What to Validate?

According to Gasching et.al, there are possibilities that the things to evaluate in an expert system is the final result of the system, intermediate results that are obtained, the reasoning of the system or the combination if the three.

While according to Chandrasekaran, he suggested that the things to validate are the reasoning process of a system, this is because, a poor reasoning that produce a correct result accidentally cannot be "scaled up" to a larger domain of application or may give different result when use with a more large knowledge base thus causing problems

Smith added that what to validate is related to the development process. He said in any given stages, if there are part of the system can be measured it performance with a set of given inputs, the part should be validated as to catch errors early as possible in the development life cycle.

2. What to Validate Against

Two things can be used to validate the success of an implemented expert system. They are:

- **Known results**
    - Sometimes unfair to expect an expert system to perform at a level close to known results when human cannot perform at the same level (Chandrasekaran, 1983)
    - Problems: previous experts decisions may precipitate the result
- **Experts**
    - Typical validation type
    - Can provide useful background for validation

3. When to Validate

Validation may differ with the system use, the type of research methodology use, the tools chosen, etc. this is supported by O'Keefe et.al where is said that level of acceptance may differ, for differing system and as the system is being extended, further validation may be necessary. But, the main thing is to validate the areas that may not need fine tuning in the future in order to decrease the time for modification and expansion

2.3. RELATED PROJECT

In order to know whether the project of BOSS is feasible or not, the need of looking whether is there any kind of project that are in the group of an expert system and especially regarding to entrepreneurship.

The first project is from Joses.S and Slvian.D (2006) where they have develop an Expert Diagnosis System for Benchmarking of Small Business Performance and they stated on their research a paper that an SME expert system is far more focus on the development of SME compare to on-the –rack expert system that are very general. The function of this system is to efficiently analyze the data of the company and perform an analysis on whther the company have done a good job compare to their peers. This is very interesting as if relate to BOSS. The design on how the data is being analyze is almost similar to the development of BOSS

Next, the next project paper is from Mirela.D (2008) and her project of an Expert System for Efficient Selection of Data Mining Method. The focuses on her paper is how the system be able to synthesize important data from a set of information. Her system also then provide a solution from the data that has been synthesize. This project is almost similar to the development of BOSS as the function is to filter and calculate the result based on the data given. Thus, really help in the development of algorithm of the system to product an efficient result

2.4. IMPORTANCE OF AN EXPERT SYSTEM TO ENTREPRENEUR

This is look at on how does an expert system affect the activity of an entrepreneur and its businesses. This is to show how expert system could help entrepreneur in easing come of their task.

According to York (n.d), with the help of an expert system, entrepreneurs have now manage to connect the dots between entrepreneurship and the use of technological equipment's in their daily task. He added that with the help of technology, entrepreneurs can gain many benefit that will help business especially small business to have access on information that they are never have the chance of just not aware of it. An expert system also could contribute to the health and growth of a small business and could have a thin line of difference whether the business can sustain or not. Thus it really shows clearly the importance of an expert system on the growth of a small business and how does expert system make it presence.

According to Howard (2007), He said that, technology, entrepreneurship and the success of a business are hand-to- hand in the current trend of the era. He quoted from Jim Collins that technology has act as an accelerator or catalyst that although are embedded into a simple system, it could produce a result that are beyond the expectation of the user, although sometimes it could backfired, it still proves a critical factor in a business success. In his article, it is said that successful entrepreneur will have to sue technology to leverage their effort towards achieving their goals quickly. This process include determining the strength, opportunities,

weaknesses and threats of the business that will help entrepreneur to plan their strategy in order to be successful in their business and helping the business to grow.

Therefore, it does prove that the usage of technology such as the expert system can really help the entrepreneur in prospering their business and be able to be a factor in determining the success of a small business and the sustainability of the entrepreneur.

CHAPTER 3

METHODOLOGY

3.1. CRITERIA IN SELECTING METHODOLOGY

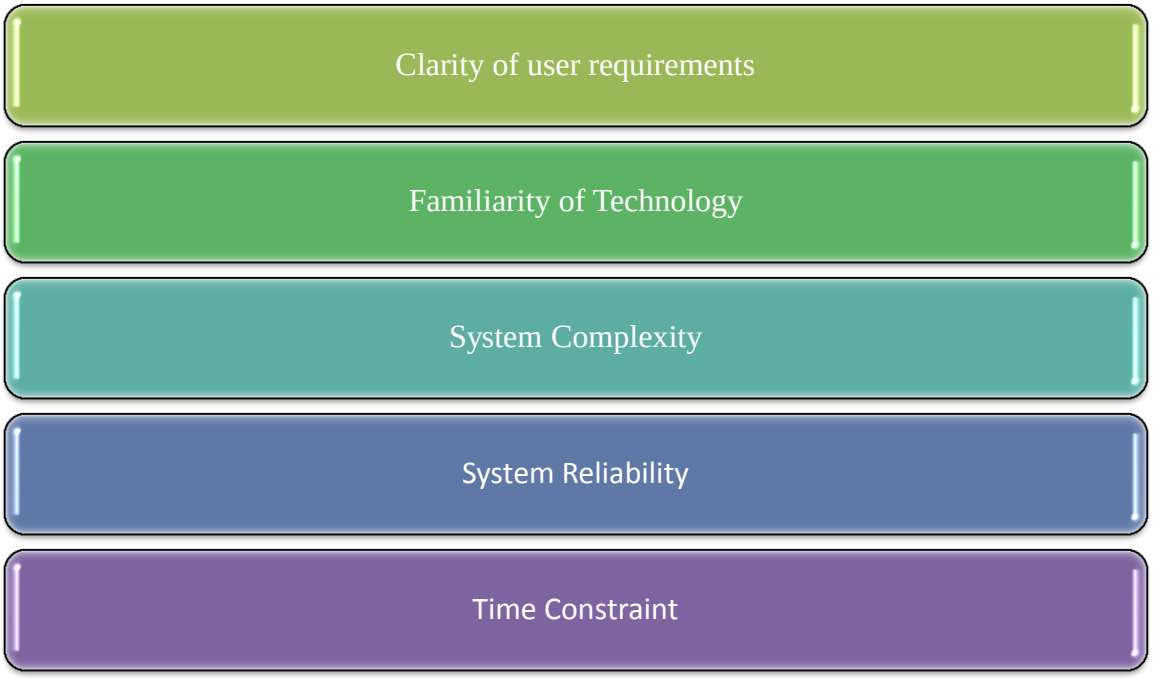

Figure 1 : Criteria in Selecting Mehodology

- **Clarity of User Requirement**

  Clarity here means is the developer knows clearly the needs and requirement and look the system holistically and knowing what kind of user that will be using the system. This is crucial because there are in some cases the developer does not fully understand the requirement and the needs of the user that are going to be using the system. And if this is the idea of the developer

itself, the developer must think as the user in order to understand the needs of the user. Therefore, the methodology chosen should address what is the best way to suits the needs of users

- **Familiarity With Technology**

  Developer must be able to identify the tools that he or she wish to use and acquire in order to develop the best system. Because the developer that cannot identify the best tools will cause the tools cannot perform up to the expectation and it cannot perform the task that the developer want it do.

  Hence the time constraint also plays a major role where developer needed to use a tool and technology that can perform the task and complete the system in the given time. Therefore, by having a right methodology will help developer in choosing the best tools for development

- **System Complexity**

  A system sometimes requires a detailed study and design in its development processes. It is the same in the design of BOSS where the complexity is in the logical analysis and algorithm design as it has to come up with. The constraints are in the algorithm itself in giving the best selection to the user that is the entrepreneur is the main concern regarding system complexity

- **System Reliability**

  System reliability is regarding the ability of the system to execute and sustain its purpose in the task given, It is also concerning to overcome unexpected situations. Therefore, the developer has to look carefully in areas where unwanted situation may occur and try to overcome it based in the methodology chosen

- **Time Constraint**

  in choosing an appropriate methodology, it is require to consider the time constraint that are given to the developer, although sometimes a methodology

will result in a good end products. However, sometimes it requires a lot of time using in developing it, and vice versa, therefore, the developer has to address the situation to try to meet both the system needs and time given.

After considering all the factors in choosing a methodology, the three basic methodologies are analyzed in order to find the best methodology to be used. The results are as follows:

	Structured Methodology	**RAPID Methodology**	**Agile Methodology**
Type of Methodology	Waterfall	Throw Away Prototyping	XP
Clarity of user requirements	Poor	Excellent	Excellent
Familiarity with Technology	Poor	Good	Poor
System Complexity	Good	Poor	Poor
System Reliability	Good	Poor	Good
Time Constraint	Poor	Excellent	Excellent

Table 1: Methodology Analysis

Based on the analyzing process that has been done, it is seen that the throw away prototyping which is under the Rapid Methodology is chosen base on the result that is it has Excellent in-terms of clarity in capturing user requirement, good in familiarizing with technology, and excellent in adapting to the time constraint.

3.2. THROW AWAY PROTOTYPING – OVERVIEW

Throwaway prototyping is a type of the general prototyping methodology, this type of methodology, the prototype develop as a part of the throw-away approach will not form part of the final solution, meaning that, only the data collected will be brought forward to the next prototyping development but the current model will not become the part of the final product.

In designing, throwaway prototyping give flexibility in terms of the interface design, layout, and interaction styles of the prototype. The designs that are usually called as ‘mock ups’ or ‘click dummies’ because they look realistic but contain basic coding just to give the user the feel on how the interface if the system will look like

One more advantage of using throwaway is because the speed of development and the modification of the prototypes is also a major reason for developer to use this kind of method and sometimes refer to as ‘rapid prototyping’.

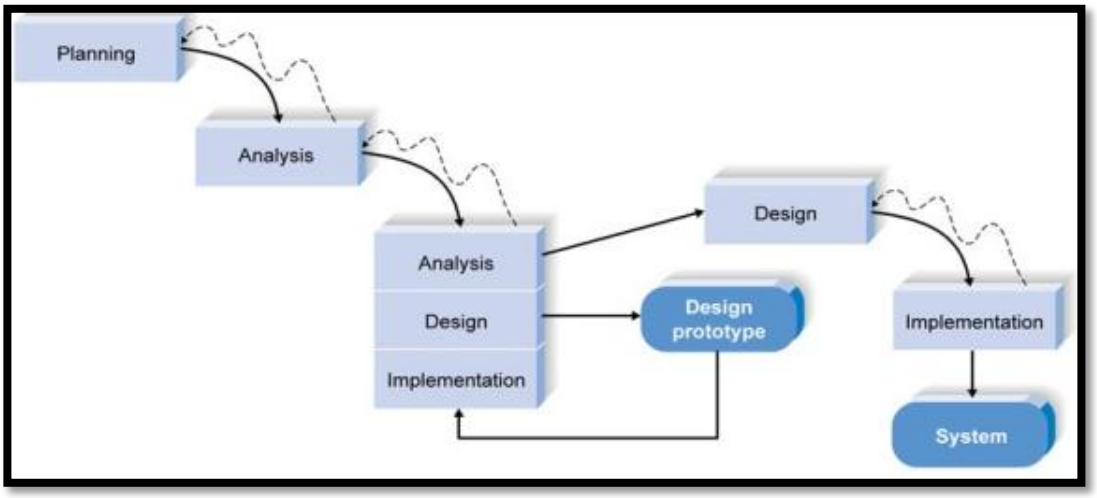

Figure 2: Throwaway Protyping

3.2.1. Planning

Planning is the utmost basic steps in the methodology; the developer needs to know on what are the needs and requirement of the user that will be using the data. Therefore, the developer needs to come up with the method in order to know whether the system is needed outside or what are the response and acceptance of the system if the system is being introduced.

For the development of BOSS, the methods in acquiring data are being done by two methods that are quantitative and qualitative method. In quantitative method, a set of questionnaire consisting of 10 question are design and are given to a target group consist 30 people. The targeted majorities groups are final year students because

these people are the potentials in being the new entrepreneur and will be the most useful target group for testing phase later in the development process and some of them are recent entrepreneurs that are asked to see the feedback from them and comments. The objective of the questionnaire is to see whether the students are going to have a plan in becoming an entrepreneurship later in the future, and whether with the development of the system will help them in making their decision of the form of ownership for the business.

For the Qualitative method, it is separated into two parts, the first that is research by using books and journals regarding previous projects on expert system generally and papers regarding similar expert system to BOSS. This is to study the system, the tools and the findings regarding the expert system that have been done and what are the improvement that can be made further. The second part is by conducting an interview regarding with some the target groups that have answered the questionnaire to have more detail answer especially with the entrepreneur to find the relation between type of business ownership and the attitude or behavior of the entrepreneur itself. This is important, as the result will help pave a way in the development of the process of the system.

3.2.2. Analyzing

After the data has been collected, it is brought to the next stage that is the analyzing stage. Here the collected data will be going through details feasibility studies. The objective of the studies is to analyze the risk and challenges that may happen during the development process. Some factors that is being consider are time constraint, skills acquired by developer, the technology, etc. This stage is also to analyze the data that have been collected earlier in order to know the needs and requirement of the user in developing the Business Ownership Selection System based on the appropriate technology and requirement

3.2.3. Design

This is where the all the data are put into the crucial part. In the design phase, the system be drafted out begins with the defining of the use of software and hardware to use for the development of the system. The design phases are separated into two phases that is:

- **Interface design**

  The creation of the Graphical User Interface (GUI) design which is the exterior part of the system. It consists of designing the window and assuring that each button and boxes can perform its function and the linkage between pages are correct before moving on to the next phase

- **System Design**

  This is where the language of the system is created that; consist of algorithm and logic in producing the intended result for the system. Furthermore, this is also, where the drawing such as the UML diagrams; class diagram is design and drawn.

3.2.4. Testing and Implementation

In this phase, the design prototype are gone through several testing such as the usability testing , black and white box testing , alpha and finally the beta testing before it is being installed into the targeted user to ensure the effectiveness of the system in producing the needed output. After that an evaluation and modification are done in order to get the feedback from the user.

For process the design and implementation system. it is done for the prototype before the final product were design based on the feedback that acquired through the throwaway prototyping method

3.3. PROJECT FRAMEWORK

In any given project, the time allocation for each section is essential in determining the success of the project because the developer can allocate which to part of the time has to be prioritized in order to develop the most possible system. Normally a Gantt chart is used to illustrate a graphical representation of the time allocation that helps to plan, coordinate, and track specific task in a project.

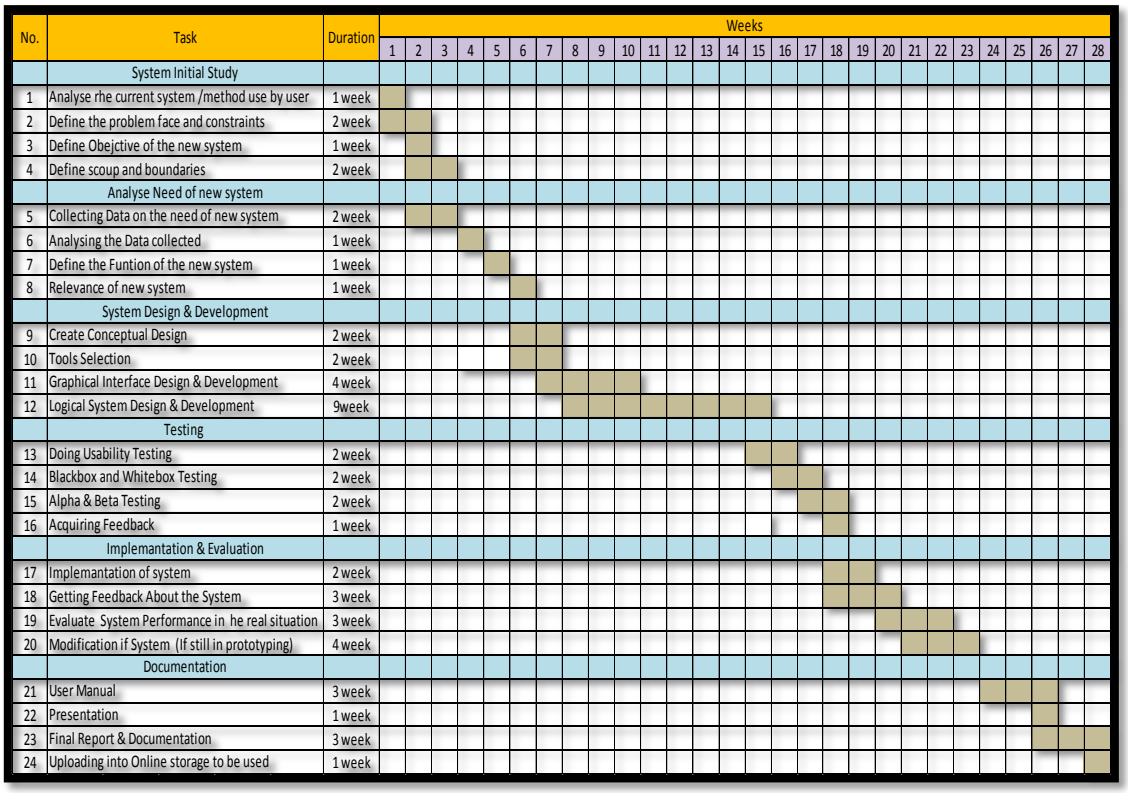

Figure 3 : Gantt chart in the Development of BOSS

From the Gantt chart, we can see that the blue label is the indicator of the project milestone that is targeted to be achieved. in the research, they are six(6) key milestone that are identified . The six milestones are system initial study, analyze need for new system, system design and development, testing, implementation & evaluation, and documentation

3.3.1. System Initial Studies

This is the system-planning phase. The first thing that should are being done is study the steps taken by the person that are wish to be an entrepreneur especially the type of ownership that are chosen by the entrepreneur and what are the basic on the form use. Then learn about the problems that are facing in the current system and the creating an objective and scope of developing a business ownership selection system (BOSS).

3.3.2. Analyze Need of New System

After observing the current system or method use, as developer, need to collect data regarding the need of new system and analyze it. After have get the fine data , a new system need to be suggested especially about the function of the new system in helping the user that is entrepreneur in becoming the solution for their problem statement

3.3.3. System Design and Development

In this phase, the developer will create the conceptual design to have the idea on how the system should lookalike. Then, the developer has to choose the right tools in order to design and develop both the external part of the system which is the user-interface before the algorithm and logic design and development.

3.3.4. Testing

In testing, the prototype that was created undergoes a few tests such as the usability test, black box and white box test, alpha and beta test, this is to receive any feedback regarding the prototype before being implemented.

3.3.5. Implementation & Evaluation

Implementation is when the system is out on test on a real life situation in a controlled group. This is to ensure easy feedback of the system from the users before being modified and build into a new version. As mention, the method that are

used is throwaway prototyping, therefore this is crucial part because the physical of the prototype will not be bring forward to the next phase.

3.3.6. Documentation

After the final result is done, the documentation is the final phase when in this phase, the developer will design a user guide to give a step-by-step on how to use the system and a few FAQ and debugging method so easy for the user to maintain the system by itself.

3.4. TOOLS REQUIRE FOR DEVELOPMENT

Requirements	Software Requirement:- • Microsoft Visual Basic 2008 • Exsys Corvid Expert System Tools • Microsoft Excel 2007 Hardware Requirement:- • Personal Computer

Table 2 : Tools needed for Development of BOSS

CHAPTER 4

RESULT AND DISCUSSION

The results that are being shown is a result of the data gathering that have been used in order to discover the details to define the information structure. Furthermore, data gathering helps in filtering the information and differentiate the important data that is needed with the rest. Therefore, data gathering helps in improving the estimated time of completion as it will help draw a mental pictures of the designer on how to design the system and what are the proper modeling method that should be design by the programmer. The data gathering also assist in reminding the developer of what are the gaps that or needs of the users that are still not being met and whether the gaps could be fill according to the schedule.

4.1. THE SOURCE AND RESULTS OF DATA GATHERING

In order to ensure that the data gathering process can get the most benefit in building the system. a reliable source has to selected. Therefore, the identified source that have been selected are:

- **The Users Of The System**

  The utmost reliable sources because the system design is to cater the needs of the users which in this case the entrepreneur that are having problems in selecting an ownership in opening a business. The result of the data gathering will help in solve the problem face by the user.

- **Established Entrepreneur**

  The establish entrepreneur is another sources of data gathering as they have already establish their own business regardless of what forms of business they have. The data gathering revolve around the data needed to establish a business such as capital, condition, area and other things that are needed in opening a business.

- **Research Paper and Journals**

  Research paper and journals are a valid source of data gathering that are based on past research regarding both the expert system and the needs in being an entrepreneur. This source is mainly to support the development and to prove that it is feasible and can be done base on the past paper and journal that are gathered.

  In the development of The Business Ownership Selection System (BOSS), a few techniques is used in assuring that the data gathered are valid and are sufficient in the development of the system. The generic method that are used are :

4.1.1. Observation

The observation is done on premises nearby in order to know the daily activities and how the established entrepreneur operates their business and what are the critical factors that differentiate each forms of business that an entrepreneur operated. This method is to give a realistic experience in order to incorporated relevant data gathered into the system

4.1.2. Questionnaire

As stated earlier, the questionnaire is to collect the data regarding whether the needs of a system that helps in choosing a business ownership for an entrepreneur is feasible or not and what are the data usually been collected by an entrepreneur before establishing the business chosen. The result of questionnaire will help in designing the system. The result of the survey are as follows:

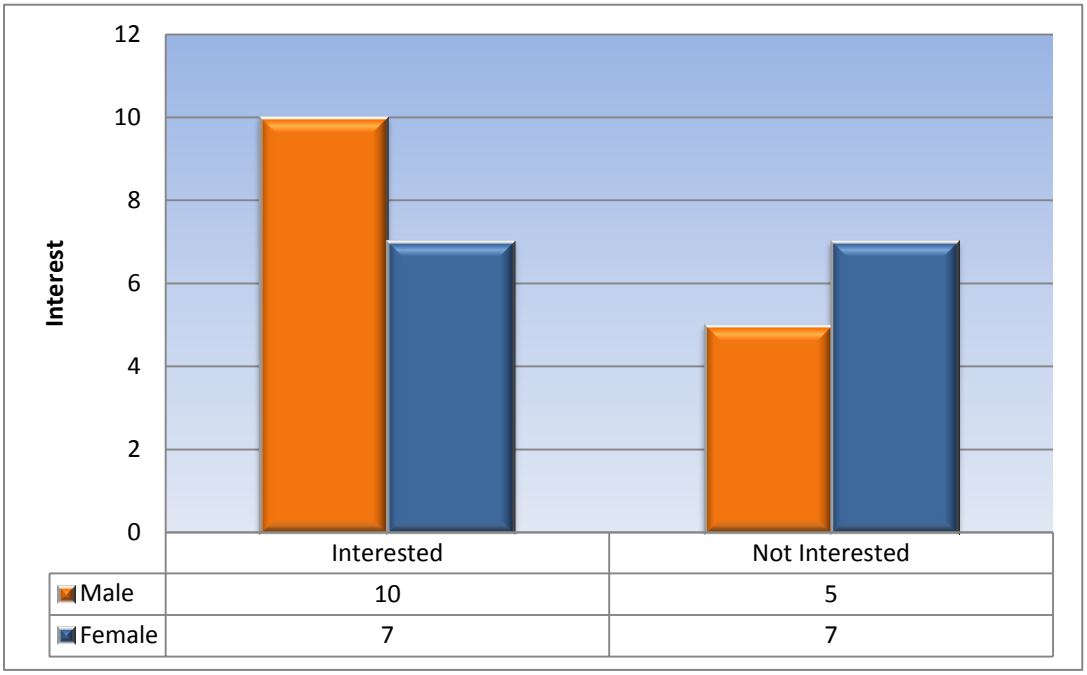

Figure 4 : Graph of interest versus gender

The first question that was asked is regarding the majority of people base on the gender that would like to be an entrepreneur. The result shows that majority of entrepreneur are from the male with 10 people are interested. But with the females also are not that far with 7 are interested in becoming an entrepreneur. This shows that majority of people especially male are interested in being an entrepreneur.

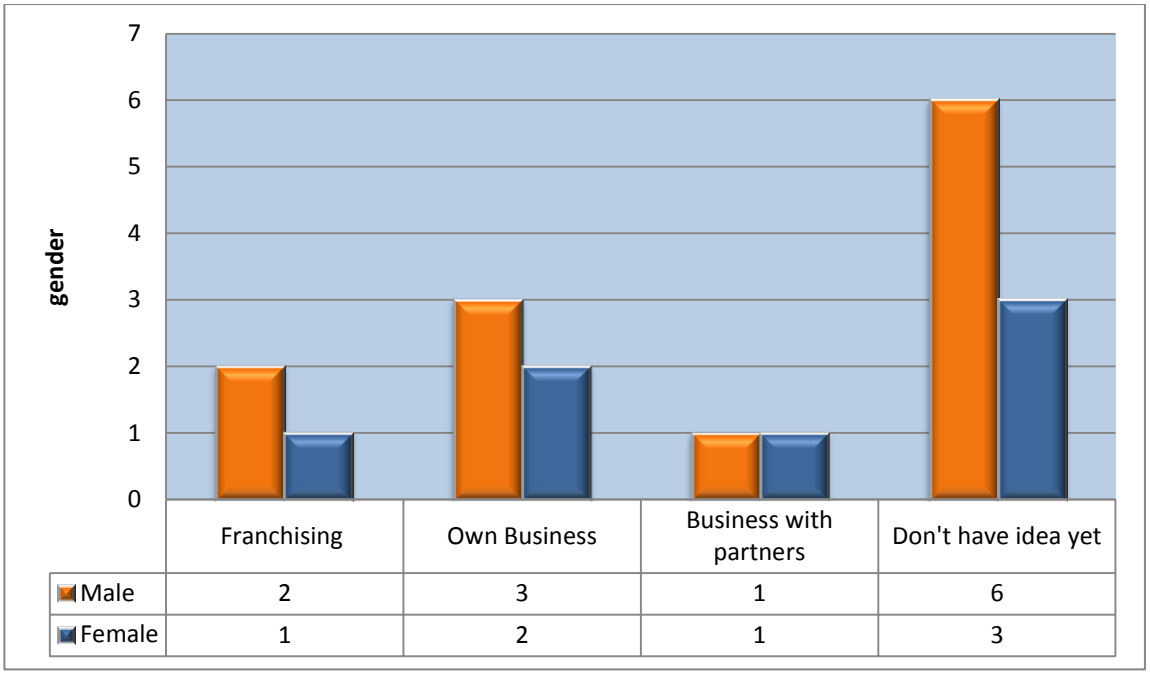

Figure 5 : Graph Of Type Of Ownership Against Gender

The next question that were asked is for whoever says yes for the first answer is what are the type of business that they want to do if they become a real entrepreneur. The results are almost half of both male, female said that they do not have an idea of what they want to do. This show how they cannot decide on what are the best ownership that they wanted to do although having interest of being an entrepreneur.

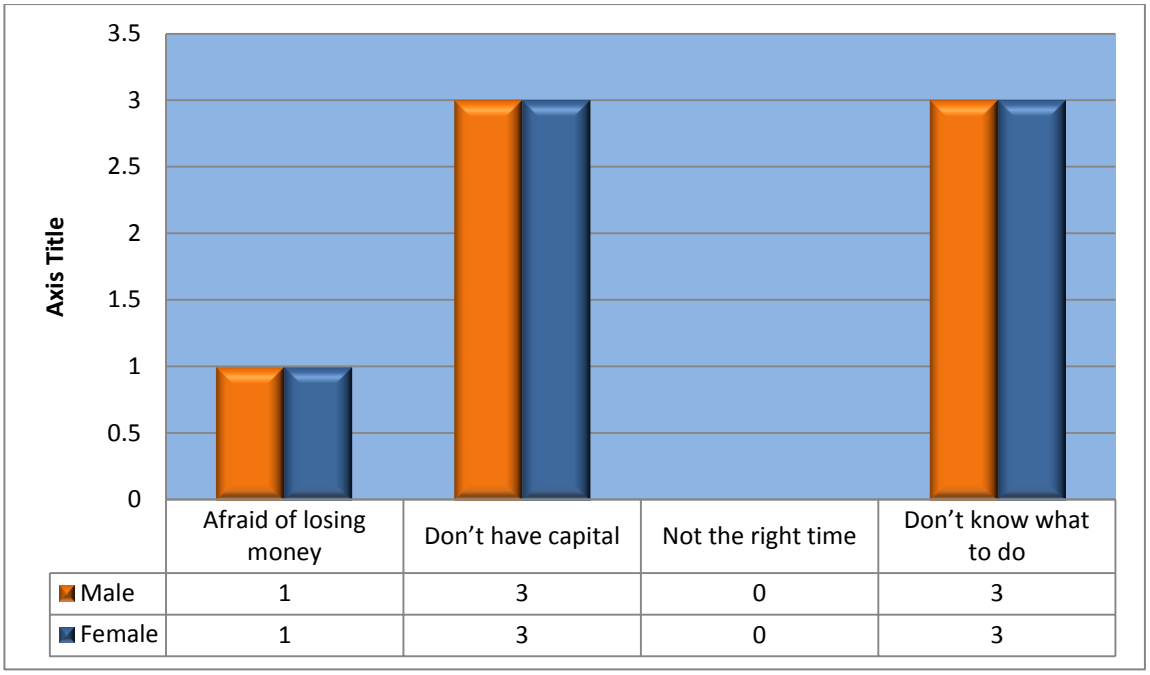

Figure 6 : Graph Of Gender Versus Reason Of Not Being Entrepreneur

The third question is for the people who answer no for the first question. They were ask of the reason of not being an entrepreneur and as they can choose more than one answer, majority choose that they don’t have sufficient financial yet to open their own business and they don’t know what to do as they know that entrepreneurship is a risky business.

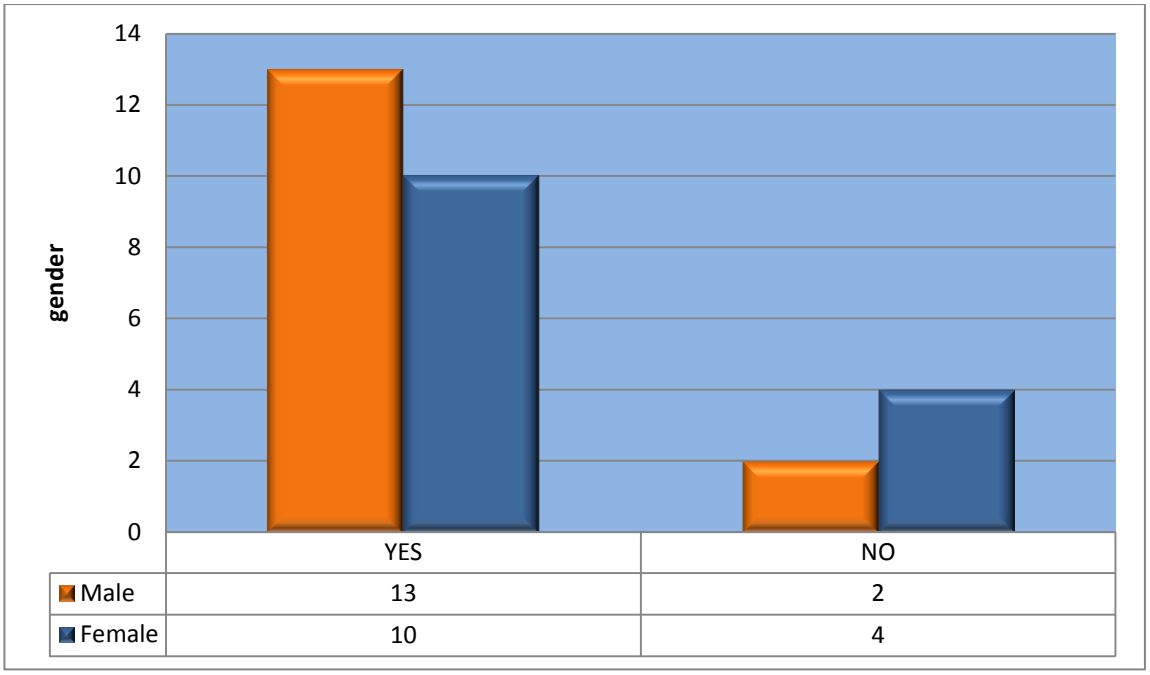

Figure 7 : Graph Of The Need Of A Business Ownership System

The fourth question is asking on the needs of a Business Ownership Selection System. and the results are majority said yes as to the questions as it shows the need of a system that can help in the assisting the entrepreneur and people that are planning to become one in choosing the right form of ownership.

As conclusion, majority if the surveyor that were asked agreed in the development of the BOSS and hopes that they system could help them in making up their mind in setting up a business and could save time and cost of needs of a consultant in helping them in choosing the best business

4.1.3. Interview With Entrepreneur

Other than doing survey, an interview session is conducted with establish entrepreneur to get the industry insight on the things that an entrepreneur needed to know. Some of the entrepreneur are the owner of a restaurant in Tronoh we called her as Mak su. She has been in the food and beverages business for more than 7 years and has been many challenges to where she is now. Her husband works as a security at University Teknologi PETRONAS that also helps her when he is not working.

During the interview session, some questions that were ask is how do she start the business and what are the factors that contribute to a business success. She also agrees that with the building of BOSS may help new entrepreneur to have lesser challenge in the business world and higher percentage of success as the system will help in choosing the suitable business ownership for the entrepreneur. She also give some suggestion on what are the things that should be put into the system such as the total profit that an entrepreneur wants to make, the number of staff and etc.

4.1.4. Own Research based on Journals and Research Paper

The own research is based on papers, books and journals of both entrepreneur and expert system that could give an insight in both the design and the functionality of the system. The research also helps in supporting the feasibility of the system design and the system architecture.

4.2. SYSTEM ARCHITECTURE

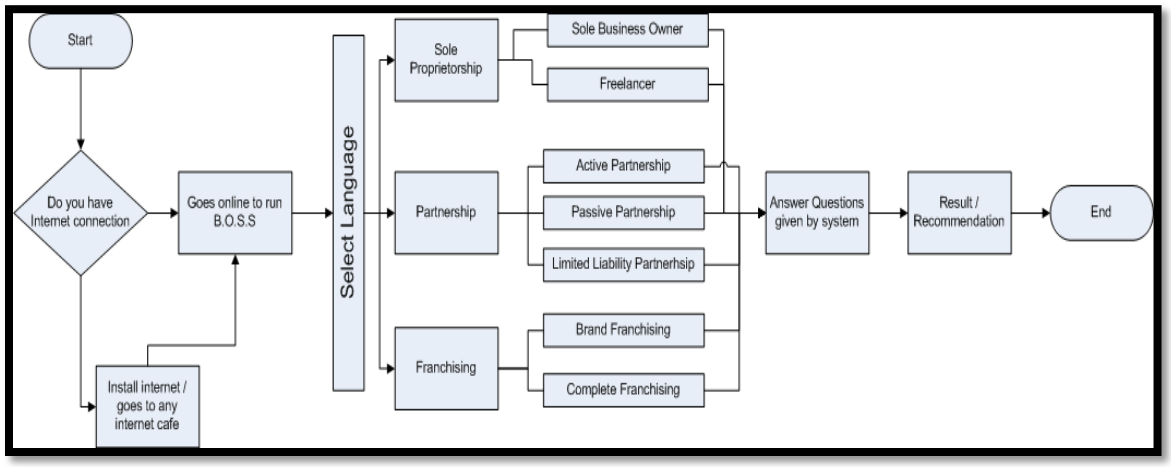

Figure 8: The System Architecture

The system architecture are as shown in figure 8. As the ES uses a server applet, an internet connection is vital. When the user Use the system online, the user will have to first select the language that are going to be operated throughout the process. Then the user will have to choose from the 3 module that is Sole proprietorship, Partnership, and franchising. In each of the module, there will be sub-module where the questions that will be generated are based on the sub-module that the user has

chosen. After the user has answer the questions that were prompted by the system, the system will then calculate the confidence level and will give the confidence and the alternative as the output

4.3. PROPOSED SYSTEM DESIGN

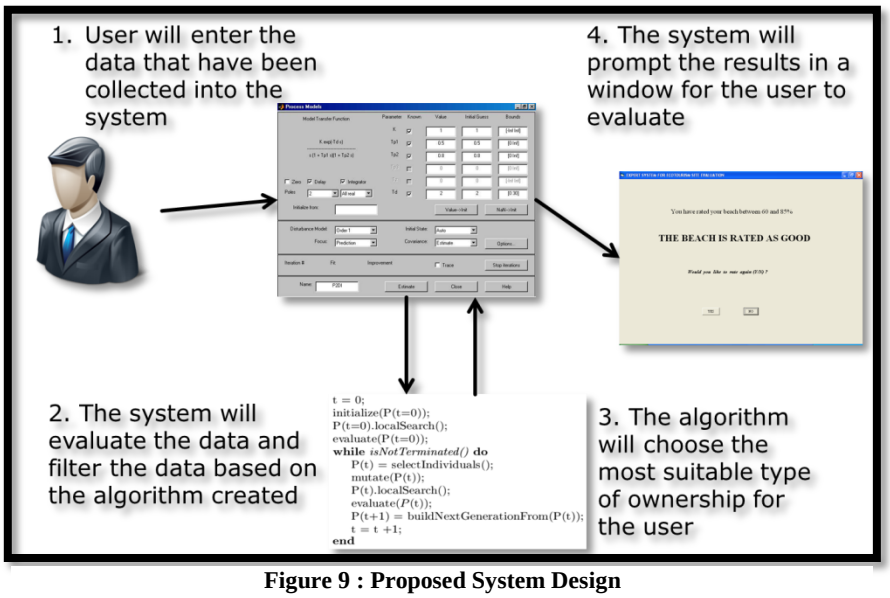

Figure 9 : Proposed System Design

Figure 9 shows on the idea on how the system will looks like and how the system going to function in order to get the desired results. The system involves two (2) main components that is the AI of the system to get the desired ownership of a business.

The User will select the business ownership that he or she wants then the system will enable a few boxes to be filled in according to the selection of the user. Base on the selection and the data that have been entered. The system will calculate the data and base on the algorithm that has been design. The system them will produce the result and prompt it to the user in separate window that tells them whether it is the right choice or not. Moreover, if not will prompt out the best base on the data collected.

4.4. FINAL SOFTWARE CHOSEN

After the propose design were accepted, the software have to be finalize in order to continue in the development process and to ease the process of familiarizing with the software. After consultation with a few lecturer and researching through the internet, The final software that were chosen is the Exsys Corvid Expert System Tools evaluation version 5.3.0.1

Figure 10: Exsys Corvid Main Window

The Exsys Corvid is an expert system tools that are very powerful in generating a knowledge automation system where it allows the logical rules and procedural that are being use by experts to be efficiently emulated in a system that are easy to apply, read, and understand. The underlying Interface Engine (IE) process the problem –solving logic to interact with the user as if the user itself are talking to the expert where it will produce a situation-specific recommendation and advise on subject where in this case is the best form of business

Although Exsys Corvid is being design specifically for the development of an expert system. It has it pros and cons that could be critical in the development of the system as the one that are currently using is only the evaluation system as the cost in purchasing for an individual license is high. Therefore, there are certain limitations that are presented by using the evaluation system. The pro and cons of the system are:

Pro	Cons
Easy to navigate with help of User interface	Are limited to only 150 nodes
Each result can be view immediately in the development area	The time constraint : limited to be used in only 30 days
The User interface help the end-user through the step-by-step in the development of the expert system	Certain features are not available in the evaluation version
The size of the software does not burden the user memory thus applicable in low-end machine	High cost of purchase of individual license

Table 3 : Pro and Cons of Exsys Corvid

4.5. DEVELOPMENT PROCESS

After the software that are will be used in the development is chosen, it goes to the crucial stage of the development of the system. The steps that are shown will show the full development process of the development of the system and the progress of the project.

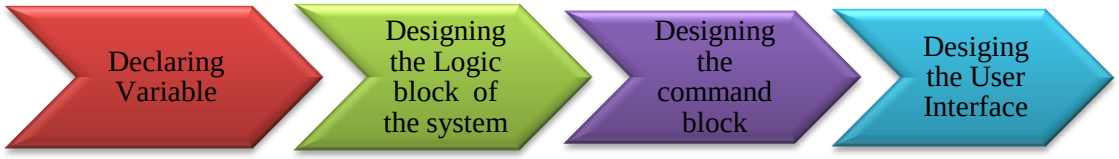

Figure 11: The Development Process

4.5.1. Declaring Variable

The first step is to declare the variable, in Corvid, the variable are similar to other computer languages such as C++, VB, etc. where the variables are name items that have associated values. The values can either be predetermined or ask by a user.

In every system, variable are the key elements that are used to describe a decision making process, therefore it is required to declare the most essential variable and if there are other requirement, more variable may be added later in the development

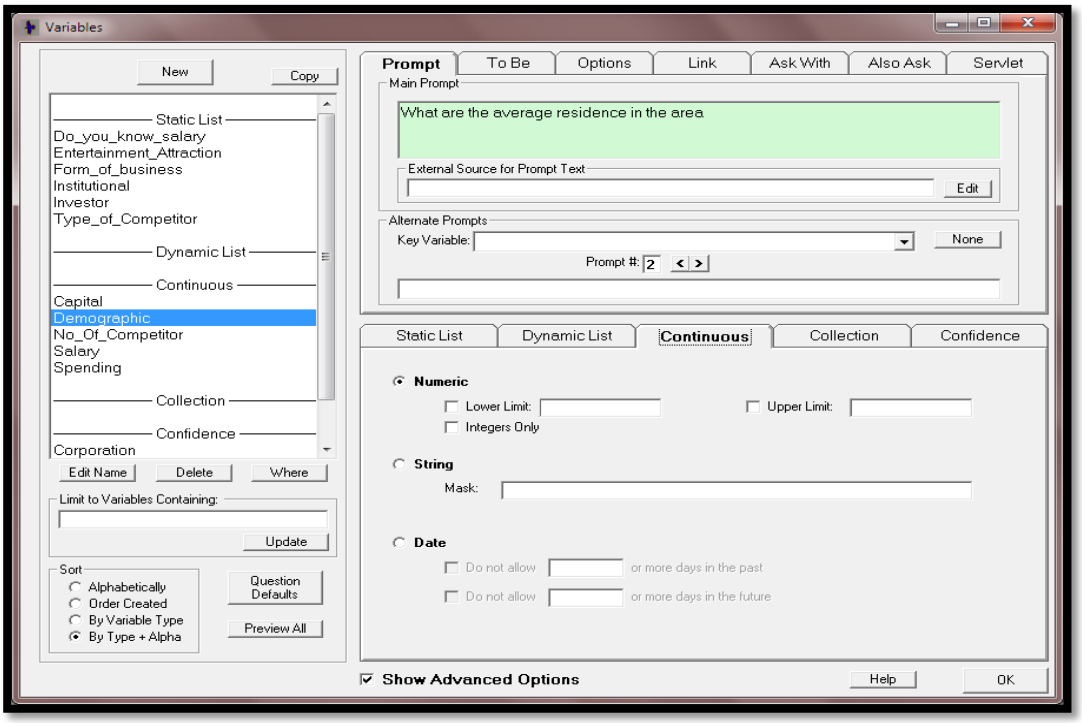

Figure 12: The Variable Window

Figure 12 shows the variable window and the variable that have been declare, the variable are separated according to the type of the variable, there are static, dynamic, continuous, and confidence. The variable that have been declared are the basic and the most essential for the time being in completing the logic block that have been created that will be explain further in the next step.

4.5.2. Designing The Logic Block

In Exsys Corvid, the rules or logic of the system are group into a logically related blocks. These logic blocks are groups of rules that can be defined by tree –shape diagram or as individual rules. Each block, may contain many rules, many trees, or only a single rule. Generally, the block of rule all relate up to a specific aspect of the decision making task.

Each rule is call a node, and as the rule are added into the block, the node also increase, as the software that are being use is not a full version, it is only limited to a certain node, thus a rule that require less node is needed.

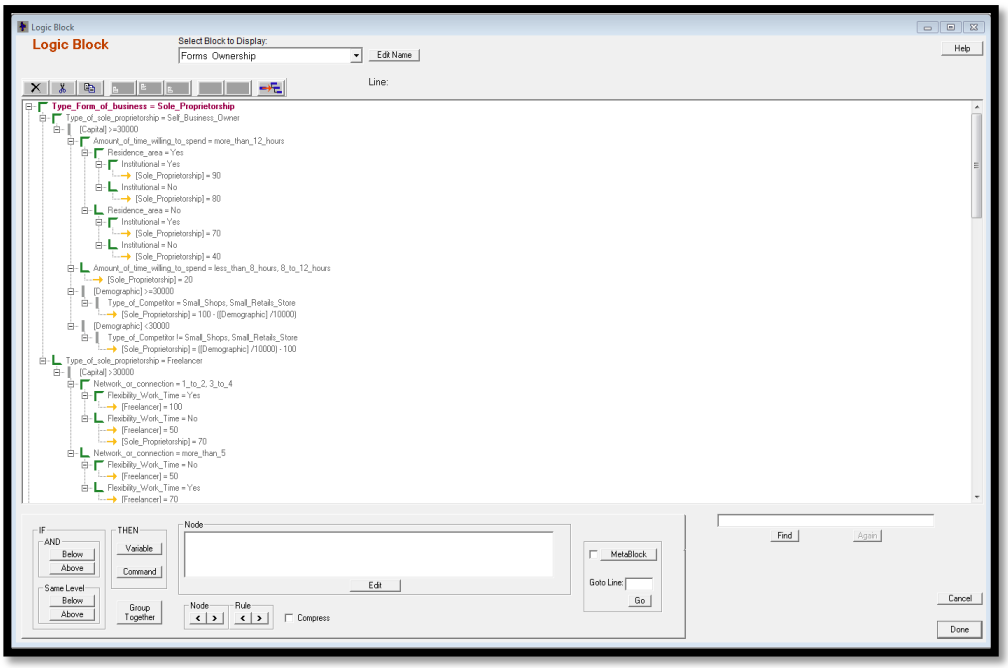

Figure 13: Logic Block Window

The first level of logic are separated into four (4) main categories that the user will choose that is the desired form of business that they intended to open. For example as it can be seen from figure 13, if the user choose Sole Proprietorship, the system will then ask regarding the demographic and also the salary of the residence in the area.

After the user has managed to enter the details needed by the system, the system will go through the logic block as request that will be set in the command block. It than will return the confidence of whether it should proceed with the selection or give other options that are more suitable base on the information that have been answered and entered into the system.

In the current process, It the logic block are tested every time the rules are competed to ensure that the accuracy the desired output could be obtain. It also to search for errors and correct it in fast rather than tested it in the end and encounter many errors that will lessen the accuracy and reliability of the system.

After the logic is complete, then it will move the design of the command block that act as the commander that give the logic block instruction on the process flow of the system and how it should work like.

4.5.3. Designing the Command Block

The command block is design to ensure that the system can perform the intended function that were design in the logic block could be perform by assigning the commands needed to run the system. Command block function by describing the procedural flow of the system execution. Command blocks are more like a script, but also allow IF, WHILE, and FOR loops. With the separation of the procedural control from the logic, it makes the its easier to build, maintain, and also updates the system.

With other system that was build using other platforms such as Microsoft VB, the process of identifying logic and the process flow in the same time could make system run much slower thus sometimes could cause malfunction in the system or lack of responsiveness in the system. Especially as the system needs to link all the logic and procedures in order to come up with the output. This process is called forward chaining. In Exsys are able to support these procedural options and the more advantage as it can use the logic in a more heuristic way by calling the rules and using the rules dynamically as they are needed anywhere in the system via backward chaining options. This two options can be mix up in the system to provide maximum flexibility towards the system. Therefore making the process of handing complex problems and logic much easier and more efficient.

For the BOSS, the logic block are design using backward chaining option as the logic are needed to be used regularly and constantly thus provide efficiency and effectiveness to the system . In the command block, there are three main commands that are being instructed for the system

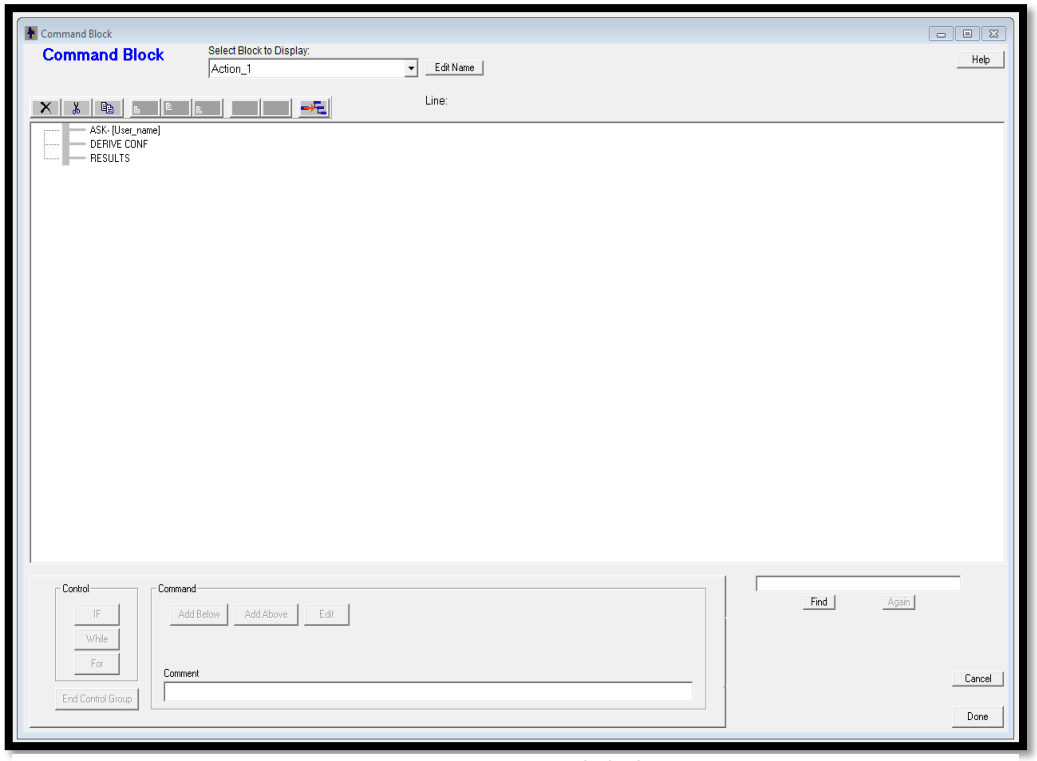

Figure 14: Command Block

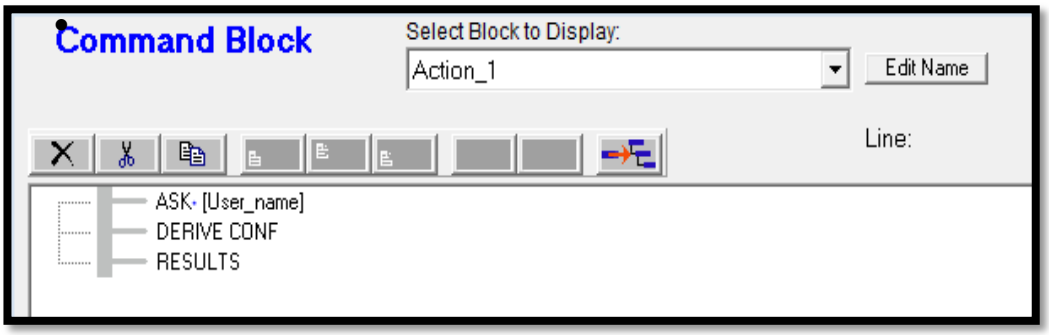

Figure 15 : Details of BOSS command block

- **To process the users name**

  The first thing the logic block is processing is detecting the users that are using the system by asking the name of the user at the beginning of the system to be use later in the system in asking the questions. Although the

current version does not include storing in the database, but it serves as a room of improvement for the later version, but for the current version is to give the user awareness to the user.

- **To derive the logics using forward and backward chaining option**
  The logic that was assign in the logic block could not run itself because it involve integration of many logic that are situated in different blocks. Therefor by using the forward and backward chaining options in the command block, it could link the related logic although the logic is located in the different blocks giving answer that is more reliable and accurate
- **To derive the results of the suitability of the forms of business**

  In Exsys, the results are based on confidence (Conf.), this means that every output are shown bas on the confidence that have been set in the logic block. The command block functions are to retrieve the value and display it in the output screen. Although the task seems easy, but with more than 150 logics that are being create that involve various logics block. This task proves on how reliable the system is.

4.5.4. Design of User Interface

After the logic has been completed, the next step is designing the user interface for the user. In Corvid, the process of making the interface is much simpler compare to other platforms, Exsys Corvid have a few method to design the user interface in order to suit the requirement of the user and the amount of control that the user wanted in designing the interface.

- **Java Servlet Runtime program (Java Applet)**

  The default forms of the Exsys Corvid platform. In the java applet form, the interfaces are designed by setting the type of fonts, color, margin of text, position of text and images. The methods of design are similar to formatting a word document, the Corvid runtime will use the settings that has been define to

control on how the questions will be asked and how the results will be presented.

- **Corvid Servlet Runtime**

This interface design options are for a system that needs more control of the user interface by the developer, this options programme implements the Corvid Interface Engine as a java servlet, the user interface is define by HTML template. Exsys Corvid give chances to the users in creating complex and advance interface although have little knowledge on HTML

For BOSS, the method that are being used is the Corvid Servlet Runtime, this is because to give the programmer more freedom in designing the system and also able to further the expanding of the system to an online integrated system that will be able to store the data that have been collected base on the current version.

4.6. THE PROTOTYPE

Business Owenership Selection System (BOSS) is currently in its first version or called version 1.0. The author has completed two major forms of ownership that is the sole proprietorship and the partnership option. This is because the limitations that have been stated earlier inhibit the continuity of the developments of the system. There are also a slight changes from the earlier part of the development. The prototype flow that will be shown is based on a test that has been done by a user that wants to pursue Sole proprietorship as desired forms of ownership.

4.6.1. Main Menu

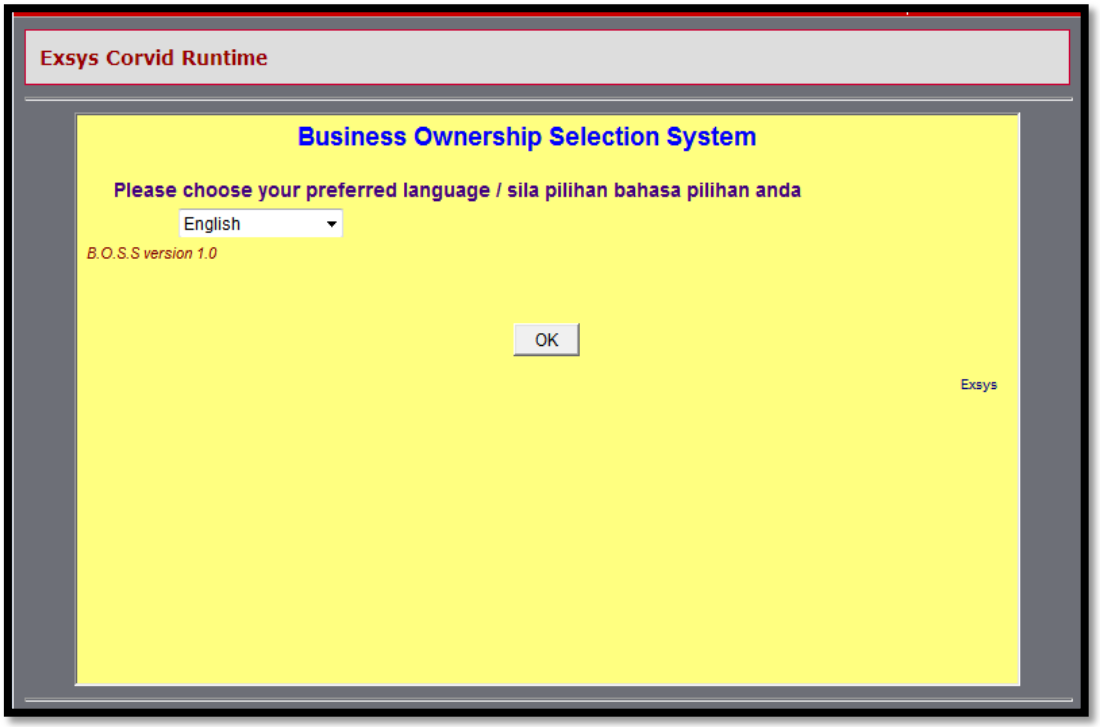

Figure 16: Main Menu Of BOSS

Base on figure 16, this is the main menu for BOSS. This is where the user will be prompt to when opening BOSS. The user is required to choose the language that he or she for the navigation of the system. The options given is for the user to feel comfortable in using the system where the user can select the default language or if he or she do not have high proficiency in English, she may choose Bahasa Malaysia as the language that the system will runs on. After that the user can proceed with the 'OK' button.

4.6.2. Recognizing the user of the system

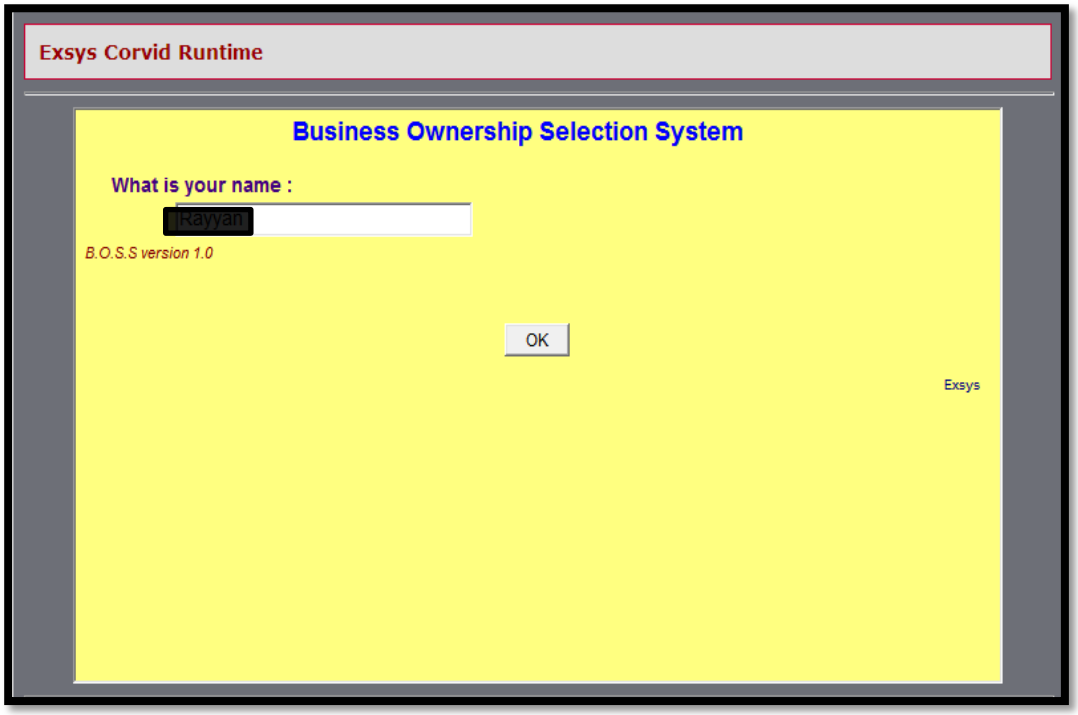

Figure 17: Username Screen

The system will ask the user of his or her name as shown on figure 17. The purpose of the author of having this question is to be used letter in the development of the system and to give a sense of relation between the system and the user. After the user has entered the name. the user can proceed by pressing the 'OK' button

4.6.3. Desired Ownership of Business Options

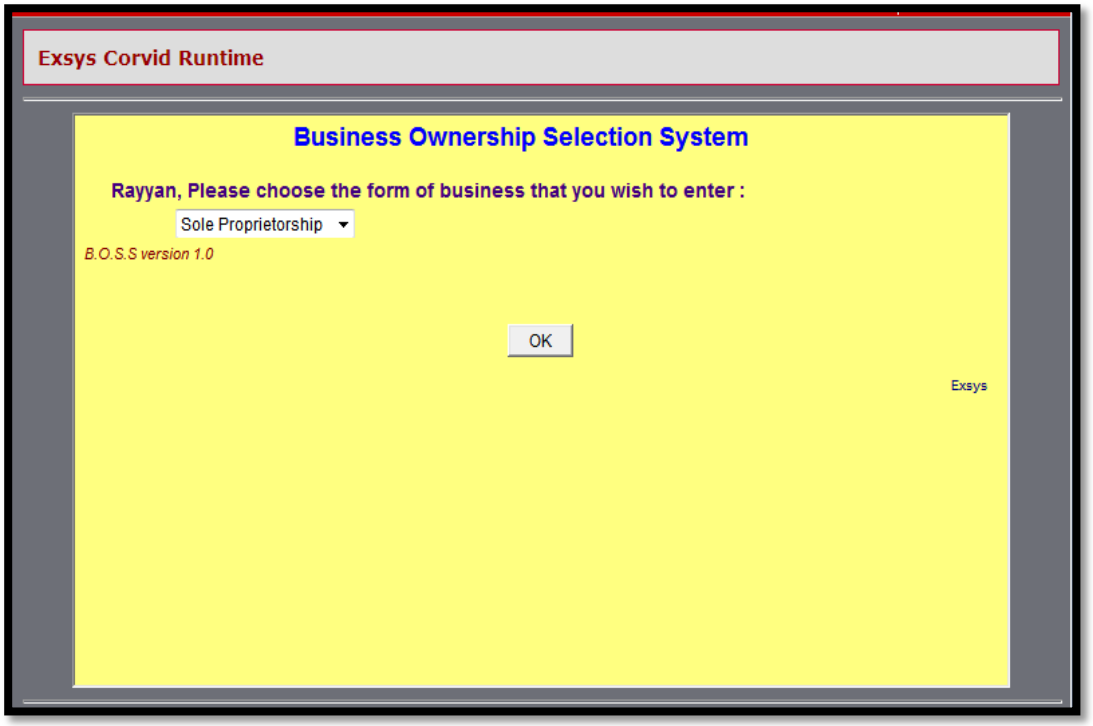

Figure 18: Desired Ownership Options

In figure 18, the user will be asked the first question that is regarding the desired form of ownership that the user wants to enter. The options are display using a drop down button where there are two (2) options that is Sole Proprietorship and Partnership. After the selection, the user can proceed by pressing the "OK" Button

4.6.4. The Type of Sole Proprietorship Options

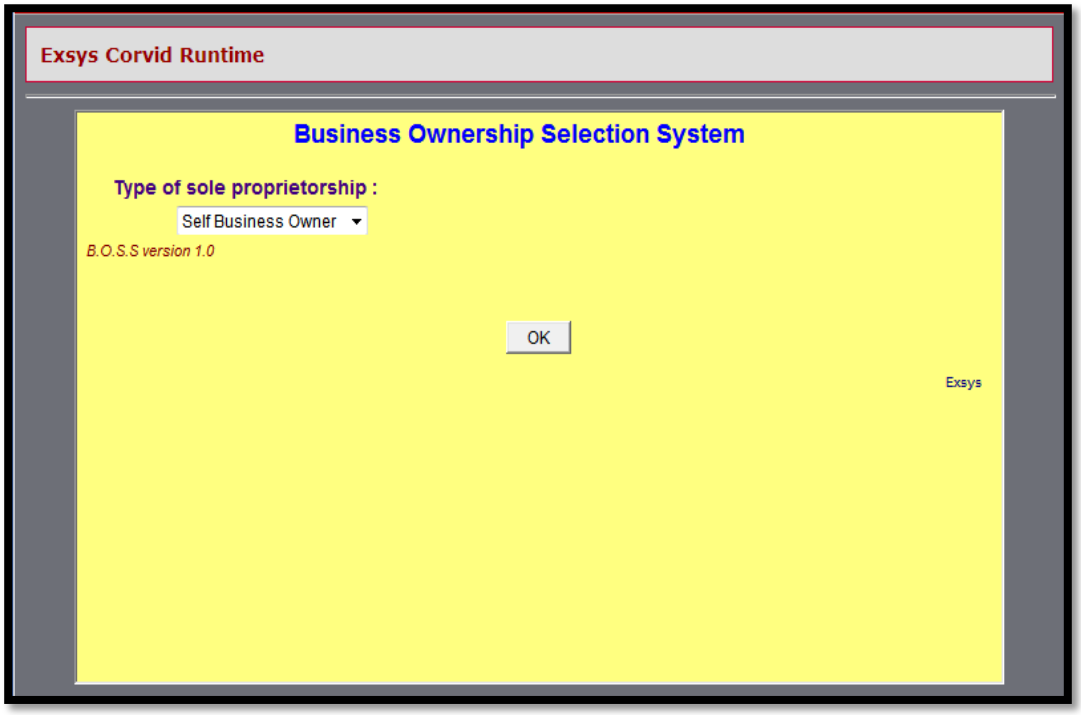

Figure 19: Type Of Sole Proprietorship

After the selection, the user will be brought to the next layout where he or she needs to choose the type of sole proprietorship that he wish to venture upon. The options are self-business owner and a freelancer just like in figure 19. This type of questions is ask to determine what are the type of sole proprietorship that the user intended to pursuer. This is because each of the type will affect the flow of the system in prompting the questions as each type may ask different forms of questions to the user.

4.6.5. Startup Cost Screen

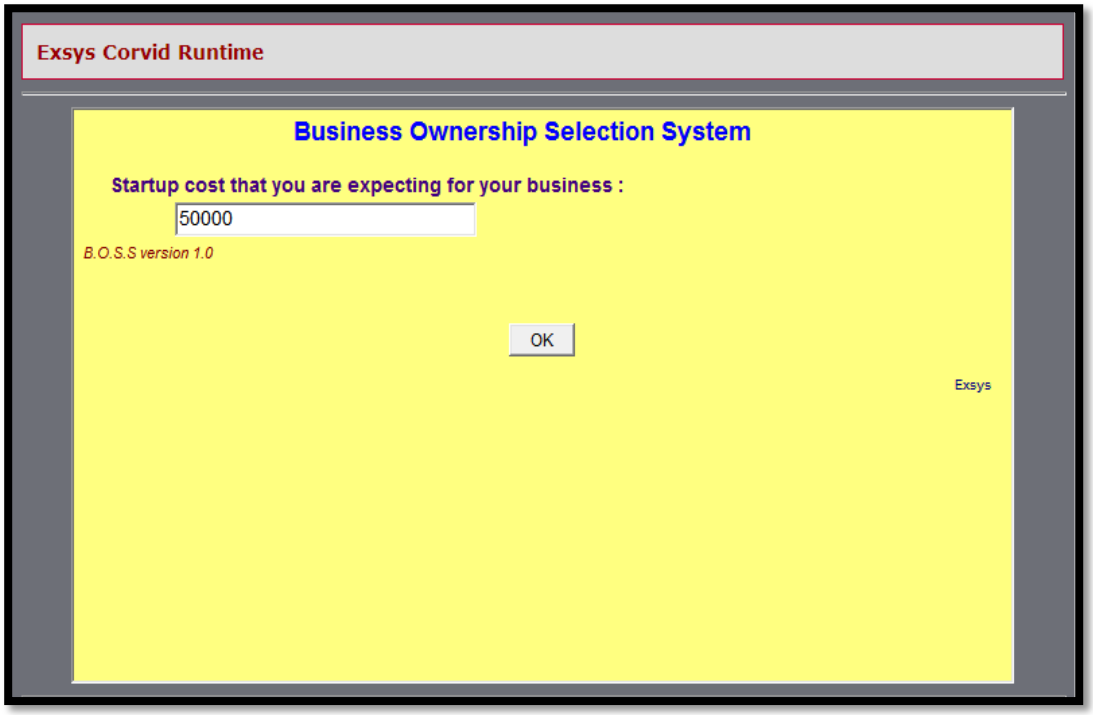

Figure 20: Startup Cost Screen

Figure 20 shows the layouts of the next details in BOSS where it will ask regarding the startup cost of that the user anticipate in their business. The user will need to enter the amount that the user has anticipate then continue by pressing the 'OK' button to proceed

4.6.6. Commitment Screen

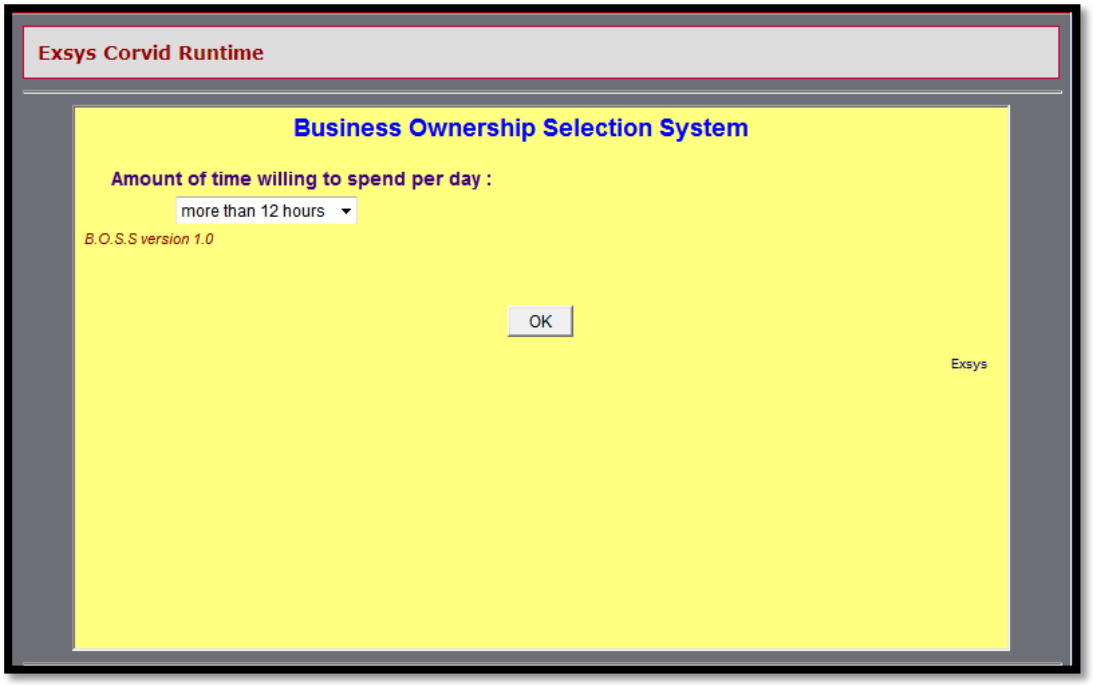

Figure 21: Business Commitment Screen

After the cost has been entered, the next question is prompted by the system to the user regarding the amount of time that the user is willing to commit for the business just how it shows in figure 21. The reason this questions are asked is because for a user to enter a sole proprietorship as a form of business, it require a huge amount of time therefore this answer will portray on how serious the users are in pursuing the form that the user wanted

4.6.7. The Demography Question

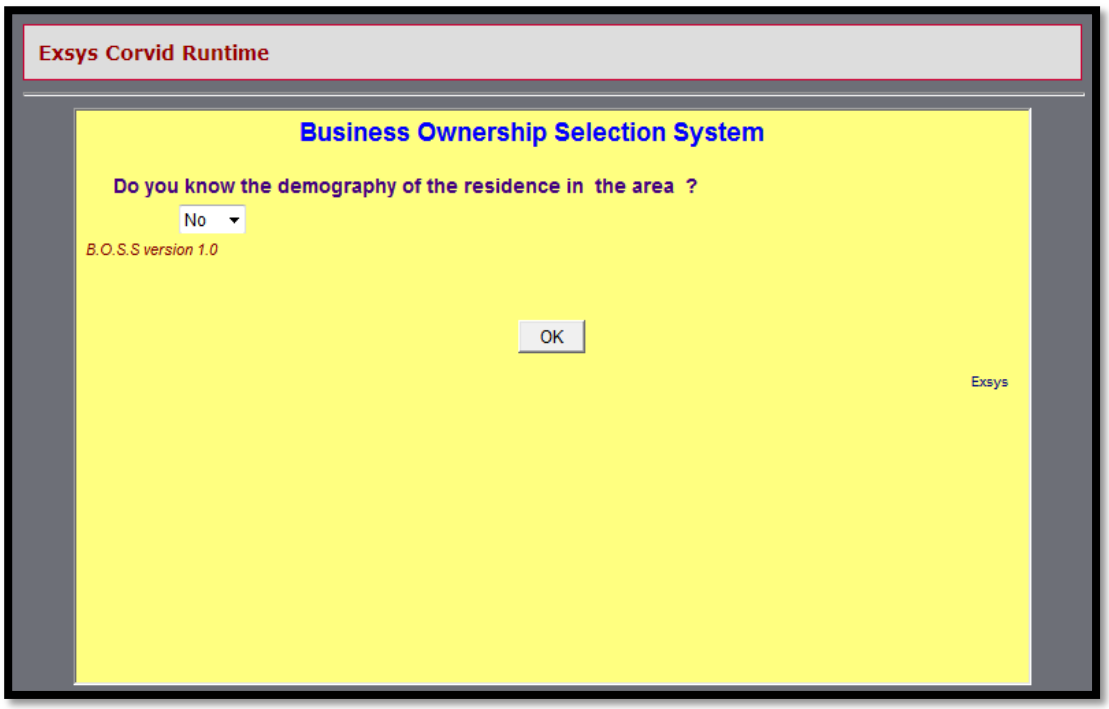

Figure 22: Enquiry Of Demography Of The Area

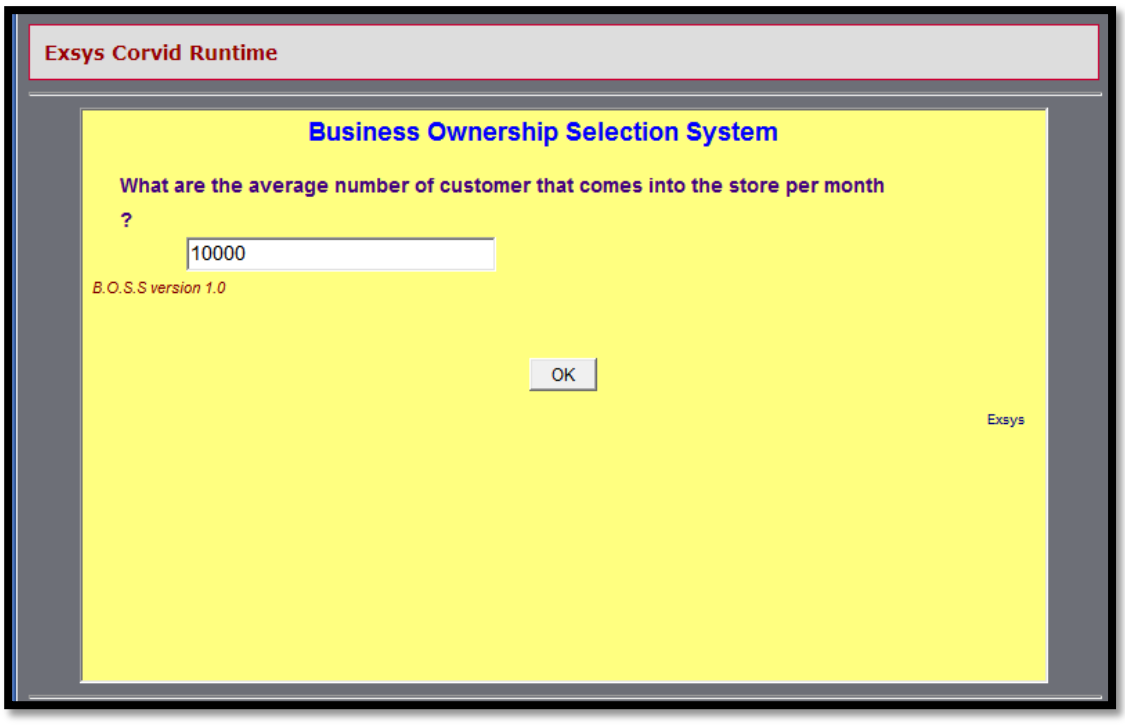

Figure 23: The Number Of Customer Per Month

In figure 22 shows the question that are being prompt by the system regarding the user knowledge of the demography of the area, where the user has either to answer yes or no. If the user answers yes, than the system will prompt the questions on the average number of residence in the area. Whereas if the users answer no, the system will prompt another question that is on the number of customer that comes into a selected stores before returning the value of the number of the demography to the system just like in figure 23.

4.6.8. The Type of Competitors in the area

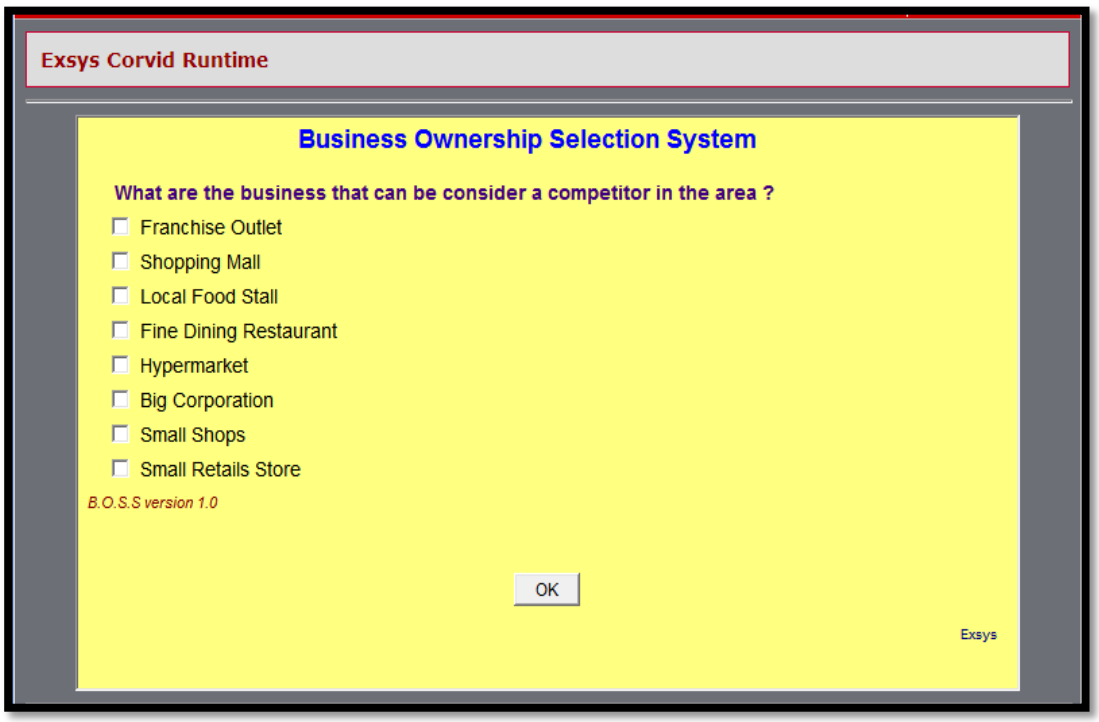

Figure 24: Type Of Competitors

In figure 24, it shows the next question that is the competitors that are situated in the area. The user could select more than one answer, as there is always a possibility that an area may have more than one competitor.

4.6.9. The Results Screen

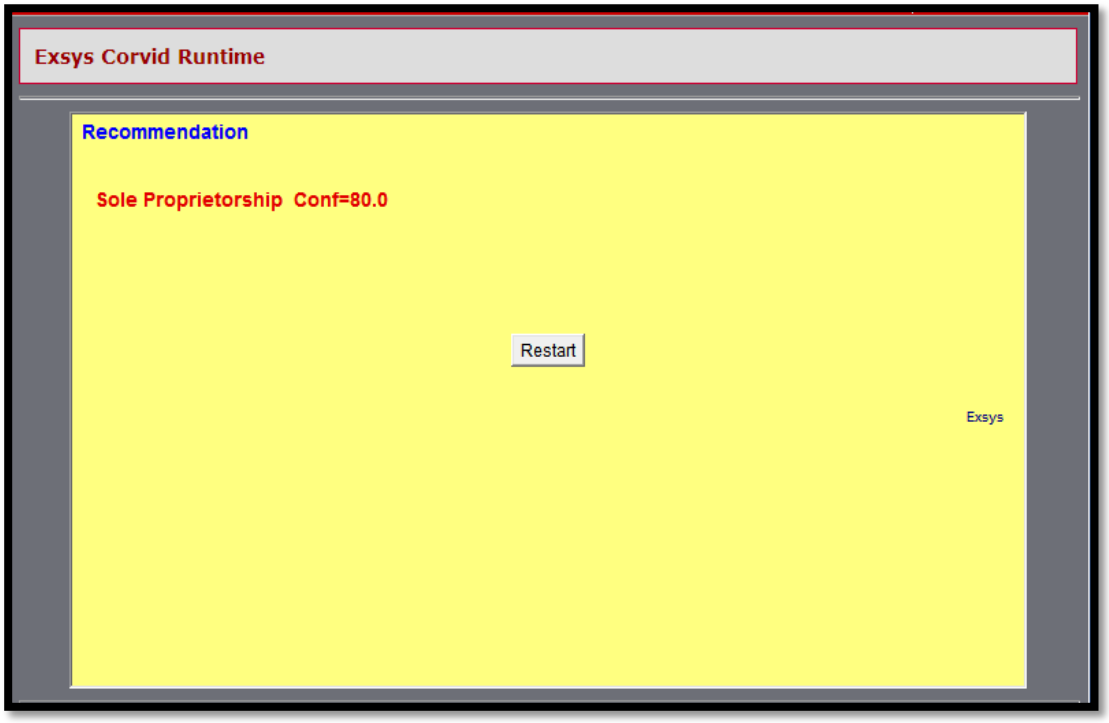

Figure 25: result

After the user has answered all the sequence, the system will prompt out the results on how are the confidences or the percentage of recommendations on whether the subject should pursue the ownership chosen. As seen in figure 25, the results show is eighty. That means that the user should pursue the ownership chosen

4.7. TESTING OF SYSTEM

In order for a system to be considered effective, the system must go through a series of test in order ensure that the system is running according to the draft and design by the author.

4.7.1. Testing Method

- **Black Box Testing**

Black box testing is a test that mainly to foucs on the outside of the system. In this case the interface whether the windows pop out when the button is pressed, the exits buttons funtions well and other external stuff that needs to be tested.

- **White Box Testing**

White Box texting includes all the internal function of the system. Whether the codes have been functioning as what is supposed to function such as calculate the cost, filtering the selection, etc.

- **Alpha Testing**

This testing is done by the programmer to ensure that from his point of view the function, the interface and others aspects funtioning as expected as what he has design the sytem before giving it to the user for the next stage of testing and accepting the system.

- **Beta Testing /User Acceptance Test**

The Beta testing is the test conduected by the potential users of the system before accepting the system. This test will test all the funtions and the interfaces from the users perspective and wether it meets the expactation of the users. If the testing failed, the author have to go back to the design phase and review the design.

The user acceptance test conclude that the system in the current version act has met the objective and become the foundation for further developemnt in the future as there are certain features that could be added on but as the limitation of using a trial version.

4.7.2. User Acceptance Testing Results

For the user acceptance testing, a group of 10-sample size was selected; half of the sample sizes are part time entrepreneur while the other half are students that were taken from the questionnaire group that have taken SME course during their studies in the university. There are three (3) things that are being evaluated here that is the process flow, the user friendliness, and the effectiveness of the system

- **Process Flow Test**

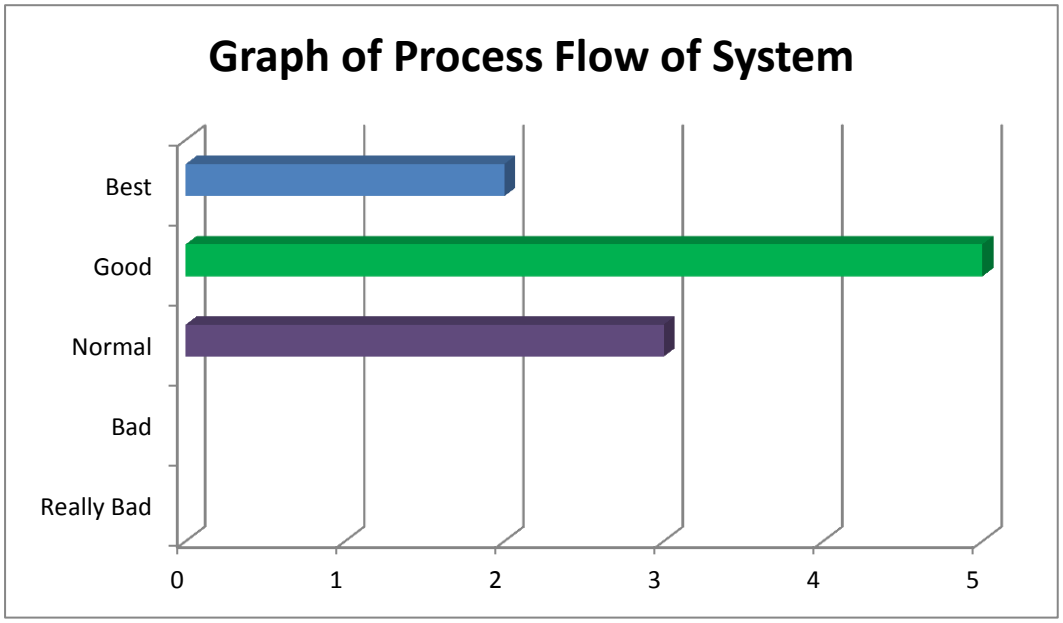

Figure 26 : Process Flow of System

Base on figure 26, the results of the test show that among the 10 sample size, majority vote that the process flow of the system are good with 5 votes. Most of them said, the process flow is simple and are able to ask crucial question and process the information fast. This also includes the other two subjects that voted the process flow as best. The remaining subject vote the process flow, gave comment that the system can be refined, and better in the future, as they are still loophole in the system.

- **User Friendliness of the System**

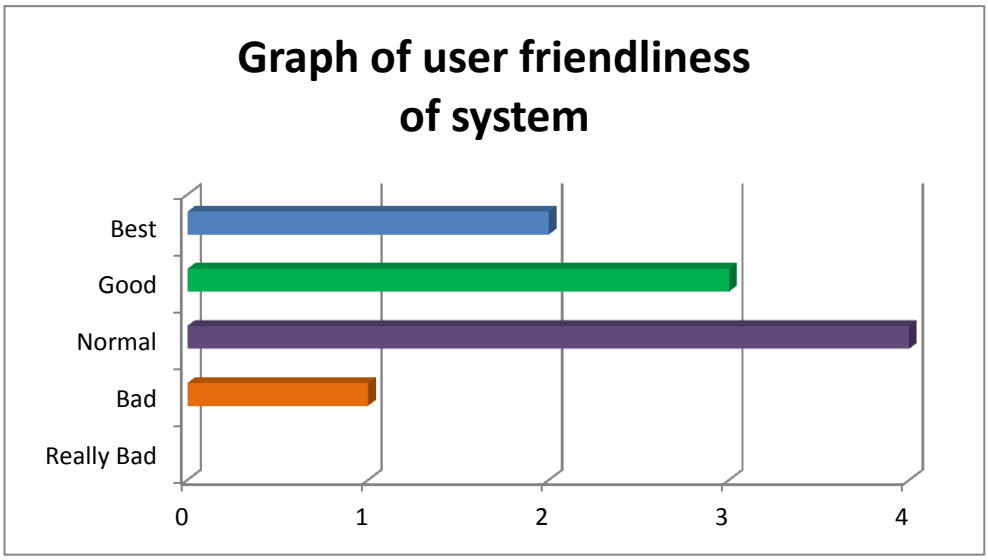

Figure 27: User Friendliness of System

Base of the result on figure 27, majority of the subjects vote that the user friendliness of BOSS are normal as they said they are still things that can be improve such as the amount of prompted windows, the wastage of free space, etc. However, they are one subject who rated the user friendliness as bad as he said that the amount of free space are really put to waste and are not arrange properly. Overall, the user friendliness could be consider a viable for the current version.

- **Effectiveness of The System**

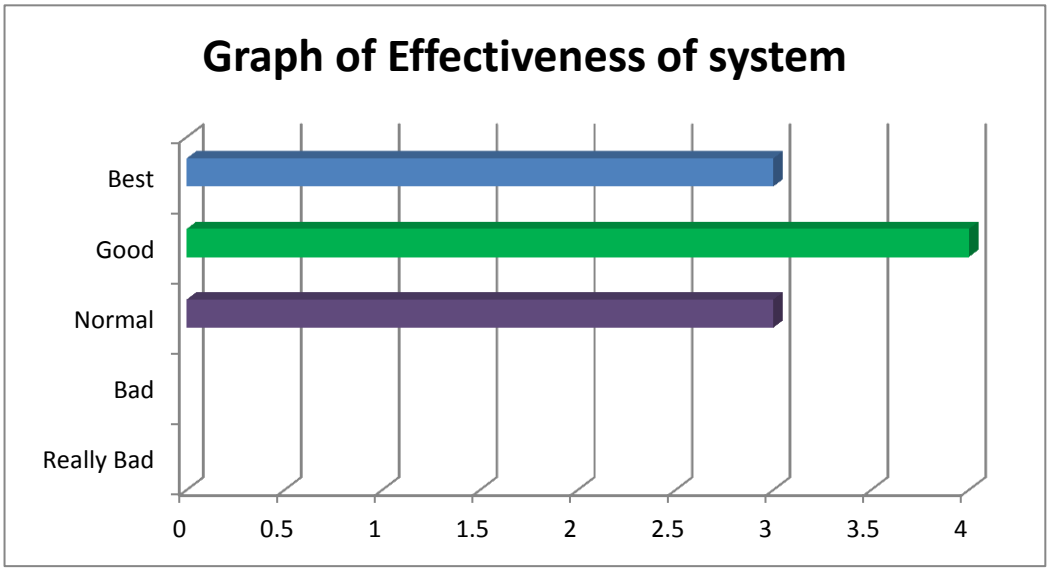

Figure 28: The Effectiveness of The System

From the figure 28 that show the result regarding the results of testing in order to know the effectiveness of the system. As can be seen through the graph, generally the system can be concluded as effective based on the response off all the ten subjects where all ten-subject rate rated normal and above with majority vote good for the effectiveness. They comment that with a more complete system, it could really provide a solution for potential entrepreneur

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

As conclusion, the Business Ownership Selection System or BOSS is a system that are expected to help new and interested entrepreneur to select the best business ownership base on the data and preferences that they have. This will create a higher percentage of success for the entrepreneur as the ownership that has been chosen is the most suitable for the entrepreneur to run the business with.

The system created will help most entrepreneur although the entrepreneur is not an IT expert because of the simple and easy-to-use graphical user interface that will guide the user step-by-step until he or she gets the result.

The author hopes that that, the Business Ownership Selection System could be a foundation for future development that could enhance and improve the system. This is to give its service to all the people that have the passion of being an entrepreneur but still cannot make up their mind or people who are afraid to lose their saving and money because of not knowing and does not have the confidence in what to do.

5.2. RECOMMENDATION

- **An online integrate system**

  As for now, the system that is being developed is a standalone system that can be used by users and be downloaded. But it hopes that it can be integrated online and stored in an cloud database so other users that use the system will be benchmark against current user or uses that previously use the system and can correlate the result so for more efficient processing.

- **A Benchmarking Identifier**

  This benchmarking identifier hope to helps the entrepreneur in determining whether the business that have been chosen by BOSS has produce result In terms of revenue, customer satisfaction, etc. thus it can measure the success form time to time.

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