The Internationalisation of Innovation to Emerging Economies: The Case of AstraZeneca in China

Shasha Zhao, Middlesex University
Marina Papanastassiou, Middlesex University
Hui Tan, Royal Holloway College

The internationalisation of firms is increasingly concerned with locating innovation activities in the most appropriate locations, particularly for more strategic research and development projects. This article attempts to explore a newly emerged development within this area, that is, the internationalisation of innovation by MNEs from advanced economies to emerging countries – the South waves. Taking a case-study approach, this article reviews the historical development of AstraZeneca in China since the 1990s and the establishment of one of the few global innovation centres in the country. The case reveals the company’s unique approach to the internationalisation of innovation to “unconventional” locations. A number of existing theoretical frameworks are discussed and challenged with regard to their applicability in interpreting this new phenomenon. We find that the established concepts and theories capture to a certain extent the rather ‘contradictory’ actions of AZ in China and thus challenge their explanatory power of the new waves in the directions of South-South and South-North. This paper concludes by making a number of research suggestions and presenting key managerial implications.

Introduction

The phrase ‘internationalisation of firms’ goes back to Ricardo’s economic theory of Free Trade and Porter’s ‘Competitive Advantage of Nations’ (1989). In line with it are the rapid technological developments which have fastened the speed of globalisation. Western firms have benefited from this phenomenon through internationalising their target markets and organizational operations for the reason of global competitiveness. Among it is the well-acknowledged internationalisation strategy of production where multinational enterprises (MNEs) first started developing in neighbouring countries with similar business systems, or countries with similar cultures (Johanson and Vahlne 1977, Kogut and Singh 1988, Xu and Shenkar 2002), then gradually moving to some less-advanced economies (Vernon, 1966). Production division has always been recognised as one of least strategically important organizational activities (Buckley, 2014), thus off-shoring has not been particularly difficult and costly.

As time went on, some MNEs started to internationalise their innovation division. Departing from Vernon’s product cycle (Vernon, 1965) where innovation was analysed as a centralised activity usually located at the home country of the MNE, Ronstadt’s (1977) seminal work provided evidence of a different strategy to innovation i.e. that of decentralisation where MNEs through a network of overseas R&D units adapted and generated existing or new knowledge respectively. By moving innovation to strategically important locations which were either geographically-close or contextually-similar countries, MNEs can have close control over key activities whilst benefiting from
locational advantages (Porter 1989, Dunning 2000, Johansson and Vahlne 1977, 2009). In this context there is extant literature that focuses on the varied roles of R&D units which in turn is closely associated with the differentiated roles of MNEs’ subsidiaries (Cantwell and Mudambi, 2005; Pearce, 1999; Ronstadt, 1978) resulting in a mixture of Global Innovation Strategies (GIS) pursued by MNEs (The core assumption of MNEs GIS was evolving around a North-North and North-South paradigm where the South e.g. emerging economies were viewed at best as augumenters of existing MNE knowledge which in turn was developed within a North-North nexus of countries) (Pearce and Papanastassiou 1997). Challenging the dominance of this paradigm, a rather ‘contradictory’ phenomenon has emerged in recent years, which is the increasingly apparent trend of the internationalisation of innovation to dissimilar and distant less-advanced or emerging countries. Recent World Investment Report (2005) published by United Nations Conference on Trade and Development provides statistics which indicate a significant growing number of R&D units in emerging economies. Similarly, McKinsey in its 2011 survey confirms the growth of overseas MNE R&D units in emerging economies. What makes this phenomenon intriguing is that a quite large number of these overseas R&D units depart from traditional technology adaptation roles and evolve into generators of new knowledge, a role that so far was considered to be restricted to, as discussed above, a handful of North i.e. developed economies. This invites debate on how MNEs deal with its core functions in an ever more globalising marketplace. Yet, despite the significance of this international business development, research interests and detailed studies exploring and/or explaining it have been extremely scarce to date.

Hence, the purpose of this paper is to conduct an in-depth study of the internationalisation of innovation by advance-economy MNEs in emerging economies. More specifically, it attempts to take a historical case-study approach to review, describe, and analyse the development of innovation activities undertaken by AZ in China over the period of two decades.

Thus, whilst the majority of the advance-economy MNEs have had a long tradition of maintaining close control of critical innovation activities by locating in close-by or similar markets, e.g., economically developed, politically stable, and legally protected (Porter 1989, Dunning 2000, Johansson and Vahlne 1977, 2009), the new phenomenon and the case of AZ in China strongly ‘contradict’ with the long-established norm. Against this background, the paper aims to make valuable and timely contributions by addressing a number of key research questions: How is the evolutionary process of AZ R&D activities in China developed? Whether and how can existing theories explain the case of AZ in China? What are the practical lessons which can be learned from the case of AZ in China for others for years to come?

The structure of the paper is as follows: first, a theoretical review of the existing literature on internationalisation of innovation is offered, which is followed by a description of research methodology adopted in this paper. Then, an overview of China as the context of this paper is provided and is followed by detailed data on the historical development of AZ PLC between its first establishments in 1913 and 2014, within which the development of AZ’s innovation in China since its initial local establishment is analysed and theoretically interpreted to address the trajectory of AZ’s internationalisation of innovation in China. Finally, we conclude by detailing the key contributions and implications of this paper.

A theoretical review of the internationalisation of innovation
There is a range of theoretical perspectives in interpreting the motivations of internationalisation. However, literature so far has reflected three waves of developments. The earliest wave was around WWII and thereafter when sending products and production to outside the home country was the first step in internationalisation (Jha et al. 2015). For instance, Williams (1985) and Hennart (1988) focus on the behavioural related theories of internationalisation. They draw upon the concept of ‘transaction cost economics’ and argue that firms entering foreign markets through certain strategic methods are based on the transaction cost level for transferring knowledge to a foreign organization. Similarly, Reid (1983) argues firms internationalise their operations in order to minimise costs incurred during organizational activities. Reversely, Hymer (1976) and Caves (1982) suggest monopolistic advantage theory where a superior advantage of a firm developed in the home country can be transferred overseas at no additional costs due to its established knowledge; meanwhile, Knickerbocker (1973)’s theory of oligopolistic reaction theory suggests that firms imitate each other’s internationalisation actions to reduce the risk of being different and causing failure. Lastly, another crucial work written by Dunning (1977, 1979) reveals the ‘eclectic theory’ where he found that foreign direct investment occurs when the home firm possesses a unique set of assets and the host country is relatively advantageous in location. Other interested researchers included Vernon (1966) who focuses on the product cycle process, and Johanson and Vahlne (1977)’s incremental process view – the Uppsala Model – to demonstrate that firm internationalisation goes through four key stages as a result of accumulated experiential knowledge and increasing commitments (Figure 1).

Figure 1. Firm Internationalisation Process

(1) Irregular Export Activities
(2) Export via Independent Agents
(3) Establish Overseas Sales Offices
(4) Build Overseas Manufacturing Facilities

While these established theories have strong explanatory power for various aspects of the internationalisation phenomenon and therefore hold high level of recognition in international business research, it is fair to conclude that little direct attention and detailed explanations are given to a more recent and strategically-important firm movement, i.e., innovation internationalisation. It is also reasonable to argue that those theories have largely failed to capture this development and remained outdated with the general belief that the benefits of having strategic home innovation significantly override the benefits of internationalising innovation. This view was particularly supported by Porter (1989) where...
he sees innovation as a core business unit of a firm, and believes that home-country innovation could bring strong international competitive advantages, whereas allocating innovation overseas forgoes such a benefit. In support of Porter’s view, a number of scholars (Vernon, 1966, Vahlne and Johanson, 1977 and Casson, 1992) generally argue that, while many foreign countries are ideal targets for market expansion and/or production, they are viewed as less attractive locations for innovation activities due to reasons such as lack of skilled labour for sophisticated operations, dissimilar country factors, barriers in information flows, and loss of management control of strategic activities. Hence, innovation activities are particularly kept in close distance (Dunning, 1993).

The second wave emerged as critiques of those established theories came later when the wider international business environment witnessed significant changes, such as the increasing international competition and the rapid advancement in information and communication technologies (Yamin and Sinkovics, 2010). To survive and succeed in this ever more challenging and open environment, firms gradually became more agile when it came to creating and sustaining competitive advantages as evidenced by the emergence of new organisational forms such as heterarchy, hierarchy, and the matrix (Bartlett and Ghoshal, 1989, Hobdari, et al 2012). In particular, industries have seen a tremendous change since the 1980s in the conventional wisdom of keeping strategic development and innovation nearby. It was believed that such a centralised approach to innovation was no longer sufficient and appropriate (Kuemmerle, 1997). Instead, firms needed to develop global innovation networks that excelled at tapping new centres of knowledge and at commercialising products in foreign markets with the speed necessary to remain competitive. Subsequently, the internationalisation of innovation became prominent among many advance-economy firms whose innovation objectives were high on the agenda. However, it was not an overnight experience. Many researchers found that firms tended to start with exploiting home-based knowledge (adaptors) in foreign locations as the first step in internationalisation of innovation. As subsidiary local involvement deepened, knowledge exploitation gradually advanced to local knowledge generation for the local market based on subsidiary experience. Finally, many of these subsidiaries became the ultimate global competence creators as their unique R&D capabilities developed overtime (Kuemmerle 1999). This was explained by Nelson (1993) and Porter (1990) that differing national innovation systems provided the ideal multiple learning environments for dispersed subsidiaries. Consequently, innovation was seen as leveraging strategic knowledge resources from multiple locations and integrating into global products (Gassmann and von Zedtwitz, 1999, Granstrand et al, 1993, Kogut and Zander, 1993). Hence, the building and maintenance of a sustainable GIS and an effective global innovation network became a top priority for knowledge-intensive firms.

Moreover, most of these internationalised innovation activities at the time were located in developed countries particularly in USA, Japan, and Europe, and extremely limited investments were made in emerging economies such as the BRICS nations (Aubert, 2004). Academically, research in this tradition paid most attention on debating the magnitude of this phenomenon (Cantwell 1995; Patel and Pavitt 1991), while converged on the idea that international knowledge sourcing is a ‘North to North’ phenomenon with innovation investments departing from advanced economies arriving in other advanced economies (Arvanitis and Hollenstein 2011; Cantwell and Piscitello 2000). Therefore, international knowledge sourcing location choices were mainly concerned with locations of advanced economies on the basis of knowledge-related advantages (Dunning and Narula 1995; Florida 1997; Pearce and Papanastassiou 1999). A common consensus was reflected in these researchers that emerging economies were characterised by low
innovativeness and therefore were least interested by MNEs in internationalising strategic innovation activities to these locations.

However, the latest report published by UNCTAD on R&D internationalisation (2005) finds otherwise. The figures from the report reveal a rather ‘contradictory’ finding where a growing proportion of the investment from firms of developed economies has been devoted to innovation-related activities in a number of emerging economies, particularly of Asia (this indicates a ‘North to South’ trend). Moreover, pictures of ‘South to South’ and ‘South to North’ are painted by increasing number of studies (Contractor et al. 2010; D’Agostino et al. 2013; UNCTAD 2005). Both ‘South to South’ and ‘South to North’ phenomena challenge the traditional view on internationalisation of innovation as per existing research. This evidence demonstrates that emerging countries are no longer viewed by firms as only targets for market expansions and production, but also increasingly important locations for knowledge sourcing. Thus, the emergence of ‘non-traditional’ locations has transformed innovation internationalisation to a truly global phenomenon. The ‘spell’ is finally broken.

In spite of this significant international business development, extremely limited research so far has attempted to capture and explain the ‘paradoxical’ development of innovation internationalisation to emerging economies. This could be argued to be the ‘myopia’ syndrome of many researchers who have been strong believers of the idea that ‘innovation only happens in the North’.

In light of this new development in innovation internationalisation, this paper challenges the traditional view of ‘North to North’. Specifically, this phenomenon raises the question of effectiveness of ‘traditional’ players to source knowledge from ‘non-traditional’ locations. While these new locations have recently experienced an advancement in its innovation capabilities with a large pool of talents and expertise (Athreye and Cantwell 2007; Lewin et al. 2009), the possibility to generate important knowledge remains an open question for both researchers and practitioners (von Zedtwitz and Gassmann 2002). Our established knowledge on the topic is largely challenged.

The narrative in this paper clearly shows that, although emerging economies generally present a unique and unknown operating environment in terms of innovation, in reality, the role of these economies is changing drastically in the eyes of firms from advanced economies, and important knowledge can be created in non-traditional locations nowadays. Consequently, the rest of the paper aims to provide a critical discussion on the development of international knowledge sourcing from emerging economies.

Research Methodology

Research design

For research in general, there are two approaches to choose from: Qualitative and Quantitative. For the purpose of this paper which is to investigate the emerging trend of innovation FDIs in non-advance economies, a qualitative approach is chosen for a number of reasons: One, as literature shows research in the area of internationalisation of innovation to emerging economies is still at a very early stage, existing knowledge on the topic is not sufficient to provide any viable theoretical frameworks for quantitative examination. A quantitative study at this point is less appropriate and less likely to capture the specifics of the new development comprehensively. Instead, there lacks more exploratory studies at this stage, which should better capture the topic in a more systematic, holistic and revealing way to triangulate and enrich existing understanding. According to
Easterby-Smith et al. (2002), qualitative approach can grant flexibility in which it allows for fluid and continual regeneration of central dimensions where more unknown or unanticipated information can be revealed. This is in line with Marshall (1996)’s view that the choice between qualitative and quantitative research approach cannot be based on personal preferences but the nature of research questions concerned. Following this belief, qualitative research approach is more appropriate for this study as the research question is specifically concerned with ‘how’. This type of questions cannot be fully captured by quantitative approach using statistical data. More importantly, given that innovation FDIs in emerging countries is a real life event which has been taking place over a number of years in recent time rather than an one-off incident, this period of development must be fully captured here in order to better understand its causes, processes, and consequences of how such a trend has developed. Hence, a longitudinal view must be called for.

**Research methods**

For qualitative research, case study is chosen here for the purpose of this study as it allows for real-life illustrations to explain an identified phenomenon, according to Eisenhardt and Graebner (2007). Within case study, researchers can choose to select either single or multiple cases. The decision to use either is largely dependent on its appropriateness in dealing with the topic (Yin 2003). While Yin (2003) suggests that multiple cases enable the logic of replication, in which the researcher replicates the procedures for each case and data from multiple cases concerning the same inquiry provides a basis for generalisation if patterns or differences are found. This study is not concerned with qualitative generalisation but in-depth longitudinal exploration of the complexity behind innovation FDIs in emerging economies. Hence, a single-case study is arguably the more appropriate choice not only for capturing all the fine details of the internationalisation of innovation process in a previously unknown context but also to stretch to cover the whole of the period of development to date, both for better answering to the research questions. There are generally three sampling techniques: convenient, selective/purposive, and theoretical. To best achieve the research objectives of this study, selective/purposive sampling method is chosen as it enables researchers to actively select the most productive sample to answer the research questions. The reasons the other two sampling methods are not selected are that, for one, convenient sampling method is the least rigorous involving the selection of the most accessible subjects. It tends to be the least costly, and time and effort consuming technique but generally results in poor quality data and lacks intellectual credibility. For two, theoretical sampling, which originated from Glaser and Strauss (1967) for understanding grounded studies, enables researchers to build new theories from data which is collected from a wide range to maximise variance and realise appropriate respondents for a specific issue as there is little or no prior knowledge to guide the researchers in investigation. This method is also inappropriate for this study as some level of prior knowledge of the topic exists which must be used for the identification of a representative case. For the purpose of this paper, **AZ PLC** has been selected as the case of this paper for a number of reasons: for one, the global pharmaceutical industry is best known to be one of the most innovation-intensive industries; for two, **AZ** is one of the world’s largest pharmaceutical companies with a total of more than fifty-thousand employees globally and an average annual turnover of around $26 billion in recent years. **AZ** currently manufactures in 16 countries, innovates in 7 countries, and operates in over 100 countries; and for three, the company is arguably one of the very first Western MNEs to have successfully developed a globally strategic innovation centre in an emerging
economy following years of local operations, making AZ a unique and representative case to study (Bernstein Research 2009). In terms of choosing an appropriate research context, according to UNCTAD’s (2005) report on innovation FDIs worldwide, the latest ranking shows China as one of the largest inward FDI destination in terms of R&D activities, instead of the established view of being the ‘world factory’ (Buckley 2014). This puts the country in the position of being one of the most representative and informative research context to investigate for the purpose of this paper.

Data collection methods

In terms of operationalising case study, well-established techniques include interviews, observations, participations, and publications. While interviews, participation, and observation allow researchers to obtain primary information about one’s experience and knowledge relating to matters concerning the investigation (Creswell 2007; Ghauri and Gronhaug 2003), they are less appropriate for the purpose of this research as innovation FDIs in emerging economies is considered an on-going development which spans across a number of years. Hence, short-lived interviews, observations, or participation cannot fully capture the developmental process over a longer period of time; rather, these primary data collection methods can only generate data to reveal partial of the internationalisation process on the basis of one’s view which could potentially be biased (Yin 2009). Instead, publications are considered to be the most suitable for this study for two important reasons: One, secondary publications can be more comprehensive in terms of historical information covering the internationalisation process concerned, enabling the subsequent analysis to be specific and holistic; two, information from these publications are factual and bias-free, providing objectivity and credibility to the analysis.

Data sources

Data collected from publications includes general company information, global R&D activities, and China operations to date. The collection of the data on AZ China comes from a variety of sources including:

- McKinsey Quarterly
- Thomson Reuters
- Bernstein Research
- KPMG Research
- Wall Street Journal (newspaper)
- The Independent (newspaper)
- The Telegraph (newspaper)
- Jiangsu News (newspaper)
- AZ PLC annual reports
- AZ Global (corporate group website)
- AZ China (corporate country website)
- Academic journals
- Pharmaceutical industry news (online)

Data analysis
The data analysis process was partially planned and partially emerged as the collection progressed. Appropriate adjustments were made throughout the study by way of examining emerging pattern from the raw data. Therefore, the process was fairly interactive whereby three distinctive periodic phases representing AZ’s China operations from the start to the most recent were identified:

**Phase 1**: The first phase identifies the earliest forms of establishment of AZ in China when it first entered the country. This period covers from 1993 and 2001 where the entry modes, purpose of entry, and level of FDI are identified from data collected from newspapers, company website, and business publications.

**Phase 2**: The second phase centres around the analysis of the subsequent development of AZ in China following phase 1 in terms of the changes in the level and nature of investments made in the country, the increasing variety of forms of establishment, and the new purposes of these changes. This stage of analysis covers the period of 2002-2008 and is based on data collected from company sources, newspapers, and business publications.

**Phase 3**: The final phase focuses on the most recent changes in the development of AZ China operations to date. Based on data collected from industry and company reports, newspapers, and business publications, this stage of analysis covers the period of 2009 to 2014 where further key changes in its investments and forms of establishments were identified.

Overall, the sum of these three phases makes up the whole developmental pattern of AZ in China. The next two sections provide a comprehensive analysis of the research context of China, and the background of the case company AZ PLC.

**The ‘transitioning’ China: From production to innovation**

Although China has long been recognised as the ‘world factory’, in more recent years, the local environment witnessed a slow but significant shift towards greater focus on innovation (Zhang and Pearce, 2011). In fact, a large number of companies in China from different industries have begun mounting challenges in sectors which were traditionally preserved by American, European, Japanese, and South Korean businesses. For example, Beijing Genomics Institute, which is the world’s biggest genetic-sequencing company, now claims to account for roughly 50 percent of global capacity and probably sequences more genetic material than Harvard University and the Massachusetts Institute of Technology combined. It also develops some of the world’s most advanced biologic-computing models. In another industry – information and communication technology - Huawei developed its own innovative new smartphone platforms which are built on chips and software designed in-house. Its competitor Xiaomi, founded in 2010, is frequently compared to Apple for its marketing strategy. The sales of Xiaomi mobile phones were more than 15 million units in 2013. In the consumer electronics industry, Midea announced a highly efficient 1-hertz variable speed air conditioning compressor which was surprisingly ahead of foreign rivals. Finally, YY.Com, a voice-based communications and gaming service provider, has captured growing attention with its mass online karaoke, which is a highly popular activity locally.

A number of key factors have been identified to contribute to this seismic change. First of all, the changing business mentality among many local companies in China: For
instance, John Oyler, CEO from a three-year-old Chinese biotech company BeiGene, underscored the attitude: “Anything is possible, we can make it happen. There is no challenge we cannot conquer, and we will surprise the world.” (McKinsey Quarterly, 06/2013). Second, the ever-closer collaboration between Chinese universities and companies: Chinese universities have gone through some significant changes. One of which is the huge interest in recruiting world class experts. For instance, when Fudan University planned to develop a waste-water treatment science programme, it hired a world top academic from Singapore. Hence, as Chinese universities raise their games, they are becoming increasingly attractive innovation partners for companies. Many local and global firms have taken this opportunity, e.g., Intel has long collaborated with Chinese universities to sponsor research projects. Increasingly, these partnerships are seen as a means of outsourcing research and development. An extreme example is a local Chinese packaged-goods company which has conducted food science research almost entirely through a local university lab. Meanwhile, BeiGene’s spokesman describes Chinese universities as “underappreciated treasure troves of innovation pockets” (McKinsey Quarterly, 06/2013). This finding is in line with Balachandra (2004)’s work who notes that the availability of a pool of skilled labour can be a crucially attractive factor to encourage Western firms to internationalise innovation activities. This can be used to explain why AZ China clearly recognised the high standard of the education systems in the country which generated a large pool of skilled workers and engineers. In addition, the comparatively low cost of skilled labour is also a crucial factor motivating AZ to locate to China. AZ’s management has recognised that China is not just about the production of cheap and low quality commodity products. Instead, a large amount of government investment has gone into the training of scientists, engineers and technologists. Balachandra (2004)’s literature corresponds with this finding whereby he suggests that MNEs’ ability to recruit a large pool of low cost skilled labour overseas so as to reduce employment costs of the home countries are huge attractions, as in the case of AZ China.

Apart from providing companies with top talents, research assistance, the partnership with universities can also benefit the companies with access to any upcoming changes in policy direction and market rules, as Chinese professors often have close relationships with government officials and can pick up valuable information.

Third, the availability and utilisation of young generation of Chinese talents: In terms of young generation Chinese talents, a McKinsey’s spokesman noted his experience with young Chinese talents. For instance, Guosheng Qi is a 28 year old Tsinghua University graduate and the founder and CEO of Gridsum, a cloud-based web-analytics company. The company’s customers range from Baidu, which is the largest search engine in China, to multinational firms such as Coca-Cola. Additionally, in 2012, it beat out companies from around the world to be titled one of Microsoft’s most innovative new software partners. Another example is Lenovo’s intense recruitment of fresh talents straight from Chinese universities, which makes up roughly 70 percent of its company. This has enabled the company sustain its innovativeness and a strong corporate culture (McKinsey Quarterly, 06/2013).

Last, government’s increasing support for intellectual property protection and national innovation system transformation: The Chinese government has played a key role in two important areas: one is the improvement in the protection of intellectual property rights, and two is the transformation of national innovation system. For intellectual property protection, the Chinese government has attempted to make it a core part of its innovation culture by being more supportive (Anderson et al, 2009). For instance, the Chinese government ministry charged with prosecution of intellectual property violations
announced the handling of 2,347 cases in 2012, which was up by 40 percent in comparison to the previous year. Another example of active government support is the building of a 500,000 square metre facility next to Suzhou’s innovation park. The intention behind this move is to bring together intellectual property related agencies and leading technology companies to elevate important protection issues. In addition, it also improves the processing and quality of patent approval and protection. These examples reflect a growing appreciation of the importance of intellectual property protection in China. At the same time, the Chinese government has actively reformed the Soviet style innovation system since its inception in the 1950s. Prior to 1980s, the Chinese system was characterised by the complete separation of science and technology activities in public research institutions from manufacturing in state-owned enterprises. The reform was then carried out to connect the two. In order to do so, the Chinese government pushed research institutions to adapt to the market environment and to conduct research that had industrial implications. The government took three specific steps between 1980s and 1990s in this regard: 1) advocating the merger of some research and development institutions with companies in the 1980s; 2) offering financial incentives to commercialise research results through various programmes in the 1980s, including the well-known Torch Programme; and 3) transforming the established research centres into institutions with economic functions, such as production and consultancy organisations, from the 1990s. Meanwhile, MNEs and new technology firms have become more involved in the new national innovation system whereby more research has been conducted in China. Consequently, companies of various sizes have grown to become major contributors of national innovation system, where spending in research and development jumped from RMB 14 billion in 1995 to 44 billion in 2001. AZ PLC was at the forefront of these developments (Data Monitor, 2005; Bernstein Research, 2009; KPMG, 2011).

A brief history of a global pharmaceutical company: AZ PLC

The very beginning of AZ can be traced back to 1913 when Astra was an independent company based in Sodertalje, Sweden. However, it was not until the 1930s that the company started its first set of research activities on a very small scale. The company since acquired a couple of factories in 1939 and 1942, making Astra the largest Swedish pharmaceutical company. Since its research and production extension, Astra established two product families and introduced them to the Swedish market in 1948. The profits from these families were then used to fund new drug development. To increase the chance of success, Astra relocated its Hassle research division to Gothenburg in 1954 in order to be near to Gothenburg University Medicine Faculty for collaborations. The collaborations were considered very successful as a number of blockbuster drugs were developed and sold (AstraZeneca Global, 2014).

Since the early 1990s, Astra witnessed increasing costs for developing new drugs and believed that the company needed a more international platform for the future. Hence, Astra started to eye for partners. It was not long before Zeneca became the ideal partner (The Independent, 11/12/1998). Zeneca Group was formed by Imperial Chemicals Industries (ICI) in the 1990s to focus on the group’s pharmaceuticals business. The demerger of ICI later led to the merger of Astra and Zeneca in the late 1990s (The Independent, 24/002/1999). This was considered as one of the largest-ever European mergers at the time and made them into the fourth largest pharmaceuticals company in the world. Tom McKillop, the new CEO for AstraZeneca noted:
“Astra and Zeneca are a perfect fit in terms of highly complementary product portfolios as well as sales and marketing organisations. A similar management philosophy together with a strong science-based culture makes the companies natural partners.”

(BBC News 1998)

The merger clearly indicated the company’s intention to strengthen its innovation and world market share in the long run.

The integration of the two companies’ worldwide organisational activities post-merger called for some major structural changes and consequently, led to the formation of a new group arrangement whereby a much widened geographical scale was realised. Specifically, the USA, Canada, and Europe remain the three largest and more mature markets for the group whilst Asia Pacific (excluding Japan), Japan, Latin America, and the Middle East are seen as the younger markets with greater growth potential in the long run. Across these seven markets, three worldwide strategic innovation centres are established in Sweden, UK, and USA, responsible for the most advanced drug research for the global market. They are supported by four other important global innovation centres which are based in Poland, Russia, Japan, and most recently, in China. These centres are further complemented by clinical development at over forty sites around the world. Furthermore, the restructuring and expansion also involved the establishment of a number of manufacturing sites worldwide for the purpose of meeting regional and/or global needs. Sales and marketing divisions are also located near manufacturing sites to ensure rapid and responsive product supply (AstraZeneca Global, 2014).

AZ: The three phases of innovation internationalisation to China between 1993 and 2014

Based on the understanding of R&D internationalisation as analysed by Arvanitis and Hollenstein (2011), and Cantwell and Piscitello (2000), three distinctive phases of internationalisation of innovative activities of AZ in China are identified as per data collected. In line with the research questions, the analysis is as follows:

AZ China’s first establishment dates back to 1993 by Astra. Since then, the operation in the country has developed tremendously in terms of scale and scope. In particular, it is witnessed that the company is now heavily dependent on China operations for not only global production but increasingly more for strategic innovation. The three key phases of AZ operation in China are reviewed next. The first phase is between 1993 and 2001 when China’s first wave of fast economic growth took place. It was seen as a market with huge potential and therefore, gaining market share with existing products was the top priority for the company – the North to South wave. Following its successful market expansion in China, during the second phase (between 2002 and 2008), AZ’s focus shifted towards strategic activities – innovation in China for China, which is the South to South wave. During the most recent phase between 2009 and 2014, AZ’s further involvement in China has sped up and is seen as the most significant to date, with serious efforts to developing global production and strategic innovation centres. China becomes a crucial part of AZ’s global network and performance – the South to North wave.

The timing of Astra’s entry to China was carefully considered. As part of Astra’s global expansion strategy, the company already had an eye for the market for some time, and it was not till the early 1990s that the first step was taken. It was fuelled by a number of key economic changes in China. Since Xiaoqing Deng’s introduction of the first economic reform in 1978, China has since set up five special economic zones where private firms are allowed between 1980 and 1994, and opened up fourteen coastal cities for foreign investments in 1984, and many more examples in the 1990s. As part of continuous economic reforms, China started mass privatisation in the following decade to move towards a more market-based system. This shift drastically accelerated the economic expansion and was the deciding point for Astra to establish its first sales and marketing subsidiary in the country. Subsequently, in 1993, Astra took the first step to set up Astra (Wuxi) Pharmaceuticals Co. Ltd in Jiangsu Province, not far from Shanghai (AstraZeneca China, 2015).

Jiangsu is an ideal location for Astra for a number of reasons. For one, in 1992, many parts of Jiangsu Province were made into economic zones and Wuxi city established Wuxi New District – one of the largest industrial parks in China. The new district was known for providing strong support for international operations. For two, Jiangsu is ideally located next to trade intensive regions such as Zhejiang and is home to hundreds of thousands of businesses. For three, to attract foreign investments, national and local governments offered attractive incentives. Hence, the overall business environment of Wuxi at the time of Astra’s entry was one of the most ideal places in China. This also worked in favour of Astra as its strategy at the time was to maintain full control rather than joint-ventures from the start with a view for the long run despite its lack of local knowledge and experience (AstraZeneca China, 2015).

In the following year of Astra’s China set-up, Zeneca also entered China but in the form of a joint-venture with Sinopharm, which is a state-owned corporation. Sinopharm, also known as China National Pharmaceutical Group Corporation, was the largest pharmaceutical and healthcare group in China, with a very well established network in the country. It owned 22 subsidiaries and holding companies including research, distribution, and production facilities. The initial agreement between Sinopharm and Zeneca was for the sole distribution of Zeneca’s blockbuster drugs at the time (AstraZeneca China, 2015). Similar to Astra, this move was also an indication of Zeneca’s attempt to move into the Chinese market early as part of their global expansion of existing products. Following one year into the agreement, Zeneca felt the huge potential of the market and invested further to established sales and marketing operations in 1995. Benefiting from the rapid economic growth in China in the following few years, Astra and Zeneca both had successfully positioned themselves in the Chinese market to be leaders in the sale of specific drugs. They also established offices in over 20 major cities. However, the joint venture demerged for Zeneca around the same time when Astra and Zeneca merged.

Following the merger the new AZ embarked on the most exciting Chinese venture at the time, i.e. an accumulative investment amount of $270million (in comparison to $121 million by GlaxoSmithKline around the same time)in building its first world class production facility in Wuxi New District where Astra’s previous Chinese operations were initiated (Chemical Market Reporter, 2001). The investment decision came through as both Astra and Zeneca were performing well in China. AZ CEO Tom McKippop commented in an interview: “There are over a billion people in China. It is potentially a very large market. I believe the prospects for new medicines coming into China are very good”. The project started in early 1999 and by the end of April, 2001, it was completed and opened for operation. The new production plant employed 600 workers and produced
95% of all AZ’s products sold in the country. According to an AZ official: “There are Western manufacturers with plants there [in China], but this is one of the largest investments made by a pharmaceutical company.” (Wall Street Journal, 04/2001).

During this phase of AZ’s expansion in China which can be partly characterised by strategic focus on market expansion, AZ also made their first important step in investing in research in the country – the first step in North to South development. Between 1996 and 2001, AZ undertook nine international multicentre clinical trials in the respiratory field in China with the involvement of over one hundred and thirty domestic hospitals and institutions. By 2001, AZ invested $35 million in clinical trials and conducted thirty seven clinical research projects involving approximately twenty thousand patients in more than one thousand domestic medical sites (Asia Pacific Biotech News, 2001). The objectives of these investments were to develop drugs that are specific for the Chinese patients with specific diseases. To further AZ’s effort in local innovation, its emphasis on the importance of strategic partnerships with Chinese research institutions became evident. For instance, the company and Shanghai Jiaotong University launched a joint research project on genetic links to neuropsychiatric diseases (AstraZeneca China, 2015).

Although AZ research related investments during this period were not for building own innovation facilities, the company was still one of the first foreign companies to commit to local research at the time. This move was further encouraged by China’s entry into the World Trade Organisation in late 2001. This was crucial for the company’s business strategy in China as it meant more protection over intellectual property rights and curtailing of counterfeit pharmaceuticals.


The booming of the Chinese market came into force in 2002 as the country officially became a member of WTO, which further fuelled the already rapid developing economy. Being one of the early movers and building on its existing research-intended investments in the previous years, AZ continued its innovation investment in China on an ever greater scale. Two major categories of developments took place: extensive local partnering and the establishment of own research institutions, despite the fact that this was still the period when China was viewed by most foreign investors as a more attractive destination for production and sales. These are strong indicators of the South to South developmental wave.

In terms of the former category of developments, for instance, in 2003, AZ took a major step in forming the most significant partnership at the time with Peking University’s Guanghua School of Management to fund the China Centre for Pharmacoeconomics and Outcomes Research. It was one in a series of research and educational programmes aimed at supporting reform of the country’s healthcare system. It was noted by the then Associate Dean Weiying Zhang: “China needs deeper health economic expertise to help continue the reform of the healthcare system... We are proud to have the dedicated and long-term support of such a world-leading pharmaceutical company and hope that our partnership with AZ will help us to become an incubator for China’s next generation of health economists.” During the first three years of the partnership, AZ provided over $360,000 in sponsorship to help set up and establish its research, advisory and training programmes for government officials, hospital executives and pharmacy directors. In particular, the sponsorship helped fund a series of research seminars hosted by international experts, and sponsor of two-year fellowship programmes for trainees, hosted alternatively by the School and AZ, and facilitate short-term training programmes across the country (AstraZeneca Global, 03/12/2003).
Continuing its innovation investment tradition in China, in 2007, AZ took another major step in its local development by forming a strategic partnership with Peking University Third Hospital to set up the company’s first Clinical Pharmacology Unit in the country (AstraZeneca Global, 04/09/2007, Global Sourcing Now, 06/09/2007). In the same month, AZ and Guangdong Province People’s Hospital jointly established a research laboratory with the focus on translational science. The Unit was intended to augment existing clinical research capabilities and undertake Phase I clinical research including clinical pharmacology and safety evaluations – steps necessary for launching new medicines in China. This move fastened the launch and patient access to new medicines in China. As part of the partnership agreement, AZ offered personnel training, system audits, and consulting services. It also invested in the hospital’s facility enhancement as required for carrying out clinical research of medicines for infections, diabetes, and cardiovascular diseases. Furthermore, it was set to expand the capabilities of early phase clinical research for local clinical pharmacology organisations, and take China’s clinical research capabilities to a new level through further research cooperation and academic exchange with the local medical community (AstraZeneca China, 2015).

In 2008, AZ reached further to Shanghai Institute of Materia Medica to establish the Drug Safety Evaluation Joint Research Centre in Shanghai Pudong Science Park of Chinese Academy of Science. This was also intended to fasten speed to market progress in the country. In the same year, as the agreement between AZ and Pharmatech Wuxi came to an end with the success of achieving targets two months ahead of schedule, AZ decided to extend its contract with the company to continue to synthesise compounds according to AZ’s designs in the new arrangement in order to further expand the company’s global compound collection. Deborah Hartman, AZ vice president, noted: “Wuxi had exceeded expectations in the first agreement, delivering value...beyond the cost savings in labour and materials.” (Jiangsu News, 08/2008).

In addition to these major partnerships, AZ also expanded its clinical research capabilities by increasing the number of scientific collaborations with local Chinese pharmaceuticals firms. For example, it signed a two-year partnership deal worth $14 million with Wuxi PharmaTech for compound collection synthesis. In the same year, AZ also entered into a license agreement with Cubist Pharmaceuticals, Inc. for the development and commercialisation of Cubicin (i.e. daptomycin for injection) in China (AstraZeneca Global, 2006).

For the latter category of development, AZ made a number of historical records. For example, in 2002, AZ was the first of its kind to launch a localised Clinical Research Unit for East Asia region in Shanghai. The significant number of high quality medical talent available in the city was the reason for the location decision. The Unit aim was to oversee East Asia clinical research in mainland China, Hong Kong, Taiwan, and Korea. This signified that the country would become a critical component of AZ’s future global trials and can significantly reduce the time it takes for drugs to be made available to Chinese patients. (First Word Pharma News, 2002).AZ President, Steen Kryer, commented: “With the establishment of the Centre, AZ China is taking an important step in building a strong presence in the Chinese Health Care market.” The trials were on par with international standards and were conducted by more than forty high-calibre Chinese researchers (Pharma Times, 2006).

Another important development was in 2006 when AZ invested more than $70 million in the establishment of the Innovation Centre China, which again was the first of its kind in the country (Chemical Week, 04/04/2007). It was also one of the most advanced scientific research centres of the group outside of the UK, Sweden, and USA. It evidenced
the company’s dedication to research in China and the ambition of having a strong innovation presence in the region. Jan Lunberg, executive vice-president of Discovery at AZ PLC, commented: “It will be an integral part of our global innovation activity aimed to ensuring that the right patients are treated with our oncology drugs and will take advantage of the excellent science base in Shanghai where there is a burgeoning biotech industry.” He further re-enforced AZ’s commitment to China, stating: “This milestone is also another powerful example of our policy of being ‘in China for China’”. The new centre was to address the area of significant unmet need of Chinese patients and bring novel therapy to them (AstraZeneca China, 26/05/2006; ICIS Chemical Business, 04/02/2007). Balachandra (2004) emphasises that filling gaps in the capabilities of the innovation function is a key consideration for firms to internationalise innovations. Although the beginning of AZ China did not seem to suggest so, the formation of this innovation centre shows its major role in contributing to AZ’s global knowledge base.

Other examples include the creation of an in-house business school, known as AZ China Business Institute, for employee development and patient education programme in 2005. In the following year, it opened its first AZ Academy for Chinese healthcare professionals for medical education and clinical research. It was intended to educate and update current and future generations in the latest advances in scientific and medical knowledge (AstraZeneca Global, 2015).

Apart from innovation investments, in 2006, AZ announced its commitment to an additional $35 million investment over the next five years to increase its productivity of the Wuxi site. The site also passed both the China and European Union Good Manufacturing Practice certification and was since authorised to export products to European Union and other countries adopting the same standards. Moreover, AZ’s China sourcing centre was founded in Shanghai in the same year as part of the company’s effort to strengthen its global sourcing of active pharmaceutical ingredients. These developments further signalled AZ China’s increasingly-evident global role (AstraZeneca China, 2015).

In summary, by 2009, AZ employed more than two thousand and nine hundred staff locally, had a network of more than twenty marketing and sales offices, a world-class manufacturing site in Wuxi, clinical research facilities, and multiple collaborations and partnerships with local academic and medical institutions. This made AZ the most committed player in China and it was way ahead of its rivals. More importantly, during this phase, AZ enjoyed sustained business growth with continuous sales increase over the years as it was ranked number one in terms of sales volume of prescription medicines among foreign multinational in China (eleven of its branded products held a Number One position in market share), thanks to China’s rapid economic growth, increasing demand for better healthcare, and AZ’s great commitment to localised innovation whereby a total of more than $150 million was invested over the years (ICIS Chemical Business, 05/06/2006). Such an innovation internationalisation motive was found in the literature of Pearce et al (1992) and Balachandra (2004), who suggest that MNEs internationalised their innovation activities to other locations where growth opportunities are apparent.

“Feeling settled”: Third phase of expansion in China, 2009 – 2014

To further its Southern expansion, on 9th September 2009, AZ held the ground-breaking ceremony in Shanghai Zhangjiang Hi-Tech Park (which was known as China’s medicine valley) for its new China site, which included AZ’s new China corporate headquarters for China and Asia Pacific, marketing operations, Innovation China Centre,
and Academic training and regional functions. It became one of the only three corporate headquarters of AZ PLC besides USA and UK (AstraZeneca Global, 2015). A solid foundation was finally laid for AZ China for the long run. By the end of this financial year, AZ’s accumulated sales were more than $800 million (The Telegraph, 06/06/2010). On the other hand, it was also an important period for AZ as many rivals started to seek big breakthroughs into the market. For the first time, AZ’s leadership position in China was replaced by the merger of Pfizer and Wyeth in October 2009. To reclaim this spot, AZ had its plans. David Brennan, Chief Executive Officer of AZ, believed that, with a population of 1.3 billion in China, a burgeoning middle class and increasing prevalence of Western-style diseases, the Chinese market would offer the most opportunity for growth, and product offerings were the way to regain its position (The Telegraph, 05/05/2010; Thomson Reuters, 26/06/2010). This was for a number of reasons: One, when the right drugs became available, they could make into China’s National Reimbursement Drugs List which allowed patients to claim a fifty percent rebate. Two, China was always considered a marketplace where mature drugs could still generate sales long after patent expiration, which was different from the situation in the West. Three, the traditional practice in China for drug selection is that once particular branded drugs were accepted by the doctors and patients, there was a strong tendency to stick to it permanently though the initial acceptance tended to take a little longer (AstraZeneca 06/12/2010).

Hence, in order to widen and better its product offering as the core source of sustainable competitive advantage, AZ continued its aggressive innovation localisation in a number of ways. First, it is AZ’s internal innovation capability building in China. Specifically, by 2011, the Innovation China Centre had already built strong capabilities in translation sciences for oncology research for the Chinese market since its opening over four years ago. Hence, the Centre embraced a new mission, which was to deliver candidate drugs and ultimate Proof of Concepts and valuable drugs to address the significant unmet medical needs of patients in China. This new mission, dedicated by the Swedish research headquarters, signalled a new level for the China centre. The mission required the Chinese research team to focus on the discovery and development of new drugs specifically targeting diseases that were more prevalent. This included working closely with AZ Innovative Medicines Unit to exploit potential drugs to treat liver and gastric cancer and other cancer with high prevalence in China (McKinsey Quarterly, 2012).

Second, and more importantly, a strong focus towards more extensive and deepened advance-research collaborations locally: According to Dr Ajay Gautam, AZ’s Executive Director for China and Emerging Markets External Collaborations: “AZ is increasingly focusing on early stage academic collaborations with institutions because we believe that working with partners across the globe who have fresh, innovative ideas and approaches will help us accelerate the discovery of new medical breakthroughs.” (AstraZeneca Global, 15/05/2014).

<table>
<thead>
<tr>
<th>Year</th>
<th>Means of Innovation Activity</th>
<th>Purpose of Innovation Activity</th>
<th>Target Market</th>
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<tbody>
<tr>
<td>2010</td>
<td>Partnership agreement with Peking University</td>
<td>Discovery and development of new treatment for diabetes, obesity, and atherosclerosis</td>
<td>Chinese and global patients</td>
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<tr>
<td>2010</td>
<td>Partnership agreement with No. 1 Affiliated Hospital of Guangzhou Medical College</td>
<td>Basic research on chronic obstructive pulmonary disease</td>
<td>Chinese patients</td>
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<tr>
<td>2010</td>
<td>Research collaboration with</td>
<td>Discovery research in</td>
<td>Chinese and</td>
</tr>
<tr>
<td>Year</td>
<td>Collaboration Type</td>
<td>Collaboration Details</td>
<td>Patients Affected</td>
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<tr>
<td>2012</td>
<td>Partnership agreement with WuXiAppTec</td>
<td>Development and commercialisation of a novel biologic for autoimmune and inflammatory diseases</td>
<td>Chinese patients</td>
</tr>
<tr>
<td>2012</td>
<td>Research collaboration with Ironwood Pharmaceuticals, Inc</td>
<td>Development and commercialisation of linaclotide for irritable bowel syndrome with constipation and chronic idiopathic constipation</td>
<td>Chinese and Global patients</td>
</tr>
<tr>
<td>2014</td>
<td>Research collaboration with Shenzhen University Health Science Centre</td>
<td>Pre-clinical research on chronic kidney disease</td>
<td>Chinese patients</td>
</tr>
<tr>
<td>2014</td>
<td>AZ China Innovation Centre</td>
<td>Discovery of first AZ pre-clinical candidate drug for oncology</td>
<td>Chinese patients</td>
</tr>
<tr>
<td>2014</td>
<td>AZ Global Medicines Development Unit collaborates with China Innovation Centre</td>
<td>Creation of an innovative local portfolio to support local growth</td>
<td>Chinese patients</td>
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</tbody>
</table>

Apart from using local collaborations as a way to improve product offerings, AZ also brought in external capabilities that complemented the core internal expertise already available at the China centre in order to bring innovative new drugs to the market faster. One of the examples was an acquisition agreement with a privately-owned generics manufacturing company - BeiKang Pharmaceutical Company Ltd - from Conghua City, Guangdong Province, in 2011 (Chain Drug Review, 2012). The deal gave AZ access to a portfolio of injectable drugs used to treat infections which the company aimed to make them available to Chinese patients. This move reinforced the company’s commitment to bringing original and high quality branded generic drugs to the ‘broader’ market to increase the accessibility and affordability for patients who were previously underserved.

Mark Mallon, President of AZ China-Pacific region, commented: “Our new acquisition further underscores our intention to serve the health needs of Chinese patients through our innovative medicines and, increasingly, high quality branded generic treatments that are locally produced to global standards.” (AstraZeneca Global 08/12/2011).

Apart from improving product offerings for the Chinese market, AZ China also entered into a number of research collaborations for the purpose of developing drugs which were required not only by local patients but also for the global market. This move signalled AZ China’s first move towards becoming a global contributor of innovation – the start of the South to North wave.

For instance, in 2011, AZ and Chi-Med China co-developed and commercialised a novel cancer therapy called Volitinib. Christian Hogg, Chief Executive Officer of Chi-Med noted: “We are very much looking forward to collaborating with AstraZeneca around Volitinib. Our collaboration will support the development and commercialisation of this novel oncology innovation, discovered in China, to the global market on an accelerated basis...” (AstraZeneca Global, 21/12/2011). In 2014, AZ China and Tianjin Medical
University signed cardiovascular research collaboration. The partner university was one of the leading medical and scientific institutions in the country, making it an ideal partner for AZ. The agreement was to focus on exploring novel targets against cardiac fibrosis. This was considered a long-term collaboration as no therapy for such a disease was available globally due to lack of knowledge about its underlying causes. AZ had two agenda for the proposed drugs which were intended to be developed from this collaboration, according to Dr Marcus Schindler from AZ. He commented at the announcement and signing ceremony that “TMU (Tianjin Medical University) has an excellent reputation in scientific research. We look forward to building on each other’s strengths and expertise in order to further medical knowledge and ultimately, develop innovative new medicines that may benefit the hundreds of millions of patients who suffer from heart disease in China and around the world.” (AstraZeneca Global, 15/05/2014).

In support of the research expansion activities, in 2011, AZ made two strategic investments in expanding its manufacturing operations in China. One of these was a group record investment of $230 million for setting up a world-class manufacturing facility in China Medical City - Taizhou, Jiangsu province (AstraZeneca Global, 10/10/2011). The new plant enabled the company to meet the growing demand for its products in China while expanding availability to patients in the urban and rural communities who traditionally had limited access to established drugs. The underserved market was estimated to be more than 900 million people. It also allowed AZ to free up some capacity at the existing plant in Wuxi to bring on more new innovative products that were to be launched in the coming years. The second investment was to construct a new injection solution plant as part of an extension to Wuxi site for producing over 30 million advanced drugs per year and a new hub for receiving and packaging drugs for the China Pacific region, including Thailand, Philippines, and Australia, as demand from these areas were growing. Sheena Behn, manager of Wuxi site, commented: “You want a hub in the region because you want to be close to the countries you are serving. Geographically Shanghai port is the biggest in the world so you can move stuff around pretty easily.” She further commented: “People in China have grown up to work. They are very committed.” Further to the new hub, AZ also moved its production of active pharmaceutical ingredients from the UK to China as the standard of the Chinese site became world-class (CBS News, 27/11/2009).

In summary of the three phases analysed above, Figure 2 below illustrates all key FDIs AZ has made between 1993 and 2014, where phase one can be characterised as mainly market and production oriented, phase two as partially the same to phase one and partially focuses on localised innovations, and phase three as mainly global innovation as well as local.
Figure 2. Investment Pattern of AZ China between 1993 and 2014

- Internal Advance Research
  - Global Market
- Advance Research Partnership
  - Global Market
- Internal Product Development
  - Global Market
- Product Development Partnership
  - Global Market
- Internal Product Development
  - Global Market
- Manufacturing – Global Market
- Corporate Headquarters
  - Asia Market
- Local Research Acquisition
  - Chinese Market
- Internal Advance Research
  - Chinese Market
- Advance Research Partnership
  - Chinese Market
- Internal Product Development
  - Chinese Market
- Product Development Partnership – Chinese Market
- Manufacturing – Chinese Market
- Sales and Marketing
  - Chinese Market

Non-R&D activities
North-South R&D activities
South-South R&D activities

Most critical development in knowledge sourcing
Discussion: A theoretical interpretation of AZ internationalisation of innovation in China

In light of the data analysis on AZ China operations over three subsequently distinctive phases, this section provides a theoretical discussion of the identified evolutionary process.

Phase one: The historical analysis of initial stage of AZ’s establishment in China reveals that the growing market size for expansion potential and the abundant availability of cheap labour for low-cost production offshoring were the initial reasons led to AZ’s first entry to the country. This is very much in line with the many of the established views on firms’ reasons behind FDIs in non-advance economies. For instance, one of the most obvious examples is the internationalisation pattern offered by Johanson and Vahlne (1977) who have always been strong believers of internationalisation of production to non-advance regions. Taking a slightly different view but with similar implications, Porter (1989) and Vernon (1965) both argue for innovation at home or ‘nearby’ locations in order to maintain control and knowledge advantages. The later stage of phase one, analysis shows a few different internationalisation activities undertaken by AZ which can be defined as R&D related adaptation and localisation. This can be argued to signal AZ’s first ever investment made in a low-cost country for the purpose of any kind of innovation activities. The traditional theoretical view of innovation never happens in ‘South’ as supported by Johanson and Vahlne (1977), Vernon (1965), and Porter (1989) is starting to be questioned for the first time. In this case, the ‘South’, for the first time, has become a destination not only for market expansion and production offshoring but for R&D related activities though of low level. This finding can be explained by the works of Florida (1997) who suggests that the non-innovation activities in a foreign location are the main reason behind internationalising some R&D activities. He argues that as production became internationalised, technical support and backup were required to be on-site in order to ensure timely problem-solving, hence, some internationalisation of innovation became mandatory. By end of phase one, an evolutionary process of AZ’s internationalisation activities in an emerging economy starts to emerge: the ‘North to South’ wave of internationalisation of innovation (Advance-economy innovation for Chinese market). This finding is coherent with the view of Pearce (1999) and Pearce and Papanastassiou (1997).

Phase two: The subsequent analysis of AZ’s China operations during the second period reveals some further developments in terms of its innovation activities. In particular, while the firm continued to invest in non-innovation activities such as marketing, sales, distribution, and production in the country for the main purpose of growth and profits, which are very much in line with well-established theories including Casson (1992) and Buckley (2014). In comparison, its investments in R&D activities in the country have increased more significantly in terms of intensity. This is strongly reflected in the changes of the types of innovations from the identified low-level adaptation in phase one to advanced research for testing and discovery of drugs for the local market as identified in phase two. This finding can be explained by Pearce et al (1992)’s work that MNEs internationalise innovation units on the basis of absence of local innovation competitors, as such a move allows firms to derive distinctive new product lines. This enables the firm to initiate and focus on extending and deepening their innovation activities targeted at the local market. Furthermore, Pearce et al (1992) also find that MNEs can also tailor goods and services to specific markets if their innovation units are located close to the local
markets as they can obtain the local market preferences and develop products and services suited to those locations. Overseas innovation units are able to bring in local knowledge and design to satisfy the local niche market, which in turn creates further market development opportunities. This is especially beneficial for MNEs in large and growing markets where innovation units can help retaining a secure market share. This is confirmed in the case of AZ China where localised innovation has enabled the firm to be close to Chinese patients to understand the most prominent disease, conduct trials, and produce effective drugs. However, these works were developed in the traditional context of the ‘North’. The conventional wisdom regarding destinations for innovation FDIs, as supported by Arvanitis and Hollenstein (2011), Cantwell and Piscitello (2000), and Pearce and Papanastassiou (1997), is largely challenged for the first time in this study. For the very first time, advanced R&D is carried out in an emerging economy despite AZ’s global presence in terms of knowledge sourcing. This newly identified development signals another important evolutionary step along the continuum of AZ China’s internationalisation of innovations pattern: the ‘North to South’ wave (as per phase one) is drifting towards the ‘South to South’ wave (Chinese innovation for Chinese market). This finding corresponds to the works of Contractor et al. (2010), D’Agostino et al. (2013), and UNCTAD (2005).

Phase three: The analysis of phase three data reveals the most alarming development of AZ China to date. The findings suggest that apart from further investments to enlarge markets, production, and sales in China and Asia (where corporate Asian regional headquarters is established in China), AZ continues to deepen its involvement with local partners and in its own research centres for the advance research and discovery of breakthrough drugs for dealing with local diseases. The firm also intensifies its ‘South to South’ commitment by innovating not only for China but also for the Asian region. This finding continues to challenge the traditional view of internationalisation of innovation. Never-the-less, in phase three, the most significant development of the company in the country is identified, which is the undertaking of world-leading R&D for the purpose of addressing knowledge gaps in drug discovery for some of the world’s most complex and challenging diseases. The ‘spell’ is finally broken whereby the ‘South’ is no longer seen as solely in the receiving end of valuable knowledge transfer but a world-class provider of strategic knowledge which can potentially determine an advance-economy firm’s success for years to come. This finding is arguably one of the greatest criticisms of the long-established view on internationalisation of innovation, including works of Arvanitis and Hollenstein (2011), Cantwell and Piscitello (2000), Contractor et al. (2010), D’Agostino et al. (2013), and Pearce and Papanastassiou (1997), as none of these studies have addressed the full extent to which innovation FDIs have evolved in an emerging economy as per this paper. Hence, it is evident that almost no research (to date) has empirically answered a similar call to this paper; hence, the significance of the findings from these three phases cannot be overemphasised.

The evolutionary pattern across the ‘North’ and ‘South’

The theoretical discussions of the three specific phases evidence a progressive evolutionary pattern of AZ innovation in China, from the early stage of ‘North to South’ focus to ‘South to South’, and now ‘South to North’. Many of the previous studies centred on internationalisation of innovation in the context of ‘North to North’ can be used to explain this overall pattern. For instance, works of Ronstadt (1977, 2001) find that during
the operations of overseas innovation units of seven U.S. MNEs, there was a general constant growth in overseas innovation expenditures compared to that of domestic innovation activities, which in turn demonstrates the increasingly evolving role of overseas innovation centres. He identified two basic patterns in the seven MNEs’ overseas innovation units. Pattern one shows that innovation centres overseas demonstrate a pronounced tendency to change their original purpose from more basic and local role to more advanced and international. There are two suggested reasons for the changes. For one, innovation managers of the overseas units felt the need to provide more challenging work to keep their best people and to attract high quality innovation professionals; for two, marketing and general managers at overseas locations also felt an increased need for new products in order to maintain growth in sales and profits. In terms of pattern two, there was a tendency amongst some centres which were un-evolving. These centres were found to be divested because they did not produce any significant transfer of knowledge to the MNE. In the case of AZ China, while pattern two is not found to be true, pattern one of gradual advancement of innovation activities from none to locally basic, to locally advanced, and to international, is clearly identifiable with the findings of Ronstadt (1997, 2001) though the context of his works is the ‘North to North’ wave. Furthermore, the transformation of AZ’s innovation in China can be easily summarised by a quote from Pearce and Singh, whose work is also based on the advance-economy context (1992:98):

“In moving from tactical short-term adaptation operations to more strategic medium term product development and longer term knowledge creation, overseas innovation in MNEs emerges from a dependent position, merely applying the current state of the group’s technological trajectory, to one that is dynamically interdependent with the key processes of reformulation and regeneration of core knowledge and commercial scope.”

For the reasons behind the evolution in overseas innovation, Penner-Hahn (1998) takes the organizational learning perspective, derived from the evolutionary theory of Kogut (1988) and Kogut& Zander (1993), and suggests that firms initially tend to undertake low level investment in innovation activities until they learn enough to invest extensively in their foreign innovation activities. This is because sequential internationalisation process allows MNEs to learn about its new environment where they are able to obtain understanding of the nature of the research process and the national context in which the innovation takes place (Michell, Shaver, and Yeung 1994). Stopford and Wells (1972)’s earlier work, while not based on organizational learning paradigm, also suggest the gradual process of undertaking more intensive innovation activities as the MNE gains substantial knowledge of the local environment. This is exactly the case in the evolutionary process of AZ China as the firm learnt about the market by first entering with sales and marketing and later production. When experience and knowledge provided confidence and reduced chances of failure, AZ China started to invest more and more in innovation. Hence, building on the case study of AZ China, Figure 3 below conceptualises the full extent to which AZ innovation has evolved in China during the period of 1993 – 2014 where a new pattern of internationalisation of innovation is suggested.
Conclusion

The case of AZ’s historical development with specific reference to the growth of innovation capability in China has revealed a new pattern of internationalisation which spanned across the country over two decades. Although it may be argued that the internationalisation of innovation by MNEs to emerging economies, as indicated in the case of AZ China, is uncommon and too complex to be explained by existing theories which were developed in a different context, an assessment of this new phenomenon is needed to establish where the current theoretical paradigm is lacking in interpreting the new phenomenon. This paper first reviews the existing knowledge on internationalisation of innovation which centres on North to North wave, then challenges the traditional view by suggesting a number of incremental waves including North to South, South to South, and South to North. The detailed case of AZ China spanning across 21 years has evidenced these new waves. Emerging economies are no longer the destinations for only market and cheap labour but have become increasingly important players in global innovation. AZ China tells us how an emerging country can become an ideal location for innovation.

This paper makes a number of important and timely contributions. First, it is one of the first to challenge the conventional wisdom and investigate the possibility of emerging economies in offering innovation. Second, some of the existing theories which are built upon the traditional context are discussed in relation to the emerging economy context whereby support for an evolutionary process is found. Third, the most important contribution this paper makes is the conceptualisation of the four waves of internationalisation of innovation which began with ‘North to North’ (wave 1) and ‘North to South’ (wave 2) as the more accepted developments in existing literature, and gradually shifted towards ‘South to South’ (wave 3) and ‘South to North’ (wave 4), with the fourth one being the most recent, alarming, and unconventional development of all.
Practically, the success of AZ China reveals the importance of time and experiential knowledge in understanding and deepening involvement in the local market. It also reveals the increasingly significant contributions emerging economies can make to the strategies and future competitiveness of knowledge-intensive companies. Whilst policy related weaknesses are still apparent, governmental support and availability of expertise and a fast-growing market are important considerations for locating R&D activities in the ‘unconventional’ regions.

To further our understanding of this important topic, it will be of great value if future research can be conducted to explore some of the key success factors to internationalisation of innovation to and from ‘South’. It will also be insightful to investigate the implications of ‘South to North’ wave on MNEs, institutions, and countries, as this challenges everything we currently know about internationalisation of innovation.
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