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# The Competitiveness of Chinese Manufacturing beyond the Lewis Turning Point: The role of Explorative Technology Transfer

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**Abstract:** This paper considers two case studies of acquisition of Western manufacturing businesses by Chinese firms. It concludes that the underlying technology transfers are significantly different from contractual forms of technology transfers with an exploitation focus. The limited knowledge that was gained through prior technology transfers agreements led Chinese manufacturers to occupy unrewarding positions in their home market, with no prospect for growth and faced with the risk of competitive decline when faced with rising labour cost (i.e. with the advent of the so-called "Lewis turning point"). In order to break out from this 'middle income trap' the case firms used acquisitions and explorative forms of technology transfer that allow them to move away from their constrained strategic positions and to truly compete with other global firms both at home and abroad.

**Keywords:** Exploration, Internationalisation, Lewis Turning Point.

## 1 Introduction

There has been a growing interest in the economics literature regarding China's status vis-à-vis the "Lewis turning point". Arthur Lewis's theory [1] is based on the observation of the typical stages of development patterns of economies that predominantly rely on the manufacturing sector. According to Lewis, national economies can derive significant benefits from the growth of manufacturing while it is fuelled by the willing migration of cheap labour from the primary (principally agricultural) sector to the manufacturing sector. When combined with the increasing economies of scale and learning curves that can be expected with growing manufacturing activities, the unrestricted supply of cheap labour to a sector means increasing profitability. To a large extent these factors together are sufficient to explain the intensity with which investments can be channelled into the manufacturing sector in a relatively short period of time. The supply of cheap labour often dries up though. This is usually the case when the rural migration to urban areas stops for demographic reasons, i.e. there are no more agricultural workers willing to take up manufacturing jobs. The resulting shortage in labour can only be managed by raising wages. The Lewis turning point is reached when the increase in the cost of labour is such that the competitiveness of the sector is negatively affected. In many countries, economies have entered phases of transitions when the Lewis turning point is reached, with a typical scenario being a

transition from manufacturing to the service sector.

There is no consensus in the literature regarding where China currently stands in terms of the Lewis's turning point. However, there is a consensus that the incidence of the turning point will have important implications, both in China and globally. When considering China's manufacturing industry, investigating the Lewis turning point raises the question of whether or not current manufacturing firms will be able to remain competitive. Economists are sceptical of China's ability to do so because of a lack of required innovation capabilities and institutional frameworks. This would result in China falling into the so-called 'middle-income trap' [2] where competitiveness of the manufacturing sector declines and where few opportunities for further growth can be identified.

In this paper we use recent developments in internationalisation theory to investigate this question from the lenses of technology transfer. We argue that there are numerous cases in the Far East, usually referred to as 'Dragon multinationals' [3], that provide evidence that manufacturing companies from the Asia-Pacific region can develop sufficient capabilities to become sustainable competitors in the global economy and to provide sustainable manufacturing activities past the Lewis turning point.

## 2 Relevant Theory

Dunning's eclectic paradigm [4] and Ownership-Location-Internalisation (OLI) framework have become established reference models to explain FDI patterns. In short, they explain the decision to invest is motivated and guided by the ownership of a unique technology. This technology will be sold in a different location in order to exploit it further, and this process will be managed in adequate ways (internalisation) given the risks associated with the new location.

In his analysis of Dragon multinationals, Mathews [3] proposes an alternative framework to explain the fast and successful growth of multinationals from the Asia-Pacific region by considering resources linkage, leverage, and learning (LLL framework). Linkage refers to the fact that investments made by Asian multinational are resource augmenting rather than resource exploiting [5]. Linkages stress the importance of acquiring assets outside of the Asia-Pacific region for the purpose of accessing knowledge and related forms of intellectual capital. Second, leverage refers to the

ability of a multinational to make the most out of the resulting network of competencies, and thus, echoes Kogut's call for the capability to manage real options opportunities [6]. Finally, learning refers to the ability of the multinational to learn from the application of linkage and leverage processes, and again, as such, is reminiscent of Kogut's learning options embedded within multinational organisations.

### 3 Research Questions

Although there are differences between the OLI and LLL frameworks (for a full account see [3][5][7]), we accept Dunning's view regarding the complementarity of these two frameworks in order to understand international manufacturing expansion programmes. We also note that both frameworks are heavily reliant on technology transfers taking place between the different nodes of a global operations network.

The purpose of this paper is to investigate the specific characteristics and nature of the technology transfer processes that are involved in recent case studies of manufacturing expansion from the Asia-Pacific region. In particular, we are interested in the following questions:

- What type of technology is being transferred?
- To what extent does the type of technology being transferred require a specific mode of internalisation (e.g. acquisitions)?
- To what extent do these technology transfers defer from those that have been previously studied in a case of FDI inward investment in the Asia-Pacific region?

### 4 Methodology

We use two case studies of recent acquisitions of Western firms and brands by Chinese enterprises to explore the research questions. The selection of the case studies is based on convenience and access to data. We consider the acquisition of IBM's PC division by Lenovo and the acquisition of Volvo Car Corporation by Geely. Most of the evidence used in this paper is based on secondary sources, although we also use primary data about Geely-Volvo that was collected as part of another research project [8].

### 5 Case Analysis

#### 5.1 Ownership and technology transfer

A typical scenario of technology transfer is based on a developed country's manufacturer seeking to increase its revenue base by licensing the use of its proprietary technology in a less developed economy. In the description of such a scenario, Krugman [9] stresses the need for the technology seller to continually innovate in order to maintain its competitive advantage.

The account provided by Liu [10] of the acquisition of

IBM PC by Lenovo tells a different story. When IBM approached Lenovo, its PC manufacturing branch was a money losing business crippled by a very high overhead burden imposed by headquarters. It was because of Lenovo's ability to better manage the business, and to operate with much lower overheads, that it was able to turn a money losing business into a profit-making operation. Thus, in this case, the Western manufacturer's assets are valued as low by the parent firm whilst the same assets are valued higher by a foreign acquirer.

Innovation skills and the resulting ability to maintain the value of a company's technology is described by Garud and Nayyar [11] as transformative capacity. By acquiring IBM PC, Lenovo did not only invest in the operational assets of IBM PC but also in its transformative capacity.

The second case also confirms that the acquisition of Volvo Cars by Geely is likely to be driven by the desire to appropriate transformative capacity. Geely's success, like that of many Chinese car makers, was based on their manufacture of foreign designed cars. The company's first car, the "Geely HQ" was a derivative of Daihatsu Charade (built under licence from the Tianjin Automotive Company). Then later, through a Shanghai subsidiary, Geely released the Maple, a car designed using a combination of parts/components coming from the Citroen ZX and the Charade. According to Wang and Kimble [12] the Maple is an example of an open modular car, a platform on which the growth of Chinese car makers is currently based. The use of open modular architecture in car design means that Chinese manufacturers are able to produce cars at a fraction of the cost of the competition, due to large economies of scale in parts manufacturing. The ability to design such an architecture denotes a clear strategic move towards the development of transformative capacity. The acquisition of Volvo - a highly valuable brand in Asia, but with a bounded market value in the West - is a logical step in the pursuit of the development of transformative capacity. As in the case of Lenovo, the technology transfer is not only about the acquisition of a technology (e.g. a product design) but about the ability to independently maintain a portfolio of technologies.

#### 5.2 Location and technology transfer

In a traditional technology transfer case, location analysis deals with the identification of a desirable investment destination, e.g. a country with fast growing demand but low political risk. The technology transfer cases that we are looking at are different in that the decision is not centred on the selection of a destination but on the requirements for technology transfers linked to competing at home.

For example, Lenovo was the biggest manufacturer of PCs in China, but it only commanded a 30% share of the local market and was reported to suffer many disadvantages when compared to its competitors [10, p. 574]. Becoming global was the only solution in order to become a key player in both the Chinese and global

PC industry. A similar point could be made for Geely, a company that faces strong competition not only from other domestic manufacturers but also global automotive companies. The facts that China is the fastest growing consumer market and the largest market in absolute terms have made the Chinese market a competitive priority to multinationals. As a result, Chinese joint ventures with multinational automotive companies lead in terms of market share, with Shanghai Volkswagen taking 17% of the market in 2010, followed by Shanghai GM with a 10% market share. By contrast, Geely's market share in 2010 was only 2.9%. In such a very disputed and fragmented market, growing as a domestic producer is a difficult strategic challenge. A solution to this challenge is to become global in order to be able to compete on the same scale and basis than multinationals operating in China.

### 5.3 Internalisation and technology transfer

The international technology transfer literature has been concerned historically with the negative sides of transfer. These include the risk of leakages of technology to a licensee or other third party, and technology theft. Although empirical evidence was initially collected to document technology leaks (e.g., [13]) this stream of research died out, and recent papers about technology transfer tend to only include a token reference to the risk of technology leakages, and no paper has recently studied the extent and consequences of this risk empirically.

This raises the question of whether or not such leakages ever took place, and if they did, to what extent the leaked knowledge actually had any strategic and commercial consequence?

To answer this question, it is worth referring back to the typical developed-less developed country technology transfer scenario discussed by Krugman [9]. In this scenario, technology leaks were a key concern and the fact that technology was transferred forced the technology seller to keep innovating. Yet, in practice, the ability to produce a product under a technology license and the ability to design both the product and its production process are two different skill sets. In the case of Geely, Wang and Kimble [12] document an independent first step away from the mere exploitation of technology, and in the case of Lenovo, Liu [10] acknowledges issues with product design prior to the acquisition. This confirms that the ability to innovate autonomously was desired but limited for these two companies.

In accordance with the work of March [14] we see that the distinction between exploration and exploitation can be used to differentiate traditional technology transfer from the cases of Lenovo and Geely. Traditional technology transfer takes place exclusively in an exploitative context. A technology owner seeks to increase its revenue base by exploiting its existing technology in new markets. In order to mitigate the risk associated with these new markets, it is better to manage

the investment through joint ventures or non-equity ventures (unless the market conditions warrant a direct investment). As the underlying technology transfers were exploitative in scope, there was never an actual, and rarely an accidental, transfer of proprietary knowledge or transformative capacity. The acquisition made by Lenovo and Geely are fundamentally different: their scopes are explorative, i.e. they seek to acquire new knowledge, technologies, and capabilities. For this reason, they can be only managed through an acquisition process.

### 5.4 Linkages and technology transfer

When thinking of the acquisition of a manufacturing business it is unavoidable to envisage the transfer of manufacturing technologies. Although we possess no primary data regarding the transfer of technology for manufacturing between IBM PC and Lenovo, Liu's account [10] is that the important technology transfers were in a different domain; that of cost control and of the ability to organise a global businesses by merging two entities from radically different national backgrounds.

This indicates that outward FDI by Chinese firms generates value by establishing linkages between all parts of the business. Thus, the acquisitions under scrutiny are better described as multi-layered technology transfers, which include:

- A traditional layer: the transfer of tested production technologies and product designs.
- A transformative capacity layer: the transfer of knowledge about the management of innovation and the ability to maintain one's technology assets.
- A functional layer: the transfer of technology within each business function, e.g., marketing, cost control, etc.
- A brand structuring layer: the transfer of brand equity and brand values that result in the creation of brand portfolio.

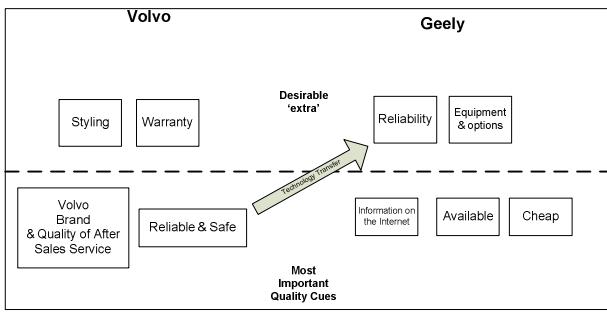
### 5.5 Leverage and technology transfer

In a traditional technology transfer scenario, there were no opportunities to seek leverage opportunities between the two parties, as the commercial opportunity was set and bounded by the technology transfer agreement.

Given the multi-layered nature of technology transfer that underpin the two foreign acquisitions by Lenovo and Geely, a wealth of leveraging opportunities exist. Figure 1 below shows the result of a survey conducted by the authors about the quality cues associated with the Volvo and Geely brands respectively.

Figure 1 shows how Taiwanese customers perceive the two brands and indicates that in the mind of customers the two products are fundamentally different. One could see in this fact a simple diversification investment in brands whereas we argue that in the acquisition of Volvo Cars by Geely there is an opportunity for a technology transfer about the ability to design reliable and safe products at two different ends of the market spectrum, i.e. the economy and premium

segments.



**Fig. 1 Comparative top quality cues for Geely and Volvo**

It is unlikely that such a technology transfer could have taken place at an earlier stage of Geely's existence under the variety of previous arrangements in which it has participated. Indeed, a traditional manufacturing technology transfer would have included a reliable product design transfer but not a systematic transfer of knowledge about making product design more reliable. Thus, we argue that the acquisition of Volvo Cars by Geely was motivated by the ability to transfer a skill set - the ability of designing a reliable product- that can be used to maintain Volvo's position in its market but also to leverage the position of Geely in its entry-level, economy product market.

### 5.6 Learning and Technology Transfer

As traditional technology transfer are contractually based, and as they are exploitative in scope, it is reasonable to conclude that they will offer very little by the way of learning opportunities. The opposite is true of explorative technology transfers.

Liu's account of the Lenovo's experience is that there were many questions marks regarding the direction that the company should take [10]. Top managers initially retained were eventually dismissed as a new organisation form with new values emerged.

One example of a key question is whether or not brands should be maintained or merged? Lenovo initially decided to trade under two separate brands, as concerns were initially expressed about the Lenovo brand which could lead to losing loyal IBM PC customers. A few years later, the decision was made to drop the IBM PC brand and to trade solely as Lenovo. Given the efforts that many businesses go through to build structured brand portfolios in order to tap into different ends of a market, one could wonder if the decision to drop the IBM PC brand were not premature? The same question applies to Geely - what is the most sensible way of maximising the value of the two existing brands? It is from similar questions, stemming from linkages and leveraging processes, that both Lenovo and Geely are experiencing valuable learning options through their acquisition of a Western business.

## 6 Conclusion

This paper has used Dunning's OLI and Matthews' LLL frameworks as two complementary lenses of investigation to explore the nature of technology transfers that underpin the acquisition of Western businesses by Chinese firms.

Our key finding can be explained with March's distinction between exploration and exploitation [14]. Traditional technology transfers are exploitative by design. The fact that very little, if any, transformative capacity has been transferred to Chinese firms under previous partnering agreements with Western firms means that many of these firms have found themselves today in a precarious position. The possibility of China reaching the Lewis turning point implies a possible further erosion of their competitiveness. The strong dominant positions that multinationals and their brands are holding in the Chinese market mean that domestic firms are small challengers, lacking the innovative and marketing capabilities to break through.

By acquiring Western companies and brands the two cases studies that we investigated have initiated a multi-layered form of technology transfer that aims to transform the constraining factor of their home location into a strength, to develop their limited transformative capacity (by seeking asset augmenting rather than asset exploiting investments), and to take control of a portfolio of assets providing multiple opportunities for linkages and leveraging.

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