



UNIVERSITI PUTRA MALAYSIA

***PERCEPTION TOWARDS PINEAPPLE VARIETY MD2 AMONG
PINEAPPLE FARMERS IN JOHOR***

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**PERCEPTION TOWARDS PINEAPPLE VARIETY MD2 AMONG PINEAPPLE
FARMERS IN JOHOR**

By

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ABSTRACT

This study was conducted to study the perception towards MD2 pineapple among pineapple farmers in Johor. Objective of this study is to examine the MD2 Pineapple acceptance among pineapple farmers in Johor. This study are using close-ended questionnaire to interview the respondents. The questionnaires distributed to 100 respondents among pineapple farmers in Johor. The data collected were analyzed using SPSS software and the analysis was based on descriptive analysis, chi-square analysis and logistic regression analysis. Findings from this survey showed that 24% of the respondents were planting MD2 pineapple. Main factor respondents planting MD2 pineapple are encouragement from MPIB, MD2 pineapple is higher quality and higher yielding than other pineapple variety. The main reason for respondents do not planting MD2 are MD2 pineapple suckers are too expensive and difficult to get it and no support from related agencies. Most respondents agreed that their current pineapple production is enough without planting MD2 pineapple. From chi-square analysis, demographic profiles do not influence respondents perception towards MD2 pineapple and do not influence respondents knowledge about pineapple farming. Even though the respondents have a different background, but all of them have a high level of knowledge, attitudes, practices and skills about pineapple farming. Furthermore, MPIB play an important role in giving extension programs to pineapple farmer to encourage them to grow pineapple especially MD2 pineapple. Based on the logistic regression, total income and total yield are significant at the 0.05 level. Total income indicates 0.185 times more intent to implement MD2 pineapple while yield indicate 0.087 times more intent to implement MD2 pineapple in their farm.

ABSTRAK

Kajian ini dijalankan untuk mengkaji persepsi penanam nanas terhadap nanas varieti MD2 di Johor. Objektif kajian ini adalah untuk mengkaji penerimaan Nanas varieti MD2 di kalangan petani nanas di Johor. Kajian ini menggunakan kedah soal selidik secara tertutup untuk menemubual responden. Soal selidik diedarkan kepada 100 orang petani nanas di Johor. Data yang dikumpul dianalisis menggunakan perisian SPSS berdasarkan analisis deskriptif, analisis chi-square dan analisis regresi logistik. Hasil daripada kajian ini menunjukkan bahawa 24% daripada responden telah menanam nanas MD2. Faktor utama yang mendorong responden menanam nanas MD2 adalah galakan daripada MPIB, kuaiti nanas MD2 yang lebih tinggi dan pendapatan hasil lebih tinggi daripada nanas variety lain. Sebab utama responden tidak menanam nanas MD2 adalah kerana sulur nanas MD2 terlalu mahal dan sukar untuk mendapatkannya dan juga tiada sokongan dari agensi-agensi yang berkaitan. Kebanyakan responden menyatakan bahawa hasil nanas semasa mereka kini mencukupi tanpa menanam nanas MD2. Daripada analisis chi-square, factor demografi tidak mempengaruhi persepsi responden terhadap nanas MD2 dan juga tidak mempengaruhi tahap pengetahuan responden mengenai pertanian nanas. Walaupun responden mempunyai latar belakang yang berbeza, tetapi kesemua daripada mereka mempunyai tahap pengetahuan, sikap, amalan dan kemahiran yang tinggi mengenai pertanian nanas. Tambahan pula, MPIB memainkan peranan penting untuk memberi program pengembangan kepada petani nanas. Berdasarkan regresi logistik, jumlah pendapatan dan jumlah hasil adalah bererti pada aras 0.05. Jumlah pendapatan mempengaruhi niat responden menanam nanas MD2 0.185 kali manakala jumlah hasil mempengaruhi niat menanam MD2 0.087 kali.

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REPORT'S DECLARATION FORM

This project entitled **Perception towards Pineapple Variety MD2 among Pineapple Farmers in Johor** is prepared by Nurul Aesyah Ismail Chong (160143) and submitted to the faculty of Agriculture in fulfillment of the requirement of the paper project (PRT4999) for the award of the degree Bachelor of Horticultural Science is based on my original works.

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CHAPTER 1

INTRODUCTION

1.1 Malaysia Agriculture

1.1.1 Contribution Agriculture to Economic

Agriculture plays a greater role in the affairs of any state or economy. It is one of the key economic sectors of a nation of which contributions made to a nation's well-being are of great importance. The transformation in agriculture sector as proposed by the Malaysian government has shows positive achievements.

In Malaysia, agriculture sector were divided into two sub-sectors which is estate sub-sector and smallholders sub-sector. Estate sub-sector is more than 40.5 ha highly commercialized and efficiently managed owned by private companies, public-listed corporate entities or public land development agencies totally involved in the production of industrial crops such as oil palm, rubber, cocoa and pineapples while Smallholders sub-sector have average farm size about 1.45 ha and owned by the local farmers. Smallholders sub-sector are less commercialized and less efficiently managed main contributors to food crop production as well as industrial crop production.

Agriculture sector is an important sector to the country economic development. It was one of the highlighted issues during Tun Abdullah Ahmad Badawi's tenure as Malaysia's Prime Minister. Abdullah strongly believed that this industry can generate wealth and reduce poverty particularly among those from rural areas. Based on statistics, agriculture industry generates approximately 12 percent to the national

gross domestic product (GDP) and also reduce unemployment rate in Malaysia. The history of agriculture can be traced back to during British administration in Malaya. Several new commercial crops such as palm oil, cocoa and rubber were introduced. Since then, these crops became the main agricultural exports to global market. Other than the above mentioned crops, Malaysian farmers also produced other high quality fruits and vegetables for domestic market consumption such as durian, coconuts, bananas, pineapples and paddy.

1.1.2 Export Value

Department of Statistics Malaysia stated that exports in Malaysia decreased to RM56 million in January of 2013 from RM57 million in December of 2012. Historically, from 1970 until 2013, averaged of Malaysia Exports is RM17906.68 million reaching an all-time high of RM63471.70 million in July of 2008 and a record low of RM328.10 million in February of 1970. Malaysia has an export oriented economy. The Malaysia main exports products are electrical and electronics products (35%), palm oil (15 %), petroleum products (9 %), liquefied natural gas (7%), timber and natural rubber. Malaysia also exports chemicals, machinery, appliances and manufactures metals. Malaysia main export partners include Singapore (15%), China (13%), Japan (12%), European Union (9%) and United States (9%), and also Thailand, Hong Kong and Indonesia.

Malaysia's export sector has evolved significantly over the five recent decades. In line with the nation's economic industrialization, the composition of exports had gradually shifted from comprising mainly of agricultural and mining products in the 1960s to manufactured goods in the 1980s. The development and growth of the

manufacturing sector was so rapid that by the late 1990s, the sector accounted for more than 80% of total exports. Today, manufactured goods remain the largest component of total exports.

Since 2000, two notable trends have emerged in Malaysia's export structure. First, the gradual move away from a heavy concentration in electrical and electronics (E&E) exports, towards non-E&E manufactured products and commodities. The second key trend is the diversification of Malaysia's export markets. This box article examines Malaysia's changing export structure since 2000, identifies the reasons underpinning this trend and broadly outlines key challenges facing the export sector going forward (Department of Statistics, Malaysia and Bank Negara Malaysia).

1.2 Pineapple Industry

The pineapple (*Ananas comosus* L. Merr) is belongs to edible member of the family Bromeliaceae. The generic name of pineapple, *Ananas* is derived from the Tupi Indian name 'nana' (Samson, 1986). Pineapples are herbaceous with long, stiff sword-shape leaves with rough edges. The commercial plant varieties are seedless and are usually propagated by suckers (Magnes et al., 1971).

The pineapple fruit develops from many smaller berries fusing together (called a multiple-accessory fleshy fruit). It is large and ovoid with a tough, spiky, waxy shell of many hexagonal sections, containing large amounts of white or yellow flesh with a tough, fibrous core. Depending on variety, the fruit can be up to 30 cm long and weigh more than 4 kg. Wild pineapples will contain one seed for each flower that

produced the fruit. However, most commercially grown pineapples do not contain any seeds.

Nowadays, pineapple has its commercial value because it is rich in vitamin A, B1, B2, and vitamin C. The edible portion of the fruit, which constitutes about 60% of the weight, contains approximately 85% water, 0.4% protein, 14% sugar (sucrose), 0.1% fat and 0.5% fibre (Rangan, 1984). The world pineapple trade consists mainly of processed products as canned slices, chilled fresh cut chunks and spears, juice (Rohrbach et al., 2003).

1.2.1 Production

Pineapple is cultivated worldwide all around the tropical and subtropical regions for local consumption and international export. Pineapple holds the third rank in world tropical fruit production only preceded by banana and citrus (Uriza Avila, 2005).

According to the Food and Agriculture Organisation (FAO), world pineapple production increased from 3,833,137 tons in 1961 to 15,287,413 tons in 2004. Five countries, namely Thailand (17,000,000 tons), the Philippines (1,650,000 tons), Brazil (1,435,600 tons), China (1,475,000 tons), and India (1,300,000 tons) contributed with about half of the world production in 2004. A second group of significant producers that includes countries as disparate as Nigeria, Mexico, Costa Rica, Indonesia, Kenya, Colombia, Ivory Coast, Venezuela, Vietnam, Malaysia, United States, and South Africa supply about one third of the total world production.

In Malaysia, pineapple is the first crop grown as a commodity or industrial crop with high export potential. The local pineapple industry took off during late 60's and early 70's and Malaysia was the number three exporter in the world for canned pineapple. As a developing country, Malaysia is one of largest countries producer's fruit to export to other country. As an example of fruit often exported to other countries is the pineapple.

Pineapple Industry in Malaysia were started in 1888 by a European in Singapore then brought to Malaysia particularly Johor since it is geographically located nearest to Singapore and later spread to Selangor and Perak. The pineapple plants were grown under coconuts, areca nuts and rubber. The expansion of rubber industry has resulted in the increased pineapple planting area as inter-cropping plant. Johor state Government were realized this situation on 1934 and then took necessary legislative measure to ensure the areas located for pineapple cultivation would be protected from erosion and their fertility maintain. This has led to the enactment of Pineapple Industry Ordinance by the Johor state Government in 1954 and later The Malayan Pineapple Industry Board was established in 1957. And in 1992 it was changed to The Malaysian Pineapple Industry Board (MPIB).

The Malaysian pineapple industry has a high potential to build as an industry that has high return for individuals involved. Based on the current situation, the market for Malaysian fresh pineapples has its advantages in the Asia, Australia, New Zealand and Mid East market share. Malaysia has conquered the pineapple market in Singapore and Brunei as both countries imported more than 70% of fresh pineapples for the year 2000.

Malaysia aims to move up beyond its 11th place ranking of the world's pineapple exporter by increasing its export value beyond the RM54 million through improved technologies and production. Malaysia produced 400,000 metric tons of pineapples with sales worth RM560 million which RM54 million were for exports.

Based on its potential economics and commercial value, pineapple has been identified as one of the priority commodities to be developed for the domestic and international markets in The Third of National Agriculture Policy (NAP 3). The export volume of fresh pineapple is small, usually less than 30 thousand tons annually and targeted mainly for the Singapore market. With the introduction of the new hybrid Josephine in 1996, the market for fresh pineapple is expected to increase further. The Malaysia used to be among the top three pineapple producers in the world in the 1960's and early 1970's.

The total overall MPIB registered pineapple cultivation area size in 2006 is a total of 8,731 hectares whereby 6,380 hectares are the farm sector and 2,351 hectares are from the small sector. It continues to show a positive increase compared to the previous years.

For 2006, pineapple fruit production for the farm sector and small farmers for delivery to factories hints at a little progress whereby a total 87,749 metric tons is received compared to 86,740 metric tons for the same period in 2005.

Canned pineapple and pineapple fruit production is dependent on the supply which is received by the factory. In 2006, 8 pineapple factories registered with MPIB whereby

2 main factories which is Lee Pineapple Co. Pte. Ltd. and Kilang Nanas Malaysia (PCM), still is the main canned pineapple producer in Malaysia.

1.2.2 Variety

According to MPIB, pineapple can be classified to 3 families which are Smooth Cayenne, Spanish and Queen. In Malaysia, there are 4 types of pineapple which are mostly planted, which are Mauritius, Josapine and Gandol and N36. Pineapple types such as Sarawak, Morris and Josapine are usually planted so that it can be eaten fresh. For a Gandol type of pineapple, it is canned and turned into juice. N36 hybrid pineapple and Maspine is generally produced for the purpose of fulfilling both usages.

'Smooth Cayenne' has more than 70% of the pineapple grown both for canning and fresh fruit in the world is from this cultivar. The production cycle for 'Smooth Cayenne' is longer than most of the other variety. Because of the plants near freedom from spines except for the needle at the leaf tip and the size-1.8 4.5 kg-cylindrical form, shallow eyes, orange rind, yellow flesh, low fiber, juiciness and rich mildly acid flavor, it has become of greatest importance worldwide even though it is subject to disease and does not ship well. Pineapple variety Sarawak and MD2 are belongs to Smooth Cayenne families.

The 'Spanish' group of pineapple is not widely cultivated in the world. However, it is well adapted to the coastal peat and has been, for over a century, the main canning variety in Malaysia. The plants are moderate in vigor and bear typically square-shouldered (cylindrical) fruits of 1-2 kg. The eyes are broad, fairly flat and deep and

this results in lower flesh recovery. The flesh is quite fibrous, with attractive deep, golden-yellow color. Sugars (10 - 12° Brix) and acids (0.3-0.5%) are usually low. The leaf margins are usually smooth with the exception of the leaf-tip where a few spines may be found. Slips are sometimes prolific and it also produces suckers readily for ratooning or replanting. Spanish variety is susceptible to fruit collapse and bacterial heart rot diseases.

'Queen' variety are widely distributed and quite extensively cultivated for fresh fruits because of its high sugar content and unsuitable canning qualities, is cultivated only for fresh consumption in the world. In Peninsular Malaysia, it is commonly known as 'Nanas Morris' derived from the more common international name 'Mauritius' and in Sarawak it is called 'Sarikei'.

'Hybrid 36' is a hybrid selected from a cross between 'Gandul' (Spanish) and the 'Smooth Cayenne' by the Peninsula Estate, Malaysia. It is a very robust cultivar and produces medium sized fruits (1.5 - 2 kg) with large crowns. It has high sugar content (14° Brix) and acid (0.6-0.8%) but its flesh color is rather pale. The fruit is quite tolerant to black heart disorder but susceptible to marbling diseases.

'Josapine' is a new variety in the Spanish group with very bright prospects as a table-fruit. It is a selection from hybridisation between 'Johor' (Spanish) and 'Sarawak' (Smooth Cayenne) and released by the Malaysian Agriculture Research and Development Institute (MARDI) in 1996. It fruits very early and is cultivated on an annual cycle in Malaysia. The plant is vigorous and produces two to three suckers. Leaves are lightly purple-tinged, usually with spineless margins except for the leaf-tip. Crowns are medium, occasionally with multiple proliferations. Fruits weight

between 1.1 to 1.3 kg, are cylindrical-shaped with dark purple peel ripening to attractive orange-red. The flesh color is deep-golden yellow with strong aroma and sugar content between 17° Brix on peat soil to 22° Brix on mineral soil. 'Josapine' fruits have good storage-life and are resistant to black heart disorder or internal browning caused by low temperatures. This is an advantage that allows 'Josapine' fruits to be shipped for export under refrigerated containers.

'MD2' is new cultivar possesses a high production capacity and good fruit quality characteristics compared with the 'Smooth Cayenne' cultivar. The top breed in the industry, MD2 a hybrid pineapple, which becomes the standard for the international market because of its colour, flavour, shape, life span and ripeness, superior to other varieties.

1.2.3 Pineapple Propagation

Pineapples are not grown from seed. Pineapples are readily reproduced by vegetative propagation, using crowns, slips, or suckers. The crown is the vegetative shoot on top of the fruit. Slips are side shoots from just below the fruit. Suckers are side shoots that develop from the main stem at ground level. All three types work, although slips and suckers are preferred in commerce. Fortunately, each pineapple fruit in the supermarket comes with a crown which can be used to start the plant which will develop slips and suckers for subsequent use.

Each plant that is propagated produces one fruit at the top of its stem. This high quality fruit is called the "plant" crop. After the fruit is harvested, several suckers develop and one year later produces the "ratoon" crop. The fruits are smaller and of

lesser quality. A second ratoon crop can develop after the first crop is harvested. After that, the field is dug up and replanted.

1.2.4 Technology

The transformation of technology is fundamental to the development process. For a new technology to be adopted by an agent, particularly in agriculture, it must be adapted to the circumstances faced by that agent. Its characteristics usually will not be transparent to the new user (Evenson and Westphal, 1995). Consequently, an investment in learning about the new technology is associated with its adoption. If there are multiple adopters of the new technology in similar circumstances, as is often the case with an innovation in agriculture, then the process of learning about the new technology may be social. New users of the technology may learn its characteristics from each other.

Handling technology for minimally processed pineapple had been successfully developed after intensive research conducted in MARDI during RMK- 7 and RMK- 8. The technology had been tested in the simulation studies and also actual export trial by air shipment to the Netherlands. Quality of the product was still good and safe to eat even after day 6 arrival at the importer's end. Minimally processed pineapple can be stored for 2 weeks at 2 °C, giving enough time for distribution to export market.

Packaged technology developed for minimally processed pineapple involves various steps included fruit maturity at index 2 to 3 (15-20% yellowness of the skin). Otherwise, handling operation involves a stages for post-harvest handling included sorting, washing, trimming the fruit stalk and peduncle, precooling, skin peeling,

cutting in required shape, pre-treatment with calcium chloride, pre-treatment with ascorbic acid, suitable retail and bulk packing and storage.

Technologies for pineapple are designed to improved fruit quality for market consumption. Example of handling technology for pineapple is quality improvement using calcium chloride for fruit firmness and ascorbic acid to prevent browning. In addition, the technology employed the use of modified atmosphere packaging (MAP) and low temperature storage to reduce weight loss and maintain the quality even after 2 weeks at 2 °C, 7 days at 10 °C and 2 days at 25 °C. The use of rigid polypropylene containers for retail packing and insulated boxes for bulk packing reduces physical injury, easy to handle and stacking is possible.

Furthermore, the use of dry ice/frozen gel for bulk packing provides a cool environment to the packed pineapple which slows down ripening and other metabolic processes, reduces deterioration and minimizes the ethylene effect which greatly influences product shelf life. The technology can be easily adopted for local or export markets. The longer storage life enables more efficient and wider market distribution.

1.3 Pineapple MD2

1.3.1 History

The world's pineapple fresh fruit export industry went through a remarkable transformation after Del Monte Corporation introduced MD2 to consumers in the United States and Europe, officially in 1996 (Frank, 2003). This variety possesses a high production capacity and good fruit quality characteristics compared with the 'Smooth Cayenne' variety (Chan et al., 2003). It was originally introduced in Costa

Rica and has now become the standard variety for most large pineapple producers in Latin America and Asia.

Prior to the introduction of MD2, the focus of the pineapple export industry was on canned Smooth Cayenne pineapple. Before entering the European market in 2003, MD2 had conquered a rapidly expanding US market during the late 1990s when Fresh del Monte successfully exploited a US-patent right (Loeillet, 2003). In this process, the company virtually transformed Costa Rica to become the by far most important supplier of fresh pineapple to the USA and later to the EU (Bardham et al., 1992). In 2003, the patent rights expired and all other major companies, Dole in particular, flooded the lucrative EU and US markets with MD2 varieties supplied by company plantations and contract growers.

1.3.2 Production

The world market for fresh pineapple has been growing rapidly during the past years. Like other tropical fruit, pineapple is grown predominantly in developing countries, where two thirds of rural people live on small-scale farms of less than two hectares.

Pineapple farmers now have more options on the types of pineapple they can grow and produce. There are more than 100 varieties, but only 6 to 8 of them are cultivated commercially. These include varieties from the Cayena group including the commercially highly successful MD2 variety. The top breed in the industry, MD2 a hybrid pineapple, which becomes the standard for the international market because of its colour, flavour, shape, life span and ripeness, superior to other varieties.

With pineapple consumption continually on the rise due to increased availability from emerging growing locations, the MD2 hybrid was developed to satisfy a market looking for exceptional sweetness as well as uniformity and consistency in size and ripeness.

The MD2 is a hybrid pineapple with a golden skin color when mature. The pulp is sweeter with lower fiber and acidity, although it can contain as much as four times more vitamin C than regular varieties. It has a nine day longer post-harvest shelf life of 30 days when compared to other varieties and it is able to survive in cold storage for up to 2 weeks. Furthermore, it has high brix (14 and more) with low acidity 0.4-0.45%, thus it has a good brix of acidity ratio of 25 or more. Consequently, there is gradual shift from export of Smooth Cayenne to MD2 most pineapple farmers.

In general MD2 has higher production costs than other varieties. In addition, MD2 has been found to be a more sensitive crop that is more susceptible to pests and diseases. In order to achieve the same yield MD2 is fertilized up to twice the number of times as other varieties.

Today, the MD2 breed has been enhanced with the use of biotechnology and the enhanced breed is said to offer farmers better quality pineapple and increased production. Tissue culture technology has been used to produce the new MD2 pineapple varieties which can help farmers overcome some of the common problems in pineapple plantation. It always grows in uniform size, which gives medium to large (1.3kg to 2.5kg) cylindrical and with square-shouldered fruit with large flat eyes. It also has spineless leaves and greener than most varieties.

The MD2 pineapple can fetch up to RM10 to RM12 per fruit compared to RM2.50 per fruit for ordinary pineapple. Furthermore, the pineapple ripens faster that is by the twelve weeks, it can be plucked compared to 20 weeks for other varieties.

1.4 Problem Statements

MD2 pineapple currently shows the greatest demand among the different available cultivars. MD2 pineapple is one of the pineapple varieties that people preferred due to textures, sweetness, colour, flavour, shape, life span and ripeness superior to other varieties. Other than that, MD2 pineapple has extra sweet and is golden in skin colour when ripens. In spite of MD2 pineapple have many advantages than other pineapple variety, there have some limitation to produce MD2 pineapple in large scale in Malaysia.

MD2 pineapple cultivation still in small scale cultivation compared to other pineapple variety. The factor cause this situation are lack of seed or sucker produce and many farmers are not interested with MD2 pineapple due to high initial investment. In general MD2 pineapple has higher production costs than other varieties.

Lack of knowledge about MD2 pineapple among pineapple farmer is considered as the MD2 pineapple is still under research. However, there are some private companies already export the MD2 pineapple to other country due to high demand from consumer.

Research questions for this study are:

- 1) What is the level perception among farmers towards pineapple farming?
- 2) What is the extension approach used by MPIB in promoting MD2 pineapple?
- 3) What is the reason of respondents do not planting MD2 pineapple?
- 4) What is the relationship between demographic profiles and the knowledge, skill, practice and attitude among farmers towards pineapple farming?

Hence, a study on the farmers' perception towards MD2 pineapple is vital to understand the farmer perception towards MD2 and to determine the extension agent activities to enhance farmer shift to MD2 pineapple. Pineapple farmers now have more options on the types of pineapple they can grow and produce.

1.5 Research Objective

General objective of this study is to examine the MD2 pineapple acceptance among pineapple farmers in Johor.

Specifically the objectives are:

- 1) To clarify the respondents' profile
- 2) To determine the level of perception towards MD2 Pineapple among respondents
- 3) To examine the extension approach used by MPIB in promoting MD2
- 4) To identify the relationship between demographic profiles and the knowledge, skill, practice and attitude among respondents towards pineapple farming

1.5 Signification of the Study

The implication and the finding of the research are to make use extension agriculture and extension agent in formulating the development of MD2 sector among pineapple farmer in Johor. Besides, we can draw the conclusion and implication for further research. A clear understanding of the factor farmer perception towards MD2 will enable extension agent to take specific measures to enhance sustainability of marginal farmer and strengthen farmer knowledge of MD2 pineapple.

The advantage of MD2 can lead to increase farmer income because MD2 has higher demand among people around the world. There are several production technologies with higher productivity being associated with greater variability in output, then having alternative to improve the production, which does not fall with a bad agriculture outcome, makes farmer willingness to shift from old variety with MD2 new variety with high return options.

From the research, it should be increase farmers awareness about MD2 variety and change the perception about new variety, since there may be great diversities in the social, cultural, economic and institutional characteristics among farmer communities.

This study also can understand farmer perception and needs towards MD2 cultivation and knowledge. Understanding these will be easier for extension agents to frame action and activities that can expand MD2 pineapple production in Malaysia.

1.6 Thesis Organization

This study consists of five chapters covering different areas of the study. Chapter 1 discuss about the importance Malaysia agriculture in economic, pineapple industry, MD2 pineapple included history, production and technology, statements of problem, objective of the study and signification of the study.

Chapter 2 summarizes previous literatures and finding related to the pineapple research, technology transfer, diffusion of innovation theory and perception theory.

The methodology adopted in this study is presented in details in Chapter 3. This chapter discusses about the research design including questionnaire as the instrument of study, details about the location of study, population and sample method, data collecting technique and analysis conducted for the study.

Chapter 4 summarizes the results and analysis of this study and Chapter 5 discusses the conclusion and provides recommendations for future study in this field.

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