UNIVERSITI PUTRA MALAYSIA

DETERMINANTS OF PRODUCTIVITY GROWTH IN THE MALAYSIAN FOOD PROCESSING INDUSTRY

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By

YODFIATFINDA

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy.

April 2012

DEDICATION

I dedicate this thesis to my lovely wife
Dr. Ir. Hanifah Nuryani Lioe, MSi., and to
our children **Muhammad Ihsan Adfinda** and
Fathya Mubina Adfinda.

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

DETERMINANTS OF PRODUCTIVITY GROWTH IN THE MALAYSIAN FOOD PROCESSING INDUSTRY

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April 2012

Chairman : Professor Mad Nasir Shamsudin, PhD

Faculty : Agriculture

Malaysia is a net importer of food products for the last two decades. Value of imported food grew from RM 8.2 billion in 1996 to RM 28 billion in 2008; spawning a larger trade deficit of RM 10.1 billion compared to RM 4.2 billion in 1996 (MIDA, 2010). Demand for processed food in Malaysia is on the rise. The increasing trend is likely to be driven by rapid population growth, higher disposal income, improvement in the living standards, better education and information about health nutrition. The government of Malaysia in its effort to reduce the trade deficit introduced a new agricultural program in the Ninth Malaysia Plan. The plan geared towards changing the orientation of Malaysia agricultural to produce the higher value added and commercially-oriented products.

Food processing industries (FPI) generates higher value added for agricultural commodities as it converts raw material from agricultural farm to intermediate inputs or readily consumed products. Food processing industries with controlled and hygiene safe environments transform the product to be more hygienic and, therefore, marketable with prolong expiration date and far-reaching accessibility. This is a crucial cycle in the agribusiness system that is to deliver agricultural products from the raw materials in the farm to readily made products for consumers.

The present study investigates efficiency and productivity growth of the Malaysian FPI and identifies its determinants during the period of 2000-2006. The format of the analysis is a two-stage study design. The first stage uses non-parametric approach (data envelopment analysis - DEA) to investigate the efficiency and productivity growth of the Malaysian FPI. The second stage uses tobit regression method to identify determinants of productivity growth. Malaysian FPI can be divided into two groups: small and medium enterprise (SMEs) and large-scale enterprises (LSEs).

In the present study, the average technical efficiency (TE) in the SMEs is 75.6 percent based on constant returns to scale (CRS) and 95.4 percent based on variable returns to scale (VRS) during the period of observation. The technical efficiency (TE) value of 75.6 signified the ability of the SMEs to expand their output by as much as 24.4 percent using the same quantity of input. TE in the LSEs was 0.683 based on CRS and 0.952 VRS, means the industry potentially can increase output as much as 31.7% using the same quantity of input.

Total factor productivity growth (TFPG) in the SMEs was a mere negative 1.3 percent, contributed by technical efficiency change (EFFCH) value of 1.3 percent and technological change (TECH) value of -2.6 percent. In stark difference to the SMEs, TFPG for the LSEs was a healthy 7.3 percent, contributed by EFFCH value of 3.1 percent and TECH value of 4.2 percent. The findings revealed crucial information about foremost problems faced by the SMEs, i.e., TECH factor, during the period of observation. On the other hand, TECH was the main contributor to a positive TFPG in the LSEs.

High-productivity growth is an indication that the industries have efficient production, excellent management perform and high profitability. Therefore, the study identified high productivity growth industry as the highly potential sub-industry in the Malaysian FPI. The high-valued TFPG sub-industries in the SMEs were companies involved in the manufacturing of palm oil, refined palm oil, noodle and snack and, processing and preserving of poultry and poultry products. The sub-industries with low-valued TFPG and needed attention for improvement were companies involved in the manufacturing of tea, starch, palm kernel oil, glucose and milk. In the LSEs, the high-valued TFPG sub-industries were companies involved in the manufacturing of alcohol, flour, oil from other vegetables, palm kernel oil and processing and preserving meat and other meat products. The sub-industries that needed attention because of low-valued TFPG were companies involved in the manufacturing of chocolate and, processing and preserving of poultry and poultry products. For these lower TFPG sub-industries, improvement strategies should be

formulated by the government at the national level and by the management at the firm level.

From the theoretical framework, the study managed to identify the endogenous and exogenous factors affecting the productivity growth. For the SMEs, the study identified four positive determinants of productivity growth. The determinants were R&D (affecting TECH and TFPG), public infrastructure (affecting EFFCH, TECH and TFPG), foreign direct investment (affecting EFFCH, TECH and SECH), and foreign ownership which affecting all dependent variables. Negative determinant of productivity growth was openness (affecting TFPG and TECH).

Determinants of productivity growth for the LSEs were training cost (affecting TECH, EFCH and SECH), IT expenditure (affecting EFFCH and TFPG), openness (affecting EFFCH and SECH), and foreign ownership which affect all dependent variables. The negative factors were non-university graduate labor (for SECH and EFFCH) and energy price (for TFPG). The process of improving efficiency and productivity growth of the Malaysian food processing industry is a long-term strategic plan to develop and promote the domestic-food production. The benefits were two folds; producing import substitution and increasing value-added products. As identified in the study, four factors, i.e., R&D, FDI, public infrastructure and foreign ownership were crucial determinants of the TFPG in the Malaysian food processing industry.

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

FAKTOR-FAKTOR PENENTU PERTUMBUHAN PRODUKTIVITI INDUSTRI PERKILANGAN MAKANAN DI MALAYSIA

Oleh

YODFIATFINDA

April 2012

Pengurusi : Profesor Mad Nasir Shamsudin, PhD

Fakulti : Pertanian

Malaysia adalah pengimport bersih produk makanan sejak dua dekad lalu. Nilai import makanan mengalami pertumbuhan dari RM 8.2 bilion pada tahun 1996 kepada RM 28.0 bilion pada tahun 2008, menjadikan defisit perdagangan produk makanan semakin besar iaitu dari RM 10.1 bilion, berbanding dengan RM 4.2 bilion pada tahun 1996. Kecenderungan permintaan untuk makanan yang diproses terus meningkat. Peningkatan ini didorong oleh pertambahan penduduk, pendapatan yang lebih tinggi, peningkatan pendidikan, taraf hidup dan maklumat mengenai kesihatan . Untuk mengurangkan defisit ini, kerajaan telah memperkenalkan program pertanian baru dalam Rancangan Malaysia Kesembilan dengan orientasi yang lebih besar terhadap pengeluaran komersial pertanian moden untuk menghasilkan nilai tambah yang lebih tinggi.

Industri Perkilangan Makanan (IPM) menghasilkan nilai tambah yang lebih tinggi untuk komoditi pertanian kerana ia memproses bahan mentah menjadi bahan perantara atau pun menjadi produk yang terus dapat dipakai oleh pengguna. Proses ini dapat membuatkan produk lebih bersih dan membolehkan ia tahan lama. Ini adalah tahap penting dalam sistem perniagaantani, untuk menghasilkan produk makanan dari ladang pertanian sampai ke pengguna.

Kajian ini menyelidiki kecekapan dan pertumbuhan produktiviti IPM di Malaysia dan mengenalpasti faktor-faktor penentu dari 2000-2006. Analisis dilakukan dalam dua tahap; yaitu 1) pendekatan *non-parametrik* - Data Envelopment Analysis (DEA) digunakan untuk menyiasat kecekapan dan pertumbuhan produktiviti, dan 2) kaedah regresi tobit digunakan untuk mengenalpasti faktor-faktor yang mempengaruhi pertumbuhan produktiviti. Dalam kajian ini, IPM di Malaysia dibahagikan kepada dua kelompok: industri kecil dan sederhana (IKS) dan industri skala besar (ISB).

Secara empirikalnya, analisis terhadap IKS memperlihatkan hasil purata kecekapan teknikal (TE) adalah 75.6 peratus berdasarkan skala pulangan tetap (*constant return to scale* - CRS) dan 95.4 peratus berdasarkan skala pulangan berubah (*variable return to scale* - VRS) dalam tempoh tersebut. Ini bermakna bahawa IKS dapat memperluaskan lagi pengeluaran sebanyak 24.4 peratus dengan menggunakan jumlah input yang sama. Pertumbuhan purata TE, memperlihatkan kecenderungan turun naik sepanjang tahun. Nilai TE pada ISB adalah 0.683 dan 0.952 masing-masing berdasarkan CRS dan VRS.

Dalam kajian ini, didapati bahawa IKS mengalami pertumbuhan *Total Factor Productivity (TFP)* yang negatif sebanyak -1.3 peratus yang disumbang oleh perubahan kecekapan teknikal (EFCH) sebanyak 1.3 peratus dan perubahan teknologi (TECH) sebanyak -2.6 peratus. Maklumat ini mendedahkan bahawa IKS menghadapi permasalahan dalam hal TECH selama tempoh pemerhatian. Berbeza dengan IKS, ISB mengalami pertumbuhan TFP sebanyak 7.3 peratus yang disumbang sebanyak 4.2 peratus oleh EFCH dan 3.1 peratus oleh TECH.

Pertumbuhan produktiviti yang tinggi bermakna bahawa industri telah mencapai proses pengeluaran yang lebih cekap, pengurusan yang baik dan perolehan pendapatan yang lebih tinggi. Kajian ini juga telah mengenalpasti sub-industri IPM di Malaysia yang mempunyai pertumbuhan TFP yang tinggi. Industri tersebut ialah pemprosesan dan pengawetan itik dan ayam itik, pemprosesan minyak sawit mentah, pemprosesan minyak sawit bertapis, pembuatan mi dan pembuatan snek. Sebaliknya, sub-industri yang perlu mendapat perhatian lebih lagi untuk pembaikan adalah sub-industri pembuatan teh, pati, minyak rong kelapa sawit, glukosa dan susu. Sub-industri di ISB yang memperlihatkan pertumbuhan TFP tinggi adalah pembuatan alkohol, pembuatan minyak dari sayuran lain, pemprosesan dan pengawetan daging, minyak rong kelapa sawit dan pembuatan tepung. Sub-industri yang perlu mendapat perhatian khusus ialah pemprosesan dan pengawetan produk itik dan ayam itik dan pembuatan coklat kerana pertumbuhan TFP yang menurun.

Untuk IKS, faktor yang berpengaruh positif adalah R&D (mempengaruhi TECH dan TFPG), infrastruktur awam (mempengaruhi EFCH, TECH dan TFPG), *pelaburan langsung asing* (mempengaruhi EFCH, TECH dan SECH), manakala pemilikan asing dalam syarikat mempengaruhi semua pembolehubah dependen. *Openness* pula adalah faktor penentu negatif (mempengaruhi TFPG dan TECH).

Faktor penentu pertumbuhan produktiviti bagi ISB adalah kos latihan pegawai (mempengaruhi TECH, EFCH dan SECH), belanja teknologi maklumat (mempengaruhi EFCH dan TFPG), *openness* (mempengaruhi EFCH dan SECH), dan pemilikan asing (mempengaruhi semua pembolehubah dependen). Faktor-faktor yang memberi pengaruh negatif ialah jumlah tenaga kerja yang bukan berkelulusan universiti (mempengaruhi SECH dan EFCH) dan harga minyak (mempengaruhi TFPG).

Hasil kajian menunjukkan bahawa peningkatan kecekapan dan pertumbuhan produktiviti IPM di Malaysia merupakan strategi pembangunan yang mempunyai manfaat ganda, iaitu untuk menggalakkan pengeluaran makanan domestik sebagai pengganti makanan import dan meningkatkan nilai tambah yang lebih tinggi bagi produk pertanian. Dalam kajian ini, R&D, pelaburan langsung asing, infrastruktur awam dan pemilikan asing didapati sebagai faktor-faktor penentu penting bagi TFPG dalam industri pemprosesan makanan di Malaysia.

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I certify that an Examination Committee has met on 19 April 2012 to conduct the final examination of Yodfiatfinda on his Doctor of Philosophy thesis entitled "Determinants of Productivity Growth in the Malaysian Food Processing Industry" in accordance with Universities and Universitiy 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 Doctor of Philosophy.

Members of the Examination Committee were as follows:

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This thesis was 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 were as follow:

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Date:

DECLARATION

I declare that this thesis is my original work except for quotation and citations, which have been duly acknowledged. I also declare that it has not been previously and is not concurrently submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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YODFIATFINDA

Date: 19 April 2012

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