UNIVERSITI PUTRA MALAYSIA

SIMULATIVE IMPACT OF ENVIRONMENT-FRIENDLY PRODUCTION METHOD OF SARAWAK PEPPER ON DOMESTIC AND EXPORT SUPPLY

WONG SWEE KIONG

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By

WONG SWEE KIONG

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirement for the Degree of Doctor of Philosophy

February 2007

Dedicated To:

My Caring, Understanding and Beloved Dad and Mum,

My Dearest sisters, Swee Min, Swee Hui and Swee Ching,

My Dearest and Only Brother, Selamat Wong,

My Brothers-in-Law, Kwong Lee and Simon, and

My Loving and Cute nephews, Timothy and Matthew.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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Chairman: **Professor Khalid Abdul Rahim, PhD**

Faculty: **Economics and Management**

The need to protect the environment and utilize natural resources in more sustainable ways is gaining greater importance worldwide. Firms of any industry that do not keep abreast with this on-going trend of development in the global economy might sooner or later be swept away from the current highly competitive international market regime.

Malaysia is an open economy that depends greatly on international trade for its national economic development. Pepper (*Piper Nigrum L.*), the King of spices, is grown in Malaysia predominantly (about 90%) for export market. To retain a significant market share for its pepper export, enhancing competitiveness in its pepper industry is a must. Hence, the objective of this study is to examine and assess the economic effects of cost of environmentally sustainable pepper production techniques and agricultural practices on production and export volumes in Malaysia.

One of the major findings of this study is that chemical cost of pepper production has a significant negative effect on the domestic supply of both black and white pepper in Malaysia. Thus, to discourage farmers from using chemical inputs indiscriminately, increasing the chemical cost is suggested as a policy option. The simulation analysis reveals that environmental regulation to increase the chemical cost would enhance export market competitiveness of both black and white pepper in Malaysia. In fact, driven by the higher price incentive fetched for better quality environmental-friendly pepper produced, farmers start to produce more and thus the volumes of production and export would increase. In addition, welfare analysis also indicates that the welfare of pepper farmers will improve by adopting low cost sustainable pepper production methods.

In short, promoting environmental-friendly pepper production in Malaysia should be given high priority. This is crucial to continue making Sarawak Pepper products marketable in the increasingly competitive international market. Moreover, by enhancing the competitiveness of the Malaysian pepper industry through the adoption of environmental-friendly pepper production methods will also help pepper farmers to meet a more stringent food safety, environmental and basic humanity requirements imposed in the international arena. This will ultimately help to improve the welfare of the Malaysian pepper farmers. This is particularly important so that pepper industry will continue to play its vital role as a major source of foreign exchange earnings besides being an important source of employment for some 74,710 households in the state of Sarawak.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

IMPAK SIMULASI BAGI CARA PENGELUARAN LADA SARAWAK YANG MESRA-ALAM KE ATAS PENAWARAN DOMESTIK DAN EKSPORT

Oleh

WONG SWEE KIONG

Februari 2007

Pengerusi: **Profesor Khalid Abdul Rahim, PhD**

Fakulti: **Ekonomi dan Pengurusan**

Keperluan untuk menjaga alam sekitar dan menggunakan sumber-sumber asli dengan cara yang lebih mapan (lestari) kini menjadi semakin penting di dunia. Firma-firma bagi mana-mana industri yang tidak mengikut perkembangan berterusan dalam ekonomi dunia semasa seterusnya akan ketinggalan daripada rejim pasaran antarabangsa semasa yang semakin kompetitif.

Malaysia adalah sebuah ekonomi terbuka yang banyak bergantung kepada perdagangan antarabangsa untuk pembangunan ekonomi negara. Lada (*Piper Nigrum L.*), Raja rempah ratus, ditanam di Malaysia kebanyakannya (lebih kurang 90%) adalah untuk pasaran eksport. Bagi mengekalkan agihan pasaran yang penting untuk eksport lada, adalah wajib untuk Malaysia meningkatkan kepersaingan industri ladanya. Jadi, objektif kajian ini adalah untuk mengkaji dan menilai kesan ekonomi bagi kos teknik pengeluaran lada yang mapan (lestari) atau mesra-alam ke atas kuantiti pengeluaran dan eksport lada di Malaysia.

Salah satu penemuan utama bagi kajian ini ialah kos kimia bagi pengeluaran lada didapati mempunyai kesan negatif yang penting dalam mempengaruhi penawaran tempatan kedua-dua lada hitam dan lada putih di Malaysia. Dengan itu, untuk tidak menggalakkan pekebun menggunakan input-input kimia secara tidak berhemah atau tidak cermat, peningkatan kos kimia adalah dicadangkan sebagai satu pilihan polisi. Analisis simulasi menunjukkan undang-undang alam sekitar untuk menaikkan kos kimia akan meningkatkan kepersaingan pasaran eksport untuk kedua-dua lada hitam dan lada putih di Malaysia. Sebenarnya, akibat daripada dorongan harga istimewa yang diperolehi bagi lada yang mesra-alam yang lebih baik kualitinya, petani mula menambahkan pengeluaran dan sebab itulah kuantiti pengeluaran dan eksport akan meningkat. Tambahan pula, analisis kebajikan juga menunjukkan bahawa kebajikan bagi pekebun-pekebun lada akan meningkat dengan mengamalkan cara-cara pengeluaran mapan lada berkos rendah.

Kesimpulannya, mempromosikan pengeluaran lada cara mesra-alam di Malaysia patut diberi keutamaan. Ini adalah penting supaya Lada Sarawak masih dapat dipasarkan di pasaran antarabangsa yang semakin kompetitif. Lagipun, dengan meningkatkan kepersaingan industri lada Malaysia melalui amalan-amalan pengeluaran lada yang mesra-alam juga akan membantu pekebun-pekebun lada kita memenuhi keperluan yang lebih tegas mengenai keselamatan makanan, alam sekitar dan kemanusiaan asas yang ditetapkan di arena antarabangsa. Ini akhirnya akan membantu untuk meningkatkan kebajikan pekebun-pekebun lada Malaysia. Ini terutamanya penting supaya industri lada akan terus memainkan peranan yang penting sebagai sumber pendapatan utama bagi pertukaran wang asing negara di

samping sebagai satu sumber pekerjaan penting untuk lebih kurang 74,710 isi rumah di negeri Sarawak.

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Praise to the Lord, our Mighty God as He has been guiding me all the way through to complete my PhD studies in Universiti Putra Malaysia (UPM). Though the journey to earn a PhD degree is long and not easy, He has never forsaken me from conception to completion. May all the glory be to Him!

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On the other hand, I am indeed very lucky to be in UPM to pursue my PhD studies as I am surrounded by a pool of outstanding senior professors and lecturers who are always generous in providing me with constructive advice and guidance. The credit of my success in getting my PhD degree should concurrently go to my beloved professors and lecturers particularly in the Faculty of Economics and Management, UPM. Your relentless spirit in teaching and educating me, encouraging and inspiring me to think and solve problems has given me a good foundation to move forward in research and teaching. You are all very wonderful. I would like to convey my sincere appreciation to you all.

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preparation till completion. Your support in some ways has enlightened me and thus is warmly acknowledged here!

Taking this opportunity, I would also like to express my special thanks to the examination committee chaired by Professor Dr. Mohd Shahwahid Haji Othman and comprising of Professor Dr. Zakariah Abdul Rashid, Associate Professor Dr Tai Shzee Yew and Professor Dato' Dr. Jamalludin Sulaiman for your constructive criticism and recommendation to improve my final thesis product. Your precious time devoted in reading my thesis and giving invaluable ideas, comments as well as guidance, support and encouragement are greatly acknowledged.

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Last but not least, my family members are the most crucial persons in giving me all the necessary resources either financially or the prayer and moral support to enable me to accomplish this significant milestone in my life. Thank you so much for your love and everything that you have done for me particularly in transporting me to and back from the various departments and places to get the data/information/references that I needed for my research studies. You are all too great for me. Thank you very much everyone and may God continue to shower you with abundant blessings!

I certify that an Examination Committee has met on 26 February 2007 to conduct the final examination of Wong Swee Kiong on her Doctor of Philosophy thesis entitled "Simulative Impact of Environment-Friendly Production Method of Sarawak Pepper on Domestic and Export Supply" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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Date: 22 MARCH 2007

This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee are as follows:

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Date: 12 APRIL 2007

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

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WONG SWEE KIONG

Date: 1 MARCH 2007

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
AFTA	ASEAN Free Trade Area
AIC	Akaike Information Criteria
ARC	Agriculture Research Centre
ARCH	Autoregressive conditional heteroscedasticity
ARDL	Autoregressive Distributed Lag
ASEAN	The Association of South-East Asian Nations
BOD	Biochemical oxygen demand
CEPT	Common Effective Preferential Tariff
CO	Carbon Monoxide
CS	Consumer surplus
CV	Compensating variation
DOA	Department of Agriculture
DOAS	Department of Agriculture Sarawak
DOE	Department of Environment
DOS	Department of Statistics
DSM	Department of Standards, Malaysia
ECM	Error Correction Model
ECT	Error Correction Term
EKC	Environmental Kuznets Curve
EV	Equivalent variation
FAO	Food and Agriculture Organization of the United Nations
FAQ	Fair Average Quality

GATT	The General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis & Critical Control Point
IEC	International Electotechnical Commission
IOSTA	International Organization of Spice Trade Association
IPC	International Pepper Community
IPPC	Integrated Pollution Prevention and Control Bureau
ISO	International Standards Organization
KPSS	Kwiatkowski-Phillips-Schmidt-Shin
LM	Lagrange Multiplier
LNG	Liquefied natural gas
MARDI	Malaysia Agricultural Research and Development Institute
MITI	Ministry of International Trade and Industry
MR	Malaysian Ringgit
NAP	National Agricultural Policies
NAP3	The Third National Agricultural Policy
NREB	Natural Resources and Environment Board
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary least Squares
PMB	Pepper Marketing Board
PPMs	Process and Production Methods
PS	Producer surplus
RM	Ringgit Malaysia

SALM	Skim Akreditasi Ladang Malaysia (Malaysian Farm Accreditation Scheme)
SAMM	Skim Akreditasi Makmal Malaysia (Laboratory Accreditation Scheme of Malaysia)
SBC	Schwartz Bayesian Criteria
UECM	Unrestricted Error Correction Model
UNCED	United Nations Conference on Environment and Development
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UN-ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
US	The United States
UVAR	Unrestricted vector autoregressive
VAR	Vector Autoregressive
WCED	World Commission on Environment and Development
WHO	World Health Organization
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization