Jurnal Pengurusan 42(2014) 89 - 102

Technology Diffusion through Production Process and the Innovative Capacity of Local Suppliers

(Pemindahan Teknologi Menerusi Proses Pengeluaran dan Kapasiti Inovatif Pembekal Tempatan)

Abd Rahim Jaguli
Marlin Marissa Malek
(UUM College of Law, Government and International Studies, Universiti Utara Malaysia)
Mohd Rizal Palil
(Faculty of Economics and Management, Universiti Kebangsaan Malaysia)

ABSTRACT

This study goes beyond the existing research in the area of Foreign Direct Investment (FDI) spillovers by opening the black box of Multinational Corporations' (MNC) technology and knowledge spillovers in Malaysia. The main objective of this study was to add to limited evidence related to how and in what ways technology and knowledge are diffused. Specifically, it attempts to contribute to the FDI spillover literature by exploring the channels through which technology and knowledge could be transferred to the host country. In doing so, the authors had employed an in-depth case study method in order to generate a deeper understanding of the significance of the assistance provided by MNCs and that this method would prove an effective strategy in generating a large volume of very meaningful data. The study has identified that technology is diffused from MNCs to local suppliers through the production process, technical consultation and production facilities. Local suppliers enhance their innovative capacity through these linkages. The findings not only provide benefit to the academic circle but also to local businesses, especially small and medium industries, as well as policy makers. The managerial and policy implications derived from the findings are relevant, not only to Malaysia, but also to other developing countries, particularly Malaysia's neighbouring countries.

Keywords: FDI spillovers; backward linkages; technology and knowledge transfer; Malaysia; MNC

ABSTRAK

Penyelidikan ini melampaui kajian sedia ada dalam bidang limpahan Pelaburan Langsung Asing (PLI) dengan membuka kotak hitam kajian mengenai limpahan teknologi dan pengetahuan Syarikat Multinasional di Malaysia. Secara spesifiknya, ia bertujuan untuk menyumbang kepada penyelidikan limpahan PLI dengan mengkaji mengenai saluran-saluran di mana teknologi dan pengetahuan boleh dipindahkan kepada Negara hos. Dengan berbuat demikian, penulis-penulis telah menggunakan metod kajian kes secara terperinci untuk memahmi secara mendalam signifikannya bantuan yang telah diberikan oleh syarikat multinasional dan metod tersebut telah terbukti merupakan satu strategi efektif untuk menjana sejumlah besar data yang bermakna. Kajian ini telah mengenal pasti bahawa teknologi dipindahkan dari Syarikat Multinasional kepada pembekal tempatan melalui proses pengeluaran, perundingan teknikal dan fasiliti pengeluaran. Pembekal tempatan telah meningkatkan kapasiti inovatif menerusi hubungan ini. Dapatan kajian ini bukan sahaja bermanfaat kepada golongan akademik tetapi juga kepada perniagaan tempatan, terutamanya kepada industry kecil dan sederhana, juga kepada pembuat dasar. Implikasi kepada pengurusan dan dasar yang diperolehi dari dapatan kajian adalah relevan bukan sahaja kepada Malaysia tetapi juga kepada negara sedang membangun lain, terutamanya negara-negara jiran Malaysia.

Kata kunci: Limpahan pelaburan langsung Asing (PLA); hubungan menegak; pemindahan teknologi dan pengetahuan; Malaysia; firma multinasional

RESEARCH OVERVIEW

It is widely recognised that foreign direct investment (FDI) affects economic growth in host economies both directly and indirectly. FDI contributes directly to employment, capital, exports, and new technology in the host country (Blomström, Kokko & Globerman 2001). In addition, local firms may benefit indirectly through improved productivity (Gorg & Greenaway 2004). This is why there is significant competition among governments to attract inward FDI using all kinds of incentives. For example, many governments, especially in developing economies, have adopted policies aimed at attracting foreign investors. This is based on the belief that the benefits from multinational corporations (MNCs) can affect productivity, enhance a country's trade performance and upgrade the technological progress of the host country. The model of endogenous innovation-driven growth by Grossman and Helpman (1991) has emphasised the importance of knowledge spillovers for economic growth. Many experts and policy-makers believe that the capacity to imitate new technologies from advanced nations is one of the key

factors in determining the rate of economic growth (Romer 1990; Aghion & Howitt 1992; Metcalfe 2002).

Even thought FDI had been considered as the vehicle for technology and knowledge spillovers (Branstetter 2000; Keller & Yeaple 2003; Giroud 2003; Ivarsson & Alvstam 2005; Liu & Buck 2007; Blalock & Simon 2009; Liu, Wang & Wei 2009), the channels through which technology and knowledge were transferred remain unexplored in the available FDI spillover literature. There is little evidence on how and in what ways technology and knowledge are diffused. Hence, this study goes beyond the existing research in the area of FDI spillovers by opening the black box of MNCs' technology and knowledge spillovers in Malaysia. This current study is complementary to previous studies by Furman et al. (2002), Hu and Mathews (2005) and Liu and Buck (2007) in that it analyses FDI spillover effects, which were not included by Furman et al. (2002) or Hu and Mathews (2005), and emphasises vertical FDI spillovers, whereas Liu and Buck (2007) only focused on horizontal FDI spillovers at industry levels. This study goes a step further by examining the impact of FDI on the innovation performance at firm level. Previous studies were unable to specifically identify how knowledge and technology were transferred through these linkages. Most of the prior studies of FDI spillovers were based on secondary data analysis and used FDI inflows, exports and imports as proxies of spillovers from foreign firms to local firms at industry level and firm level in various countries. Therefore, these factors were regarded as the main channels of technology spillover in many previous studies (see meta-analysis study by Gorg & Greenaway 2004). Moreover, many studies have also investigated and confirmed that vertical linkages between multinational companies and domestic suppliers are the channels for the diffusion of technology (Rodriguez-Clare 1996; Markusen & Venables 1999; Javorcik 2004; Ivarsson & Alvstam 2005; Liu, Wang & Wei 2009), based on secondary data analysis. Therefore, the present study was designed to determine how and in what ways technology is transferred through these linkages. The principal aim of this study is to examine the impact of FDI spillovers on innovation performance at firm level. Specifically, it investigates how MNCs provide their local suppliers with different types of technological assistance and presents testimonies from respondents on the channels through which technology and knowledge could be diffused to local suppliers.

THEORETICAL EXPLANATIONS OF FOREIGN DIRECT INVESTMENT

In FDI theory, firms go overseas in order to extract raw materials and source production and technology (Dunning 1981, 1988). One of the main channels for multinational expansion is FDI. One of the most comprehensive theories of FDI is the Eclectic Theory of International Production, which was developed by Dunning (1988). The theory considers the host-country's factor endowments and intangible assets which serve to explain the international involvement of firms within the host- country. The Eclectic Theory holds that a firm's decision to invest in a foreign market can be explained in terms of its ownership advantage, the location advantage of the market in which it is investing and internalisation advantages conferred by direct investment (Dunning 1981, 1988).

According to Blomström and Kokko (1998), spillovers can occur through three main channels: firstly, through a labour mobility channel; the diffusion of technology occurs when the movement of labour from foreign subsidiaries to locally-owned firms takes place (Kaufmann 1997; Haaker 1999; Fosfuri, Motta & Ronde 2001; Glass & Saggi 2002; Meyer 2004; Spencer 2008). This occurs through labour turnovers, whereby local firms obtain the technological know-how of foreign firms by ''stealing'' their skilled workers. In this case, the movement of highly-skilled staff from MNCs to domestic firms results in an influx of knowledge which may be usefully applied in domestic firms. Additionally, labour mobility facilitates human capital development in a host country when a trained local work force starts their own businesses. On the other hand, there is the possibility of MNCs attracting local firms' best employees as MNCs are able to offer higher wages (Sinani & Meyer 2004).

Secondly, another route for the diffusion of technology is through what is referred to as the 'demonstration effect' (Kokko 1996; Wang & Blomström 1992). Demonstration effects permit local firms to observe foreign technology. The presence of multinationals, together with their new products and advanced technologies may thereby encourage domestic firms to imitate and innovate. Görg and Greenaway's (2004) study on productivity spillover from FDI reveals that the superior knowledge brought into the economy through FDI may leak to domestic firms through worker movement and imitation. Local firms can learn about the products and technologies brought in by foreign investors by means of reverse engineering or demonstration effects, where domestic firms learn superior production technologies from MNCs. If domestic firms learn better technology from MNCs then this may also lead to more innovation activity within domestic firms. The presence of foreign firms with their advanced technologies within domestic markets can inspire and stimulate local innovators to develop new products and processes. It helps local producers to reduce their cost in terms of the trial-and-error processes. Moreover, since the products and technologies that foreign firms bring in have already been tested in foreign markets, the perceived risk of innovating is lowered for local firms.

Thirdly, many theoretical models emphasise the role of competition where the presence of MNCs affects the competitive environment in the domestic economy, which leads to an increase in competition for domestic firms (Wang & Blomström 1992; Kokko 1994, 1996; Glass & Saggi 2002). Through this competition affect, the influx of FDI will affect domestic firm's innovative activity (Blundell, Griffith and Van Reenen, 1998; Aghion et al. 2005). Aghion et al. (2005) argue theoretically and

provide evidence that increasing competition is expected to stimulate innovative activities in firms that are equal in terms of technology with their competitors but identify that it also discourages laggard firms from innovating. Intense competition from multinationals may force domestic rivals to update their production technologies and techniques to become more productive and because of this, spillovers are highest in sectors with high competition (Blalock & Gertler 2003). However, this channel may negatively affect local firms through the "market stealing effect" (Aitken & Harrison 1999). Aitken and Harrison (1999) suggested that MNCs have low marginal costs due to their firm-specific advantages which allow them to attract demand away from domestic firms. They point out that competition effects may reduce the productivity of local firms, making them reduce levels of production and thereby increasing their average cost curve. Foreign firms may also increase the intensity of the competition by introducing new ways to compete (Blomström & Kokko 2003; Driffield & Love 2007).

In fact, evidence from previous theoretical and empirical studies shows that technology transfer from export activities does occur and has a significant positive effect on product innovation. This is consistent with the effects of learning by exporting on firm innovation. It has also been recognised that the endogenous growth model is important as it considers international trade as an important channel of diffusion of technological knowledge (Grossman & Helpman 1991; Coe & Helpman 1995). The endogenous growth theory emphasises the role of international trade in enhancing innovation which is generated from an international flow of ideas, where the international trade process between trading countries enables the transfer of technology and knowledge. There is a vast amount of knowledge and technological information diffusion that occurs from exporting activities. Selling products to international buyers requires local firms to be more competitive as high quality products and price become crucial factors. The high standard requirements imposed by international buyers enable local firms to learn how improve product quality and production process. The "collaboration" with their foreign buyers may create the opportunity of "learning-by-exporting" where exporting firms learn from their buyers how to upgrade the product quality. MNCs can also directly affect the trade performance of host country through their own exporting activities (Blake & Pain 1994; Barry & Bradley 1997; Cabral 1995). MNCs have an impact upon domestic firms through export information externalities and the demonstration effect (Aitken, Hanson & Harrison 1997; Greenaway, Sousa & Wakelin 2004).

EMPIRICAL EVIDENCE ON FDI SPILLOVERS

Empirical studies that examine whether FDI causes positive spillover effects have been increasing. However, the studies produce mixed findings where several authors have acknowledged the significant positive spillover effects but some studies find no evidence or negative effects of FDI spillover. The empirical evidence of FDI spillover was pioneered by Caves (1974), Globerman (1979) and Blomström (1986), using data for Australia, Canada and Mexico respectively. Since then, their empirical models have been extended and refined. Most of the empirical studies focus on productivity, although some analyse the implications of market competition. Empirical studies have also been carried out in different types of countries, ranging from the developed to the developing and transition economies. The empirical study by Caves (1974) generally demonstrates a positive correlation between foreign presence and productivity. There are several studies of developed economies which employed panel data and find positive evidence (e.g. Liu, Siler, Wang & Wei 2000; Driffield 2001; Ruane & Ugur 2002; Dimelis & Louri 2002; Görg & Strobl, 2003; Keller & Yeaple, 2003). On the other hand, most studies in transition and developing economies suggest that there is no positive effect of spillovers.

In a study which uses firm-level data from 1992-1996, contrary to what might be predicted, Djankov and Hoekman (2000) found a statistically significant negative intra-industry spillover effect of foreign participation on domestic firms in the Czech Republic. They revealed that greater foreign participation in an industry has a statistically significant negative effect on the performance of other firms where an increase in the share of foreign assets is associated with a fall in sales growth of domestic firms. This finding is consistent with the results found by Konings (2001). He used firm level panel data to investigate empirically the effects of foreign direct investment (FDI) on the productivity performance of domestic firms in three emerging economies of Central and Eastern Europe-Bulgaria, Romania and Poland. He found no evidence of positive spillovers to domestic firms where foreign firms, on average, do not even perform better than domestic firms. He also found that on average there are negative spillovers to domestic firms in Bulgaria and Romania. Even though in Poland foreign firms are more productive than domestic firms, no evidence of spillover effects on domestic firms was found. The study suggests there is a negative competition effect that dominates a positive technology effect. Yudaevaet al. (2003) found that, in Russia, the stock of human capital in regions where foreign firms operate is one of the factors that helps domestic firms to benefit from the entry of foreign firms. They also found that there are positive spillovers from foreign-owned firms to domestic firms in the same industry but negative effects on domestic firms that are vertically related to foreign-owned firms.

In recent development of FDI spillover studies, there has been an increasing amount of literature that has shifted the attention from productivity spillovers to technology and knowledge spillovers. A considerable amount of empirical studies have been published on the impact of knowledge and technology spillover on host countries. The use of FDI as a channel of international spillovers is

by now fairly well established in the empirical literature on innovation. It is often argued that subsidiaries of foreign multinational enterprises are a mechanism through which technological know-how flows across borders. More sophisticated or tacit knowledge can also spread in cases where there is close interaction between MNCs and local firms, as, for instance in the case of MNCs and their suppliers. Branstetter (2000), for example, using firm level data on Japanese firms' FDI and innovation activity, found evidence that FDI increases the flow of knowledge spillovers (measured by patent citations) both from and to Japanese multinationals undertaking direct investment in the US Girma et al. (2006) provide suggestive evidence that FDI is an important vehicle for international technology transfers. Using unpublished firm-level data on the Czech manufacturing sector between 1995 and 1998, Kinoshita (2000) examined the importance of the firm's R&D and technology diffusion from FDI in explaining productivity growth. The result suggests positive spillovers from FDI are found in electrical machinery and radio and TV sectors, which are also active investors in innovative R&D. Empirical studies by Hu and Jefferson (2002), which used data for large and medium-size enterprises in China, found that inward FDI has a positive effect on the introduction of new products in China.

Liu and Buck (2007) investigated the impact of different channels for international technology spillover on the innovation performance of Chinese high-tech industries by using a panel of sub-sector level data from 1997 to 2002. Their findings suggest that learning by exporting and importing promotes innovation in indigenous Chinese firms. The study also reveals that foreign R&D activities by multinational enterprises in a host-country significantly affect the innovation performance of domestic firms only when absorptive ability is taken into account. The findings indicate that both international technology spillover sources and indigenous efforts were important in determining the innovation performance of Chinese high-tech sectors.

To summarise the empirical findings from FDI spillover, Gorg and Greenaway (2004) in their empirical study concluded that the evidence for generalised spillovers from multinationals located in the same industry (horizontal spillovers) might be interpreted, at best, as weak. The evidence is stronger when the focus is on more homogeneous groups of firms, when the physical proximity is high, and on multinationals located up or down the supply chain (vertical spillovers). Technology protection is one of the reasons why such a situation occurs. Foreign firms want to prevent the leakage of their technology to domestic firms to protect their future interest, as these domestic firms are potential new competitors given the 'right' assistance and exposure. According to Javorcik (2004), however, foreign firms derive no benefit from preventing the diffusion of their technology to their suppliers. The study by Aitken and Harrison (1999), for example, concludes that FDI negatively affects the productivity of locally-owned plants in Venezuelan industry. There are some explanations for the negative results. Aitken and Harrison (1999) and Konings (2001) suggested that foreign firms reduce the productivity of domestic firms through competition effects. Aitken and Harrison (1999) argue that the entry of foreign firms' produce to the local market can draw demand away from local firms and cause them to cut their production. As a result, the productivity of local firms would fall as they are forced to back up their average cost curves.

Finally, differences in methodology and level of data aggregation are another possible reason for a failure to find evidence for positive spillovers. The data used in the studies was collected at different degrees of aggregation. While some studies use firm level data, other studies employ industry level data. There are studies that use cross-sectional data, where some other studies use panel data over a period of time. Gorg and Strobl (2001) in their meta-analysis study stresses that "on average, cross-sectional studies report higher coefficients of the effect of foreign presence than panel data studies." Moreover, for studies that use industry data, it is complicated to differentiate between inter-industry effects and intra-industry effects of spillover. As a result, there is no evidence of positive inter-industry spillover effects due to intra-industry factors. This is because MNCs may be able to guard their firm specific advantages closely to prevent leakages to local firms in the same industry, hence, no spillovers occur. These findings may suggest that spillovers may not occur horizontally but through vertical relationships.

The results from past studies appear more conclusive for vertical spillovers. Among the 16 studies discussed in Gorg and Greenaway (2004) and author's compilation that focus on vertical FDI spillover effects, all of the studies found positive inter-industry spillovers (see, for example, Schoors & Van der Tol 2001; Blalock 2001; Javorcik, 2004, 2008; Ivarsson & Alvstam, 2005; Kugler 2001, 2006; Blalock & Gertler 2003, 2008; Giroud 2003; Liu, Wang & Wei 2009; Yang, Xu, Wang, Lai & Wei 2009). The contradictory findings in previous studies can be explained by the influence of the magnitude of spillover effects from MNCs to domestic firms. A technology gap, the ability of local firms to absorb the knowledge, local firm's motivation to react to foreign entry, the host country conditions, behaviour and the strategies of foreign subsidiaries, the levels of competition between foreign and levels of economic situation may all vary across countries. Thus, these factors may influence the significance of spillover effects.

RESEARCH APPROACHES

The in-depth case study was used in order to generate a deeper understanding of the significance of the assistance provided by MNCs. The findings based on the cases prove to be valuable in providing deeper and richer evidence as to what extent, and in what ways, MNCs provide their local suppliers with different types of assistance and to what

extent the linkage effects have improved the innovation activities of their local suppliers. Moreover, as suggested by Feagin, Orum and Sjoberg (1991) case studies are an ideal methodology when a holistic, in-depth investigation is needed. Moreover, many scholars suggest exploratory research and qualitative methodologies to capture multi-dimensional phenomena (Anderson 1983; Yin 1994) and this can provide a clear and holistic view of the context (Ghauri & Gronhaug 2002; Ruyter & Scholl 1998). This study uses multiple sources of evidence such as interviews, company reports and archival records. The goal of using these three sources is to obtain a rich set of data.

CASE SELECTION

A total of 9 interviews were conducted: two interviews with an American firm, five interviews with three different Japanese firms and two interviews with a European firm. According to Yin (1994), a researcher can use one case study only if one or more of the three justifications apply, and the appropriateness of two or more theories can be examined with the case. However, several case studies should usually be used in postgraduate research because this approach allows cross-case analysis to be used for richer theory building. Therefore, in order to achieve information-richness of the case selected, this study uses three important criteria in selecting the cases. Firstly, the firm must have already operated in Malaysia for a relatively long period in which their presence has already had a significant contribution to the economic growth of the country. In addition, firms which have already had a long period of operation are more likely to have linkages/ business links with domestic firms. Secondly, the selected firms must be among the largest in terms of output in the selected industries. Thirdly, the firms will be from the main industries in Malaysia which have attracted a substantial amount of FDI: that is, in this case, the electrical and electronics industry.

THE INTERVIEW PROCESS

Firstly, in order to secure the interviews, the authors wrote to the CEO of respecting firms and asked them for permission to conduct an interview with a suitable person. The letter also confirmed that all answers and responses in the interview would be kept confidential and results would be used only for academic purposes with no specific individuals identified. All interviews took place at the respondent's offices, and each interview lasted between forty five minutes to one hour and was conducted in English. A semi-structured in-depth interview format was used where a list of pre-prepared open-ended questions were asked. These open-ended pre-prepared questions were designed to extract detailed and crucial information on how technology transfer occurs. Moreover, this approach enabled the researcher to focus on the main topic rather than a more general one and address more specific questions. Obviously, in the interview process, the interviewer did not attempt to influence the responses of interviewees. Each respondent explained the topics asked according to their own conscience and understanding. It is important to stress that a triangulation strategy was used in the interview process, where in each case, two separate interviews were conducted. In each firm, the author had selected two very important or senior people as interviewees who are responsible for handling matters with suppliers and dealing with the production process. In order to maintain confidentiality and ensure that the findings were used solely for academic purposes, pseudonyms have been used to identify the names of the companies, while the respondents have been identified by their position within the respective companies. The study identifies the company as Japan co. 1, Japan co. 2, Japan co. 3, the US co. 1 and Europe co.1. The interviewees of the case companies are the Assistant Head of AU Production (BU2), Production 2 Department of Japanese Co. 1, the Procurement & Logistics Manager of the US co. 1, the Production Manager of the US co. 1, the Purchasing Department Manager and the Department Head of Home Shower Production of Japan co. 2, the Assistant Manager of Procurement & Administration and the Production Manager of Japan co. 3, the Purchasing Section Manager and the Director of Procurement of Europe co. 1. The interviews were conducted one-to-one, digitally recorded and subsequently transcribed. As a crucial proof that all respondents were actually talked to the author, all quotations were direct quotes and not be edited and therefore, it was an authentic material which contains grammar mistakes.

KNOWLEDGE DIFFUSION THROUGH TRANSFERRING PRODUCTION TECHNOLOGY

One of the reasons why host countries in developing nations may have attracted MNCs to invest in their country is possibly to gain access to technologies and skills which the host country does not possess. This includes the prospect of acquiring modern technology, interpreted broadly to include product, process, and distribution technology, as well as management and marketing skills (Blomström & Kokko 1998). Since developing countries like Malaysia are lagging behind in terms of technology capabilities, they need to rely on inflows of foreign technology to improve their technological capability. The presence of MNCs and their linkages with local suppliers may lead to increases in the rate of technology transfer and the diffusion of knowledge. With the linkages, MNCs might introduce new knowledge as a means of demonstrating management know-how and new technologies.

From the interviews conducted in this study, the American MNC likes to have a discussion and consultation with suppliers in terms of designing new products. This is because the American MNC requires supplier's production process to meet all specifications. In order to achieve this, the MNC gives assistance on the production process and gives details on how to design the parts. During this process, they will explain to suppliers about the process

of production of new product. The supplier's engineers will come to MNC's facility and stay with people from the MNCs to study a particular project. The objective is to let the suppliers learn and master all the production processes and gain a full understanding of how to design a particular product with the assistance from the MNC. The company also gives suppliers ideas and will have a Non-disclosure Agreement between them where they give details on how to design the parts. The idea is to give local suppliers the opportunity to learn certain technologies, enhance their business and help the host country to build local talent. This emerged clearly from an interview with the Procurement and Logistics Manager of US co. 1:

We actually engage with suppliers ask them to design this part for us so they have people come in side here sit with our engineers. (US co. 1)

He added:

Suppliers send their engineers here and sit here for this particular project and sit here for half a year in our facility. The idea is that they will know the process and now you want them to design your parts of course with our assistance. (US co. 1)

The statement was echoed by the production manager of US co. 1 as he pointed out:

We will definitely give ideas to them, that is okay because sometimes we design all suppliers sign NDA (Non Disclosure Agreement) with us, so whether we design or they design they still have our parts because they need to make parts to us they know the design for all parts. (US co. 1)

He added:

In terms of like all those technology that we are trying to ever transfer from the States or other countries to Malaysia, equally all this will be transferred to them, all this tech will be passed on to them, indirectly it will help build our local talent not only inside the company but outside the company. (US co. 1)

I believe they are very happy because once they have the new technology, I believe they will enhance their business. (US co. 1)

Moreover, support is also given on production set up. The MNC will discuss and consult with suppliers on technical parts as well as giving support in terms of production equipment. In this case, the MNC's engineers will provide suppliers with assistance in setting up their production line. Meetings will be held to discuss every aspect of production. Discussion includes issues regarding product design, the process and technical specifications. The Production Manager of US co. 1 reiterated:

Our engineers will help our suppliers set up their production line. They will have a meeting with suppliers, we will tell them on everything about the introduction of the new model. We will discuss in terms of product design, the process, technical specifications, see whether they are able to produce to our standard requirement. (US co. 1)

He added:

We even provide equipment to them. We have quite a number of local suppliers like pcm, cpi, kalimatsu is more or less like well developed. (US co. 1)

To make matters clear on everything aspect of the production, the company sends their engineers and also requests engineers from Headquarters to come over and go to supplier's factory. In this case, the MQE (Mechanical Quality Engineering) team will work closely with all the suppliers to help them resolve any problems. Every aspect will be studied and the outsourcing and the MQE team will work together and map out every part of the entire production process. The discussion with suppliers will also include discussions about technical consultancies that they need from the company. All this is carried out because the company wants the product to be of high quality. The company does not want the suppliers to experience any problems with regard to the quality of a product. As the Procurement and Logistics Manager of US co. 1 said:

We don't want our suppliers to bear heavy loss. We will send our engineers first to study the problems and then if they cannot solve the problems then we will ask engineers from HQ to come and help us to solve the matter. (US co. 1)

He added:

MQE (Mechanical Quality Engineering) work more closely with all the suppliers whether it is foreign or local and if there are some issues need to be looking at the team will get their experts to go down to the factory to help them resolve issues.(US co. 1)

Similarly the Production Manager said:

I will get my outsourcing team and our engineering side that will work together, get the whole process work out and then get the outsourcing team to work with all these suppliers what are the technical consultancies that they need from us all this will be done up front before we transfer it to them. (US co. 1)

He added:

We get our R&D team to do whatever changes and send our print to them and get our outsourcing team to work with them as well. (US co. 1)

Once we have all the data ready, then we will get our supplier to come over here for discussion and verified all those quality issues. (US co. 1)

For Japanese MNCs, subsidiaries' employees and HQ's engineers will have discussions with suppliers and study all the production aspects. In this regard, MNCs will send engineers to examine suppliers' problems. If necessary, engineers from HQ will come and help to solve any problems. The objective is that Japanese MNCs are willing to share ideas with suppliers and encourage them to communicate any problems to the MNCs. Constant interactions between designing engineers, the manufacturing function and suppliers also take place in order to increase consumer satisfaction through useful, innovative products. The Section Head of Production of Japan co. 2 pointed out:

We will send our engineer and also ask our engineers from HQ coming here and visit suppliers' factories. We discuss and study all the problems faced by our suppliers and study all aspects because we want our products to have good quality. Moreover, we do not want our suppliers to bear heavy loss. We will send our engineers first to investigate the problems and then if they cannot solve the problems, we will ask engineers from HQ to come and help us to solve the matter. (Japan co. 2)

Similarly, the Production Manager of Japan co. 3 pointed out:

We normally pay a visit to the suppliers' premises and have a discussion with them. They are encouraged to communicate with us when they feel necessary. (Japan co. 3)

The Japanese companies have inspections at the supplier's production site in which all queries from suppliers will be handled. MNCs have a special team that ensures that supplier's production meets all the requirements. The Assistant Manager of Purchasing and Administration of Japan co. 3 stressed:

There are designated officials to handle queries from our suppliers in order for them to meet our specific requirements. (Japan co. 3)

In Japanese MNCs, their Headquarters will transfer technology to subsidiaries. It will be based on HQ specifications where an MNC and suppliers will discuss and do production testing. MNCs have to show suppliers the production process. In other words, they give support to suppliers in terms of the production process as well as sharing ideas with suppliers. Extensive prototyping and trial production is carried out. The goal is to "get the bugs out" of a new product before production, rather than rushing into markets with a questionable product. This emerged clearly from an interview with the Manager of the Purchasing Department of Japan co. 2:

HQ will give the specifications, so we will inform the supplier and our team together. The suppliers will set up the testing. Normally we will inform our suppliers about what type of machine that we want. (Japan co. 2)

Similarly, the Section Head of Production of Japan co. 2 pointed out:

The parent company will transfer technology here, our subsidiaries will produce. Our local people are able to produce the products because we have a pool of local engineers that are able to produce. (Japan co. 2)

Japanese MNCs hold discussions with suppliers about production process matters. An effective production and design process is believed to have a direct impact on the quality of performance through its effect on product reliability, product features and serviceability. On top of this, MNCs also offer support in terms of production equipment. This is evidenced below, as the Head of the Production Department of Japan co. 1 reiterated:

We support them in terms of processing the product, and our objective is to make sure that they grow and they must be able to supply the quantity and the quality to meet our requirement. If we don't support them they will die. If they die means we will die. (Japan co. 1)

He added:

Sometimes we set up lay out for them, necessary equipment jig tool and help them make sure they pick up the quality. The PQA organises some conferences from time to time where they meet all the vendors and share good ideas and the vendors present their activities. (Japan co. 1)

Detailed inspections of supplier's production processes will take place. Japanese MNCs provide local suppliers with support and knowledge of the production process. Consultations and discussions about product design, processes and technical specifications also take place between Japanese MNCs and local suppliers. Experts from the companies' Headquarters will provide detailed specifications in terms of the production process and product design. Subsidiaries in Malaysia, together with local suppliers, will follow all the specifications. This emerged clearly from an interview with the Head of the Production Department of Japan co. 1:

We support them in terms of processing the product and our objective is to make sure that they grow. They must be able to supply the quantity and the quality to meet our requirement. (Japan co. 1)

In this case, engineers will go to suppliers' factories and verify all the details so that products will be produced according to the specifications. Japanese MNCs in some cases also help suppliers in setting up their production line. The Production Manager of Japan co. 3 stressed:

We go and visit the suppliers' premises in order to verify that the products ordered will be produced according to our specifications. (Japan co. 3)

Although local suppliers are expected to run production using processes and guidelines as indicated by this European company, the company also gives flexibility to the suppliers to decide on which machinery and equipment they feel could best assist them in producing the highest quality components. It is a healthy business relationship where local suppliers are given the opportunity to govern their production processes up to a certain degree where they feel they can provide a favourable outcome for all parties involved.

The Director of Procurement of Europe co. 1 said:

In terms of setting up production facilities, we do not help suppliers set up their production facilities but we try to improve the facility. We will inform suppliers to adopt certain production processes and techniques. We do not consign machinery or equipment, it is more on know-how. (Europe co. 1)

As product design is crucial in the production process, the companies see the pressing need to ensure that every product is designed exactly per-instructions as this product design is the foundation of future products. Therefore, product design specifications are given at the outset and adhering to these precise specifications is mandatory. This

is evident below as the Purchasing Section Manager of Europe co. 1 pointed out:

Product design, we have to go and make sure they do all the tools correctly. Yes our engineers will go there. (Europe co. 1)

Similarly the Director of Procurement said:

We provide our suppliers with product designs and technical specifications through technical drawings or dedicated data file (eg. 3D file) (Europe co. 1)

Part of the healthy business relationship that the company has with the suppliers is built through knowledge sharing and on-going discussions. It has always been a two-way relationship as the company is there to provide guidance and to reward contracts but the suppliers are the ones 'closest' to the action. Their views are just as important in ensuring that the components are produced to the highest standard because they know which machinery is going to do the job and exactly which procedure will help to correct some product flaws. The company is there with suppliers every step of the way. The guidance that the company gives to the suppliers is commensurate with the suppliers' experience: more support is given in the initial stages and this is gradually lessened when the local suppliers have been around for quite some time in the industry and the need to have detailed guidelines diminishes with experience. The commitment to providing guidelines is stressed by the Purchasing Section Manager of Europe co. 1:

Yes, we have discussion and consultation from the start of a process, if they are the new one and still need for assistance then we will provide assistance, if they are well establish local companies we will provide very minimum help. (Europe co. 1)

The company also gives support in terms of designing a product as well as providing tools to produce certain products. The company always consults with suppliers and gives detailed explanations about the production process. Discussion includes every aspect of product design, processes and technical specifications.

The Purchasing Section Manager of Europe co. 1 reiterated:

Anything they need for example tooling, we will pay for the tooling as well as providing them materials to build parts. We provide them memo with the detail explanation on what are we doing, what is laded what is un-laded, why we need to do this and all that. (Europe co. 1)

She added:

Normally, for local suppliers mostly is like packaging, we design everything then we will call them we will show them the drawing then they will go and do the art work come back to us and then if they have problems they will go over and see what are the problem and then we will work together, when the art work is okay then they will start producing. (Europe co. 1)

The company understands that they are operating in an industry that depends on technology development. In the case of introducing new technology, the company will have to ensure that the suppliers are made aware of these new trends by providing detailed descriptions and procedures so that these changes can be reflected in the production process. The local suppliers are given training until they are comfortable enough in running the processes themselves with minimal supervision from the company. The steps to include the local suppliers in the introduction of new product development are pointed out by the Director of Procurement of Europe co. 1:

The company provides technical consultations on product characteristics to local suppliers in order for them to master new product-technology. We will have a technical discussion, new project quotation meeting with suppliers whenever we want to introduce new technology to suppliers. (Europe co. 1)

The company also demonstrates certain aspects of production process to the suppliers. The company believes this is an effective way for suppliers to master the production and design process. This is evidenced below as the Director of Procurement of Europe co. 1 pointed out:

Sometimes we provide technical consultations on product characteristics to suppliers and if it is applicable to the supplier we will demonstrate the technologies and train suppliers' workers in order for them to master the technology. In terms of demonstrating new technologies and training we have NPI and PPAP processes in place. (Europe co. 1)

He added:

Suppliers' reaction to the new technology introduced by our company has been brilliant and they said it makes them more competitive. (Europe co. 1)

TECHNOLOGY DIFFUSION THROUGH PRODUCTION PROCESS AND THE INNOVATIVE CAPACITY OF LOCAL SUPPLIERS

The finding of this study shows that the American MNC requires the supplier's production process to meet all its specifications. In order to achieve this, the MNC gives assistance to the production process and gives details about how to design the parts. Another important finding was that the American MNC prefers to have discussions and consultations with suppliers in terms of designing new products. During this process, the MNC explains to suppliers the process of production of a new product. One of the most interesting findings was that consultations and discussions with suppliers took place continuously, and there are also monthly quality reviews between the sales departments of the American MNC and suppliers. On top of this, they consult local suppliers about parts design and the production process. What is surprising is that sometimes they team up with the supplier's personnel to do production testing, where a special team works closely with suppliers to resolve alarming issues. However, on a contrasting note, while the American MNC gives suppliers innovation ideas, at the same time, a Non-disclosure Agreement between them is signed in order for the Americans to protect their technology. Based on the case evidence, the current study found the existence of

technology spillovers from the American MNC, takes place through learning contacts between MNCs and local firms where this ''on-site'' assistance to suppliers enables local suppliers to observe and practice acquired knowledge. If local firms learn better technology from MNCs, then this may also lead to more innovation in local firms.

It is also encouraging to find in this study that, as part of healthy business relationships, the European MNC has developed knowledge-sharing and on-going discussions with local suppliers. In the European MNC, as product design is a crucial part of the production process, the company ensures that every product is designed exactly per instructions; this is because the product design is the foundation of future products. Therefore, product design specifications are given from the outset and adhering to the precise specifications is mandatory for the local suppliers. The company also gives supports in terms of designing products and undertakes consultations with suppliers as well as giving detailed explanations about the production process. Discussion includes every aspect of product design, process and technical specifications. The results of this research support the idea that the dialogue in terms of designing parts enables local suppliers to learn all the processes involved, thus stimulating their innovative capacity. The evidence from this study suggests that extensive discussion and consultation with MNCs provides local suppliers with knowledge about how to design particular products.

Consultation and discussion in terms of product design, processes and technical specifications also takes place between Japanese MNCs and local suppliers. Investigation of Japanese MNCs in this study produced results which corroborate the findings of American and European MNCs. Case evidence indicates that Japanese MNCs also discuss production process matters with their suppliers. For example, Japanese subsidiaries and engineers from the headquarters (HQ) hold discussions with suppliers and study all aspects of production. In this regard, MNCs send their engineers to solve suppliers' problems. Sometimes, engineers from the HQ also come and help to solve local suppliers' own problems. The objective is for the MNC to share ideas with suppliers and encourage them to communicate any difficulties to the MNCs. As far as Japanese MNCs are concerned, their HQs transfer technology to their subsidiaries. This is based on HQ specifications where MNC and suppliers hold discussions and undertake production testing. The MNCs show local suppliers all the production processes as well as sharing ideas with suppliers, thus facilitating technology transfers.

Taken together, these results suggest that local suppliers may have learned all the processing aspects, specifications on technical areas, thereby enabling them to produce products that meet the MNCs' standard requirements while also increasing their innovative capacity. Many studies have related designing a product to innovative activities and have explored how this can have a positive effect on innovation outputs (Marsili & Salter 2006). As Rosenberg (1982) suggests, innovation performance is greatly influenced by the "grubby and pedestrian" activities of firms (e.g. design). According to Laestadiuset al. (2005), design is a creative process that can be rational, innovative or artistic. Design also refers to the stages of detailed development that are necessary to translate the first prototype into a successfully manufactured product (Marsili & Salter 2006).

The results from this section show that technology spillovers from MNCs to local firms occur through direct social interaction and communications, whereby trained engineers from HQ share ideas and discuss the production process with local firms. Technology and skills from HQ learned by these engineers are transferred to local suppliers' employees and enhance local firms' innovative capacity. Previous studies have reported that the superior knowledge brought into the economy through FDI may leak to domestic firms through worker movements and imitation (Fosfuri, Motta & Ronde 2001; Glass & Saggi 2002). Therefore, if domestic firms learn more advanced technology from MNCs then this may also lead to more innovation activity in local firms.

The results from this study indicate that another activity driving innovation outputs is the use of advanced manufacturing technology. The case evidence shows that MNCs also discussed and consulted with suppliers about technical parts as well as giving support in terms of production equipment (as technology may also be embodied in capital equipment). Another important finding was that the American MNC gives support regarding production set up. Japanese MNCs also give support in terms of production equipment in addition to helping suppliers in setting up their production line. The Japanese companies have inspections at supplier's production sites. All queries from suppliers are handled and MNCs have a special team that acts to ensure the supplier's production meets all requirements. In addition, detailed inspections of supplier's production process will take place and MNCs give support and knowledge about the production process.

As for the European MNC, the results of this study indicate that, apart of giving support in terms of designing a product, the company provides tools to produce certain products. Although local suppliers are expected to run production using processes and guidelines as indicated by this European company, the company is flexible in terms of which machineries and equipments that local suppliers feel could best assist them in order to produce the highest quality components. It is a healthy business relationship where local suppliers are being given the opportunity to govern their production ways up to certain degree where they are able to provide a win-win situation for all parties involved. The company also demonstrates certain aspects of production processes to the suppliers.

In this section, this thesis has identified that technology is diffused from MNCs to local suppliers through the production process, technical consultation and production facilities**.** Local suppliers enhance their

innovative capacity through these linkages. Existing research has found that the presence of foreign firms with their advanced technologies has stimulated local firms to innovate new products and processes. These findings suggest that this is an effective way of suppliers mastering the production and design process as MNCs may increase local firms' innovation through this ''demonstration effect." Moreover, in this study, it was revealed that the resources that MNCs bring in (which include capital, technology and management skills) enable local suppliers to learn or imitate from these firms and thereby enhance their innovative capacity.

For example, Kim and Nelson (2000) suggested that imitation through the adoption of existing technologies serves as an effective learning experience that paves the way for indigenous technological innovation. This finding further supports the idea of Cohen and Levinthal (1989) who argue that research and development involves not only innovation but also learning, therefore it could enhance firm's absorptive capacity and boost the efficacy of technology transfer. As a result, it helps local firms to enhance their absorptive capacity and reduce the cost of trial-and-error processes in the search for inventions. It is important for local firms to increase their absorptive capacity as a recent study by Blalock and Simon (2009) suggests that firms' absorptive capacity does affect their propensity to benefit from FDI. In particular, the study found that firms with greater absorptive capacity tend to benefit more from downstream FDI. Moreover, since the products and technologies that foreign firms bring in have already been tested in foreign markets, the perceived risk of innovating along similar directions is lowered for local firms.

This study produced results which corroborate a great deal of the findings from the resource-based view of firms (Barney 1991) about the important role of learning as a source of competitive advantage and the knowledge-based view (Grant & Fuller 1995; Grant 1996a, 1996b, 1997) about the importance of knowledge-creation and application. One of the most significant findings from this study is that the learning effect created by MNCs acts as an intangible asset that could give the local firms sustainable competitive advantages if the knowledge acquired is rare, valuable and inimitable (Barney 1991). Consistent with this view, the study finds that by investing in local firms' human capital, MNCs believed they have a significant impact on learning and firm performance; thus local firms are able to produce products that can meet MNCs' high-quality standards. This study contributes to a perspective regarding how learning may create a valuable resource in terms of skills and proprietary processes. The relationship between learning and sustainable competitive advantages theoretically developed by Barney (1991) places emphasis on tacit knowledge and learning as the criteria necessary for achieving a sustainable competitive advantage. The theory suggests that if tangible and intangible assets are rare, valuable and inimitable, they lead to a sustainable competitive advantage. Barney defines the theory as in order to possess competitive advantage, resources must not be possessed by all competing firms, difficult to imitate or duplicate through other means and contribute positively to performance (Barney 1991).

The findings further support the idea of the knowledge-based view (KBV) (Grant & Fuller 1995; Grant 1996a, 1996b, 1997) of the firm which suggests that knowledge is considered as a specific strategic resource and the role of the firm is to create and apply knowledge in order to develop its competitive advantage. This knowledge is in the form of tacit (know-how, which is difficult to codify) and codified knowledge (explicit knowledge such as facts or documents) (Kogut & Zander 1992; Nonaka & Takeuchi 1995).

This study confirms that technological knowledge through consultation and discussion between MNCs and local suppliers are key intangible resources that are diffused from MNCs to local suppliers and seem to confirm that FDI is one of the most effective forms of international technology transfer because it can convey intangible assets (Branstetter 2000). This knowledge is considered as tacit knowledge or know-how, skills, practical knowledge or production tasks (which is difficult to codify) (Kogut & Zander 1992; Nonaka & Takeuchi 1995; Grant & Fuller 1995; Grant 1996a, 1996b). Moreover, technology and knowledge transfer activities are realised where direct interaction between MNCs and local suppliers takes place. The objective of this interaction is to increase supplier capabilities and also stimulate their innovative capacity. Activities established between MNCs and local suppliers include: visits by MNCs' engineers to local suppliers' site, ideas about production set up, assistance on production processes, continuous discussions and ideas-sharing sessions, initiated in order to improve and facilitate technology and knowledge transfer. This direct contact between MNCs and local suppliers enables MNCs tacit knowledge to be transferred through its experts because the knowledge already exists in MNCs' personnel in the form of know-how (Grant 1996a). Thus local firms are able to enhance their innovative capacity through acquiring external technologies from MNCs as well as through developing their own internal knowledge assets through this learning process.

This finding supports previous research in this area which links the importance of a combination of international technology spillover sources and indigenous effort in determining innovation performance (Liu & Buck 2007). This study also produced results which corroborate the findings of the previous work in this field. Lall (1980) for example in his empirical study of vertical technology transfer in the Indian trucking industry reveals that vertical technology transfer can take place through the assistance of multinational firms in setting up prospective suppliers' production capacities, providing technical assistance or information to raise the quality of suppliers' products or by facilitating innovations and providing training and help in management and organisation. The study by Branstetter (2000) using firm level data on Japanese firms' FDI and

innovation activity, finds evidence that FDI increases the flow of knowledge spillovers both from and to Japanese multinationals undertaking direct investment in the US. All evidence provides suggestive proof that FDI is an important vehicle of international technology transfer. It is noted in this study that, from the perspective of MNCs, there is no risk of losing or leaking their tangible as well as their intangible assets to local firms when they establish linkages with local suppliers. This evidence was echoed by Javorcik (2004) who pointed out that multinationals have no incentive to prevent technology diffusion to upstream sectors, as they may benefit from the improved performance of intermediate input suppliers.

It is clear that this study has gone further towards enhancing understanding on whether the presence of foreign firms through FDI has an effect on local firms' innovative capacity, and particularly the impacts of vertical FDI spillover on the innovation activity of local firms. The current findings are able to add to a growing body of literature on the importance of various international knowledge spillovers and this spillover is important for local firms, especially in order for them to acquire technology from external sources such as FDI and act as an effective way of catching up with technological leaders. Taken together, these results suggest that innovation and technology transfer through production technology was found to help improve local suppliers' production and technology. The present results are distinctive, as earlier studies had only identified linkages as a channel of vertical spillover. However, they did not examine the detailed channels through which technology transfer takes place between MNCs and local suppliers, whereas one of the most important findings to have emerged from this study is that vertical spillover takes place more specifically through technology diffusion from production technology and subsequently enhanced local suppliers' innovative capacity. Hence, it could conceivably be proposed:

Production process can act as a channel for technology spillovers.

IMPLICATIONS AND LIMITATIONS

The findings show the importance of the effect of knowledge and technology brought in by MNCs. Local firms' managers should consider the joint impact of different channels of knowledge and technology spillovers upon their innovative capacity. The findings show the importance of various advantages that local businesses could gain from business relationships with MNCs. For instance, activities like vendor management programmes to improve the product-quality of local suppliers may improve local suppliers' performance. In addition, MNCs' support for local suppliers to reach quality compliance is valuable as quality compliance certification is hugely important and crucial for today's business activities. The adaptation of total quality management (TQM) programmes by local suppliers from MNCs' requirements could also help local suppliers to have advanced quality planning and adequate quality control throughout the supply chain. Moreover, constant interactions between MNCs' engineers and local suppliers enable them to share new ideas. Consultations and discussions about product design, processes and technical specifications provide local suppliers with skills that could enhanced their innovative capability.

For policy-makers, the evidence obtained in this thesis related to foreign innovation activities as a significant factor for the improvement of national innovative capacity justifies government policies that aim to encourage more capital intensive foreign investments. Attracting more technology intensive foreign investments from leading economy countries may be an effective way of catching up with technological leaders in developed countries. Hence, providing incentives to induce technology intensive foreign investments will benefit Malaysia's innovative capacity as a whole. As for local businesses, policies such as exemption from paying import duty on high technology machinery and equipment could be introduced for the benefit of local firms and the fostering of R&D activities. The strategies introduced to attract foreign investments that give priority to R&D will strengthen Malaysia's capability to innovate and create indigenous technology and market new products. Hence, these strategies are critical in order for Malaysia to establish local abundant resources which are highly skilled and knowledgeable. Significant investment in innovation activities is needed for Malaysia to establish a knowledge-based economy and speed up economic development, thus stimulating innovation activities and increasing local innovative capacity. The managerial and policy implications derived from the findings are relevant, not only to Malaysia, but also to other developing countries, particularly Malaysia's neighbouring countries, such as Vietnam, Thailand, Cambodia, Myanmar, Laos and Indonesia. As for local businesses (and especially small and medium industries), FDI and innovation activities from MNCs may represent a source of knowledge and technology know-how. Hence, local suppliers may gain a number of advantages from establishing linkages with MNCs. The limitation that should be considered in this study concerns the issue of generalisation in the use of the case study method. The research attempt is based on five cases and therefore does not permit any claim of generalisability.

REFERENCES

Aghion, P., Bloom, N., Blundell, R., Griffith, R. & Howitt, P. 2005. Competition and innovation: An inverted-U relationship. *Quarterly Journal of Economics* 120(2): 701-28.

Aghion, P. & Howitt, P. 1992. A model of growth through creative destruction. *Econometrica* 60(2): 323-51.

Aitken, B.J. & Harrison, A.E. 1999. Do domestic firms benefit from foreign investment? Evidence from Venezuela. *American Economic Review* 89: 605-618.

Aitken, B.J., Hanson, G.H. & Harrison, A.E. 1997. Spillovers, foreign investment, and export behaviour. *Journal of International Economics* 43(1/2): 103-132.

Anderson, P. 1983. Decision making by objection and the Cuban missile crisis. *Administrative Science Quarterly* 28: 201-222.

Barney, J.B. 1991. Firm resources and sustained competitive advantage. *Journal of Management* 17: 99-120.

Barry, F. & Bradley, J. 1997. FDI and Trade: The Irish host-country experience. The *Economic Journal* 107(445): 1798-1811.

Bell, E. & Bryman, A. 2003. *Business Research Methods*. USA: Oxford University Press.

Blake, A.P. & Pain, N. 1994. Investigating structural change in UK export performance: The role of innovation and direct investment. NIESR Discussion Paper No. 71.

Blalock, G. & Gertler, P. 2003. *Technology From Foreign Direct Investment and Welfare Gains Through the Supply Chain*. Mimeo: Cornell University.

Blalock, G. & Gertler, P. 2008. Welfare gains from foreign direct investment through technology transfer to local suppliers. *Journal of International Economics* 74(2): 402-421.

Blalock, G. & Simon, D. 2009. Do all firms benefit equally from downstream FDI? The moderating effect of local suppliers' capabilities on productivity gains. *Journal of International Business Studies* 40(7): 1095-1112.

Blomström, M. & Kokko, A. 2003. The economics of foreign direct investment incentives. NBER Working Paper 9489.

Blomström, M. 1986. Foreign investment and productive efficiency: The case of Mexico. *Journal of Industrial Economics* 35: 97-110.

Blomström, M. & Kokko, A. 1998. Multinational corporations and spillovers. *Journal of Economic Surveys* 12(3): 247-278.

Blomström, M., Kokko, A. & Globerman, S. 2001. The determinants of host country spillovers from foreign direct investment: A review and synthesis of the literature. In Inward *Investment, Technological Change and Growth: The Impact of Multinational Corporations on the UK Economy*, edited by N. Pain, 34-65. Palgrave: Basingstoke .

Blundell, R., Griffith, R. & Reenen, J.V. 1998. *Market Share, Market Value and Innovation in a Panel of British Manufacturing Firms*. Mimeo.

Branstetter, L. 2000. Is FDI a channel of knowledge spillovers: Evidence from Japanese FDI in US. *Discussion Paper* No. 8015, Cambridge, MA.

Cabral, S. 1995. Comparative export behaviour of foreign and domestic firms in Portugal. *Economic Bulletin* March: 69-78.

Caves, R.E. 1974. Multinational firms, competition and productivity in host-country markets. *Economica* 41(162): 176-193.

Coe, D.T. & Helpman, E. 1995. International R&D Spillovers. *European Economic Review* 39: 859-887.

Cohen, W.M. & Levinthal, D.A. 1989. Innovation and learning: The two faces of R&D. *Economic Journal* 99: 569-596.

Dimelis, S. & Louri, H. 2002. Foreign ownership and production efficiency: A quantile regression analysis. *Oxford Economic Papers* 54: 449-469.

Djankov, S. & Hoekman, B. 2000. Foreign investment and productivity growth in Czech Enterprises. *World Bank Economic Review* 14: 49-64.

Driffield, N. 2001. The impact on domestic productivity of inward investment in the UK. *The Manchester School* 69(1): 103-119.

Driffield, N. & Love, J.H. 2007. Linking FDI motivation and host economy productivity effects: Conceptual and empirical analysis. *Journal of International Business Studies* 38(3): 460-473.

Dunning, J. 1988. *Explaining International Production*. London: Unwin Hyman.

Dunning, J. 1981. *International Production and the Multinational Enterp*rise. London: Allen & Unwin.

Feagin, J., Orum, A. & Sjoberg, G. 1991. *A Case for Case Study*. Chapel Hill, NC: University of North Carolina Press.

Fosfuri, A., Motta, M. & Rønde. 2001. Foreign direct investment and spillovers through workers' mobility. *Journal of International Economics* 53: 205-222.

Furman, J., Porter, M. & Stern, S. 2002. The determinants of national innovative capacity. *Research Policy* 31: 899-933.

Ghauri, P.N. & Grønhaug, K. 2002. *Research Methods in Business Studies: A Practical Guide*. 2nd edition. London: Financial Times Prentice-Hall.

Girma, S., Gong, Y. & Görg, H. 2006. Can you teach old dragons new tricks? FDI and innovation activity in Chinese state-owned enterprises. University of Nottingham IZA Discussion Paper No. 2267.

Giroud, A. 2003. *Transnational Corporations, Technology and Economic Development: Backward linkages and Knowledge Transfer in South-East Asia*. Cheltenham, UK: Edward Elgar.

Glass, A.J. & Saggi, K. 2002. Multinational firms and technology transfer. *Scandinavian Journal of Economics* 104(4): 495-513.

Globerman, S. 1979. Foreign direct investments and 'spillover' efficiency benefits in Canadian manufacturing industries. *Canadian Journal of Economics* 12(1): 42-56.

Görg, H. & Greenaway, D. 2004. Much ado about nothing? Do domestic firms really benefit from foreign direct investment? *The World Bank Research Observer* 19: 171-197.

Görg, H. & Strobl, E. 2001. Multinational companies and productivity spillovers: A meta-analysis. *Economic Journal* 111(475): 723-739.

Görg, H. & Strobl, E. 2003. Multinational companies, technology spillovers and plant survival. *Scandinavian Journal of Economics* 105: 581-595.

Grant, R. 1996a. Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. *Organization Science* 7(4): 375-388.

Grant, R. 1996b. Toward a knowledge-based theory of the firm. *Strategic Management Journal* 17 (Special issue): 109-122.

Grant, R. 1997. The knowledge-based view of the firm: Implications for management practice. *Long Range Planning* 30(3): 450-454.

Grant, R.B. & Baden-Fuller, C. 1995. A knowledge based theory of inter-firm collaboration. *Academy of Management Best Paper Proceedings* 38: 17-21.

Greenaway, D., Sousa, N. & Wakelin, K. 2004. Do domestic firms learn to export from multinationals. *European Journal of Polical Economy* 1: 1027-1043.

Grossman, G. & Helpman, E. 1991. *Innovation and Growth in the Global Economy*. Cambridge, MA: MIT Press.

Haaker, M. 1999. Spillovers from foreign direct investment through labour turnover: The supply of management skills. Discussion Paper, London Scool of Economics.

Hu, A. & Jefferson, G. 2002. FDI impact of spillover: Evidence from China's electronic and textile industries. *World Economy* 25(8): 1063-1076.

Hu, M.C. & Mathews, J. 2005. National innovative capacity in East Asia. *Research Policy* 34(9): 1322-1349.

Ivarsson, I. & Alvstam, C.G. 2005. Technology transfer from TNCs to local suppliers in developing countries: A study of AB Volvo's truck and bus plants in Brazil, China, India, and Mexico. *World Development* 33(8): 1325-1344.

Javorcik, B.S. 2004. Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review* 94: 605-627.

Javorcik, B.S. 2008. Can survey evidence shed light on spillovers from foreign direct investment? *The World Bank Research Observer* 23(2): 139-159.

Kaufmann, L. 1997. A model of spillovers trough labor recruitment. *International Economic Journal* 11(3): 13-34.

Kathuria, V. 2000. Productivity spillovers from technology transfer to Indian manufacturing firms. *Journal of International Development* 12: 343-369.

Keller, W. & Yeaple, S.R. 2003. Multinational enterprises, international trade and productivity growth: Firm level evidence from the U.S. NBER Working Paper No. 9504.

Kim, L. & Nelson, R.R. 2000. *Technology, Learning, and Innovation: Experiences of Newly Industrializing Economies*. Cambridge, UK: Cambridge University Press.

Kinoshita, Y. 2000. R&D and technology spillovers via FDI: Innovation and absorptive capacity. CERGE-EI, CEPR & WDI Working Paper.

Kogut, B. & Zander, U. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science* 3(3): 383-397.

Kokko, A. 1996. Productivity spillovers from competition between local firms and foreign affiliates. *Journal of International Development* 8: 517-530.

Kokko, A. 1994. Technology, market characteristics, and spillovers. *Journal of Development Economics* 43: 279-293.

Konings, J. 2001. The effects of foreign direct investment on domestic firms: Evidence from firm level panel data in emerging economies. *Economics of Transition* 9: 619-633.

Kugler, M. 2006. Spillover from foreign direct investment: Within or between industry? *Journal of Development Economics* 80: 444-447.

Kugler, M. 2001. *The Diffusion of Externalities From Foreign Direct Investment: The Sectoral Pattern of Technological Spillovers*. Mimeo: University of Southampton.

Laestadius, S., Pedersen, T. & Sandven, T. 2005. Towards a new understanding of innovativeness and of innovation based indicators. *Journal for Perspectives on Economic Political and Social Integration* 11(1-2): 75-122.

Lall, S. 1980. Vertical inter-firm linkages in LDCs: An empirical study. *Oxford Bulletin of Economics and Statistics* 42: 203-227.

Liu, X., Wang C. & Wei, Y. 2009. Do local manufacturing firms benefit from transactional linkages with multinational enterprises in China. *Journal of International Business Studies* 40(7): 1113-1130.

Liu, X. & Buck, T. 2007. Innovation performance and channels for international technology spillovers: Evidence from Chinese high-tech industries. *Research Policy* 36: 355-366.

Liu, X., Siler, P., Wang, C. & Wei, Y. 2000. Productivity spillovers from foreign direct investment: Evidence from UK industry level panel data. *Journal of International Business Studies* 31(3): 407-423.

Markusen, J.R. & Venables, A.J. 1999. Foreign direct investment as a catalyst for industrial development. *European Economic Review* 43(2): 335-56.

Marsili, O. & Salter, A. 2006. The dark matter of innovation: design and innovative performance in dutch manufacturing. *Technology Analysis & Strategic Management* 18(5): 515-534.

Metcalfe, J.S. 2002. Equilibrium and evolutionary foundations of competition and technology policy: New perspectives on the division of labour and the innovation process. In *Economics in Evolution: What can Governments Do and Economists advise?*, edited by P. Pelikan & G. Wegner. Aldershot: Edward Elgar.

Meyer, K.E. 2004. Perspectives on multinational enterprises in emerging economies. *Journal of International Business Studies* 35: 259-276.

Nonaka, I. & Takeuchi, H. 1995. *The Knowledge Creating Company: How Japanese Companies Creates the Dynamics of Innovation*. New York: Oxford University Press.

Rodriguez-Clare, A. 1996.Multinationals, linkages, and economic development. *American Economic Review* 86(4): 852-873.

Romer, P.M. 1990. Endogenous technological change. *Journal of Political Economy* 98(5): 71-102.

Rosenberg, N. 1982. *Inside the Black Box*. Cambridge, MA: Cambridge University Press.

Ruane, F. & Ugur, A. 2002. Foreign direct investment and productivity spillovers in The Irish manufacturing industry: Evidence from firm level panel data. Trinity Economic Papers. Dublin: Trinity College.

Ruyter, de K. & Scholl, N. 1998. Positioning qualitative research: reflections from theory and practice. *Qualitative Market Research: An International Journal* 1(1): 7-14.

Schoors, K. & van der Tol, B. 2001. *The productivity effect of foreign ownership on domestic firms in Hungary*. Presented at the EAE Conference in Philadelphia, PA.

Sinani, E. & Meyer, K.E. 2004. Spillovers from technology transfer: The case of Estonia. *Journal of Comparative Economics* 32: 445-66.

Spencer, J.W. 2008. The impact of multinational enterprise strategy on indigenous enterprises: Horizontal spillovers and crowding out in developing countries. *Academy of Management Review* 33: 341-361.

Wang, J. & Blomström, M. 1992. Foreign investment and technology transfer: A simple model. *European Economic Review* 36(1): 137-155.

Yang, J., Xu, H., Wang, C., Lai, M. & Wei, Y. 2009. Productivity spillovers from foreign direct investment in Chinese Industries. *Journal of Chinese Economic and Business Studies* 7(4): 429-446.

Yin, R. 1994. *Case Study Research: Design and Methods*. 2nd edition. Thousand Oaks, CA: Sage Publishing.
Yudaeva, K., Konstantin, K., Melentieva, N. & Ponomareva, N. 2003. Does foreign ownership matter? The Russian experience. *Economics of Transition* 2: 383-410.

Abd Rahim Jaguli (corresponding author)
UUM College of Law, Government and International Studies
Universiti Utara Malaysia
06010 UUM Sintok, Kedah, MALAYSIA
E-Mail: abdrahim@uum.edu.my

Marlin Marissa Malek
UUM College of Law, Government and International Studies
Universiti Utara Malaysia
06010 UUM Sintok, Kedah, MALAYSIA
E-Mail: marissa@uum.edu.my

Mohd Rizal Palil
Faculty of Economics and Management
Universiti Kebangsaan Malaysia
43600 UKM Bangi, Selangor, MALAYSIA
E-Mail: mr_palil@ukm.edu.my