

**TECHNOLOGICAL CAPABILITY BUILDING THROUGH
BACKWARD LINKAGES IN THE MALAYSIAN
PETROCHEMICAL INDUSTRY**

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**THESIS SUBMITTED IN FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY**

**DEPARTMENT OF SCIENCE & TECHNOLOGY STUDIES
FACULTY OF SCIENCE
UNIVERSITY OF MALAYA
KUALA LUMPUR**

2012

ABSTRACT

While foreign direct investment (FDI) is regarded as an effective channel of technology transfer, the question of whether or not FDI helps to upgrade the technological capacities of firms in host countries remains an important one for policy makers. The study presented here is based on a firm-level analysis of petrochemical firms in two Malaysian industrial regions, namely Pasir Gudang in Johor, and Gebeng in Pahang.

This research is concerned with technological capability of local suppliers in the petrochemical industry in Malaysia. The technological capabilities of local suppliers are assumed to have been upgraded by the backward linkages provided by the multinational company (MNC) subsidiaries that located in Malaysia after the country decided to host petrochemical plant in the 1970s. Together with the country's national oil company, Petroliaam Nasional Berhad (Petronas), MNC subsidiaries played a key role in bringing the technology of the petrochemical industry to Malaysia in the 1980s. Studies indicate that MNCs are playing a crucial role in the current globalization process and are expected to increase their control over productive activities in many countries, especially in Malaysia's part of the world. They are expected to increase their activities in the foreseeable future.

The research questions of this study deal with the variables that affect the diversity of backward linkages between subsidiaries and local suppliers. Factors explored include the corporate strategy of MNCs, the technological capability of local suppliers, inter-organizational linkages between MNCs and local suppliers, and other specific factors, such as the ownership structure and size of MNCs.

This study utilizes an interview survey of MNC subsidiaries and local suppliers in the Malaysian petrochemical industry to explore the factors influencing the upgrading of technological capability of local suppliers through backward linkages. A total of 9 MNCs and 18 local suppliers have so far participated in the survey. (This is based on the

population of 27 MNCs in the Malaysian petrochemical industry in the two regions surveyed. Some firms are reluctant to participate).

The findings suggest that the roles of MNCs located in Malaysia have shifted. They have developed a higher level of autonomy. This has increased the diversity of backward linkages offered to local suppliers. However, the number of backward linkages formed is still dependent on the ownership structure of the firms. Wholly local-owned MNCs have more strength in backward linkages than joint ventures, which in turn are stronger in backward linkages than wholly foreign-owned MNCs. MNCs that are wholly foreign-owned do not produce as many linkages as other companies unless they are embedded in the host country. Thus, backward linkages provided by subsidiaries can significantly affect local suppliers' technological capabilities. At the same time, the motivation of MNCs to create backward linkages is positively affected by their production networking, and the diversity of backward linkages they create is believed to be affected by the specific roles the subsidiaries play, rather than by the nationality of the firms involved.

Local firms in developing countries find themselves in a weak position when bargaining with MNCs. Support from the government, industry associations or international organizations can contribute to improving their bargaining position (Lauridsen, 2004). In the case of Malaysia, Petronas as the anchor company for the Vendor Development Program (VDP) has become a tool for technology transfer. Petronas has brought technology into Malaysia and has become an enabler for the country to upgrade the technological capabilities of local suppliers in the petrochemical industry. In this regard, Petronas has acted as an intermediary in bargaining by local suppliers.

Abstrak

Pelaburan langsung asing (FDI) adalah salah satu cara bagi pemindahan teknologi. Bagaimanapun, samada FDI dapat mempertingkatkan kapasiti firma-firma pembekal di negara yang menjadi tuan rumah kepada firma multinasional (MNC) kini telah menjadi isu utama bagi pembuat dasar. Kajian di firma-firma petrokimia ini adalah berdasarkan analisis peringkat firma di dua kawasan industri di Malaysia iaitu di Pasir Gudang, Johor dan di Gebeng, Pahang.

Penyelidikan ini adalah berhubung dengan peningkatan keupayaan teknologi bagi firma-firma pembekal tempatan di dalam industri petrokimia di Malaysia. Melalui kaedah rantaian ke belakang (backward linkages) yang diberikan oleh subsidiari MNC yang terdapat di Malaysia selepas negara ini menjadi tuan rumah kepada firma-firma petrokimia pada tahun 1970an, dikatakan keupayaan teknologi di firma-firma pembekal ini telah mengalami peningkatan. Bermula pada tahun 1980an, subsidiari MNC ini yang beroperasi di Malaysia beserta dengan syarikat minyak milik negara, Petroliaam Nasional Berhad (Petronas) telah memainkan peranan utama di dalam membawa masuk teknologi industri petrokimia ke Malaysia. Kajian-kajian yang dijalankan sebelum ini telah menunjukkan bahawa subsidiari MNC telah memainkan peranan di dalam proses globalisasi dan dijangka akan terus mempertingkatkan aktiviti dan pengaruh mereka di negara-negara membangun di kawasan Asia Timur.

Pertanyaan masalah di dalam kajian ini adalah berkisar kepada variable yang mempengaruhi rantaian ke belakang di antara subsidiari MNC dengan firma-firma pembekal tempatan. Faktor-faktor yang dilihat adalah terdiri daripada strategi korporat MNC, keupayaan teknologi firma-firma pembekal tempatan, pertalian antara-organisasi di antara subsidiari MNC dan pembekal tempatan, serta faktor-faktor spesifik seperti struktur hak milik syarikat dan saiz subsidiari MNC tersebut.

Kajian ini menggunakan kaedah temuduga dengan responden daripada MNC asing serta tempatan dengan firma-firma pembekal tempatan di dalam industri petrokimia di

Malaysia. Perkara-perkara yang dilihat adalah faktor-faktor yang mempengaruhi peningkatan keupayaan teknologi firma-firma tempatan melalui pertaliannya dengan subsidiari MNC. Sebanyak 9 subsidiari MNC dan 18 firma-firma pembekal tempatan telah ditemuduga di dalam kajian ini (Ini adalah berdasarkan kepada populasi 27 subsidiari MNC petrokimia yang terdapat di kedua-dua kawasan industri tersebut. Kebanyakan firma-firma tidak berminat untuk mengambil bahagian).

Kedapatan kajian menunjukkan peranan subsidiari MNC yang terdapat di Malaysia telah berubah. Firma-firma induk kini telah memberikan autonomi kepada firma-firma subsidiari untuk membuat keputusan. Ini telah memberikan lebih diversiti kepada rantaian ke belakang dengan firma-firma tempatan. Bagaimanapun, jumlah bilangan rantaian ke belakang terhasil masih bergantung kepada struktur hak milik syarikat (ownership structure) tersebut. Firma-firma MNC yang 100% milik tempatan memberikan lebih banyak rantaian ke belakang berbanding dengan firma-firma usaha sama yang seterusnya mempunyai lebih banyak rantaian ke belakang berbanding dengan firma-firma multinasional yang 100% milik asing. MNC yang 100% milik asing tidak menunjukkan banyak rantaian ke belakang berbanding firma yang telah lama beroperasi di dalam negara tuan rumah. Oleh itu, rantaian ke belakang ini yang diberikan oleh subsidiari MNC boleh memberi kesan kepada peningkatan keupayaan teknologi firma-firma pembekal tempatan. Motivasi subsidiari MNC adalah dipengaruhi oleh peranan firma-firma ini dan bukan daripada faktor asal usul kenegaraan firma-firma terbabit.

Firma-firma pembekal tempatan di negara membangun berada di dalam keadaan yang lemah semasa mengadakan rundingan dengan MNC. Sehubungan dengan itu, sokongan daripada kerajaan, pertubuhan-pertubuhan industri dan pertubuhan-pertubuhan antarabangsa boleh memberikan peluang yang lebih untuk firma-firma tempatan berunding dengan MNC (Lauridsen, 2004). Dalam kes Malaysia, Petronas sebagai syarikat induk di dalam Program Pembangunan Vendor (VDP) telah berperanan sebagai wacana untuk pemindahan teknologi. Sehubungan dengan itu, Petronas telah membawa banyak teknologi ke Malaysia dan telah menjadi “enabler” kepada negara ini untuk mempertingkatkan keupayaan teknologi firma-firma pembekal tempatan di dalam

industri petrokimia. Dalam hal ini, Petronas telah menjadi perantara di dalam rundingan di antara firma-firma pembekal tempatan dengan firma-firma multinasional asing.

ACKNOWLEDGEMENTS

I would like to thank the Malaysian Public Services Department for sponsoring my PhD studies. I extend a special thank-you to the Prime Minister's Department for giving me the opportunity to further my studies. I am indebted to my supervisor Associate Professor Dr. K. Thiruchelvam for guiding and motivating me throughout.

I thank my beloved mother Hjh. Saedah Hj. Mat, my wife Dr. Site Nor Ismail, my sons Muhamad Ashraf and Muhammad Fakhrol Amin, my daughter Nur Farhana and my brothers and sisters for their love, patience and understanding. Without their support, the journey to a Ph.D. would not have been possible. May God bless you all.

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ABBREVIATIONS AND ACRONYMS

ABS	-	Acrylonitrile-butadiene styrene
BTX	-	Benzene, toluene and xylene
ECER	-	East Coast Economic Region
E&E	-	Electrical and Electronics
EPC	-	Engineering, Procurement and Construction contractors
FOB	-	Foreign-owned British
FOJ	-	Foreign-owned Japan
FOT	-	Foreign-owned Taiwan
GDP	-	Gross Domestic Product
GIPC	-	Gebeng Integrated Petrochemical Complex
GNP	-	Gross National Product
HDPE	-	High Density Polyethylene
JVAM	-	Joint Venture American Malaysia
JVGP	-	Joint Venture German Petronas
KIPC	-	Kertih Integrated Petrochemical Complex
LDPE	-	Low Density Polyethylene
LLDPE	-	Linear Low Density Polyethylene
LOP	-	Locally-owned Petronas
LOM	-	Locally-owned Malaysia
LPG	-	Liquefied Petroleum Gas
LNG	-	Liquefied Natural Gas
MIDA	-	Malaysian Industrial Development Corporation
MITCO	-	Petronas petrochemical purchasing arm
MtBE	-	Methyl t-butyl ether
OEM	-	Original Equipment Manufacturing
PE	-	Polyethylene
Petronas	-	Petroleum National Berhad
PP	-	Polypropylene
PS	-	Polystyrene
PVC	-	Polyvinyl Chloride
RC	-	Registered Category
SDP	-	Supplier Development Program
VDP	-	Vendor Development Program