UNIVERSITI PUTRA MALAYSIA

ADOPTION OF MALAYSIAN GOOD AGRICULTURAL PRACTICES BY VEGETABLE FARMERS IN PENINSULAR MALAYSIA

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By

NATASHA ASHVINEE RAJENDRAN

Thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia, in fulfillment of the Requirements for the Degree of Master of Science

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Abstract of this thesis presented to the senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Science

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Chairperson : Tey Yeong Sheng (John), PhD
Faculty : Institute of Agriculture and Food Policy Studies

Globally, sustainability standards have been promoted as a regulatory mechanism aimed at improving financial security, improving environmental quality and advocating labour equity. Good Agricultural Practices (GAP), one such standard, has been prevalently replicated by numerous governments to shape distinct national standards. Despite being heavily modelled after the successful international standard GlobalGAP, MyGAP, the Malaysian replica has experienced limited uptake since its genesis. The purpose of this research is to provide a focus on the MyGAP adoption process and the factors that influences the level of uptake. This thesis presents the three-objective outcome of a survey of 165 vegetable farmers conducted in several states in Peninsular Malaysia. Exploratory factor analysis revealed Compatibility, Complexity, Investment, Business returns and Trade Regulations to be focal attributes perceived by farmers, while a radar chart displayed Business Returns to be the most prominently perceived in terms of performance. Logistic regression revealed farming experience, formal education, gender, farm income) and membership in farmer group to be significant determinants of MyGAP adoption. Survival analysis was utilized to determine the adoption speed. Kaplan-Meier survival estimates revealed adoption to be rapid in earlier years, which then declined as time progressed. Cox regression revealed labour availability to be an adoption speed accelerator, while income, farm-market distance and technical assistance from change agents to reduce the speed. The overall findings suggest multidisciplinary policy implications aimed at improving a farmer's capacity to procure knowledge and manage risks (monetary and non-monetary). Policy implications include encouraging a decentralized, flexible learning experience between change agents and farmers. Modernizing information diffusion tools and enhancing economic opportunities to help encourage and retain adoption among local vegetable farmers. It is hoped that the implications generated by the findings of this thesis will serve as an instrumental policy change to guide the Malaysian Ministry of Agriculture in improving their extension

services, thus helping farmers improving a farmer's capacity to procure knowledge and manage risks (creating markets for MyGAP produce, enabling premium payments).

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk Ijazah Master Sains

PENGAMALAN AMALAN PERTANIAN BAIK MALAYSIA OLEH PETANI SAYUR DI SEMENANJUNG MALAYSIA

Oleh

NATASHA ASHVINEE RAJENDRAN

Jun 2017

Pengerusi : Tey Yeong Sheng (John), PhD
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Di peringkat antarabangsa, piawai kemampanan telah dipromosi sebagai mekanisme kawal selia yang berfungsi meningkatkan penjaminan kewangan, memelihara kualiti alam sekitar dan menyokong hak tenaga kerja. Amalan Pertanian Baik (GAP) telah direplika berulang kali oleh kebanyakan kerajaan dunia untuk membentuk piawai kebangsaan yang unik. Walaupun dimodelkan berdasarkan piawai GAP antarabangsa yang berjaya, MyGAP, replika piawai Malaysia mengalami pengamalan terhad sejak pelaksanaannya. Tujuan utama kajian ini adalah untuk menumpukan perhatian kepada proses pengamalan MyGAP dan faktor-faktor yang mempengaruhi tahap penerimaan piawai tersebut oleh petani sayur. Tesis ini membentangkan hasil kajian tiga objektif berlandaskan survei 165 petani sayur yang dijalankan di beberapa negeri di Semenanjung Malaysia. Analisis faktor penerokaan mendedahkan Keserasian, Kerumitan, Pelaburan, Pulangan Perniagaan dan Peraturan Perdagangan sebagai ciri-ciri utama yang diperhatikan petani, manakala carta radar memaparkan ciri Pulangan Perniagaan sebagai ciri utama yang diperhati dari segi prestasi. Hasil kajian regresi logistik mendedahkan pengalaman pertanian, pendidikan formal, jantina, pendapatan ladang dan keahlian dalam kumpulan petani sebagai faktor-faktor penting mempengaruhi pengamalan MyGAP. Analisis kemandirian diaplikasi untuk menentukan kelajuan pengamalan MyGAP. Analisis Kaplan-Meier mendedahkan pengamalan MyGAP adalah pesat pada peringkat awal implementasi dan merosot apabila masa berlalu. Kaedah regresi Cox mendedahkan penyediaan sumber tenaga kerja sebagai faktor peningkatan kelajuan pengamalan, manakala pendapatan, jarak antara ladang dan pasar serta bantuan teknikal daripada agen perubahan sebagai faktor penurunan kelajuan pengamalan. Hasil kajian memaparkan implikasi dasar kepelbagaian bidang yang berpusat pada keupayaan petani untuk memperoleh pengetahuan dan menguruskan risiko (kewangan dan bukan kewangan). Implikasi polisi yang dicadangkan termasuk menggalakkan pengalaman pembelajaran yang fleksibel antara agen perubahan dan petani, memodenkan alat penyebaran infomasi dan meningkatkan peluang ekonomi untuk menggalakkan dan

mengekalkan pengamalan MyGAP oleh petani sayur-sayuran tempatan (mewujudkan pasaran untuk hasil MyGAP, menyediakan bayaran premium).

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Lastly, I will be forever grateful and indebted to my parents, sibling, family members and friends whose contribution to this work in prayers, encouragement and strong moral support helped me throughout the two years of study.

APPROVAL

I certify that a Thesis Examination Committee has met on 19 June 2017 to conduct the final examination of Natasha Ashvinee Rajendran on her thesis entitled "Adoption of Malaysian Good Agricultural Practices by Vegetable Farmers in Peninsular Malaysia" in accordance with the Universities and University colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The committee recommends that the student be awarded the Masters of Science.

Members of the Thesis Examination Committee were as follows:

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Declaration by graduate student

I hereby confirm that:

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Declaration by Members of Supervisory Committee

This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in Rule 41 in Rules 2003 (Revision 2012-2013) were adhered to.

Signature: _____
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LIST OF ABBREVIATIONS

AIC	Akaike's Information Criterion
B2B	Business-to-Business
CFA	Confirmatory Factor Analysis
CPC	Control Points and Compliance
DOA	Department of Agriculture
DOI	Diffusion of Innovation
EFA	Exploratory Factor Analysis
EurepGAP	Eurep Good Agricultural Practices
FAO	Food and Agricultural Organisation
FASM	Farm Accreditation Scheme
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GlobalGAP	Global Good Agricultural Practices
HCV	High Conservation Value
IPM	Integrated Pest Management
KMO	Kaiser-Mayer-Olkin
MDG	Millennium Development Goal
PCA	Principal Component Analysis
QMS	Quality Management System
SALT	Good Husbandry Practices Scheme of Malaysia
SAP	Sustainable Agricultural Practice

CHAPTER 1

INTRODUCTION

1.1 Background

1.1.1 Malaysian vegetable sector and promotion of MyGAP standard

The agricultural sector has been documented to be a crucial contributor to the Malaysian economy. It is estimated that production of sustainable, high quality agricultural produce will contribute approximately 1% to the Gross Domestic Product (GDP) of the country (Salleh et al., 2007). Fresh vegetables, identified as Malaysia's eight-largest crop, registers a strong growth in volume production, amounting to 17.9% of the total production. According to Ahmad (2001), around 50 species of vegetables have been identified to be grown commercially either as individual species (leafy vegetables), commodities coupled with cash crops (cassava, yam), and even spices (lemongrass and ginger).

The vegetable sector is an income contributor to approximately 55,000 farmers. In terms of procurement, it is noted that local production of fresh vegetables could only account around 41 % of the total market demand (Ahmad, 2001). Even then, the number of species is limited, with only 6 vegetables having a self-sufficiency ratio of over 100 (Tey et al., 2012). Malaysia imports mainly temperate vegetables from China, Taiwan and Thailand. According to the Malaysian Department of Statistics (2014), vegetables such as tomato, chilli, brinjal and long beans recorded a higher import dependency ratio in 2014 as compared to the previous year.

A number of sustainability issues have been documented to plague the Malaysian vegetable sector. Research by Murad et al. (2009) and Ahmad (2001) have highlighted incidences of inappropriate and unsustainable farming practices such as intensive land usage and preparation, as well as uncontrolled application of pesticides and insecticides. These activities have led to negative environmental consequences (i.e. water pollution and soil pollution), which impacts the quality of the vegetables grown. It was imperative that corrective measures be implemented instantaneously to overcome these issues.

In 2002, the Malaysian government established a voluntary public certification standard specifically for fresh fruit and vegetables, known as the Farm Accreditation Scheme of Malaysia (FASM) (Islam et al., 2012). Initiated by the Department of Agriculture (DOA), the standard was heavily modelled after the international sustainability standard EurepGAP (Tey et al., 2016). Farmers who are certified will promote sustainability in their daily farming production by adopting agricultural practices that enhance environmental maintenance, labour welfare and primarily, food safety (Valk and Roest, 2009). The standard underwent a rebranding exercise in 2013 when it was systemized

with two other schemes, namely Good Husbandry Practices Scheme of Malaysia (SALT) and the Aquaculture Farm Certification Scheme of Malaysia (SPLAM). It was then renamed as MyGAP (Tey et al., 2015).

This standard is mandatory for participants in the Permanent Food Park Programme (PFPP), while remaining voluntary for non-participants. Individual farmers known to grow commercial fresh vegetables are requested to fulfil several initial criteria for qualification purposes, specifically pertaining to land rights, farm location and water quality (Salleh et al., 2007). After a successful registration with the DOA, farmers are required to comply with a list of guidelines enlisted under the scheme manual. A total of 16 specific rules, with varying degree of compliance, are necessary to obtain certification (Tey et al., 2016).

Upon criteria conformation, a team of auditors visits the farmer for inspection and validation. Another visit is then warranted by the auditors to prepare a report for the Farm Accreditation Committee. The DOA is accountable for ensuring that the applicants conform to the requirements before being granted certification (Salleh et al., 2007). If the farmer satisfies all requirements, he is then awarded a GAP certificate, plus approval to affix the MyGAP logo on his fresh produce. (Liu et al., 2007). Subsequently, farmers are mandatorily required to record every farming activity for further inspection purposes by DOA officers. It should be noted that certification lasts for only two years, hence adopters can reapply for recertification (Meybeck and Redfern, 2014).

1.2 Research Problem

MyGAP has been demonstrated to underperform, despite high expenditure for promotion and dissemination by the Malaysian government. Number of adopters remain relatively low. A newspaper article by the Star Online (2013) reported that as of 2013, only 636 farms have been certified, which only represent 2% of the total planted vegetable land acreage, currently valued at 61, 347 hectares in Peninsular Malaysia. The article also mentions a slow uptake rate in addition to the low number of adopters. A further report by Gom et al. (2015) and Mohamed et al. (2016) iterated that as of 2014, the number of farms in the vegetable sector who have received MyGAP certification remains at a low number of approximately 670-750 farms, from a total vegetable farmer population of 278,628. This figure is still extremely small and worrying from a sustainability perspective. Clearly the improvement in number of adopters over a year is miniscule, even negligible. The slow uptake of the standard since its genesis in 2002 is also emphasized by Gom et al. (2015). The problem statement of this research revolves around the reason as to why MyGAP not been popularly received by the farmers in the vegetable sector, despite the voluntary uptake basis, free registering and auditing as well as the prolonged efforts of the Malaysian government in providing free courses and training.

Up to date, there has been no documentation on the response rate of farmers towards MyGAP, and the influencing reasons behind it. Only one report by Tey et al., (2016) demonstrated evidence indicating MyGAP to underperform in contrast to its corresponding international version, GlobalGAP. GlobalGAP (Global Good Agricultural Practices) has demonstrated success since its genesis by linking farmers to higher market niches, providing premiums to farmers and improving the overall sector productivity in terms of produce safety and quality. However, this is a theoretical reflection. Little attempt so far has been undertaken to gather raw field-level data and responses from vegetable farmers and process the motivations that influence their adoption, non-adoption or even discontinuance of the MyGAP scheme.

1.3 Research Gaps

MyGAP adoption, or basically the adoption of local sustainability standards remains an understudied area. For a thorough assessment of a new technology or innovation, , Roger posits the "Individual Innovativeness Theory", in which considerations should be focused towards the characteristics of the innovation, the nature of how the innovation is perceived and accepted by society, the nature of the adopters (personal and external) that influences their uptake decision-making, the diffusion rate of the innovation among the members of the surrounding society and the variety of internal or external factors that influences that rate speed. Using a similar thought process, it is believed that a thorough assessment of MyGAP, a fairly new sustainability enhancer technology, should be scrutinized based on the exact considerations mentioned above.

Attributes are perceivable traits that aid in reducing misgivings or doubt of an innovation's efficacy. This then results in an increase in uptake (Rogers, 2010). The theory of perceived attributes posits that an innovation is adopted if it is identified to provide benefits, be feasible and also be compatible with the adopters' existing infrastructure and own personal values (Noltze et al., 2012). It should be noted that while most adoption studies have considered farmers' perceptions, they have heavily utilized and depended upon Rogers' innovation attributes as a subjective preference that condition adoption decisions (Fuglie and Kascak, 2001; Oladele, 2006; Srisopaporn et al., 2015). While two of these attributes e. g complexity (adhering to a vast collection of principles, plus recordkeeping which is burdensome to illiterate farmers) and compatibility (mandatory criteria compliance with little farmer intervention), may qualify as significant perceived attributes, alternative studies suggest that there may be other elements subjectively evaluated by farmers. Another aspect not reviewed in previous perception studies is attribute performance analysis. The main objective of this appraisal is to measure the extent to which these attributes influence the decision-making process. Past studies have reviewed both perceived technology attributes and technology performance analysis separately. It is believed that this is not a systematic method to contribute better comprehension towards farmers' perception of a sustainability standard like MyGAP. Hence, the research gap is the identification of an inadequate perception assessment in past studies.

Past research on the adoption of international standards have highlighted a range of influential adoption variables, for example, farmer characteristics (education and age), economic determinants (income), and institutional determinants (social capital, extension service) (Kersting and Wollni, 2012; Lemeilleur, 2013; Ganpat et al., 2014). The second research gap is identified here, where the same level of coverage and research are not observed in studies related to local sustainability standards like MyGAP. A few papers have attempted to identify significant factors leading to GAP adoption in developing countries (Amekawa, 2009; Srisopaporn et al., 2015), however the policy implications derived to remedy farm level issues remain inconclusive.

The third research gap is related to the dearth of information on speed of adoption, especially pertaining to sustainability standards. Studying the time duration taken between a farmer's awareness of a new technology and it being officially adopted is necessary to (1) determine the level of efficiency of information dissemination by relevant groups, and (2) to implement remedies which hasten sustainability in the studied area. Adoption of a sustainability standard is a dynamic interaction of many factors, some of which vary with time, whilst others do not.

1.4 Research Objectives

1.4.1 General Objective

The adoption of a local sustainability standard like MyGAP is postulated to be a result of a complex decision-making process. This thesis aims to generate a clearer understanding of the matter and analyze various facets of the decision-making process. The primary objective of this research is to provide a comprehensive analysis of the adoption of a local sustainability standard, in this context MyGAP, by vegetable farmers of the Malaysian vegetable production sector

1.4.2 Specific Objectives

The adoption of MyGAP is a multifaceted decision-making process and requires research on specific aspects. This study aims to provide a comprehensive account explaining its adoption in the vegetable production sector. Through the identification of the three research gaps earlier, the specific objectives are as such:

a) To identify and investigate the importance of MyGAP attributes and their perceived performance;
b) To identify the factors affecting MyGAP adoption;
c) To assess the speed of MyGAP adoption and its influencing factors.

1.5 Research Significance

Researching and obtaining multifaceted results will be beneficial to local policymakers. Through this research, areas of improvement will be identified and corrective measures can be subsequently carried out by change agents. The identification of MyGAP attributes that are subjectively perceived by farmers, as well as their perceived performance, are crucial to policymakers. These empirical results can assist change agents in identifying specific attributes that are heavily emphasized and prioritized by farmers. Using these findings as organized recommendations, targeted approaches by change agents can then be implemented, instead of general amendments that may not improve adopters' paradigm towards MyGAP and its functionalities.

The examination of the factors that lead to MyGAP adoption will provide a better comprehension of the multidisciplinary facets that influence farmer's perspectives and decision-making. A better understanding of the constraints that condition a farmer's adoption behaviour is important for designing and implementing policies that could stimulate the adoption of MyGAP, thus encouraging development of the vegetable sector.Lastly, determining the speed of adoption and the variables that influence it is a crucial thread of investigation, since timely adoption of a sustainability tool like MyGAP can improve overall agricultural productivity and determine the survival of both farm and farmer in the market place. The information obtained from this study may be useful in designing and implementing policies that could hasten the adoption of voluntary sustainability standards by farmers.

1.6 Thesis Structure

The thesis begins with an Introduction chapter providing an exposition on the Malaysian agricultural industry and a brief description on the vegetable sector. Following that is a specific focus on the MyGAP standard, its promotion and poor reception by local farmers, in terms of adoption numbers and diffusion rate. This setting justifies the decision in selecting the Malaysian vegetable sector as the primary case study, the objectives (general and specific) and their contribution to the research arena.The following chapter, Literature Review, is divided into two sections (Theoretical and Empirical Literature). The first section provides a detailed account of sustainability standards, bundled sustainable agricultural practices, an inventory significant variables influencing the adoption of bundled agricultural practices, an exposition on Good Agricultural Practices (GAP) and finally narrowing the focus on the Malaysian Good Agricultural Practices scheme (MyGAP) The pivotal differences between international and local interpretations of the GAP standard, in this context, GlobalGAP and MyGAP, are reviewed. Under Empirical Literature, an in-depth summary of the theories utilized in this research is provided. Past review on the analytical methodologies applied for data analysis (exploratory factor analysis, radar chart, logistic regression and duration analysis) are also discussed.

Under Chapter 3 (Methodology), research area description, sampling frame, survey questionnaire design, and primary data collection procedures are elaborated thoroughly in this chapter. The subjective expected utility model, the basis for this entire study is thoroughly discussed here. The chapter is concluded with a schematic conceptual framework. Chapter 4-6 (Results and Discussion) denotes the results obtained specifically to the three research objectives, followed by a thorough discussion. The final chapter, Conclusion, narrates and summarizes the findings obtained in the previous sections. Relevant general policy implications guided by the findings are elaborated thoroughly, aimed at enhancing the management and acceptance of MyGAP by vegetable farmers. The research limitations are also stated, and this chapter is concluded with suggestions for future research. An Appendix concludes the thesis, consisting of the questionnaire used in the primary data collection and the output of the logistic regression. Student biodata and list of publications are enlisted as well.

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