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DO FIRMS INNOVATE ABROAD? - The Case of Swedish R&D in India

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DO FIRMS INNOVATE OFFSHORE? The Case of Swedish R&D in India

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Abstract

This is a study of Swedish firms that have offshored some of their R&D functions to India. How R&D is arranged offshore and what innovation outcomes emerge from this is the question this paper answers. The sample is a set of Swedish firms with an R&D facility in India. Data are collected from interviews with decision makers from both the Swedish and the Indian sides, responsible for implementing the offshoring decisions. The result is an offshore R&D configuration model which also explores how Swedish firms derive value from innovation when performing some of their R&D abroad.

Offshoring

Existing work in international business forms the basis of this paper. Internationalisation is not a new phenomenon. Though not strictly internationalisation in the form we know it today, the first proponent of 'international trade' and having production outside the borders was arguably the Scottish moral philosopher and political economist, Adam Smith, who in his 1776 classic 'An Inquiry into the Nature and Causes of the Wealth of Nations', first described the principle of 'absolute advantage' using labour as the only condition. He claimed that a country should export commodities in which it possessed an absolute advantage in. Influenced by Adam Smith's work, the English political economist, David Ricardo, in his seminal work "On the Principles of Political Economy and Taxation" in 1817 brought the idea of 'comparative advantage' asserts that gains from trade for firms and nations arise from the differences in their factor characteristics and technological prowess. This rather than absolute advantage is responsible for much of international trade and can explain some of the free trade movements of today. One of the earlier modern works on international investment recommended searching for international locations based on the product lifecycle (Vernon, 1966). This product lifecycle method was however, a discussion only for USA based firms to look for economies of scale by producing from foreign countries. The author suggests this method only for mature and standardised products so the article does not consider businesses in other stages in the lifecycle. Also, at the time the article was written the differences in economic indicators between the USA and even Western European countries was quite wide, so these recommendations are perhaps not as relevant today but still provide an early insight into international relocation of production.

According to the 'internationalisation' theory, firms will cross international borders as they see fit to develop and deploy resources to take advantage of knowledge and capabilities (Buckley & Casson, 1976). There are generally two perspectives or schools of internationalisation. The first is the economic view which answers the question of why internationalisation happens. The OLI framework (Dunning, 1980) suggests that firms will strategically invest internationally to seek out ownership, location and internalisation advantages. The OLI framework used industrial patterns and geographical distribution of sales from US affiliates in fourteen industries in seven countries but this framework proposes only offshoring via captive centres. Though this original work dates from the 70s, a lot of the reasons are still valid today. Arguing for offshoring as a strategy for internationalisation, Doh (2005) proposes that for many firms offshoring is intrinsic to their business model and their strategies confirm these theories of internationalisation. The second major view is the

behavioural school of internationalisation led by the Uppsala model which was developed by Johanson & Vahlne (1977). They proposed that internationalisation is a series of sequential increments where market knowledge and market commitment at a certain point in time affect the commitment decisions at subsequent stages in the process. The Uppsala model is founded on organisational learning and knowledge acquisition. The model answers the question of how internationalisation happens, and explores how firms operate in a market where they lack knowledge. There are other IB traditions that combine the parts of the above two schools or extend the theories further. The DLE paradigm (Disintegration–Location–Externalization) proposed by Kedia & Mukherjee (2009) is based on Dunning’s work and discusses the advantages sought by disaggregating the value chain thereby seeking the advantages achieved of down-sizing and modularity. Their framework is different from Dunning’s in that they champion the benefits associated with external vendors in obtaining cost reduction and in tapping into supplier related capabilities. This DLE model is, however, mainly a proponent for offshore outsourcing. In a recent development, Mathews (2006) discusses a different approach that challenges the OLI framework. He presents a new LLL framework (Linkage-Leverage-Learning) where he suggests building networks (links) to access resources abroad, then leveraging these resources to secure strategic advantages. Together these two facilities accelerate international expansion and repeated applications of linking and leverage may result in the firm learning. While this is a departure from the traditional IB theories, it is only applicable to newcomers or late comer firms and only for firms from emerging economies that invest in developed countries. This framework is thus a model for challenger firms to grow internationally without the resources, skills, and knowledge that incumbent firms from developed economies possess. The IB models discussed are summarised in table 1 to provide the core themes of each. Each model is compared to highlight the main drivers they are motivated by.

Table 1: Core IB literature

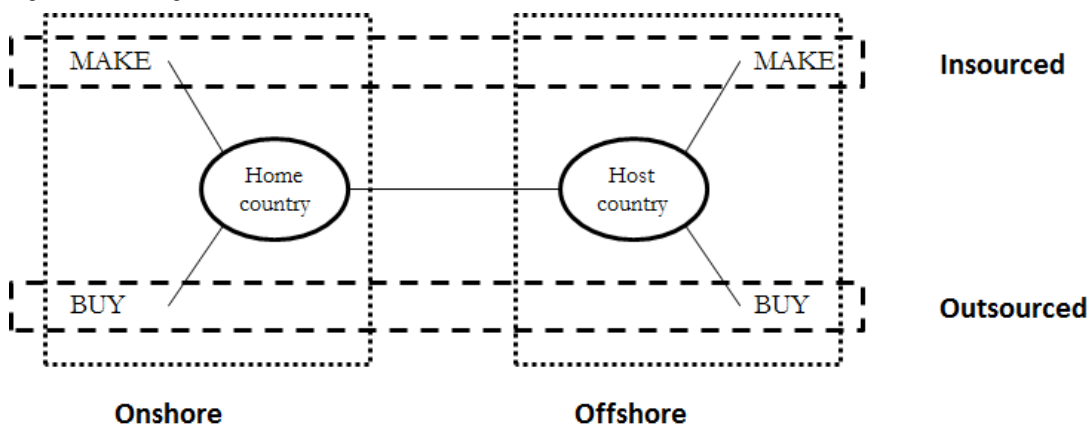
Framework/ model	Author(s)	Core themes
Product lifecycle	Vernon (1966)	Seeking economies of scale Applies to Standardised product only.
OLI	Dunning (1980)	Ownership and captive offshoring. Answers the questions of why to internationalise.
Uppsala	Johanson, Vahlne (1977)	Learning and market commitment. Answer the questions of how to internationalise.
DLE	Kedia, Mukherjee (2009)	Disaggregating the value chain. Seeking supplier capabilities.
LLL	Mathews (2006)	Emerging country MNCs. Internationalisation without adequate resources, skills, or knowledge.

Source: Own elaboration

Offshoring has been a business strategy for several years now and has been seen as new managerial practice with its origins possibly in the late seventies (Lewin & Peeters, 2006). The relocation of parts of firms’ value chains from their home countries to foreign locations has been an important strategic decision for many companies in order to remain competitive in a globally dispersed marketplace. Global sourcing now comprises three different activities that have been sourced – manufacturing, information technology and business processes (Roza, Van den Bosch, & Volberda, 2011). In the global race for talent however, firms have now started considering offshoring innovation as a viable business strategy (Lewin, Massini, & Peeters, 2009). This study could build on earlier research on Scandinavian offshoring experience in India (Koch, 2013), longitudinal studies of offshoring strategy (Šmite & Cruzes,), and specific case studies, for example

Ericsson's experience in India (Šmite, Wohlin, Aurum, Jabangwe, & Numminen, 2013), to establish a framework to develop a Swedish model of offshoring innovation to India, i.e. identifying the offshoring drivers, functions, location and governance mode choice involved in offshoring (Roza et al., 2011). Just to clarify a subtle difference between 'offshoring' and 'outsourcing' because they can sometimes be used generically to mean the same thing, outsourcing refers to the decision to buy products or services previously produced internally from another (domestic or offshore) company where as offshoring refers to a domestic company obtaining services from a foreign-based company, be that a subsidiary (captive or international insourcing) or an independent service provider (offshore outsourcing) (Massini & Miozzo, 2012). There are four main options for sourcing strategies when choosing what and where to relocate services (Bunyaratavej, Doh, Hahn, Lewin, & Massini, 2011). For my study, these definitions capture the offshoring scenario to include firms that offshored via 'make', 'buy' and in some cases 'ally' decisions while choosing between producing internally and sourcing from an external provider for their R&D. An illustration of the sourcing strategies is provided in the figure 1 below. This study considers the 'offshore' block shown (which includes both the 'make' and 'buy' decisions).

Figure 1: Sourcing matrix



Source: Own elaboration

I am motivated to produce this study because offshoring of innovation is an interesting strategy area. I have spent over 14 years as a consultant working in offshored centres in India specifically for delivering information technology services and products for USA and Europe based firms. How innovation centres are arranged is a somewhat fuzzy area and the progress of innovation offshore remains a challenge for firms attempting to derive this value abroad.

Present Work

There have been studies done on innovation, innovation theory and innovation management. Innovation is not always restricted to conventional research and development (R&D) production, and is a little difficult to define. OECD/Eurostat's 2005 edition of the Oslo Manual¹ defines innovation as new developments in the product, process, marketing and organisation functions. Studying, for example, the sources of innovation and innovation drivers, there are some typologies of variables to consider when discussing innovation. R&D performed in house, R&D acquired outside, acquisition of know-how, and acquisition of machinery and design are all sources of innovation while cost reducing opportunities, technical opportunities, and market opportunities are cited as the major drivers for innovation (Filippetti, 2011). Many of the studies explore

¹ http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/OSLO/EN/OSLO-EN.PDF

innovation in terms of newness. Innovation has been categorised in terms of what was new and whom it was new for (Johannessen, Olsen, & Lumpkin, 2001). They investigated six different innovation activities first introduced by Schumpeter (1934) and came up with 'newness' as the common denominator of innovation. The 6 activities discussed are: new products, new services, new methods of production, opening new markets, new sources of supply, and new ways of organising. Other theories use knowledge as the source of innovation and its appropriation as innovation. Innovation is discussed as the application of knowledge to create new knowledge (Drucker, 1993) and the transformation of information to knowledge (Johannessen, Olsen, & Olaisen, 1999) although their study considers this only for organisational innovation and all knowledge innovation leads to being the base for a firm's competitive advantage (Sveiby, 1997). Jones (2009) discusses innovation theory by putting an innovator and a stock of knowledge as the centre of innovation. Most of the literature suggests the concept of newness, a stock of knowledge and some kind of transformation of this as innovation.

It is important to clarify here that there is a subtle difference between innovation and invention. Considering a tendency to use the two terms interchangeably I suggest that invention is the 'creation' of something new (and is a 'thing'), which didn't exist before while innovation creates a new 'usage' of something that existed before. Innovation can also be in behaviours and in interactions. It is my view that R&D, which is briefly discussed below, can result in one or the other (or both). There is no consensus on the definition of R&D. Research and Development (R&D) has existed as an activity for a very long time. What it means or what it comprises is still not completely clear. The idea of 'systematicity' as the centre of most definitions of R&D is discussed by Godin (2001). He goes on to say that an organised, formal and continuous activity is the central theme in most definitions of research. OECD international standards on R&D exist and are specified in the OECD Frascati manual (2002). The OECD manual also mentions 'systematic' as a key term in its definition, where R&D is creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications². The manual suggests both laboratory and industrialized research, and distinguishes between continuous R&D (carried out in units attached to establishments or in central units) and ad hoc R&D (carried out on an operational part of a business). The Frascati manual discusses two elements of R&D: one carried out in formal R&D departments, the other of an informal nature carried out in units for which it is not the central activity.

Reviewing literature on IT (information technology) outsourcing – I chose this as a suitable starting point because my past experience working in several offshored IT engagement and to confirm my initial curiosity in examining the theoretical explanations for such a movement. Lacity, Khan, & Willcocks (2009) examined 18 years of research on IT and addressed questions on the strategic intent and the effect of IT outsourcing. While this is a study specific to the IT industry, and considers only the 'buy' side of internationalisation, it is a starting point as it details the motivations of why firms choose to source from abroad. I assume many of the reasons would be similar across industries and will also find mention in the strategies where firms produce internally from abroad. Håkanson & Nobel (1993) studied 150 foreign R&D establishments of 20 largest Swedish manufacturing firms to determine the nature of the work performed in the overseas units, and the factors that led to these firms relocating this work outside Sweden. They classified the motivations of

² OECD (2002), *Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development*, The Measurement of Scientific and Technological Activities, OECD Publishing, Paris: p. 30.

going abroad based on typology of the foreign R&D units segregated into market orientated units, production support units, pure research units, political units and multi-motive units. Granstrand (1999) developed a simple model of corporate R&D internationalisation using a sample of Swedish and Japanese firms. Determining the driving and inhibiting forces behind R&D internationalization of R&D this study suggested that Swedish multinationals were early internationalisers with generally higher foreign shares of sales, employees and R&D. On similar lines, in discussing the relationship between competences and the global innovation networks in the Swedish ICT industry, Chaminade & De Fuentes (2012) used regression analysis on Swedish ICT firms and confirmed that firm level competences (defined as human capital and R&D activity) are an important enabler for the globalization of innovation, while competences accumulated in the host region (defined as host competencies and region's economic tier) are an important driver for the globalization of innovation. This distinction could prove useful while studying the motivations for offshoring innovation. In the context of this research, Martinez-Noya, Garcia-Canal, & Guillen (2012) combine streams of outsourcing and offshoring literature determines how technology-intensive firms choose their R&D outsourcing strategy and where to locate it.

Lehrer & Asakawa (2002) discuss three paths of foreign R&D lab development in MNCs. Whether the lab is a knowledge incubator, a transfer unit, or a fully integrated lab, details how integrated it is with the home facility. In the context of my research, I am interested in exploring how this 'embeddedness' is driven by the industry sector the firm is in. Roza-van Vuren (2011) developed a study discussing a multi-dimensional view of offshoring strategies and relating them to firm sizes, though specific to Dutch firms. This study could serve as a useful candidate to study the offshore presence of Swedish firms in India although specific methods will be employed to answer this in the Sweden-India context. Ambos & Ambos (2011) studied the firm and location specific factors to explain the challenges of offshoring R&D. In locating knowledge activities according to home country advantages or according to host country strengths, Patel & Vega (1999) and Bas & Sierra (2002) discuss results on multinationals' locational strategies where they analyse technology-seeking FDI in R&D, home-base-exploiting FDI in R&D, home-base-augmenting FDI in R&D and market-seeking FDI in R&D as the four major strategies motivating the location choices. Their articles further discuss how historically US, Japanese or European based firms choose different types of the above as their respective strategies for relocating their R&D. Why firms choose to internationalise R&D is also motivated by knowledge, market or efficiency seeking drivers (Granstrand, Håkanson, & Sjölander, 1993), where either demand-orientated or supply-orientated (or both) forces for innovation decentralisation outweigh the companies' need to protect firm-specific or proprietary technology.

The firms that I considered had investments in applied research or in basic/fundamental research, or in both. Basic research is pure R&D research. I considered applied research as research in 'Design, development, and testing (DDT)' and manufacturing (Castelli & Castellani, 2013). These two types of research will therefore include the activities in any part of the value chain, in any industry. In the initial contact with the firms when I sent out a preliminary survey I used these two terms for R&D. This was one factor in selecting the sample of Swedish firms to study. R&D also considers the activities for new products, new services, new methods of production and new ways of organising performed in centres that are dedicated R&D units and centres for which R&D is part of the main activity of the unit. The activities are thus systematic, institutionalised and continuous. Few studies have explained how innovation is derived offshore, how firms

innovate from abroad and how they progress to innovate. This study discusses how R&D is configured offshore and what kinds of value are derived by such firms. I will, thus, answer the following questions:

RQ1: How is offshore R&D configured?

RQ2: How do firms derive innovation from such R&D configurations?

Method

The sample for the research is segregated based on the grid shown in table 1. The grid is a view separated by industry type and firm size. The data categories of size and industry activity are originally from Bureau van Dijk's Orbis³ database. Orbis contains information on nearly 150 million companies worldwide, with an emphasis on private company information. For the purpose of this study I have combined firms in Information and communication, and Services into a category 'Technology and Services'. There are now two categories – Manufacturing, and Technology and Services. Furthermore, for the size I have simplified the sample into large and small. I don't expect any major differences between 'large' and 'very large', and 'small' and 'medium', so I have considered 'Large' to include both large and very large, and 'Small' to include both medium and small. I would expect firms in the manufacturing sector to be on the larger side just because of the type on investments they have and the products they sell. A summary of the numbers of firms segregated by size and industry activity is shown in table 2.

Table 2: Sample selection grid

Category		
Technology and Services	1	3
Manufacturing	3	3
	Large	Small

There are several scenarios that I considered for this research in terms of the research setting for selecting cases to isolate. Each of the choices had its merits and challenges.

- 1) Swedish firms from different industry sectors offshoring to India;
- 2) Swedish firms from the same industry sector offshoring to India;
- 3) One Swedish firm that offshored R&D to India

Basing my judgement on the sample I had and the contacts within those firms, I discarded option 2 because I did not have enough information to further a research study. Getting access was a problem and I would have had very few interviews to use to develop a convincing study. I rejected choice 3 on two grounds. Firstly, I did not want to localise my study to just one firm as that would make it too firm specific and it would have been hard to isolate exactly which firm I would need to study. Secondly, in most firms there would be only three or four direct decision makers and that would be too few to study any possible divergence in viewpoints between managers. Thus, I settled on option 1 and selected as many firms as was possible before narrowing down the selection depending on response rates and ease of access. I consider two very different industries (one traditional, production intensive industry and one services orientated or knowledge intensive industry) and explore their managerial decision making processes. Firms belonging to these two

³ <http://orbis.bvdinfo.com>

industries are selected for the research study. It is interesting to study the offshoring R&D from two different looking industries.

Data are collected via interviews with senior manager level staff in the selected firms, questionnaires sent via emails and some information from the firms' websites. All interviews were recorded with a digital voice recorder, with prior permission of the interviewees. I transcribed verbatim, all the recordings into text documents. 1 hour of recording took approximately 6-8 hours to manually convert to text information. I analysed the resulting text files for keywords, common themes, and 'interesting' revelations or information. The summary of these details is shown in the table 2.

Table 2: Interview details

Firm	Size	Industry	R&D	Managers interviewed
F1	Large	Technology and Services	Offshored	3
F2	Large	Technology and Services	Offshored	1
F3	Small	Technology and Services	Offshored	2
F4	Large	Manufacturing	Offshored	3
F5	Large	Manufacturing	Offshored	3
F6	Large	Technology and Services	Offshored	4
F7	Small	Technology and Services	Not offshored	2
F8	Small	Manufacturing	Offshored	2
F9	Large	Manufacturing	Offshored	4
F10	Small	Manufacturing	Re-shored (previously offshored)	1

The firm names are aliases and are codes that will be used in the manuscript wherever the corresponding firm is referenced. These codes were used during the coding and analysis phase also to easily make groups and clusters. Some respondents preferred detailed questionnaires in addition to being interviewed. The questionnaires were sent via email and the responses were analysed in the same way as the interview transcripts were. Questionnaires were also sent in certain cases to managers previously interviewed, when follow up clarifications were needed. The reasons why there are differences in the numbers of interviewees across the firms are because of the type of firm and the access to information of the individual managers. F6 and F9 are large conglomerate firms with several levels of management and the individual managers I interviewed had only partial views of the whole picture of the scenario. Only after interviewing 4 managers from each firm did I get a good enough perspective of the offshoring. F2 is a small firm with very few direct decision makers. The manager from F2 had access to all the information and was completely involved in all stages of the decision making so another perspective might not have added any new insight. F10 was a case of re-shoring and the manager I interviewed provided enough information about both the initial offshoring and the subsequent re-shoring. For all the other firms, I could capture enough detail from interviewing 2 or 3 people as the case may be, to make a good assessment of the respective cases.

R&D Configuration and Innovation

The study of innovation configurations is quite recent and not well researched yet. G. E. Hall & Loucks (1978) were among the first to talk about innovation configurations. Analysing the adaptations of innovation they proposed that any one innovation can have several different operational forms or innovation configurations and each component can be varied or adapted. Discussing the management of the

internationalisation of R&D, Chiesa (1996) developed R&D arrangements in terms of experimentation structures and exploitation structures. Tseng, Kuo, & Chou (2008) developed an innovation schema and found four innovation configurations: overall innovation, focus on organisational innovation, low participative and cooperative innovation, and less innovation. There are other studies done where configurations are based on performance effects of project-based configuration, mass customization configuration, cellular configuration, and organic-technical configuration (Tidd & Hull, 2002) or on activity based configuration for value-based modes of innovation, technology-based functional modes, and strategy based modes (Fuglsang & Sundbo, 2005) or on a systems view of innovation where innovation emerges from three critical firm-level factors of posture, propensity and performance (Carayannis & Provan, 2008).

I queried the decision makers of the firms about what constituted R&D in their firms and what capabilities they believed their firms possessed to perform such R&D. The activity and capability data from the consolidated view of the firms, as shown in the table below, are then transformed into two R&D factors. The activity indicates what the firm does at the R&D centre and reveals the objective of the R&D while the capability indicates how the decision makers view their firms' R&D capabilities and how the R&D is thus positioned or orientated with respect to these being product centred or market centred. This is the R&D orientation.

R&D Activity and Capability

Firm	Type	Activities	Capabilities
F1	SM	Reduce hourly cost Bring down the cost and to simplify those products Variants of already existing products	Quick to market and agility Ability to develop new products quickly Size advantage
F2	ST	Developing a new solution Try to transform the market	Specialised product
F3	ST	Develop to the quality the Swedish market demands Use to team to deliver quality	Understanding the country or culture Understanding the customer
F4	LM	We have to reduce the cost of our R&D Explore cheaper designs Introduce the right product	Ability to develop new products quickly Quick to market and agility Understanding the customer
F5	SM	Use to team to deliver quality Develop the standard product	Specialised product Specialised skills Understanding the country or culture Internal processes
F6	LT	Deliver the same type of R&D with a lower cost Developing a lower solution with an acceptable quality	Specialised product Internal processes
F7	ST	Finding innovations that work Expertise and excellence based work	Specialised product Specialised skills Network and connections
F8	LM	Introduce the right product Develop a value solution Produce competitive quality	Understanding the country or culture Understanding the customer
F9	LM	Deliver cheaper designs Develop customer driven products Cost based modelling	Understanding the country or culture Understanding the customer Ability to develop new products quickly Network and connections
F10	SM	Develop innovative products	Specialised product Specialised skills

Source: Own elaboration

The R&D activities are grouped into three overall R&D objectives: Cost led R&D, Quality driven R&D, and Innovation led R&D. Activities that involve reducing hourly cost, finding cheaper design techniques or

variations of delivering lower cost R&D are all intentions of producing R&D with a cost-saving objective. Producing a 'value' product or motivations to find quality solutions or 'competitive' quality are all intentions to deliver R&D with a quality-driven objective. When firms are trying to explore ways to transform a market or working to find new solutions or innovative working solutions and products, these firms are positioning themselves to deliver innovation led R&D objectives. Why firms exist in a particular R&D configuration offshore is defined by the activities the firm does offshore and the capabilities it possesses. This transformation from activity types to the R&D objective is summarised in the table shown.

Transformation: Activity to Objective

R&D ACTIVITIES	R&D OBJECTIVE
Reduce hourly cost Bring down the cost and to simplify those products Deliver the same type of R&D with a lower cost Develop a lower solution with an acceptable quality Deliver cheaper designs Cost based modelling	<div style="border: 1px solid black; padding: 10px; text-align: center;"> Cost Savings </div>
Introduce the right product Develop a value solution Produce competitive quality Use to team to deliver quality Develop to the quality the Swedish market demands	<div style="border: 1px solid black; padding: 10px; text-align: center;"> Quality Driven </div>
Developing a new solution Try to transform the market Develop innovative products Finding innovations that work Expertise and excellence based work	<div style="border: 1px solid black; padding: 10px; text-align: center;"> Innovation Led </div>

Source: Own elaboration

The R&D capabilities are condensed into two overall R&D orientations: Customer or market centred and engineer or product centred. These orientations are dictated by the capabilities the decision makers believe their firms possess and these capabilities result in whether firms are focussed on excellence of the products or engineers or whether firms developed expertise in learning from the customers or the market. Specialised products or skills, excellence of internal process are indicative of a firm centred on the product or the engineers while possessing expertise in understanding the market, country, culture or customer, and the ability to produce market specific products quickly suggests that the firm's capabilities are orientated towards a clear focus on the market or the customer. This transformation from capability to R&D orientation is summarised below.

Transformation: Capability to Orientation

R&D CAPABILITIES	R&D ORIENTATION
Quick to market and agility Ability to develop new products quickly Understanding the country or culture Understanding the customer	Customer / Market centred
Specialised product Specialised skills Internal processes	Engineer / Product centred

Source: Own elaboration

Looking at the firms in aggregation and the transformation to see how R&D happens offshore, I develop an offshore R&D configuration - which is how R&D is structured and performed offshore, as shown in figure 4. I base the configuration on the objective and the orientation of the R&D facility offshore. The objective is one (or some mix) of 3 motives: cost-saving, quality-improvement, and innovation-led. The orientation is the focus of the R&D, which is either product (or engineer) centric or customer (or market) centric. As shown in figure 4, seven of the firms in the study are primarily motivated to save cost or to improve quality from their Indian R&D centre. Slightly older R&D establishments are performing quality improvement or are moving away from cost-saving motives to quality-improvement deliveries. This does not, however, mean that in due course the facilities will work on innovation-focus led R&D activities. For that to happen, other factors need to be considered which include progressing on the challenges discussed later in this thesis. Firms have differing strategic outlook with respect to the focus of their R&D. They may be inward looking or outward looking depending on where their core R&D focus is. Firms that have a standard global product have a tendency to centre their R&D on the product or the engineering expertise. These are inwardly focussed firms or what I call introverted firms. Such firms' primary focus lies in transforming its internal engineering strength into a global product that is similar worldwide. Firms that enter a market with a simplified product or a heavily customised offering are more market or customer centred. These are outwardly focussed firms and are what I call extroverted firms. Such firms' primary focus lies in transforming market information into customised products that tend to differ depending on the market. Firms are thus configured to perform R&D in various ways offshore. The R&D configuration of a firm is decided somewhat by the firm size and industry ownership. There are broad patterns that emerge when looked at in aggregation. Manufacturing firms tend to exhibit 'pull' innovation where firms in the context of this study are working towards producing a simpler, value product specially developed for the Indian market and are not selling their standard European products (or those are not the majority selling ones) in India. According to the decision makers in this thesis, this is because the Indian market is not yet ready for the sophisticated, high quality European product; firms in this sector need to learn to develop simpler, basic products which are the 'right' product for the Indian market. This requirement to produce simpler, lower specification products coupled with the lower quality awareness of Indian customers and engineers alike has been mentioned by decision makers of the manufacturing firms in this study. On the other hand technology firms tend to develop the same product for the global market and there are few or no local simpler versions required. Technology firms are thus exhibiting 'push' innovation and producing their standard product portfolio everywhere in the world. Push and pull innovation are innovation outcomes of the R&D configuration and these are product innovations. In the studied cases, product innovation results from the R&D orientation where the firm capabilities decide the type of product developed. When firms make simpler products, it is actually a form of unlearning because these firms need

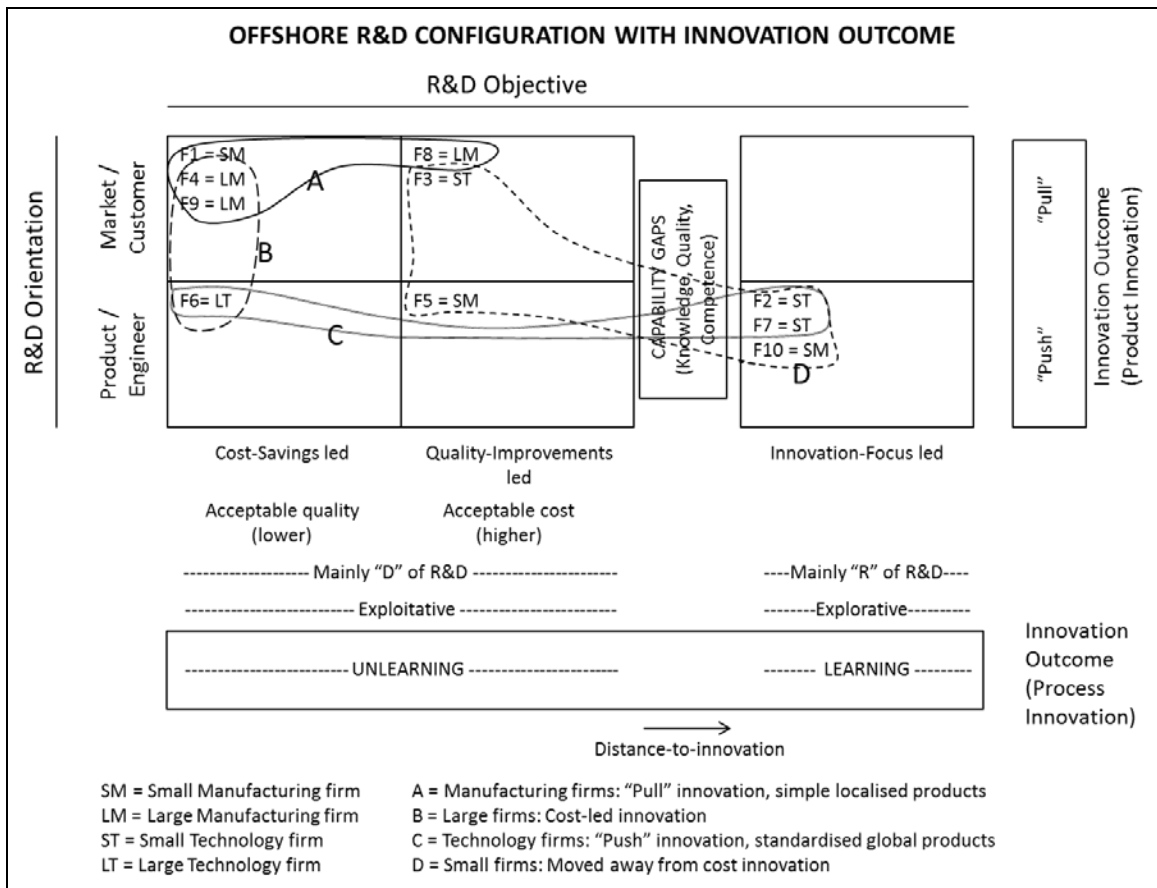
to change some of their knowledge and organisational processes in order to try to develop a lower specification product and this is quite difficult to do. This is, however, the 'unlearning' path to innovation and this outcome is a form of process innovation. Firms performing innovation-focus led activities are on the conventional 'learning' path which is also an innovation outcome and is a form of process innovation.

Larger firms are still working on cost-savings led R&D where their objective is to bring down costs in developing products, to achieve higher volumes. Smaller firms appear to have moved away from cost savings and are delivering quality-improvements led R&D where they are seeking efficiency gains at an acceptable cost. The small firms in my thesis also appear to be gaining value from innovation-focus led R&D. Smaller firms may have somewhat lower volumes and perhaps do not always compete on scales, so their mode of operation tends towards the designing and development of more innovation offerings at a reasonable but higher cost. Many of the R&D centres in emerging countries are started with cost savings in mind. There is good talent there, young talent and it always helps the global business to be more competitive or to be more profitable doing that. That's one key driver. But then that is only a beginning because although cost may be an advantage that alone cannot offer sustainability because if one cannot maintain quality in research activities then cost savings alone reduce efficiency. After starting with cost savings, firms need to try to make sure that whatever is being done is done at a somewhat improved level of quality so that at the other end of the deliverable there isn't much corrective action required. The third stage is when firms derive value from innovation. These are the different ways in which innovation is configured abroad and it is not necessary for firms to progress from cost-led activities to seeking value in innovation. This is not a sequential configuration; this is how firms are positioned based on current strategy and decision maker led motivations.

The offshore R&D that is configured to produce unlearning, does so with either the cost factor or the quality factor possibly being compromised to an 'acceptable' level. Quality factor here is the level of sophistication in specifications. A lower quality factor indicates a lower specification product. By 'acceptable', I mean a factor the firm is internally willing to partially concede in order to satisfy its primary objective of innovation. In cost-savings led innovation, firms find cheaper designs and solutions to deliver a product at an acceptable (which is somewhat lower) quality. Lower cost is an innovation because the firm devised a different way to reduce their product or service R&D cost. With quality-improvements driven innovation, firms seek efficiency gains in quality at an acceptable (which is somewhat higher) cost than a low cost solution. This is an innovation for the firm because it is producing somewhat improved designs and functionality. In innovation-focus led R&D firms seek value from innovation-intensive activities but cost and quality are not necessarily compromised. Both process and product innovation are innovation outcomes that emerge from the R&D configuration but with different R&D determinants affecting the outcome.

In terms of the functions performed at the R&D centres offshore, they vary according to what the R&D objectives are. The firms that are deriving value from innovation abroad tend to perform explorative and innovative functions – mostly the 'R' of R&D - and tend to have a greater part retained in Sweden. When centres are primarily established to save cost or to improve quality, the functions performed are supportive and exploitative – mostly the 'D' of R&D – and tend to have a larger presence in India.

Figure 2: Offshore R&D Configuration



Source: Own elaboration

R&D configurations are specific combinations of factors that produce a particular innovation related outcome (Fichman, 2004) insofar as new service adoption does not depend on individual service attributes but on specific configurations of those attributes (Ordanini, Parasuraman, & Rubera, 2014). These configuration choices vary on the size of the firm and the industry it belongs to. A larger firm has a different strategy for R&D in India than a small firm has and the same is true for firms from different industries. How they configure the R&D facilities are also different based on the objective of their activities. Firms derive different values from innovation arrangements abroad and in the context of this study I find there are many types of ways in which innovation is being delivered from India. Technology firms are closer to performing innovation led activities than are manufacturing firms, and innovate different on their product portfolio, so they are configured differently offshore and that is a result of the decision choices of each. In the R&D configuration, either cost or quality may be compromised by the firm in order to achieve the result that the firm is looking for. In order to derive value from innovation it is not necessary for either parameter to be accepted at a poorer level. Firms deriving value in cost-savings led innovation could settle on lower acceptable levels of quality, while firms deriving value in quality-improvements led innovation could settle on higher levels of cost, while firms deriving value in innovation-focus led innovation may or may not accept lower quality and higher cost levels. For each configuration, different innovation outcomes emerge. Each of these innovation outcomes is either product innovation or process innovation and this depends on the type of R&D configuration the firm has offshore. Thus a firm innovates depending on the R&D configuration it has offshore. This study, to the best of my knowledge, is the first to suggest that the R&D configuration offshore depends on the capability and activity of the firm and is also the first to suggest a relationship between the R&D configuration offshore and the resultant innovation outcome.

For example, at a firm level, consider firm F10. This is a small manufacturing firm that established an R&D centre in India to develop a highly sophisticated product which was similar to its global product. When I transformed the activities and capabilities of F10 into an R&D orientation and R&D objective, I established that F10 was configured to perform innovation-focus led R&D in India. The innovation-focus led R&D results in a firm on the learning path of process innovation. As the R&D orientation of F10 is product centred it results in product innovation whereby F10 is producing a standard global product in a form of push innovation. At an aggregated level, consider manufacturing firms for example. They are generally configured to produce simpler products that are market or customer dependent and are established to find cheaper methods of product development or to produce value solutions. Manufacturing firms in this study tended to have their R&D orientation to be market or customer centred wherein they are producing market specific products in a form of pull innovation. From the results of my thesis, I propose that:

Proposition 1a: When a firm's R&D is internationalised, its R&D configuration offshore depends on the capability it possesses and activity it performs.

Proposition 1b: When a firm's R&D is internationalised, its innovation outcome depends on the R&D configuration it has offshore.

Learning and innovation are related to each other in organisational outcomes. Firms invest in R&D not only to pursue directly new process and product innovation, but also to generate information (Cohen & Levinthal, 1989). This learning has normally been researched from the education side and not so much from the demand side as innovations are today viewed as a function of the learning and knowledge creation (Ellström, 2010) where innovation driven learning finds its way into new product development through conversion strategies of internalisation, socialisation, combination and formalisation (Zhang, Lim, & Cao, 2004). Most of the previous theories discuss learning as innovation but I found in this study that unlearning is also a strategic method (and outcome) of innovation. Unlearning as innovation is required for firms to operate in (possibly) developing economies and markets which is not ready for advanced product development techniques and where customers are not willing to pay for expensive innovation led offerings. Unlearning to develop a simpler offering is a process innovation used by firms to compete in such markets. Unlearning is true for manufacturing firms and generally large firms that operate on cost-led and quality-led innovation because they tend to produce lower specification products especially for the Indian market. From even my personal experience from working as an engineer, unlearning is a difficult task because engineers are trained to constantly find ways of devising more sophisticated technologies and products, so this is an activity that runs counter to their mindset and education. Unlearning is, however, innovation because even the means of devising ways to produce a simple product is a new process itself, and this leads to market specific innovation. Technology firms and small firms in the study are operating in an innovation-led configuration where they have now moved away from unlearning and are in the traditional learning path and deriving value from learning to produce new products and processes. Technology firms in India are able to do this because the Indian market is willing to accept more sophisticated products while the manufacturing segment in India is still somewhat traditional and has more price-sensitive customers. No previous study has discussed unlearning in internationalisation, as far as I know, so my study is the first to show unlearning as a form of innovation in internationalisation situations. From the results of this study, I propose that:

Proposition 2: When firms internationalise their R&D in markets that accept lower specification products then unlearning can lead to innovation.

So, are firms then achieving innovation from offshore? As I have shown in this study there are various ways innovation is performed offshore and this is explained by the innovation configurations setup abroad. These are all establishments in some form of innovation arrangement and are deriving different types of values from innovation. In the cost-led and quality-led derivatives of innovation there is an unlearning path while in the innovation-led arrangement there is a learning path. Transitioning from unlearning to learning involves bridging a gap which comprises various dissimilarities between the home facility and the host facility. I also propose a 'distance-to-innovation' which signifies how far removed firms are from performing innovation-led activities in their offshore R&D centres. The shorter this distance is, the more innovative its activities tend to be and the centre is on the learning path. Distance-to-innovation is a combination of the dissimilarities mentioned below. Innovation performed offshore can be progressed with and optimised if the causes or the effects of the following dissimilarities are closed or minimised:

- Competence level dissimilarities
- Technical knowledge dissimilarities
- Product specification dissimilarities
- Quality understanding dissimilarities

These dissimilarities can exist because of different stages of maturity between the home and host, possible inefficiencies in knowledge flows, differences in engineering and scientific understanding, and dissimilarities in work practices. Distance-to-innovation tends to be related with the quality of decision making which is an interesting topic for a future study in innovation offshoring. From the discussion we can infer that the gaps slow down the progress of innovation, or result in a different innovation configuration, in the R&D centre. A better quality decision could shorten the distance to innovation and poorer considered decision may increase the time to perform innovation-led activities and I can thus conclude that:

Proposition 3: When firms internationalise their R&D, a 'distance-to-innovation' can exist because of dissimilarities in competence, knowledge, and quality understanding conditions between home and host R&D centres.

Conclusion

The decisions the managers agree to take on behalf of their respective firms results in a configuration for innovation offshore. The R&D configuration depends on the R&D objective for the firm and its R&D orientation. The firm's orientation can be outward looking or 'extroverted', where the market or the customer is the primary strategic focus. Such firms exhibit 'pull' innovation. A firm can be inward looking or 'introverted', where the product or the engineer is the strategic focus. Such firms exhibit 'push' innovation. A firm's objective is one of three value drivers. A firm can seek value from cost-led innovation, quality-led innovation or innovation-led innovation. Depending on where a firm is in this matrix, it innovates differently. Firms where the objective is cost-led or quality-led innovations are exploitative in their intent while innovation-led firms are explorative in their intent. Firms in cost-led and quality-led configurations are on the 'unlearning' path where knowledge process and products are simplified and adjusted to lower specifications in order to satisfy the lesser advanced industry segment offshore. Firms in innovation-led configurations are on the 'learning' path where knowledge process and products are the same as the European offering or

better. For firms to exist in innovation-led configuration there are gaps firms need to overcome. These gaps are because of dissimilarities between Sweden and India in knowledge, competence levels, product specifications, and the understanding of quality. These gaps create a 'distance-to-innovation' and indicate how far a firm is from delivering on innovation or the progress to innovation-led activities. The work performed in most R&D centres in India is non-critical and routine work. Work that is at the forefront of technology or engineering is often not offloaded to India and according to the managers it is unlikely that such work will be performed from their firms' Indian arm. Activities which are repeatable and of lower specifications are performed from India while the more knowledge intensive and critical activities are handled from the Swedish or European facilities. Although one key driver to go to India is the presence of large numbers of highly skilled engineers and scientists, this allocation of lower specification work is not optimal utilisation of these personnel. This is also possibly a somewhat short term focus in trying to gain benefits from the market. While quickness to market is important to the business it may not necessarily be the motivation for innovation.

In the case of manufacturing firms, the Indian customer isn't prepared to pay for products of European sophistication at the prices they are at. The result of this is that firms have to compete on price and search for a 'value' product with reduced specifications and some compromise on quality. This is a challenge for engineers who are trained to try to develop better and better products with more advanced functionality than earlier product versions. The basic, simpler products that are accepted in India required 'unlearning' and simplification of designs and processes. This is more difficult to do than advancing and improving designs. The unlearning process in an R&D centre is a cost to a firm and it doesn't lead to innovation other than devising a solution that is simpler than the standard offering. Gaining quick access to a market for sales versus furthering product innovation is a dilemma managers need to think about with their offshore R&D strategy.

References

- Ambos, B., & Ambos, T. C. 2011. Meeting the challenge of offshoring R&D: An examination of firm-and location-specific factors. *R&D Management*, 41(2): 107-119.
- Bas, C. L., & Sierra, C. 2002. 'Location versus home country advantages' in R&D activities: Some further results on multinationals' locational strategies. *Research Policy*, 31(4): 589-609.
- Buckley, P. J., & Casson, M. 1976. *The future of the multinational enterprise* Macmillan London.
- Bunyaratavej, K., Doh, J., Hahn, E. D., Lewin, A. Y., & Massini, S. 2011. Conceptual issues in services offshoring research: A multidisciplinary review. *Group & Organization Management*, 36(1): 70-102.
- Carayannis, E. G., & Provan, M. 2008. Measuring firm innovativeness: Towards a composite innovation index built on firm innovative posture, propensity and performance attributes. *International Journal of Innovation and Regional Development*, 1(1): 90-107.
- Castelli, C., & Castellani, D. 2013. The internationalisation of R&D: Sectoral and geographic patterns of cross-border investments. *Economia e Politica Industriale*.
- Chaminade, C., & De Fuentes, C. 2012. Competences as drivers and enablers of globalization of innovation: The Swedish ICT industry and emerging economies. *Innovation and Development*, 2(2): 209-229.

- Chiesa, V. 1996. Managing the internationalization of R&D activities. *IEEE Transactions on Engineering Management*, 43(1).
- Cohen, W. M., & Levinthal, D. A. 1989. Innovation and learning: The two faces of R & D. *The Economic Journal*, 99(397): 569-596.
- Doh, J. P. 2005. Offshore outsourcing: Implications for international business and strategic management theory and practice. *Journal of Management Studies*, 42(3): 695-704.
- Drucker, P. 1993. F.(1993). post-capitalist society.
- Dunning, J. H. 1980. Toward an eclectic theory of international production: Some empirical tests. *Journal of International Business Studies*, 11(1): 9-31.
- Ellström, P. 2010. Practice-based innovation: A learning perspective. *Journal of Workplace Learning*, 22(1): 27-40.
- Fichman, R. G. 2004. Going beyond the dominant paradigm for information technology innovation research: Emerging concepts and methods. *Journal of the association for information systems*, 5(8): 11.
- Filippetti, A. 2011. Innovation modes and design as a source of innovation: A firm-level analysis. *European Journal of Innovation Management*, 14(1): 5-26.
- Fuglsang, L., & Sundbo, J. 2005. The organizational innovation system: Three modes. *Journal of change Management*, 5(3): 329-344.
- Godin, B. 2001. Defining r&d: Is research always systematic. *Project on the History and Sociology of S&T Statistics. Working Paper*, 7.
- Granstrand, O. 1999. Internationalization of corporate R&D: A study of japanese and swedish corporations. *Research Policy*, 28(2-3): 275-302.
- Granstrand, O., Håkanson, L., & Sjölander, S. 1993. Internationalization of R&D — a survey of some recent research. *Research Policy*, 22(5-6): 413-430.
- Håkanson, L., & Nobel, R. 1993. Determinants of foreign R&D in swedish multinationals. *Research Policy*, 22(5-6): 397-411.
- Hall, G. E., & Loucks, S. F. 1978. Innovation configurations: Analyzing the adaptations of innovations.
- Johannessen, J., Olsen, B., & Lumpkin, G. T. 2001. Innovation as newness: What is new, how new, and new to whom? *European Journal of innovation management*, 4(1): 20-31.
- Johannessen, J., Olsen, B., & Olaisen, J. 1999. Aspects of innovation theory based on knowledge-management. *International Journal of Information Management*, 19(2): 121-139.
- Johanson, J., & Vahlne, J. 1977. The internationalization process of the firm-A model of knowledge development and increasing foreign market commitments. *Journal of International Business Studies*, 8(1): 23-32.
- Jones, B. F. 2009. The burden of knowledge and the “death of the renaissance man”: Is innovation getting harder? *The Review of Economic Studies*, 76(1): 283-317.
- Kedia, B. L., & Mukherjee, D. 2009. Understanding offshoring: A research framework based on disintegration, location and externalization advantages. *Journal of World Business*, 44(3): 250-261.

- Koch, C. 2013. ***Offshoring engineering-experiences of scandinavian engineering consultants***. Paper presented at Proceedings of the 19th CIB World Building Congress: Construction and Society, Queensland University of Technology. Brisbane.
- Lacity, M. C., Khan, S. A., & Willcocks, L. P. 2009. A review of the IT outsourcing literature: Insights for practice. ***The Journal of Strategic Information Systems***, 18(3): 130-146.
- Lehrer, M., & Asakawa, K. 2002. Offshore knowledge incubation: The "third path" for embedding R&D labs in foreign systems of innovation. ***Journal of World Business***, 37(4): 297-306.
- Lewin, A. Y., Massini, S., & Peeters, C. 2009. Why are companies offshoring innovation? the emerging global race for talent. ***Journal of International Business Studies***, 40(6): 901-925.
- Lewin, A. Y., & Peeters, C. 2006. Offshoring work: Business hype or the onset of fundamental transformation? ***Long range planning***, 39(3): 221-239.
- Martinez-Noya, A., Garcia-Canal, E., & Guillen, M. F. 2012. International R&D service outsourcing by technology-intensive firms: Whether and where? ***Journal of International Management***, 18(1): 18-37.
- Massini, S., & Miozzo, M. 2012. Outsourcing and offshoring of business services: Challenges to theory, management and geography of innovation. ***Regional Studies***, 46(9): 1219-1242.
- Mathews, J. A. 2006. Dragon multinationals: New players in 21 st century globalization. ***Asia Pacific journal of management***, 23(1): 5-27.
- Ordanini, A., Parasuraman, A., & Rubera, G. 2014. When the recipe is more important than the ingredients: A qualitative comparative analysis (QCA) of service innovation configurations. ***Journal of Service Research***, 17(2): 134-149.
- Patel, P., & Vega, M. 1999. Patterns of internationalisation of corporate technology: Location vs. home country advantages. ***Research Policy***, 28(2-3): 145-155.
- Roza, M., Van den Bosch, F. A. J., & Volberda, H. W. 2011. Offshoring strategy: Motives, functions, locations, and governance modes of small, medium-sized and large firms. ***International Business Review***, 20(3): 314-323.
- Roza-van Vuren, M. 2011. ***The relationship between offshoring strategies and firm performance: Impact of innovation, absorptive capacity and firm size***Erasmus University Rotterdam.
- Schumpeter, J. A. 1934. ***The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle***Transaction Publishers.
- Šmite, D., & Cruzes, D. S. ***Expectations and achievements: A longitudinal study on an offshoring strategy***. Paper presented at Symposium on Empirical Software Engineering and Measurement (ESEM).
- Šmite, D., Wohlin, C., Aurum, A., Jabangwe, R., & Numminen, E. 2013. Offshore insourcing in software development: Structuring the decision-making process. ***Journal of Systems and Software***, 86(4): 1054-1067.
- Sveiby, K. E. 1997. ***The new organizational wealth: Managing & measuring knowledge-based assets***Berrett-Koehler Publishers.
- Tidd, J., & Hull, F. 2002. Organizing for service innovation: Best-practice or configurations? .

Tseng, C., Kuo, H., & Chou, S. 2008. Configuration of innovation and performance in the service industry: Evidence from the taiwanese hotel industry. *The Service Industries Journal*, 28(7): 1015-1028.

Vernon, R. 1966. International investment and international trade in the product cycle. *The quarterly journal of economics*: 190-207.

Zhang, Q., Lim, J., & Cao, M. 2004. Innovation-driven learning in new product development: A conceptual model. *Industr Mngmnt & Data Systems*, 104(3): 252-261.