Risks and Perception of Risk Management towards Fertigation among Small Farmers in Malaysia

By

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DECLARATION

I hereby declare that the work embodied in this Report is the result of the original research and has been submitted for a higher degree to any universities or institutions.

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I certify that the Report of this final year project entitle “Risk and Perception of Risk Management towards Fertigation among Small Farmers in Malaysia” by Nur Farah Hani Binti Ahmad Zaidi, matric number F14A0236 has been examined and all the correction recommended by examiners have been done for the degree of Bachelor of Applied Science (Agrotechnology) with Honours, Faculty of Agro Based Industry, University Malaysia Kelantan.

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ABSTRACT

Risk is an uncertainty that might be happen during operating the modern technique of cultivation, which is fertigation system. In order to assess the risk, the risk management steps can be useful to the farmers. This research attempts to identify the risk of fertigation system that the farmers faced around Malaysia nowadays. Besides, to determine socio-personnel, psychological and economic profile of the farmers with the severity level of risk towards fertigation farmers in Malaysia and also to evaluate the perception and attitude of fertigations' farmers towards risk in fertigation. Based on this research, it can be said that the risk assessment influenced the severity level of risk at their farm. The study is carried out by using questionnaires within 100 of respondents which distributed within South, North, East Malaysia, East Coast, West Coast of Malaysia. The result was analyse by using descriptive analysis, Chi-square analysis, risk matrix and also Pareto analysis. In the nutshell, all the variables have their own categorize which are production, price and market, technology, financial, and human resource (Objective 1). Besides, from the 5 variables from severity graph it can be concluded that there is a significant and positive relationship between selected variables from demographic with severity of risk. Therefore, the alternate hypothesis is accepted (Objective 2). In addition, the highlighted risk from attitude section indicates that the farmers are a risk avoidance person (Objective 3).

ABSTRAK

Risiko adalah ketidakpastian yang mungkin berlaku semasa mengendalikan teknik penanaman moden, iaitu sistem fertigasi. Untuk menilai risiko, pengurusan risiko sangat berguna kepada petani. Penyelidikan ini bertujuan untuk mengenalpasti risiko sistem fertigasi yang dihadapi oleh para petani di sekitar Malaysia pada masa kini. Di samping itu, untuk menentukan profil sosiobudaya, psikologi dan ekonomi petani dengan tahap keterukan risiko terhadap petani fertigasi di Malaysia dan juga untuk menilai persepsi dan sikap petani terhadap risiko dalam fertigasi. Berdasarkan kajian ini, dapat disimpulkan bahawa penilaian risiko mempengaruhi tingkat keparahan risiko di ladang mereka**.** Kajian ini dijalankan dengan menggunakan soal selidik terhadap 100 responden yang diedarkan di Selatan, Utara, Pantai Timur, Pantai Barat, Sabah dan Sarawak. Data yang diperolehi dianalisa dengan menggunakan analisis deskriptif, analisis gandaan dua, matrik risiko dan juga analisis Pareto. Secara ringkasnya, semua pemboleubah mempunyai kategori risiko tersendiri iaitu risiko pengeluaran, risiko harga dan pasaran, risiko teknologi, risiko kewangan dan sumber manusia (Objektif 1). Di samping itu, dari lima pembolehubah dari graf pemisah itu dapat disimpulkan bahawa terdapat hubungan yang signifikan dan positif antara pemboleh ubah terpilih dari demografi dengan keparahan risiko. Oleh itu, hipotesis alternative diterima (Objektif 2). Di samping itu, risiko yang ditonjolkan dari seksyen sikap menunjukkan bahawa petani adalah orang yang menghindari risiko (Objektif 3).

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter discussed the research background of this study, problem statement, research questions, objectives, scope of study, and significant of study.

1.1 Research Background

Risk can be defined in many ways. One usual distinction is to suggest that risk is imperfect knowledge where the possibilities of outcomes are known. Risk is also mean exposing to unfavourable consequences (Hardaker & G.Lien, 2005). However, risk and uncertainty are different in meaning even though we always thought it is similar but in fact they are not. The differences between risk and uncertainty is risk is the probability of winning or losing something worthy (potential of loss) while uncertainty implies a situation where the future events are unknown. Besides, we can measure the risk but not uncertainty. In addition, usually the chances of risk outcome are known, however, the outcome of the uncertainty cannot be predicted or unknown.

Farmers that faced risk is exposing themselves to a significant chance of injury or loss. Besides, when we talk about accounting for the risk, risk can become serious things especially in farmers' management decisions. This is because the farmers must

think deeply before they deal with uncertainty situation to ensure the choices that they take are exact (Hardaker J. B., 2004). This is because managing risk means balancing the trade-off between taking risks and getting returns. In farming activities, many management of farm decision can be taken without need to take explicit account of the risks involved. However, a few risky decisions will require decision maker to give more attention to the choices among the available alternative. Definitely, all business activities encounter risk and uncertainty, but few people do not know how to define it. Taking a risk involves making a decision to take an action or to take no action where there is some uncertainty. Some decisions are simple or routine, while others are difficult and could make or break an operation. This is because farmers have to work in many types of exposure and unpredictable surrounding that are always rave about by natural environment, market faults and social unreliability (Alderman, 2008). This depends on farmer itself whether they want to avoid, eliminate, or face the risk (Abid, M.Ashfaq, Hassan, & N.Fatima, 2011).

In order to faced risk, the farmers will be susceptible to a profit decline. Nowadays, the risk management become less important to the farmers as the farmers does not realise the consequences or impact if they neglect the risk. For example, they might be suffering a great loss in their yield. However, for the business purpose, risk is considered to be important things as the farmers have to deal with good or bad uncertainty (Hardaker & G.Lien, 2005). Therefore, a proper risk management is crucial in making any farm management decision, where the identified risk may have particular impact on all business performance. Besides, other risky farm decision, need a thoughtful analysis, include those possibility of major losses or where the opportunity of big profits may have been missed. In such cases, a considerable time and effort is needed to structure a solution to the problem in a proper way, to analyse the

alternatives available in terms of possible consequences may leads to a good decision (Hardaker & G.Lien, 2005).

As we all know, agriculture practise is an important contributor to the economic development, but the production is highly susceptible to a lot of risk and uncertainty (Pandaraiah & Shahidar, 2015) which can be managed to some extent by using agricultural technology. One of the agriculture sector that need risk management is the fertigation system. Fertigation is a modern agriculture technique that rapidly grow nowadays as by using this system the farmers able to earn big profit and yield in a short time. Fertigation can be defined as the application of fertilizers, soil amendments, or other water soluble products through an irrigation system. In other word, fertigation is the combination from the word fertilizers and irrigation (Bandyopadhyay, 2010). The fertigation is used widely in commercial agriculture and horticulture. Plus, fertigation also used in common landscape application as dispenser units. The fertigation is become useful in many aspects (Goyal M., 2013). For the past 15 years, fertigation technique had been used widely in agricultural farms. The types of fertigation that are well known today is drip irrigation system (Bandyopadhyay, 2010). Even so, a good technology and system also have the risk associated with it. Hence, the farmer must be concerned about the uncertainty that will happen in their operational in regards to the usage of the technology. Therefore, the farmers must aware and always being alert.

1.2 Problem Statement:

Fertigation is the application of supplying fertilizer in a liquid form to the crop, through irrigation system. From day to day the percentage of annual crop to get the sufficient fertilizer is increasing up to 90% through the application of fertigation system. When combined with an efficient irrigation system both nutrients and water can be manipulated and managed to obtain the maximum possible yield of marketable production from a given quantity of these inputs. Besides, fertigation is efficient system to address fertilizer deficiency that make the plant growth retard, save the energy of employee and operational efficiency. The farmers' perception towards fertigation system is high. Frequently, the farmers would think about the output of their yield and also the price risk related to input and output. The expectation of money return in these investments is higher; however, the risk that they have to face is the highest (Alderman, 2008).

Even though fertigation system can give a huge profit to the farmers, but definitely every technique that we apply have their own disadvantage. Same to the fertigation system, the farmers do not realize the risk by operating this cultivation technique. Hence, it is important for the farmers to implement risk management at their farm to avoid them suffering unpredictable loss in the future (Alderman, 2008).

Generally, the farmers tend to appear risk disinclination towards ways of resolution. The exposure of risk that the farmers face are ranging from the management of nutrients and fertilizers, the pesticides used, fertility of the soil, irrigation of water management and also the management practices for chemigation (Mosley & Verschoor, 2005). In order to prevent these kinds of possibility, the farmers

have to make investment of money and also build up time for a few strategies and take dissimilar adaptive measures.

Basically, the perception of farmers can influence the farmers' attitude. Hence, we cannot assume that farmer have an inbuilt awareness of risks, or any knowledge of the rate of uncertainties that surround them. This is a natural condition of the human to be optimistic towards their own welfare and to regard disasters as more likely to happen to other people. Same goes to the farmers who practice the fertigation in their farm. They are supposedly concern about the risk of fertigation that occur in their farms (Duware & Pandy, 2003). However, in order to make the farmers move to the attitude, they must recognize the risks first. That is why perception and attitude is important for the farmers to evaluate the severity level of risk (Abid, M.Ashfaq, Hassan, & N.Fatima, 2011). This is because they are related to each other where at the time the farmers realize the impacts of certain risk, they will make a decision either they want to take risk management to overcome it or they just want to stick with usual activity.

1.3 Research Question:

1) What are the risks in fertigation system that farmers faced around Malaysia?

2) What is the relationship between socio-personnel, psychological and economic profile of the farmers with the severity level of risk towards fertigation farmers in Malaysia?

3) What are the perception and attitude of farmers in Malaysia towards risk in fertigation?

1.4 Objective:

1. To identify the source of risk in fertigation system that the small farmers faced around Malaysia.
2. To determine the relationship between socio-personnel, psychological and economic profile of the farmers with the severity level of risk towards fertigation farmers in Malaysia.
3. To evaluate the perception and attitude of farmers towards risk in fertigation.

1.5 Scope of study:

This study will focus on the aspect of risk source, and risk management of farmers practicing fertigation. Data collection was done on farms which employ fertigation by means of drip irrigation in Malaysia, regardless of crop type.

1.6 Significance of study:

Risk is an uncertainty that may give affect in farmer's job. Therefore, it is important to identify risks, come up with strategies to guard and overcome them before it affected farmer's operation. The ability to manage the risk can help the farmers secure their business in the future. Besides, this also helps the farmers to make the best decision regarding their business in the future. Moreover, the knowledge regarding risk management enables farmers to make a number of options to deal with potential problems. Furthermore, risk management is important aspect because it can help the

farmers to achieve their goal while keeping all other risks under control for the continuous day. The risk management will work when the farmer business is in the critical level and condition. During the critical risk, these could have an adverse impact on the business. Research instruments and risk matrix that had been developed in this study can be used as future reference or guideline in assessing risk in agriculture, with special attention to fertigation technology.

CHAPTER 2

Literature Review

2.0 Introduction

In this chapter, previous study pertaining to the topic were collected and analysed. This included socio personal, psychological and economic profile of the respondents, source of risk in fertigation, risk management, and also the strategic risk management process (SRMP) stages.

2.1 Source of Risk in fertigation

According to (Tchankova & Lubka, 2002), the farmers face a lot of uncertain situation. If this risks they could count, then the farmers will find way out to overcome the risks. On 1996 Farm Bill created the Risk Management Agency (RMA) to help the farmers manage these risk and the RMA had grouped the many types of agricultural risk into five primary source (Harwood, R.Heifner, K.Coble, perry, & A.Somwaru, 1999). The source of agricultural risks are:

- Price and market
- Production
- Institutional
- Human resource and personal
- Financial

- Technology (additional)

Usually, farmers think about market and production risk more than they think about financial risk, and also they do not realize about human or institutional risk. The farmers want a high price and quantity and low costs. The authors also claimed that farmers can face bankruptcy if they do not mind about institutional, human resource and financial risks.

2.1.1 Price and market risk of fertigated crop

Price and market risk are probably the risks that farmers spend the most time worrying about. Price or market risk simply means the risk of getting a low net price. Process can be low due to management practices or business risk, such as poor quality, transportation, storage and handling, or created by forces outside the farm gate like crop yields in international markets or government policies or between countries. Price risk is often on the minds of farmers because of its impact on profitability and also because it is largely out of their control (Driessen, Joost, & Vilkov, 2013).

In term of fertigation by using drip irrigation, microirrigation is expensive. Usually, drip irrigation is more convenient for vineyards, tree orchards and row crop. However, there is the limitation where the initial cost for the system is very high for crops with very narrow planting distance. Besides, forage crop cannot be irrigated economically with drip irrigation. However, drip irrigation is can be adapted for almost all soils. In very fine textured soils, the intensity of water application can cause problems of aeration. Compared to heavy soils, the lateral movement to the water is

limited, thus more emitters per plant are needed to wet the desired area. With the good design, drip irrigation can be used to almost all topography. In some areas, drip irrigation is used successfully on steep slopes. However, in order to set the drip irrigation system it used a lot of money as the system is very expensive (Goyal M. R., 2013)

2.1.2 Production risk of fertigated crop

Production risk is tied to the amount a producer can sell or harvest and how well the farmer can influence costs. This is surely the risk producers spend the most time controlling because production risk must be faced on a daily basis and are in direct control of farmers. Decisions have to be made about which task done today and which one will have to wait for tomorrow. Farmers have to decide which seed variety to use, which fertilizer, which pesticides. They have to decide where to invest their labour, when to water and when to harvest. this list is endless, but the goal is the same; produce the most farmer can at the lowest cost (Abalos, et al., 2014).

Agricultural production includes an expected outcome or yield. Variability in outcomes from those, which are expected, poses risks to ability to get financial goals. The main sources of production risks are weather, pests, diseases, and the communication of technology with other farm and management machinery efficiency, and the quality of inputs (C, E.Ryma, Contreras, & Segura, 2012).

The development of irrigation technique which ensures large coverage of area with a given quantity of water without any adverse effect on yield is need of the hour.

Drip irrigation is very efficient method, which reduce water requirement by reducing the application losses, reduces water requirement by reducing the application losses, reduce weed growth and providing the water and nutrient beneath the root zone of plant (Kaur, Amandeep, Brar, & A.S., 2016). So, under water scarcity conditions productivity of crop can be improved significantly through drip irrigation by decreasing the leaching and evaporation losses (El-Hendawy, et al., 2008).

2.1.3 Institutional risk in agriculture

Institutional risk refers to the way rules affect profits; this includes both laws and policies. Farmers and ranchers also have to deal with licenses, labour laws and the potential for lawsuits over everything from environment to inheritance. One of the biggest examples of institutional risk a farmer faces today is what will happen to the estate if he or she passes away. An estate or succession plan can be difference between whether or not a farm or ranch survives the owner's passing (Haimes & Y., 2015). Policy dimensions include federal crop insurance, loan programs, price supports, grazing policies, tax waivers, interest support programs, international trade, foreign subsidies, global competition, and other assistance policies and programs. The legal dimensions include structural issue (forms of business ownership), estate transfer issues, power of attorney, contract obligations, tort liability, statutory obligations and food safety.

Most people forget to recognize that institutional risks have positive impact too. The government invests in research and education, makes trade deals, and creates safety guidelines that improve quality of life.

2.1.4 Human and personal risk in agriculture

Managing human and personal risk means paying attention to the people around farmer. Human and institutional risk represent the last two of the five sources of identified risk. These risks are serious threats to most organizations and enterprise but are seldom given the attention they should receive. As such, these sources of risk may well represent the risks that most seriously threaten the long-term, survival of today's farm business. This is especially true where human institutional risks are not as easily measured or managed when compared to production, marketing or financial risks.

Human resource management usually brings employee management to mind. Human resource certainly include employee; however, human resources are much more than that. Human resource here are the people involved in an organization either directly or indirectly. This will include the owner and the owner's immediate family and heirs. If hired management is involved, it includes the managers and their immediate families, even if those immediate family members are not directly involved in the operation. This list also includes full-time and part time hired employees, contractors and other service providers. Indirect providers such as bankers, insurance sales representative, ditch riders be human resources involved in the operation (Sharo, Hewlett, & Tranel, 2009).

The risk in human resources stems from the fact that managers are uncertain about whether or not people involved in the system will deliver as they agreed. Human resource uncertainty can come from many sources or combination of sources, including sickness, disease, injury, death, relationship problem, divorce, lack of proper

training, failure to recognize the importance of task, poor communication, lack of qualification, carelessness, inconsistent performance and poor work ethic (Singer, 2002).

2.1.5 Financial risk in agriculture

Farmers are exposed to financial risk when they have debt. Since most people borrow operating money from a bank or the financial institution, they are at a leader's mercy.

The challenges financial institutions face when offering financial products to agriculture are threefold: the transaction costs of reaching remote rural populations, higher perception of non-repayment due to sector-specific risks, such as production, price and market risks, financial institutions' lack of knowledge in how to manage transaction costs, agriculture-specific risks and how to market financial services to an agricultural clients, also government policies often proven to be ineffective and could in fact create impediments to offering financial serves to the agricultural sector. Policies like concessional lending practices, interest rate caps, and loan forgiveness programs create disincentives for private sector lending while creating problems for government lending to agriculture (Varangis, 2015).

2.2 Risk management in agriculture

Risk management is subjective and offers no guarantees. In a simple way, risk management is the process of taking actions to shape the likelihood and the outcome. Nevertheless, accounting for risk exposes subjectivity, while ignoring it does not. Risk analysis does not overcome the frailties of human judgement but makes farmer think more deeply about how to manage risk (Hardaker and Lien, 2005). The fields of agriculture economics offer farm and ranch managers many tools and techniques to manage risk. The Strategic Risk Management (SRM) process provides such a framework and it is currently available for use on farms and ranches. Traditionally, risk management identifies the sources of risk and provides the tools to manage it, given a manager's personal preferences and willingness to tolerate risk.

Agricultural economics, economics, business, and finance offer farm farmers many tools and techniques for decision making when it comes to risk. The concepts of profit, marginal analysis, cash and noncash costs of production enterprise analysis and financial analysis all provide decision makers with valuable information. For this purpose, the Strategic Risk Management Process (SRMP) had been introduced. The SRMP provides such a framework and is designed for use on farms and other agribusiness. The farmer will manage risks better if they follow the steps.

SRMP was introduced by Hoang (2005), as he searched for a way to make risk management more accessible. He found that risk management concepts could be portrayed through the well- establish strategic management literature from business. The process will help farmers by developing a risk management plan. The process is divided into three parts- strategic, tactical and operational containing ten specific steps.

The process is cyclic with feedback and reevaluation as conditions change. That is, risk management requires continuous evaluation and reevaluation. Management decision based on operation's goals, actual performance, and consider current and forecast conditions that effect all types of risk.

2.3 The SRMP strategic stage

The strategic portion of the SRMP includes the following three steps: (1) determine financial health, (2) determine risk preference, and (3) establish risk goals.

2.3.1 Determine financial health

Determining financial health refers to assessing the well-being of the business's financial resources. This process will identify areas of financial strength and weakness within the business. Doing so helps management better understand vulnerabilities, and allows for the development of plan to reduce them to accept levels. In addition, the practice may help identify areas of underutilized capacity, perhaps offering the option to capitalize on developing opportunities.

2.3.2 Determine risk preference

Farmers have three basic types pf risk preference or tolerance. The farmers who exhibit risk-neutral preferences seek to minimize income while ignoring the presence of risk. Risk-loving farmer intentionally seek risk. Most farmers exhibit risk-averse preference, meaning they are willing to give up income to avoid risk.

2.3.3 Establish risk goals

To aid in this process, draft a mission statement for the operation to capture the operation's focus and purpose. This statement describes the direction to the operation takes in the future. Next, craft the risk goals. These goals should be SMART: Specific, Measurable. Attainable, Related to other goals and constraints and Traceable over time.

2.4 The SRMP tactical stage

In tactical stage of the SRMP, agriculturalist must evaluate various alternatives for reaching their vision for the future outlined in the strategic stage. Specific steps in the tactical level of the SRMP includes: (1) determine risk source, (2) identify management alternatives, (3) estimate likelihoods, and (4) rank management alternatives.

2.4.1 Determine risk source

The first step in the tactical phase is to determine when the risk will come and where it come from and to prioritize where risk management efforts will pay off most. In order to determine the risk source, it can be started with identifying risks. To that end, the five major types of risk in fertigation: production risk, market or price risk, financial risk, institutional risk and human resource risk. After that, the variety of tools can help organize and prioritize these risks and helps to describe the various risks that contribute to a desired outcome, such as making a profit or being able to pay off a loan. Often just identifying the risks can be a bigger challenge than developing a method for managing them.

The flow charting technique may help the farmer to think through the various factors needing attention. Besides, risk impact and risk-influence tools can help to determine the risks. These charts highlight each risk by how much impact it has on farmer and how much influence the farmer have on it. Plus, another helpful tool is SWOT analysis. A SWOT analysis identifies Strengths, Weakness, Opportunities and Threat to accomplishing the farmers' goals.

2.4.2 Identify management alternatives

Decision makers have to decide how to manage risks after identifying and prioritizing them. There are four basic ways to manage risk: assume it, avoid it, reduce it, or transfer it. The objective is to find the appropriate trade-off between the risk and achieving the personal goal. Risk can be transferred to people who are better prepared

to handle it. Farmers, for example, can shift yield risk to insurance companies and the government by purchasing crop insurance.

The objective of any particular risk management strategy is to manipulate the risk profile into a more acceptable form. Management efforts are focused on narrowing risk by squeezing the probability density function or increasing the expected value of the outcome. For example, production risk can be managed through diversification or by installing drip irrigation. Marketing risk can be managed with storage or by using the future market. Maintaining credit reserves will help financial risk and having a backup management plan can reduce human risk.

2.4.3 Estimate likelihood

The next step in the SRM process provides the tools for estimating the likelihood of various alternatives. This is the last step required to build the actual plan and choose risk management strategy.

2.4.4 Rank management alternatives

The final step of the Tactical Stage of the SRM process is to rank the various alternatives considered to this point and select those with the most desirable outcomes. The SRMP uses the concept of a payoff matrix along with powerful tools in Excel to analyse and compare different risks. Two or more risks can be compared by looking at their returns, the probability of good and bad outcomes, and factorial in the personal risk preferences of a decision maker.

The Risk Navigator tool called the Risk Ranker organizes the information into a payoff matrix about risks, probabilities, and management alternatives, and creates five different types of analyses that helps to compare which risks are right for farmer. However, the risk must be considered and sometimes, the risk is not important enough to make one management alternative preferred over another. For example, if using irrigation reduces risk and improves profits, risk is not a factor. If risk is important, we provide risk profiles of each management alternatives for comparison purpose.

Finally, we consider a person's personal risk tolerance scores to rank one management system over another. In all, there are over ten different ways to compare and rank management alternatives based on risk and returns.

2.5 The SRMP operational stage

The third stage of the SRM process is the operational stage. It is within this segment that the action plans are implemented by actually taking the planned risks. The focus is on the day-to-day duties of management.

Specific steps in the operational portion of the SRM process include implement plans, monitor and adjust, and re-plan. Strategic plans often left in a drawer and never fully carried-out, usually due to lack of diligence in developing all levels of the plan- the vision for the future, consideration of alternative methods for reaching that future, selection of the preferred method and the implementation, and monitoring and readjustment necessary to see the plan through to completion. This stage reduce risk. The SRM process is depicted as a circle to illustrate this cycle and the need for

continuing the process. The operational level is focused on the activities of day-to-day work. At this stage, the planning process should influence and affect what takes place week by week, month to month and season to season. For the best results, there should be a structured approach used as the activities of labour and management are carried out.

Operational-level activities include making sure the operational plans are carried out, that resources are available when and where they are needed, that those responsible for various stages of the production process are providing the needed oversight, and that system are reaching appropriately when contingencies come to light. In addition, successfully shifting toward the future requires simultaneous work on a number of strategic goals and tactical objectives with differing time frames. Operational-stage management provides the needed oversight and coordination to ensure smooth functioning of the business and resource use.

CHAPTER 3

Methodology

3.0 Introduction

This chapter elaborates the methods used to complete this study. This methodology section included theoretical framework, data collection methods, research hypothesis and also data processing.

3.1 Conceptual Framework

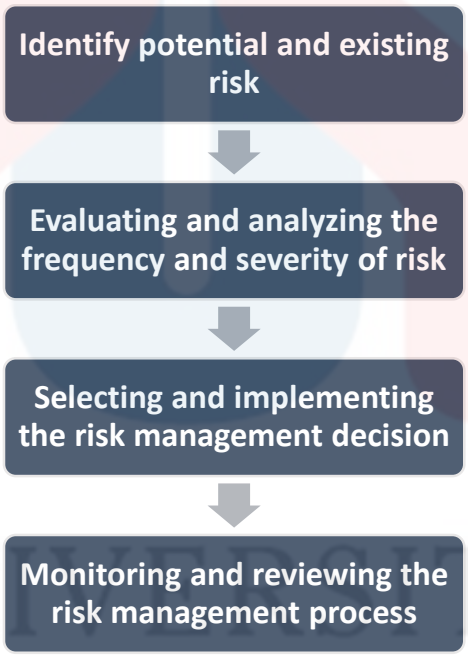
Based on the framework shown in **Fig. 3.1**, the first step in risk management is to identifying existing and potential risk. Some of risks that can be identified in fertigation such as property risk, human resource or personal risks. Financial statement, physical inspections, historical loss data, flowcharts process from start to final process, and by interview or discussion are among the tools that can be used to identify the risk.

The second step is evaluating and analysing the risks by looking at the severity level of the risks and also the frequency of occurrence followed by the third step which selecting and implementing the risk management decision where after the farmers

identified the risky problems, they discuss and select the best solutions to be implemented on their farm.

The last step is monitoring and reviewing the risk management process which the farmers evaluate the risk again. Whether the risk has been successfully reduced, can be avoided or vice versa.

Figure 3.1: Risk Management Framework



Adopted Dana, 2010 Risk Management Framework

3.2 Data collection

The type of research method is selected based on the type of information required, availability of resources and the ability to manipulate the interest variables.

3.2.1 Sampling frame and technique

To distribute the questionnaires, we were using cluster area random sampling. This is because this method was suitable for the online survey since we have distributed the questionnaire to all states in Malaysia without meeting the farmers face-to-face. The questionnaires were distributed to 130 respondents including pilot test. As the theoretical said that the minimum number of respondents required to answer the survey is at least 50. This is because 50 respondents are enough for statistical test. However, we were distributed it to 100 respondents as more number of respondents lead to the accurate answer.

3.2.2 Sources of data

The list of fertigation farmers was collected from respective agricultural officers at Department of Agriculture (DOA) in three states; Kelantan, Terengganu and Pahang. Besides, some of the respondents were identified through media social group, facebook, from Persatuan 1 Malaysia Fertigation, Fertigasi Malaysia and also Persatuan Fertigasi Semenyih.

The data were collected by using a semi-structured questionnaire method to gain information within Malaysia fertigation farmers. The other method that we used to collect the data was by using Google form which the farmers were asked to fill in the survey online with provided link. The questionnaires and link were distributed to 130 respondents including pilot test.

3.2.3 The questionnaire/ instrumentation

A semi-structured questionnaire was prepared to discover the perception and risk management of small farmers in Malaysia towards fertigation. The semi-structured questionnaires consist of four sections as follows:

Section A:

Section A consist of 15 questions to determine demographics of the respondents. The respondent was asked to answer the demographic questions. In this section, there were two types of question; closed answer and open-ended answer.

Section B:

Section B which composed of 33 questions were designed based on the first objective which is to identify the risk in fertigation. The rating method was used to determine the risk in their farm. The respondents were asked to rate the possibilities of the that had been listed risk occurred at their farm by using five Likert's scales; 1 as never occur, 2 as rare to occur, 3 as sometimes occur, 4 as always occur and 5 as very often to occur.

Section C:

Section C, 33 questions were based on the second objective: to discover the severity level of risk that happens on their farm. The type of question that had been used was five Likert's scales: 1 as not effected, 2 as slightly effected, 3 as quite effected, 4 as effected and 5 as very effected.

Section D:

Section D, 11 questions were designed to evaluate the attitude of the farmers toward risk, five Likert-scale again had been used in this section starting with strongly disagree until strongly agree.

All farmers were given questionnaires and google form link.

3.2.4 Pilot study

A pilot test was conducted before distributed the official questionnaire. A pilot test was conducted to ensure the viability of the questionnaire, so the understanding of the farmers and researchers about same question is congruent. The pilot test had been distributed to 30 fertigation farmers. A copy of this questionnaire had been attached in Appendices A at page 75-82. Data from this pilot test were analysed with reliability analysis, conducted in SPSS 21 to make sure the Cronbach's Alpha is in the acceptable value range which is between 0.7-0.9. Besides, we able to assess the degree of consistency between multiple measurements of the variables

3.3 Research hypothesis

H_0: There is no significant and positive relationship between socio-personnel, psychological and economic profile of the farmers with severity level of risk.

H_1: There is a significant and positive relationship between socio-personnel, psychological and economic profile of the farmers with severity level of risk.

3.4 Data processing and analysis

The collected data from the survey were processed with a reliability test, descriptive statistics, Chi-square analysis, Pareto analysis and risk matrix. The data were analysed by using SPSS software version 2.1 and by using Microsoft Excel version 2010.

3.4.1 Reliability analysis

The test was conducted using Cronbach's Alpha to assess the degree of consistency between multiple measurements of the variables. Cronbach's is a function of the number of items in a test, the average covariance between item-pairs, and the variance of the total score.

Reliability means the ability of a measuring instrument or instrument of research to produce consistent or consistent decisions every time a measurement is made. According to McMillan and Schumacher (2006), the level of reliability of a tool can be

estimated using five methods for example to determining stability, determining equality, determining stability and equivalence, determining internal consistency and determining degrees' agreement. For this study, the methods that were used to estimate the reliability of a measuring instrument are by determining internal consistency (Schmitt, 1996).

3.4.2 Descriptive analysis

The collected data were analysed by using descriptive analysis to describe the basic features of the collected data in a study. The descriptive analysis provided simple summaries of the sample and the measures. Besides, descriptive statistics also used to present quantitative descriptions in a manageable form. Besides, descriptive statistic helps to simplify large amounts of data sensibly. Each descriptive statistic reduces a lot of data into a more straightforward summary.

3.4.3 Chi square Analysis

The chi-squared test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories.

3.4.4 Risk matrix analysis

Risk matrix had been used as a risk was “rated’ for its probability and impact on a scale to understand where on the Risk Matrix it lies. Risk likelihood and magnitude are best demonstrated using a risk matrix. Risk matrix can be produced in many formats. The basic style of risk matrix plots the likelihood of an event against the impact should the event materialize (Fleisher, 1990).

A standard format for presenting a risk matrix has been adopted. The vertical axis is used to represent likelihood. The term likelihood is used is used rather than frequency because the word frequency implies that events will definitely occur and the risk matrix is registering how often these events take place. The likelihood is a broader word includes frequency but also refers to the chances of an unlikely event happening (Goodwin, 1993).

The horizontal axis is used to indicate magnitude. The word magnitude is used rather than severity, so the same style of risk matrix can be used to illustrate compliance, hazard, control and opportunity risks. Severity implies that the event is undesirable and is, therefore related to compliance and hazard risks. The magnitude of the risk may be considered to be its gross or inherent level before controls are applied (Goodwin, 1993).

Shading or colour coding is often used in the risk matrix to provide a visual representation of the importance of each risk under consideration. As risks move towards the top right-hand corner of the risk matrix, they become more likely and have

a more significant impact. Therefore, the risk becomes more critical and immediate and effective risk control measures need to be in place.

3.4.5 Pareto Analysis

Pareto analysis is used to separate the few major problems from many possible problems. Hence, we can focus on the improvement efforts. In addition, by using this analysis the researcher can arrange the data according to priority or importance. A part from that, the researcher can determine which problems are most important using data and need immediate risk management.

CHAPTER 4

RESULT AND DISCUSSION

4.0 Introduction

This chapter discussed the outcome of the survey of this study including descriptive analysis result, risk matrix, Pareto analysis and also reliability test outcomes.

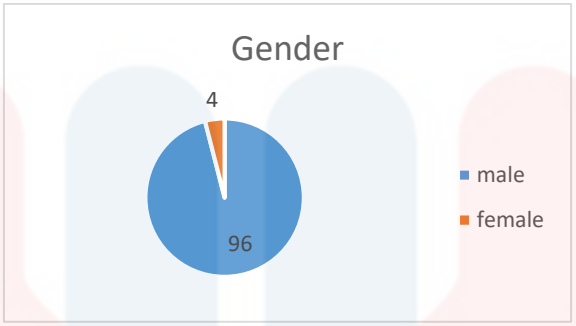
4.1 Socio-personnel, psychological and economic profile of the farmers

The data regarding socio-personnel, a psychological and economic profile of the respondents were analysed, and their basic statistical values are presented in chart:

Percentage of respondents according to their Gender:

The majority of the respondent who cultivate the crop by using this fertigation system were male (96%) and only a small portion of these farmers are female (4%).

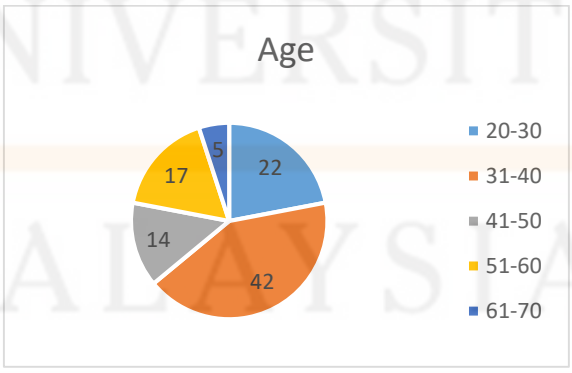
Figure 4.1: Percentage of respondents according to their Gender



Percentage of respondents according to their Age:

The result presented in figure 4.2 showed that a majority (42%) of fertigation farmers are aged between 31-40-year-old, followed by some younger farmers 20-30-year-old at 22%, 17.0% between 51-60-year-ol, while 14% are between 41-50 and lastly farmers who are aged between 61-70 make up 5% of the respondents.

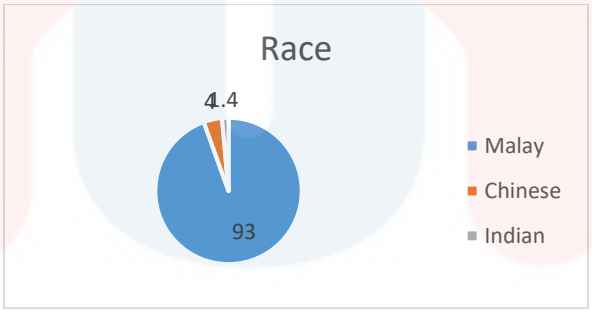
Figure 4.2: Percentage of respondents according to their Age



Percentage of respondents according to their Race:

Based on the chart in figure 4.3, the result showed up that the majority number of respondents were Malay which was 93.0%, followed by Chinese which 4.0% and lastly Indian 3.0%. Thus, it can be concluded that in the study area, the highest percentage of the respondents that are used fertigation system for their cultivation of crop in their farm were Malay. Secondly, Chinese and the last was Indian.

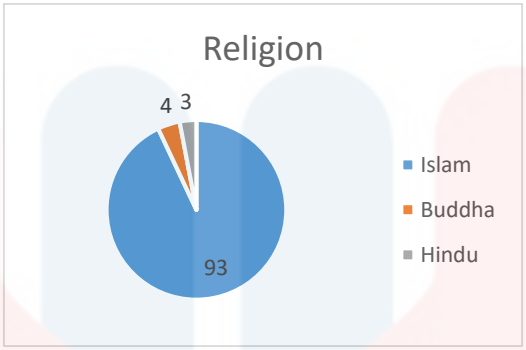
Figure 4.3: Percentage of respondents according to their Race



Percentage of respondents according to their Religion:

The result presented in figure 4.4 showed that out of the total respondents, the majority of the respondents 93.0% were Islam farmers, followed by Buddha which was 4.0% and Hindu 3.0%. Thus, it can be concluded that in the study area, the highest number of the respondents were Islam followed by Buddha and Hindu respectively.

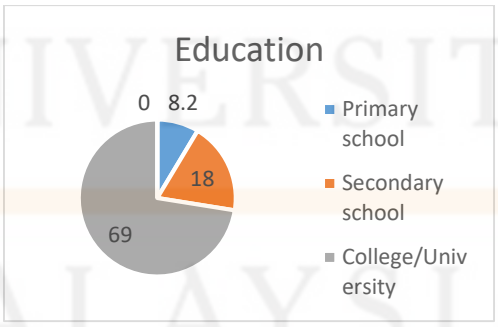
Figure 4.4: Percentage of respondents according to their Religion



Percentage of respondents according to their Education:

It can be concluded that under the study, a higher number of the respondents were found to college or university education (69%) followed by secondary school (18%) and primary school (13%).

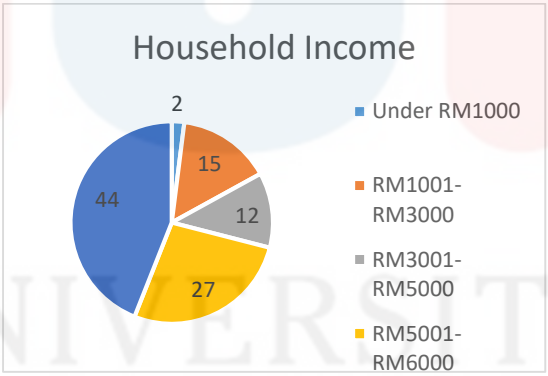
Figure 4.5: Percentage of respondents according to their Education



Percentage of respondents according to their Household Income:

Household income was considered as the salary that the respondents got for one month by using this technique. Based on figure 4.6 below, the majority of the respondents got household income exceed than RM6001 which was 44.0%. Secondly, RM5001-RM5001 which 27.0% followed by RM1001-RM3000 15.0%, then, RM3001-RM5001 12.0% and lastly was income that below RM1000 2.0%. Thus, it can be concluded that the highest household income that the respondent got by using this system was income that exceeds RM6001 followed by RM5001-RM6000, RM1001-RM3000, then, RM3001-RM5001 and under RM1000.

Figure 4.6: Percentage of respondents according to their Household Income

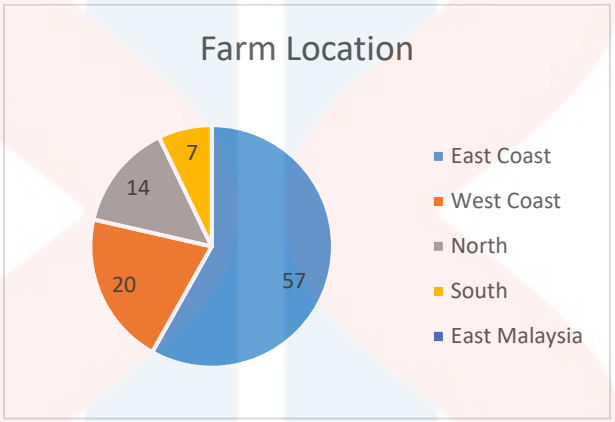


Percentage of respondents according to their Farm Location:

Fertigation planting technique is the system that flexible to be used anywhere and any demographic. The result presented in the figure 4.7 showed that out of the total respondents, the majority of the respondents 57.0% were coming from East Coast, followed by 20.0% from West Coast, 14.0% from North, 7.0% from the south

and 2.0% from East Malaysia. Thus, it is observed that the highest number of the farmers had come from East Coast followed by West Coast, next north, South and East Malaysia.

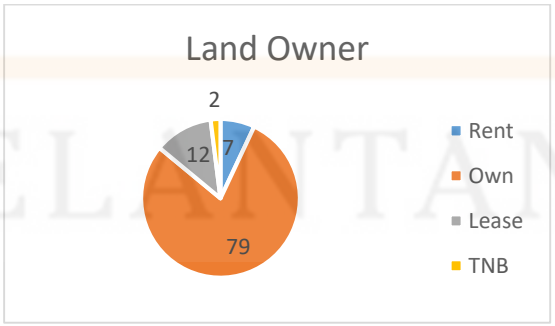
Figure 4.7: Percentage of respondents according to their Farm Location



Percentage of respondents according to Land Owner:

Based on the figure 4.8 above, mostly the respondents had their land to make the fertigation system which was 79.0%. Next, 12.0% of the respondents got the land by lease followed by land rent 7.0% and 2.0% from TNB land. Thus, it can be concluded that the highest number of respondents was own followed by lease, rent and TNB.

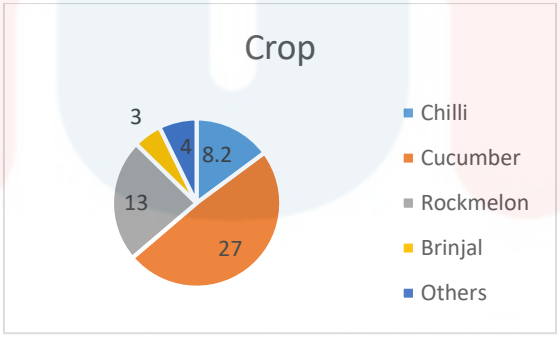
Figure 4.8: Percentage of respondents according to Land Owner



Percentage of respondents according to their Crop:

To use fertigation technique to cultivate the crop, the suitable crops must be selected as every crop had their own risk. The result presented in figure 4.9 showed that out of the respondents, the majority the respondents 53.0% that cultivated chilli crop, 27.0% grown cucumber, 13.0% grew rock melon, 3.0% cultivated brinjal and 4.0% cultivated other than above crops. Thus, it is observed that higher number of the respondents was cultivated chilli crop followed by cucumber, next was rock melon, others and brinjal.

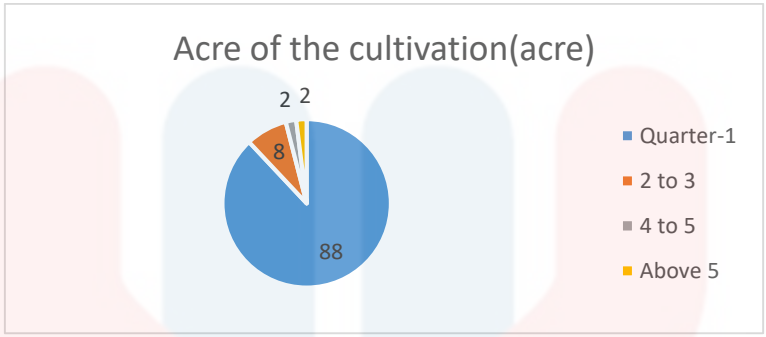
Figure 4.9: Percentage of respondents according to their Crop



Percentage of respondents according to Area of the Cultivation (acre):

Based on the figure 4.10 above, most respondents had 1/4-1 acre of cultivation area with 88.0% out from 100 respondents followed by 2-3 acre 8.0%, 4-5 and above 5 acres with 2.0% respectively. Thus, it can be concluded that most respondents had ¼-1 acre of cultivation area, followed by 2-3 acre, 4-5 and above 5 acres.

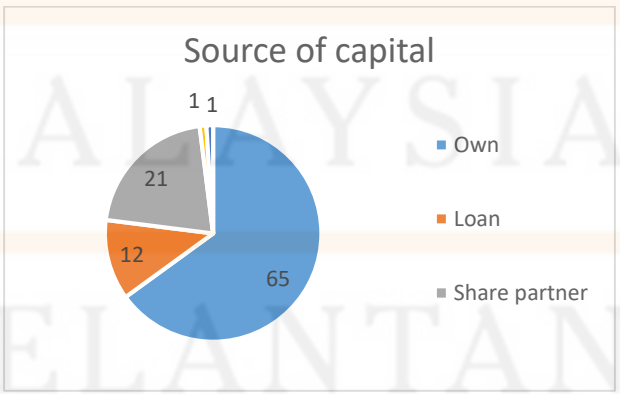
Figure 4.10: Percentage of respondents according to their Crop



Percentage of respondents according to Source of Capital:

Source of capital is essential to know where the start-up money was come from to run the respondent business. In the figure 4.11, it showed that 65.0% or respondents were using their own money, followed by 21.0% from share partner, 12.0% from loan and 1.0% from UAM grant and fund from investment respectively. Thus, it can be concluded that most of the respondents earn start-up capital from their saving followed by share partner, then loan and UAM and fund from an investment.

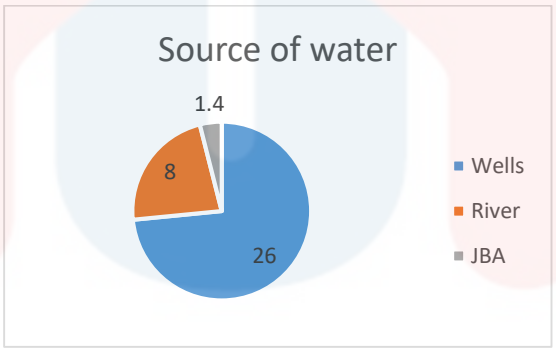
Figure 4.11: Percentage of respondents according to Source of Capital



Percentage of respondents according to Source of water:

Water is an essential element in fertigation system as it used to ensure the crop get sufficient water requirement for growth. From the figure 4.12 above, 66.0% of the respondents were using JBA for water sources followed by 26.0% got the water sources from wells and only 8.0% from river. Thus, it can be concluded that most of the respondents were using JBA water sources compared to wells and river for their irrigation of crop in their farm.

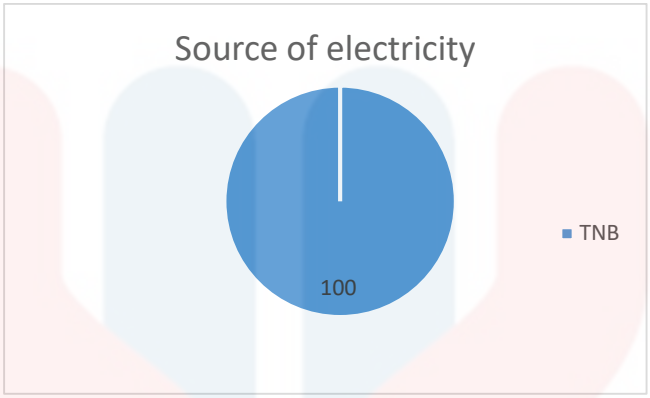
Figure 4.12: Percentage of respondents according to Source of water



Percentage of respondents according to Source of electricity:

Fertigation system is an automatic system that uses electricity to operate it. Based on the figure 4.13, all the respondents which 100.0% were using TNB as a source of electric in their farm.

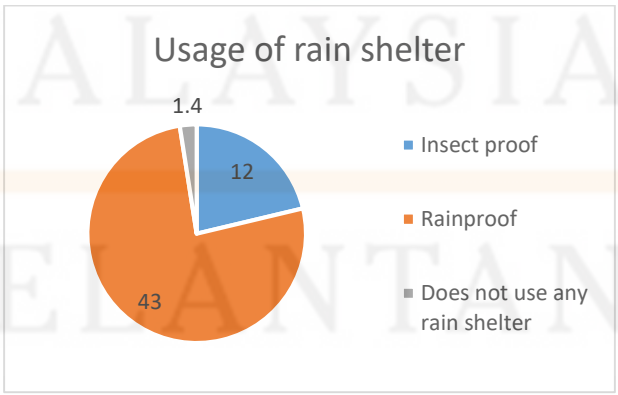
Figure 4.13: Percentage of respondents according to Source of electricity



Percentage of respondents according to Usage of Rain shelter:

Rain shelter is an optional component that can be used in fertigation setup. chart 4.14 showed that 45.0% of the respondents were not using any rain shelter while 43.0% were using rain shelter as for the protection from rain and only 12.0% were using rain shelter for protecting their crop from insects. Thus, it can be concluded that higher number of respondents did not use any rain shelter in their farm followed by respondents that were using rain shelter for rainproof and insect proof.

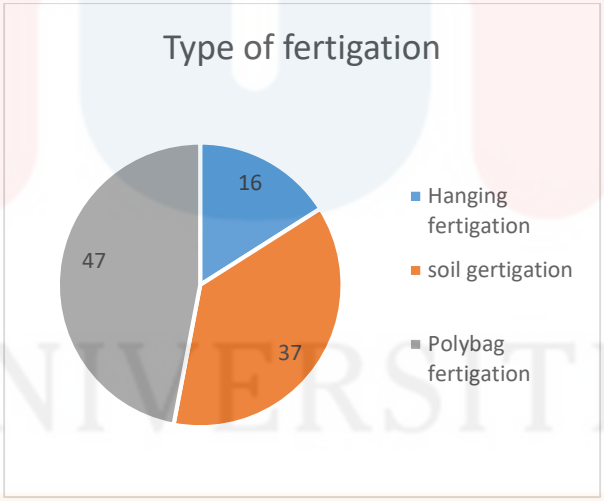
Figure 4.14: Percentage of respondents according to Usage of Rain shelter



Percentage of respondents according to Type of Fertigation:

Fertigation technique is the planting technique that can save the space, and the farmers can plant a maximum number of crop they want. There are three types of fertigation that can be used on the farm. They are air fertigation, land fertigation and also polybag fertigation. Based on the chart result 4.15, 47.0% of the respondents prefer to use land fertigation followed by land fertigation 37.0% and air fertigation 16.0%. Thus, it can be concluded that most of the respondents were using polybag fertigation followed by land fertigation and air fertigation.

Figure 4.15: Percentage of respondents according to Type of Fertigation



4.2 Identification of risk

Basically, risk can be divided into five major categories, they are production risk, marketing risk, financial risk, institutional risk, technology risk and also human resource risk. In this section, we arranged the questionnaires based on their categories.

4.2.1 Production risk

It is important for the farmers to identify the risk that occurs on their farm. The statement from the respondent feedback, ‘Fungal disease attack' showed that 47.0% of the respondents said that the fungal attack always occurred at their farm, 36.0% of the respondents answered the fungal disease attack sometimes happen at their farm, 10.0% answered the fungal disease attack very often occur at their farm and only 7.0% of the farmers said that there were rare to occur the fungal disease attack at their farm. This statement indicates that fungal disease attack is the dangerous disease for the fertigation farmers.

The statement ‘Insect disease attack' indicates that mostly the respondents face this type of disease at their farm which was 47.0% always occur. 30.0% of the respondents said that insect disease attack very often occurred at their cultivation area, 23.0% answered that this disease sometimes happened and only 7.0% of the respondents said that this disease was rare to occur at their farm. Thus, it can be concluded that this insect disease attack is the risky disease for the farmers since there was no respondent said that this disease never occurred on their farm.

The statement ‘Virus disease attack' showed up that the respondents face this type of virus disease at their farm which was 43.0% always occur. 22.0% of the respondents said that insect disease attack always occurred at their cultivation area, 19.0% answered that this disease very often and only 16.0% of the respondents said that this disease was rare to occur at their farm. Thus, it can be concluded that this virus disease attack is the risky disease for the farmers since there was no respondent said that this disease never occurred in their farm.

Based on the statement ‘Cut off electricity', 44.0% of the respondents answered that this problem was rare to occur in their farm. 23.0% of the respondents respond that this problem sometimes happened, 16.0% said that it was never faced this situation at their farm, where 9.0% of them answered that this problem very often to occur and 8.0% said that this problem always occurred at their farm. This statement indicates that the cut off electricity is not a risky problem since that the majority of the respondents that did not face this problematic situation.

The statement ‘Cut off clean water' showed up that the highest number of respondents which were 40.0% answered that they never faced this problem on their farm. Where, 33.0% said that this situation sometimes occurred, 17.0% of them responded that this problem was rare to occur and only 3.0% of the respondents very often faced such situation. It can be concluded that this problem was not the risky problem.

Since fertigation planting technique is a concept of planting that saves the space of cultivation area, the statement ‘Limited cultivation area' indicated that majority of the respondents which 61.0% never faced limited cultivation area, 18.0% of them

responded that they faced very rare to occur this problem, 8.0% of the respondents said that they faced this situation sometimes, 2.0% answered always occurred in their farm, and 11.0% said that this problem was very often to occur. So, it can be concluded that this problem did not cause a serious problem since the farmers can plant a maximum number of crops in a limited space.

Since the fertigation planting technique is a technique that considered the form of fertilizer used, the statement ‘Form of fertilizer does not suitable' showed up that the highest number of the respondents which 48.0% responded that they never faced this problem, 25.0% of the farmers said that they sometimes faced the unsuitable form of fertilizer, 13.0% marked that they rare to occurred unsuitable form of fertilizer, 8.0% of them answered they always occur unsuitable form of fertilizer. Thus, this statement indicates that this problem could not risk the farmers since a majority of them did not face this problem seriously.

The statement ‘Hard to get fertilizer' indicates most of the respondents which 43.0% never occur this problem, 36.0% of them sometimes had a problem to get fertilizer supplier, 13.0% answered that they were rare to occurred this problem and only 8.0% said that they were very often faced this kind of problem. Since most of them did not face this kind of problem, it can be concluded that this problem does not give big risk to them.

The statement ‘Flood at the certain season' indicates that 42.0% answered that this risk always happened in their area, 26.0% marked as very often to occur, 17.0% said that this situation was rare to happen, 9.0% of the respondents answer this problem sometimes occurred and 6.0 marked as never happen at their area. Thus, it

can be concluded that flood season gives risk to the farmers that cultivate the crop by using this technique.

Definitely fertigation system needs to be maintained in order to ensure the operation does not bring problem in the future. From the statement ‘Technology that needs maintenance' showed that 50.0% of them sometimes did the maintenance to their fertigation system, 18.0% were rare to service their system, 13.0% of them marked as very often to occur, 12.0% of the respondents said that they were always service their system and only 7.0% of the respondents marked as never occur. Thus, it can be concluded that this statement brings risk to the farmers as the technology need to be maintained to ensure it well operating.

The statement ‘Insect disease attack' indicates that mostly the respondents face this type of disease at their farm which was 47.0% always occur. 30.0% of the respondents said that insect disease attack very often occurred at their cultivation area, 23.0% answered that this disease sometimes occurred and only 7.0% of the respondents said that this disease was rare to occur at their farm. Thus, it can be concluded that this insect disease attack is the risky disease for the farmers since there was no respondent said that this disease never occurred on their farm.

The statement ‘Fertigation tools had been stolen' showed that the highest number of farmers 38.0% were never faced this situation, 38.0% of the respondents were rare to occur this problem, 12.0% of the respondents sometimes occurred this situation, 8.0% of them always occurred this problem and only 4.0% marked as very often to occur. In conclusion, this problem did not give big risky since most of the farmers did not faced this problem seriously.

From the statement ‘The yield had been stolen' indicates that 38.0% of the respondents never occur this problem, 33.0% from them marked as rare to occur, 13.0% of the respondents were always occurred this situation, 9.0% of them answered as very often to occur and 7.0% said that they sometimes occurred this problem. Since most of the respondents already had the experience on yield had been stolen, so this situation considered as a risky situation to the farmers.

4.2.2 Human resources risk

The statement ‘Lack of labour' indicates that most of the respondents face this problem at their farm which was 39.0% answered that very often occurred to find the worker. 18.0% of the respondents said that they always faced and rare to occur the situation which the employee was hard to get, 8.0% answered that this problem never occurred to them and 17% of them marked as sometimes occurred at their farm. Thus, it can be concluded that it is difficult to find the labour to work on the farm.

Fertigation system is the modern system that saves the energy labour, however, it really needs a highly skilled labour for the operation. Based on the statement ‘Lack of expert labour' the highest number of respondents marked at very often which is 30.0%, 26.0% of the respondents' answered they always faced this problem, 28.0% marked that they never had this problem and 8.0% from the respondents said that they were rare and sometimes happen this problem at their farm. This statement can be indicated that this problem is a risky problem to the farmers since most of them faced this situation. Fertigation system is the modern system that saves the energy labour, however, it really needs a highly skilled labour for the operation. Based on the statement ‘Lack of expert labour' the highest number of

respondents marked at very often which is 30.0%, 26.0% of the respondents' answered they always faced this problem, 28.0% marked that they never had this problem and 8.0% from the respondents said that they were rare and sometimes happen this problem at their farm. This statement can be indicated that this problem is a risky problem to the farmers since most of them faced this situation.

The statement ‘Labour does not interest to work' showed up that 35.0% of the respondents answered as very often to occur, 23.0% of the respondents said that this problem sometimes occurs, 18.0% marked as always happen, 16.0% of the respondents answered never occurred, and only 8.0% of them always occur this problem. This can be concluded that labour is hard to find.

4.2.3 Financial Risk

To use fertigation system, the cost of the production must be considered. Based on the statement ‘Expensive fertilizer' showed that half of the respondents which 51.0% very often faced expensive fertilizer at the market or supplier, 17.0% answer that they always face this situation, 16.0% responds that they sometimes occur, 9.0% rare to occur and 7.0% never faced this problem. Thus, it can be concluded that fertilizer price gives risk to the farmers.

The statement ‘Expensive media' showed up that 48.0% of the respondents very often face this problem, 18.0% of them always face this situation, 13.0% answered they rare to occur such problem, 11.0% marked the expensive fertilizer sometimes occur to them and 9.0% said that they never had this problem. Thus, it can be

concluded that expensive fertilizer gave a risk to farmers since most of them occur this problem.

The statement ‘Expensive labour salary' showed that 43.0% of the respondents sometimes occur this problem, 18.0% of them marked as very often to occur, 16.0% of the respondents answered as never occur, 13.0% of the respondents said that they were rare to occur this situation and 10.0% of them answered as always occur. Thus, it can be concluded that this statement is a risky problem to the farmers.

The statement ‘Expensive technology' indicated that the higher number of the respondents 30.0% marked as very often to occur and always occur respectively, 25.0% of the respondents answered as sometimes occur, 8.0% of them marked as rare to occur, and 7.0% of them answered as never occur. Thus, this can be concluded that this statement gives risk to the farmers.

The statement ‘High interest bank loan’ showed up that 40.0% of the respondents answers as very often to occur, 25.0% respondents respond that they never face this problem, 18.0% of them said that they sometimes occurred this problem, 9.0% of them marked as rare to occur this problem and only 8.0% of them marked as sometimes occurred. Thus, it can be concluded that the farmers mostly faced this kind of problem.

4.2.4 Technology Risk

Fertigation system is an automatize machine which sometimes cannot function properly. Based on the statement ‘Fertigation system does not function' 46.0% answered they never in such situation, 26.0% marked as sometimes occurred at their operational area, 17.0% said that this problem was rare to occur, 6.0% of the respondents marked as very often to occur and 5.0% answered they always faced the situation where the fertigation system does not proper function. It can be concluded that this statement does not give big risky to them since a majority of them does not have problem with this problem.

The statement ‘Fertigation pump damaged’ indicated that 42.0% of the respondents never faced this situation, 25.0% of the respondents marked as sometimes occur in their farm, 19.0% of them said that this situation was rare to occur, 6.0% of the respondents answer that very often to occur and 8.0% sometimes occurred. Thus, it can be said that this problem does not give risk to the farmers since many of them did not have problem with pump damaged.

The statement ‘Leakage at fertigation pump' most of the respondents 36.0 answered that this situation sometimes happened, 35.0% of the respondents respond rare to occur, 18.0% said that they never faced this situation, 6.0% marked as very often to happen and 5.0% of the respondents said that this situation always happened to them. So, it can be concluded that this situation gives little bit risky to the farmers.

The statement ‘Leakage at greenhouse plastic UV' showed that 61.0% of the respondents never occurred this problem, 12.0% of the respondents rare and sometimes faced this problem respectively, 6.0% of the respondents always occurred this situation and 9.0% of them very often met this problem. Thus, it can be concluded that this statement did not give significant risk to the farmers as long as most of them did not face this issue seriously.

From the statement ‘Greenhouse collapsed because of strong wind' indicates that most of the respondents which 59.0% never occurred this problem, 15.0% from them was about sometimes to happen in their farm, 11.0% of the respondents were very often with this problem, 10.0% of them always faced this risk and only 5.0% of the respondents were rare to face this problem. Therefore, it can be concluded that greenhouse collapsed because of strong wind did not give big risk to them.

4.2.5 Price and market Risk

The statement ‘Competition with import vegetables and fruits’ indicates that 43.0% of the respondents very often faced this problem, 18.0% from them sometimes and always happen this problem respectively, 17.0% of them answered that they faced this problem rare and 4.0% of the respondents said that they never occur in such problem. Thus, it can be concluded that this risk is a big risk for the farmers.

The statement ‘Competition with fertigation farmer to get market' showed up that 47.0% of the respondents marked as never occurred this risk, 24.0% of them answered rare to occurred, 12.0% from the respondents said that this problem

sometimes happened, 6.0% of them answered always occurred and 11.0% marked as very often to occur. This can be concluded that competition with fertigation farmer was not the serious risk among them.

It is common in agribusiness to play with the market price. From the statement ‘Unstable market price' indicates that the higher number of respondents 38.0% said that they were very often faced this risk, 21.0% of the respondent answered always faced this problem, 22.0% said that they sometimes faced this situation, 5.0% marked as rare to occurred and 14.0% marked as never occurred. Thus, it can be concluded that unstable market price brings significant risk to the respondents.

The statement ‘High demand for vegetables and fruits' showed that 41.0% of the respondents were marked always occur, 30.0% of the respondents answered sometimes to occur,13.0% said that they were rarely faced this problem, 9.0% of them marked very often to occur and only 7.0% of the respondents answered they were never faced this problem. This can be concluded that high demand for vegetables and fruit is a big risky to them.

The statement ‘Difficult marketplace' indicates that most of the respondents 42.0% were sometimes occur this problem, 18.0% of the respondents marked as very often to occur, 16.0% of them marked as never occur and rare to occur respectively, and 8.0% of the respondents answered as this problem always happened on their farm. Thus, it can be concluded that this problem can bring risky to the farmers.

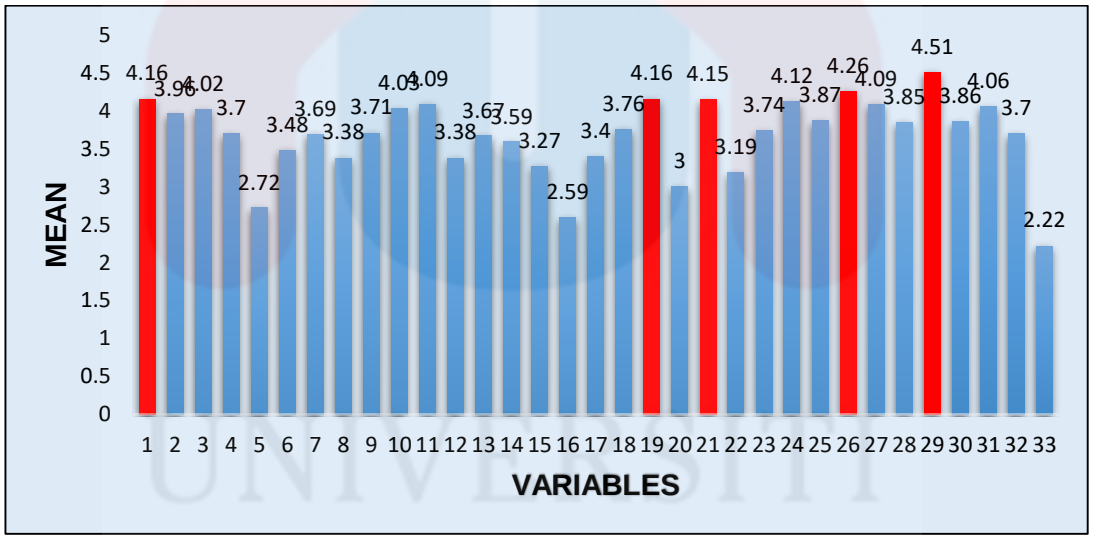
The statement ‘Farmers difficult to get government help' indicates that 43.0% of them very often occurred to get help from the government, 19.0% of them marked as always occur, 16.0% of the respondents answered as rare to occur, 14.0% marked as sometimes occur and 8.0% of them answered as never occur. Thus, it can be concluded that the farmers were difficult to get government help.

The statement ‘Limited knowledge’ showed up that 47.0% of the respondents marked as sometimes occur, 17.0% of them marked as always occur, 16.0% of the respondents answered as very often to occur, 12.0% of the respondents said that they were never occur this problem and 8.0% answered as rare to occur. Thus, it can be concluded that most of the respondent had limited knowledge regarding the fertigation system.

4.3 Severity level of the risk

Based on the bar chart 4.16, the result show that five variables from severity level of the risk have higher mean. The five variables are 'Fungal disease attack' with mean 4.16, 'Competition with import vegetables' with mean 4.16 respectively, 'Unstable market price' with mean 4.15, 'Difficult to get labour' with 4.26 and the last variable with high mean is 'Farmers difficult to get government help' indicates mean 4.51.

Chart 4.16 Severity level of the risk



*Red bar indicates variables with high severity level of risk

*Blue bae indicates variables with low severity level of risk

4.4 Attitude of Farmers towards Risk

Table 4.4 indicates the result of attitude of the farmers towards risk. Based on the table, there are four variables that have been highlighted which are 'I avoid from making decision that has big probability to gain loss or profit' with mean 2.60, 'I do not want to make maximum loan even though I deserved it' with mean 2.83, 'I only use new technology if there positive testimony from other farmers' with mean 2.83, and lastly is 'I will ask for other opinion before I make any decision that highly risky' with mean 4.36. These variables show that the farmers are a risk averse person since they do not courage to take action that high risky to their farm.

The remaining variables indicates that the farmers are risk taker person since they have enough courage to take action that maybe can give them high uncertainty.

Table 4.4 Distribution Attitude of farmers towards risk

Statement	Mean
I avoid from making decision that has big probability to gain loss or profit	2.60
I do not want to make maximum loan even though I deserved it	2.83
I am ready to use new technology even though other farmers does not interested in it	4.03
I only use new technology if there positive testimony from other farmers	3.67
I am brave to take the risk to gain profit	4.17
I will ask for other opinion before I make any decision that highly risky	4.36
I fully submit to market forces	2.83
I was able to control the percentage of yield on my farm	3.53
I have installed a CCTV at a strategic location on the farm	2.74
I know there is agriculture insurance in Malaysia	3.00
I am willing to pay more for agriculture insurance	2.85

4.5 Chi- square analysis

The further analysis is by using chi-square analysis between selected a few variables from demographic part with five variables that have high severity of risk from the previous descriptive analysis section.

4.5.1 Relationship between type of crop with severity level of risk

From the table 4.5.1, the result show that 'Fungal disease attack' with p value 0.012 and 'Unstable market price' with p value 0.005 have significant and positive relationship between these two variables with type of crop. This means that the type of crop is influence the severity of risk since the p value is below than 0.05, null hypothesis had been rejected. This might be due to fungal disease that attack their farm affected the yield of the crop and there is a fluctuation of market price depending of the type of crop that the farmers cultivate.

In the other hand, the remaining variables seem have greater p value meaning that there is no significant and positive relationship between these variables with severity level of risk. Since the null hypothesis is rejected, meaning that the type of crop does not influence the variables.

Table 4.5.1 Relationship between type of crop with severity level of risk

Variables	Chi-square	Df	Sig.	Decision
Fungal disease attack	12.823	4	0.012	Reject Ho
Competition between local and import vegetable and fruit	18.937	16	0.272	Accept Ho
Unstable market price	22.192	8	0.005	Reject Ho
Difficult to get labour	15.684	12	0.206	Accept Ho
Difficult to get help from government	21.652	16	0.155	Accept Ho

4.5.2 Relationship between type of fertigation with severity level of risk

From the table 4.5.2, the result show that 'Fungal disease attack' with p value 0.012 have significant and positive relationship between this variable with type of fertigation. This means that the type of crop is influence the severity level of this variables since the value of p is below than 0.05, the null hypothesis had been rejected. This might be due to fungal disease that attack their farm affected the yield of the crop

In the other hand, the remaining variables seem have greater p value meaning that there is no significant and positive relationship between these variables with severity level of risk. Since the null hypothesis is rejected, meaning that the type of fertigation does not influence the variables.

Table 4.5.2 Relationship between type of fertigation with severity level of risk

Variables	Chi-square	Df	Sig.	Decision
Fungal disease attack	12.823	4	0.012	Reject Ho
Competition between local and import vegetable and fruit	12.893	12	0.377	Accept Ho
Unstable market price	12.915	12	0.375	Accept Ho
Difficult to get labour	15.684	12	0.206	Accept Ho
Difficult to get help from government	5.719	4	0.221	Accept Ho

4.5.3 Relationship between level of education with severity level of risk

From the table 4.5.3, the result show that 'Fungal disease attack' with p value 0.024 have significant and positive relationship between this variable with level of education. This means that the level of education is influence the severity level of this variables since the value of p is below than 0.05, the null hypothesis had been rejected. This might be due to farmer lack of knowledge or information regarding the pest and disease management.

In the other hand, the remaining variables seem have greater p value meaning that there is no significant and positive relationship between these variables with severity level of risk. Since the null hypothesis is rejected, meaning that the level of education does not influence the variables.

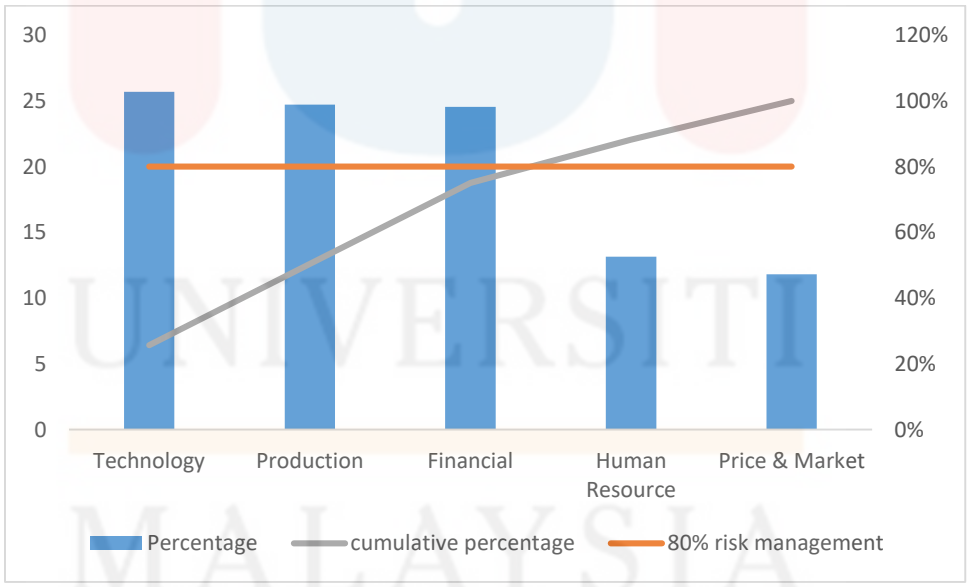
Table 4.5.3 Relationship between level of education with severity level of risk

Variables	Chi-square	Df	Sig.	Decision
Fungal disease attack	14.567	6	0.024	Reject Ho
Competition between local and import vegetable and fruit	12.893	12	0.377	Accept Ho
Unstable market price	12.915	12	0.375	Accept Ho
Difficult to get labour	7.572	9	0.578	Accept Ho
Difficult to get help from government	7.902	6	0.245	Accept Ho

4.6 Pareto analysis

Based on the Pareto chart, the result indicates that type of risk which are technology (25.69%), production (24.71%), and financial risk (24.54%) are exceed than 20% of theoretical Pareto value while human resource (13.16%) and price market (11.82%) are below than 20% of Pareto value. According to the Vilifredo Pareto, 80% of quality problems in the end product or service are caused by 20% of the problems in the production or service process. Therefore, technology, production and financial risk are in extremely dangerous risk since the identified risk has exceed than 20% and need 80% of risk management effort immediately.

Figure 4.17 Pareto chart



4.7 Reliability analysis

Reliability is used to provide a measure of the variables that purpose to ensure the validity of the questions. In this study, three latent factors are identified and the factors were tested by using Cronbach's Alpha score.

According to the Tavakol & Dennick (2011) stated that the acceptable value of Cronbach's Alpha is more than 0.7. Therefore, based on the table 4.5 shows that all the variables from each section have acceptable value of Cronbach's Alpha.

Table 4.7 Cronbach's Alpha value

Section	Cronbach's Alpha	N of item	Conclusion
Risk identification	0.991	33	Acceptable
Severity level of risk	0.994	33	Acceptable
Attitude of farmers towards risk	0.976	11	Acceptable

4.6 Risk Matrix analysis

Based on the Risk Matrix diagram, on the X-axis is the severity level of the risk and on the Y-axis is marked as a percentage of risk. As we can see in the diagram, there are four different colour which assigned to four different level of risk. The four levels of risk are low risk, moderate risk, high risk and also extremely high risk.

Low risk is a condition where the risk was not affected but very often to occur, not affected but always occur, not affected bur sometimes occur, not affected but rare to occur, not affected but never occur. Since there was none of the data showed up at this stage, it can be concluded that none of the listed risk in low stage.

Moderate risk is a condition where the risk slightly affected but very often to occur, slightly affected but always occur, slightly affected but sometimes occur, quite affected but sometimes occur, quite affected but rare to occur, affected but rare to occur and very affected but rare to occur. Based on the table, it showed that thirteen of the data at this stage. It can be concluded as moderate risk.

High risk is a condition where the risk was quite affected but very often to occur, quite affected but always occur, affected but sometimes occur, and very affected but sometimes occur. Based on the table, it showed that ten of the data at this stage. It can be indicated as high risk.

An extremely high risk is a condition where the risk was affected but very often to occur, affected but always occur, very affected but very often to occur, and very

affected but always occur. Based on the table, it showed up that ten of the data at this stage. It can be concluded as this risk is an extremely high risk.

Diagram 4.18 Risk Matrix

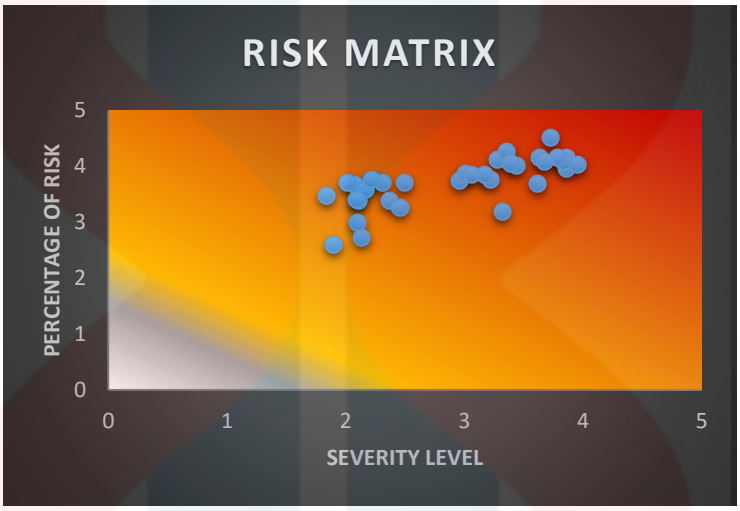


Table 4.9 Risk Matrix

	Not effect	Slightly effect	Quite effect	Effect	Very affected
Very often to occur					
Always occur					
Sometimes occur					
Rare to occur					
Never occur					

LEVEL	Low Risk	Moderate Risk	High Risk	Extremely High Risk
COLOUR AND RANGE	0-4	4.1-9.9	10.0-13.99	14.1-16.99

CHAPTER 5

CONCLUSION AND RECOMMENDATION

In the nutshell, all the variables have their own categorize which are production, price and market, technology, financial, and human resource (Objective 1). Besides, from the 5 variables from severity graph it can be concluded that there is a significant and positive relationship between selected variables from demographic with severity of risk. Therefore, the alternate hypothesis is accepted (Objective 2). In addition, the highlighted risk from attitude section indicates that the farmers is a risk avoidance person (Objective 3).

As for a recommendation, the risks in every farm or estate can be reduced or avoid if the farmers alert for this condition and take early action to overcome these problems. Risk management is the important element that farmers must realise the importance to have it. The good risk management practice will lead to highest profit to the farmers and reduce the loss faced by farmers.

5.1 Limitation of study:

The constrain in processed this investigation was difficult to obtain data from agricultural office. In order to get the list of farmers' data, we must discuss with the higher officer. However, the person that in charge in horticulture sector are always absent in their position. Hence it is hard for us to meet them. In addition, the number of farmers who run the fertigation are concentrated in one are. The location of the survey was at the different places and it is take time and financial resources to survey from one place to other places. These limitations make us difficult to move and it is costly. Those affected the study in term of we could not achieve the targeted number of survey in certain time. Therefore, the survey done in a different time and is costly. Furthermore, the attitude of the farmers was difficult to corporate to answer the survey. In addition, surveys that use online as email, whatsapp and facebook seems did not achieve the target of respondents.

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Appendix A

Table 1: Distribution of respondents according to their Gender:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
1	Gender	Male	96	96.0
		Female	4	4.0

Table 2: Distribution of respondents according to their Age:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
2	Age	20-30	22	22.0
		31-40	42	42.0
		41-50	14	14.0
		51-60	17	17.0
		61-70	5	5.0

Table 3: Distribution of respondents according to their Race:

No.	Attribute	Categories	No. of respondents (N=100)	percentage of total
3	Race	Malay	93	93.0
		Chinese	4	4.0
		Indian	3	3.0

Table 4: Distribution of respondents according to their Religion:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
4	Religion	Islam	93	93.0
		Buddha	4	4.0
		Hindu	3	3.0

Table 5: Distribution of respondents according to their Education:

No.	Attribute	Categories	No. of respondents (N=130)	Percentage of total
		Primary school	13	13.0
		Secondary school	18	18.0

5	Education	College/ University	69	69.0
		No formal education	0	0.00

Table 6: Distribution of respondents according to their Household Income:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
6	Household Income	Under RM1000	2	2.0
		RM1001-RM3000	15	15.0
		RM3001-RM5000	12	12.0
		RM5001-RM6000	27	27.0
		Above RM6001	44	44.0

Table 7: Distribution of respondents according to their Farm Location:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
7	Farm Location	East Coast	57	57.0
		West Coast	20	20.0
		North	14	14.0
		South	7	7.0
		East Malaysia	2	2.0

Table 8: Distribution of respondents according to Land Owner:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
8	Land Owner	Rent	7	7.0
		Own	79	79.0
		Lease	12	12.0
		TNB	2	2.0

Table 9: Distribution of respondents according to their Crop:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
		Chilli	53	53.0
		Cucumber	27	27.0

9	Crop	Rockmelon	13	13.0
		Brinjal	3	3.0
		Others	4	4.0

Table 10 Distribution of respondents according to Area of the Cultivation (acre)

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
10	Acre of the cultivation (acre)	¼-1	88	88.0
		2-3	8	8.0
		4-5	2	2.0
		Above 5	2	2.0

Table 11 Distribution of respondents according to Source of Capital:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
11	Source of capital	Own	65	65.0
		Loan	12	12.0
		Share partner	21	21.0
		UAM grant	1	1.0
		Fund from investment	1	1.0

Table 12 Distribution of respondents according to Source of water:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
12	Source of water	Wells	26	26.0
		River	8	8.0
		JBA	66	66.0

Table 13 Distribution of respondents according to Source of electricity:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
13	Source of electricity	TNB	100	100.0

Table 14 Distribution of respondents according to Usage of Rain shelter

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
		Insect proof	12	12.0

14	Usage of rain shelter	Rainproof	43	43.0
		Does not use any rain shelter	45	45.0

Table 15 Distribution of respondents according to Type of Fertigation:

No.	Attribute	Categories	No. of respondents (N=100)	Percentage of total
15	Type of fertigation	Hanging fertigation	16	16.0
		Soil fertigation	37	37.0
		Polybag fertigation	47	47.0

Table 4.3 Distribution of respondents according to Severity Level of Risk

Statement	1*	2*	3*	4*	5*	Mean	SD
Fungal disease attack	0.0	0.0	16.0	52.0	32.0	4.16	0.677
Insect disease attack	0.0	0.0	27.0	50.0	23.0	3.96	0.710
Virus disease attack	0.0	7.0	13.0	51.0	29.0	4.02	0.841
.Cut off electricity	0.0	17.0	35.0	11.0	37.0	3.70	1.403
Cut off clean water	14.0	39.0	19.0	17.0	11.0	2.72	1.223
Limited cultivation area	12.0	16.0	9.0	38.0	25.0	3.48	1.344
Lack of labour	7.0	9.0	18.0	40.0	26.0	3.69	1.161
Form of fertilizer does not suitable	8.0	12.0	38.0	18.0	24.0	3.38	1.204
Hard to get fertiliser	8.0	13.0	15.0	28.0	36.0	3.71	1.297
Expensive fertilizer	1.0	3.0	33.0	18.0	45.0	4.03	1.00
Expensive media	0.0	1.0	37.0	14.0	48.0	4.09	0.944
Flood at the certain season	13.0	10.0	40.0	0.0	37.0	3.38	1.405
Fertigation system does not function	13.0	9.0	18.0	18.0	42.0	3.67	1.429
Fertigation pump damaged	13.0	12.0	22.0	9.0	44.0	3.59	1.471
Leakage at fertigation pump	12.0	27.0	18.0	8.0	35.0	3.27	1.476
Leakage at greenhouse plastic UV	40.0	5.0	27.0	12.0	16.0	2.59	1.505
Greenhouse collapsed because of strong wind	25.0	0.0	21.0	18.0	36.0	3.40	1.576

Lack of expert labour	8.0	8.0	25.0	18.0	41.0	3.76	1.288
Competition with import vegetables and fruits	8.0	1.0	12.0	25.0	54.0	4.16	1.187
Competition with fertigation farmer to get market	14.0	36.0	12.0	12.0	26.0	3.00	1.449
Unstable market price	5.0	7.0	18.0	8.0	62.0	4.15	1.234
High demand for vegetables and fruits	8.0	12.0	51.0	11.0	18.0	3.19	1.116
Difficult marketplace	9.0	18.0	9.0	18.0	46.0	3.74	1.426
Labour is not interested to work	0.0	12.0	8.0	36.0	44.0	4.12	0.998
Expensive labour salary	0.0	16.0	26.0	13.0	45.0	3.87	1.160
Difficult to get labour	0.0	8.0	12.0	26.0	54.0	4.26	0.960
Expensive technology	1.0	8.0	14.0	35.0	42.0	4.09	0.986
Technology that needs maintenance	0.0	12.0	19.0	41.0	28.0	3.85	0.968
Farmers difficult to get government help	0.0	0.0	16.0	17.0	67.0	4.51	0.759
Limited knowledge	1.0	8.0	39.0	8.0	44.0	3.86	1.110
High interest bank rate for loan	8.0	5.0	18.0	11.0	58.0	4.06	1.301
Fertigation tools had been stolen	13.0	8.0	18.0	18.0	43.0	3.70	1.425
The yield had been stolen	11.0	8.0	19.0	18.0	44.0	3.76	1.379

*Indicator: 1*Not effect, 2* Slightly effect, 3*Quite effect, 4*Effect, 5*Very effect*

Table 4.2 Distribution of respondents according to Identification of Risk

Statement	1*	2*	3*	4*	5*	Mean	SD
Fungal disease attack	0.0	7.0	36.0	47.0	10.0	3.86	0.765
Insect disease attack	0.0	7.0	23.0	47.0	30.0	3.86	0.853
Virus disease attack	0.0	16.0	43.0	22.0	19.0	3.44	0.978
Cut off electricity	16.0	44.0	23.0	8.0	9.0	2.50	1.133
Cut off clean water	40.0	17.0	33.0	6.0	3.0	2.14	1.116
Limited cultivation area	61.0	18.0	8.0	2.0	11.0	1.84	1.324
Lack of labour	8.0	18.0	17.0	18.0	39.0	3.62	1.369
Form of fertilizer does not suitable	48.0	13.0	25.0	8.0	6.0	2.11	1.262
Hard to get fertiliser	43.0	13.0	36.0	0.0	8.0	2.31	1.195
Expensive fertiliser	7.0	9.0	16.0	17.0	51.0	3.96	1.294
Expensive media	9.0	13.0	11.0	18.0	48.0	3.84	1.390
Flood at the certain season	6.0	17.0	9.0	42.0	26.0	2.37	1.405
Fertigation system does not function	46.0	17.0	26.0	5.0	6.0	2.08	1.212
Fertigation pump damaged	42.0	19.0	25.0	8.0	6.0	2.17	1.231
Leakage at fertigation pump	18.0	35.0	36.0	5.0	6.0	2.46	1.039
Leakage at greenhouse plastic UV	61.0	12.0	12.0	6.0	9.0	1.90	1.337
Greenhouse collapsed because of strong wind	59.0	5.0	15.0	10.0	11.0	2.09	1.464
Lack of expert labour	28.0	8.0	8.0	26.0	30.0	3.22	1.624
Competition with import vegetables and fruits	4.0	17.0	18.0	18.0	43.0	3.79	1.274
Competition with fertigation farmer to get market	47.0	24.0	12.0	6.0	11.0	2.10	1.352
Unstable market price	14.0	5.0	22.0	21.0	38.0	3.64	1.396
High demand for vegetables and fruits	7.0	13.0	30.0	41.0	9.0	3.32	1.043
Difficult marketplace	16.0	16.0	42.0	8.0	18.0	2.96	1.271
Labour have no interest to work	16.0	18.0	23.0	8.0	35.0	3.28	1.498
Expensive labour salary	16.0	13.0	43.0	10.0	18.0	3.01	1.267
Difficult to get labour	11.0	28.0	13.0	10.0	38.0	3.36	1.494
Expensive technology	7.0	8.0	25.0	30.0	30.0	3.68	1.188

Technology that needs maintenance	7.0	18.0	50.0	12.0	13.0	3.06	1.052
Farmers difficult to get government help	8.0	16.0	14.0	19.0	43.0	3.73	1.370
Limited knowledge	12.0	8.0	47.0	17.0	16.0	3.17	1.164
High interest bank rate for loan	25.0	9.0	8.0	18.0	40.0	3.39	1.657
Fertigation tools had been stolen	38.0	38.0	12.0	8.0	4.0	2.02	1.092
The yield had been stolen	38.0	33.0	7.0	13.0	9.0	2.22	1.323

*Indicator: 1*Never Occur, 2* Rare Occur, 3*Sometimes to Occur, 4*Always Occur, 5*Very Often to Occur*

Table 4.4 Distribution of respondents according to Attitude of Farmers towards Risk

Statement	1*	2*	3*	4*	5*	Mean	SD
I avoid from making decision that has big probability to gain loss or profit	12.0	42.0	29.0	8.0	9.0	2.60	1.092
I do not want to make maximum loan even though I deserved it	0.0	38.0	47.0	9.0	6.0	2.83	0.829
I am ready to use new technology even though other farmer does not interested in it	0.0	7.0	33.0	10.0	50.0	4.03	1.058
I only use new technology if there positive testimony from other farmers	0.0	8.0	32.0	45.0	25.0	3.67	0.829
I am brave to take the risk to gain profit	2.0	8.0	8.0	35.0	47.0	4.17	1.016
I will ask for other opinions before I make any decision that highly risky	0.0	0.0	9.0	46.0	45.0	4.36	0.644
I fully submit to market forces	14.0	16.0	48.0	17.0	5.0	2.83	1.035
I was able to control the percentage of yield on my farm	8.0	15.0	18.0	34.0	25.0	3.53	1.243
I have installed a CCTV at a strategic location on the farm	27.0	8.0	40.0	14.0	11.0	2.74	1.300
I know there is agricultural insurance in Malaysia	22.0	15.0	23.0	21.0	19.0	3.00	1.421

I am willing to pay more for agricultural insurance	28.0	13.0	26.0	12.0	21.0	2.85	1.486

Indicator: 1*Strongly disagree, 2* Disagree, 3*Neutral, 4*Agree, 5*Strongly agree

Risk Matrix

PROBABILITY X SEVERITY= RISK INDEX

Low	Moderate	High	Extreme
	4.9210	10.5908	14.3136
	5.8208	12.1072	15.1060
	6.3000	12.2362	16.8223
	7.1318	11.7810	15.7664
	6.4023	13.7634	13.8288
	8.0442	13.5136	15.9588
	8.0106	13.3578	15.7056
	7.1060	11.7810	15.2856
	7.7903	10.5908	16.0576
	9.2500	10.5908	14.3136
	8.3472		
	8.5701		
	7.6336		
	7.4700		

UNIVERSITI MALAYSIA KELANTAN

RISIKO DAN PERSEPSI TERHADAP PENGURUSAN RISIKO DI KALANGAN PENGUSAHA FERTIGASI DI PANTAI TIMUR MALAYSIA

RISK AND PERCEPTION ON RISK MANAGEMENT AMONG SMALL FERTIGATION PRACTITIONERS AROUND EAST COAST IN MALAYSIA

Risiko boleh ditakrifkan sebagai ketidakpastian yang boleh berlaku semasa melakukan sesuatu. Justeru itu, pengurusan risiko adalah perkara yang harus dititik beratkan bagi mana-mana perniagaan untuk terus kekal dan maju.

Objektif kajian ini dijalankan adalah untuk:

1. Mengenalpasti risiko dalam sistem fertigasi yang petani hadapi seluruh Malaysia sekarang
2. Untuk mengetahui hubungan antara demografi dan tahap keterukan risiko di ladang.
3. Untuk menilai anggapan dan sikap petani fertigasi terhadap risiko dalam fertigasi

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FAKULTI: FACULTY OF AGRO BASED INDUSTRY

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BAHAGIAN A- MAKLUMAT DEMOGRAFI

Arahan: Tandakan (✓) pada kotak yang bersesuaian dan isikan tempat kosong

1. Jantina

   ☐ Lelaki ☐ Perempuan

2. Umur (Nyatakan): _____

3. Bangsa

   ☐ Melayu ☐ India

   ☐ Cina ☐ Lain-lain: _____

4. Agama

   ☐ Islam ☐ Hindu

   ☐ Buddha ☐ Kristian

   ☐ Lain-lain: _____

5. Tahap pendidikan

   ☐ Sekolah rendah

   ☐ Sekolah menengah ☐ Tiada pendidikan rasmi

   ☐ Kolej/Universiti ☐ Lain-lain: _____

6. Pendapatan isi rumah

   ☐ Bawah Rm 1000 ☐ RM 3001- RM 5000

   ☐ RM 1001- RM 3000 ☐ RM 5001 ke atas

7. Lokasi ladang (Nyatakan): _____

8. Pemilikan tanah:

☐ Sewa ☐ Sendiri ☐ Pajakan ☐ lain-lain: _____

9. Tanaman:

☐ Cili ☐ Timun ☐ Melon ☐ lain-lain:_____

10. Keluasan tanah yang diusahakan (Nyatakan):_____

11. Sumber modal:

☐ Sendiri ☐ Pinjaman bank ☐ lain-lain: _____

12. Sumber air:

☐ Telaga ☐ Sungai ☐ Tasik ☐ JBA

13. Sumber elektrik:

☐ TNB ☐ Solar ☐ Generator

14. Penggunaan rumah lindungan hujan

☐ kalis serangga

☐ kalis hujan

☐ tidak menggunakan sebarang rumah lindungan hujan

15. Jenis fertigasi

☐ Fertigasi Gantung

☐ Fertigasi atas tanah

☐ lain-lain

BAHAGIAN B: RISIKO DALAM FERTIGASI

Kebarangkalian berlakunya risiko-risiko dalam fertigasi (1 tidak pernah berlaku hingga 5 sangat sering berlaku)

	1 TIDAK PERNAH BERLAKU	2 JARANG BERLAKU	3 KADANGKADANG BERLAKU	4 SERING BERLAKU	5 SANGAT SERING BERLAKU
Serangan penyakit bawaan kulat					
Serangan penyakit bawaan serangga					
Serangan penyakit bawaan virus					
Terputus bekalan elektrik					
Terputus bekalan air bersih					
Kawasan penanaman terhad					
Kekurangan tenaga buruh					
Penggunaan bentuk baja yang tidak sesuai					
Kesukaran mendapat bekalan baja					
Harga baja mahal					
Harga media yang mahal					
Banjir pada musim tertentu					
Sistem fertigasi tidak berfungsi					
Pam fertigasi rosak					
Kebocoran paip fertigasi					
Pastic UV rumah hijau mengalami kebocoran					
Rumah hijau roboh akibat angin terlampau kuat					
Tiada buruh yang mahir					
Persaingan dengan syuran atau buahan					

import					
Bersaing dengan petani fertigasi yang lain untuk mendapatkan pasaran					
Harga di pasaran tidak stabil					
Permintaan sayuran atau buahan yang tinggi di pasaran					
Kesukaran untuk mencari pasaran					
Buruh tidak berminat untuk bekerja					
Gaji buruh yang mahal					
Kesukaran untuk mendapatkan tenaga buruh					
Teknologi yang mahal					
Teknologi yang memerlukan penyelenggaraan berkala					
Petani sukar untuk mendapatkan bantuan kerajaan					
Ilmu yang terhad					
Kadar interest bank yang tinggi untuk membuat pinjaman					

BAHAGIAN C: IMPAK RISIKO

Impak sekiranya berlaku risiko-risiko dalam fertigasi (1 tidak terkesan hingga 5 sangat memberi kesan)

	1 TIDAK TERKESAN	2 SEDIKIT TERKESAN	3 AGAK TERKESAN	4 TERKESAN	5 SANGAT TERKESAN
Serangan penyakit bawaan kulat					
Serangan penyakit bawaan serangga					
Serangan penyakit bawaan virus					
Terputus bekalan elektrik					
Terputus bekalan air bersih					
Kawasan penanaman terhad					
Kekurangan tenaga buruh					
Penggunaan bentuk baja yang tidak sesuai					
Kesukaran mendapat bekalan baja					
Harga baja mahal					
Harga media yang mahal					
Banjir pada musim tertentu					
Sistem fertigasi tidak berfungsi					
Pam fertigasi rosak					
Kebocoran paip fertigasi					
Pastic UV rumah hijau mengalami kebocoran					
Rumah hijau roboh akibat angin terlampau kuat					
Tiada buruh yang mahir					
Persaingan dengan syuran atau buahan import					
Bersaing dengan petani fertigasi yang lain untuk mendapatkan pasaran					

Harga di pasaran tidak stabil					
Permintaan sayuran atau buahan yang tinggi di pasaran					
Kesukaran untuk mencari pasaran					
Buruh tidak berminat untuk bekerja					
Gaji buruh yang mahal					
Kesukaran untuk mendapatkan tenaga buruh					
Teknologi yang mahal					
Teknologi yang memerlukan penyelenggaraan berkala					
Petani sukar untuk mendapatkan bantuan kerajaan					
Ilmu yang terhad					
Kadar interest bank yang tinggi untuk membuat pinjaman					

BAHAGIAN E: PENILAIAN SIKAP TERHADAP RISIKO DALAM FERTIGASI

Tandakan (✓) bagi tahap kesetujuan anda di dalam kotak.

1	2	3	4	5
SANGAT TIDAK SETUJU	**TIDAK SETUJU**	**NEUTRAL**	**SETUJU**	**SANGAT SETUJU**

NO	PERNYATAAN	SKALA				
		1	2	3	4	5
1	Saya mengelak dari membuat keputusan yang mempunyai kebarangkalian untung besar atau rugi besar					
2	Saya tidak mahu memohon pinjaman maksimum meskipun layak					
3	Saya bersedia untuk menggunapakai teknologi baru meskipun rakan pengusaha lain tidak berminat					
4	Saya hanya akan menggunakan teknologi baru sekiranya mendapat testimoni positif dari rakan pengusaha					
5	Saya berani mengambil risiko untuk meningkatkan keuntungan					
6	Saya akan meminta pandangan orang lain sebelum membuat sesuatu keputusan yang berisiko besar					
7	Saya berserah sepenuhnya kepada kuasa pasaran					
8	Saya berupaya mengawal peratusan pengeluaran hasil di ladang saya					