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**Moving Up the Value Chain:
How to Make the Smiling Curve smile?**
Case studies of ICT firms from an emerging economy

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Abstract

The concept of Smiling Curve coined by Stan Shih, founder of Acer, shows the appropriable value added of different sections of an industry. Normally the upper and down streams of the value chain that generate higher value added are controlled by firms from developed economies, while firms from developing world are typically stuck at the manufacturing section with low value added. However, the unprecedented growth of Information Communication Technology hardware market over the years has opened up possibilities for those latecomers to catch up. Although a handful firms have succeeded, little is known about how they managed to move up along the value chain. Trying to solve this mystery, a conceptual model is proposed based on case studies of ICT firms from an emerging economy, Taiwan. Knowing the difficulties for firms to survive head-to-head competitions that come along with the moving up activities, the model suggests that firms should look for new market opportunities by the means of functional upgrading and innovation, and eventually evolve into creating a new value chain with high end topped by themselves.

Keywords: Smiling Curve, value chain upgrading, innovation, market creation

List of Abbreviations

CAGR	Compound Annual Growth Rate
CEO	Chief Executive Officer
EMS	Electronics Manufacturing Services
GVC	Global Value Chain
ICT	Information Communication Technology
IO	Industrial Organization
OBM	Original Brand Manufacturer
ODM	Original Design Manufacturer
OEM	Original Equipment Manufacturer
OS	Operating System
PC	Personal Computer
PDA	Personal Digital Assistant
RBV	Resource-Based View
ROA	Return on Assets
ROE	Return on Equity
R&D	Research and Development

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1. Introduction

The opening chapter discloses the background information of the research which then leads to the research problem explication and the research question. The purpose of the study as well as the scope and delimitations are also briefly outlined.

1.1 Background

Information Communication Technology (ICT) as a high growth market has created unprecedented opportunities; particularly the ICT hardware market, which can be identified with computer hardware, peripherals and electronics, and most recently, the diffusion of mobile telecom and related technologies. Indeed, throughout the last twenty years from 1990 to 2010, worldwide mobile phone subscriptions have grown from 12.4 million to over 4.6 billion (ITU, 2010; CBSNews, 2010), notably with the recent intense growth of smartphones. In contrast, the global computer hardware market is forecasted to reach USD 511 billion in 2013, which will be an overall increase of 24.4% since 2008 (Datamonitor, 2009). ICT hardware manufacturing is one of the largest and fastest growing manufacturing industries in the world, in fact the share of which doubled during past two decades and reached almost one quarter of the world trade in manufactured goods (SOMO, 2005).

Certainly, the increasing global demand for ICT hardware is opening up possibilities for countries to capture a share in this global market pie. It also exposes an opportunity for the *latecomer* manufacturing firms from emerging economies, which surged rapidly to “catch-up” with forerunners through leveraging their low-cost advantage (Mathews & Cho, 1999). In fact a significant presence of the latecomer ICT firms has been witnessed; in some high-technology sectors such as telecom and semiconductors, latecomers are imposing substantial challenges to the precursors from US, Japan and Europe (Wu & Zhang, 2010). To take an example, today Taiwan, a representative of emerging economies, accounts for 65% of the world’s Electronics Manufacturing Services (EMS)¹ business (ThomasWhite, 2011). A handful of Taiwanese firms, such as AsusTek, HTC and Foxconn, more than doubled their revenues over the last three to five years (ibid). Similarly Acer, the global PC giant originating from Taiwan, sets up a frontier example of latecomers by being one of the world’s largest suppliers of personal computers today. But what have these firms done to achieve such competitiveness?

¹ EMS refers to providing design and manufacture services of electronic components and assemblies for OEMs.



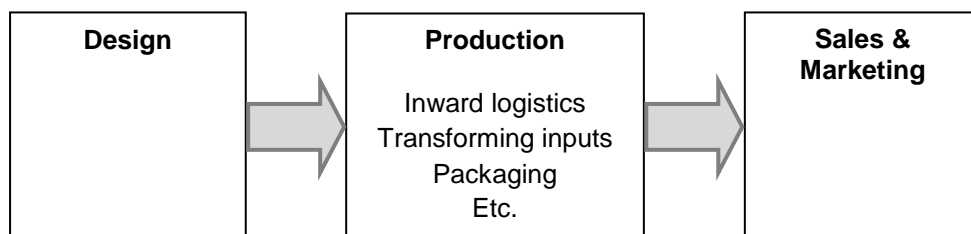
While the research and studies today highlight these success stories, the analysis of their development process is somewhat restricted. In other words, little is known about how these firms from emerging economies are able to promote their technological capabilities, offer successful products and attain competitiveness in their respective value chains. Existing studies often observed that latecomers' development is a distinct process: unlike early movers, the latecomers are referred to be skipping certain stages of development or "leapfrogging" and devise their own paths of development (Hobday, Rush, & Bessant, 2004; Mathews & Cho, 1999). However this kind of conclusion is too broad and vague, thus further exploration is still required to unveil the true stories of their success.

1.2 Problem Formulation

Value configuration is a tool often used to gain insights into an industry and diagnose firm's competitive advantages. Stabell & Fjeldstad (1998) identified three types of models to create value: 1) the *value chain* that transforms inputs into product with a long-linked technology, 2) the *value shop* that resolves a particular customer problem by intensive technology, and 3) the *value network* that facilitates direct and indirect exchanges between customers using a mediating technology. While professional service firms and banks are typical examples of the value shop and value network respectively, the ICT (hardware) industry represents the concept of value chain quite well.

According to Kaplinsky (2000), value chain "describes the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production, delivery to final consumers, and final disposal after use." A simplified value chain of its most elementary form can be presented as Figure 1 although in reality it is much more complicated.

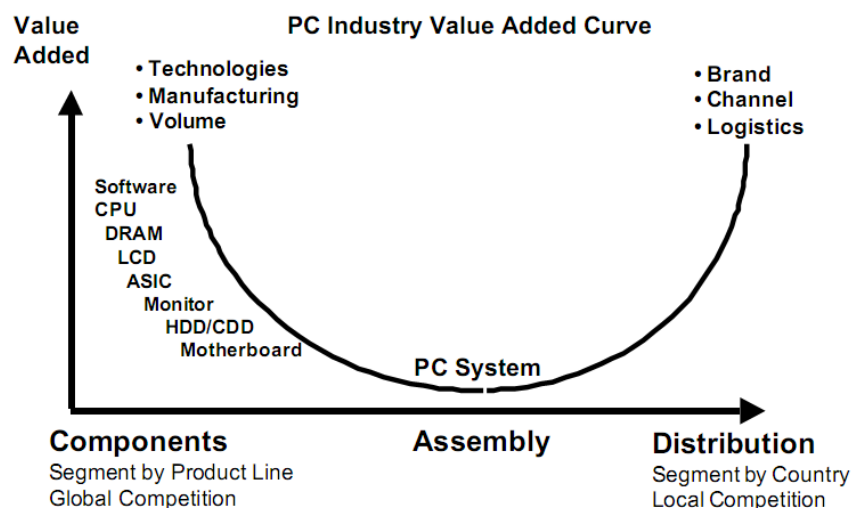
Figure 1. A simple value chain



Source: Kaplinsky, 2000

It is understandable that different sections of the same value chain may appropriate different added value. In this regard, in 1993, Stan Shih, the founder of Acer coined the idea of using a curve to show the appropriable value added of different sections of an industry, which he thought was determined by entry barrier and accumulation of capabilities - the higher an entry barrier and greater accumulation of capabilities, the more value added can be appropriated. The horizontal axis was made of component production, product assembly and distribution, corresponding with the upper, middle and down streams of the computer industry that Acer was competing in. Those different sections had high, low and high added value on the vertical axis respectively, thus bending the curve like a smile and hence got the name as the *Smiling Curve* (Figure 2) (Shih, 2005, pp. 213-215).

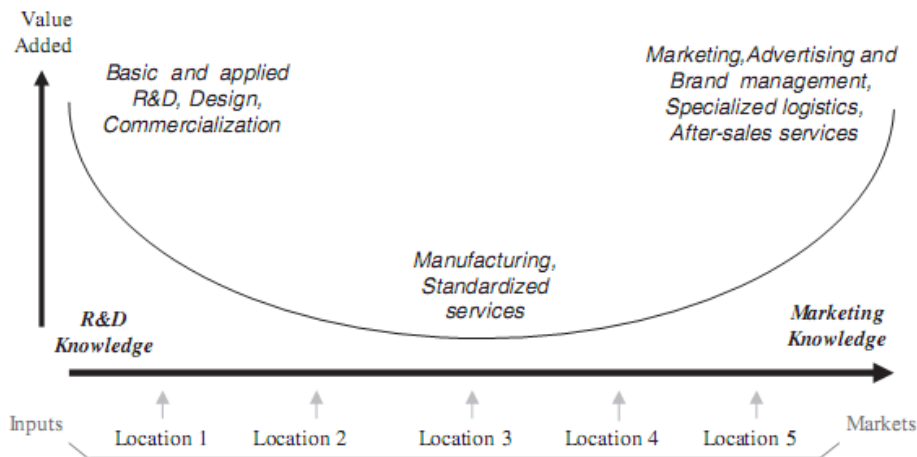
Figure 2. Stan Shih's Smiling Curve



Source: Dedrick & Kraemer, 1998, p. 156

The idea has inspired not only the business society but also the academic world, being further developed by scholars. For example, Mudambi (2008) described the smile of value creation and argued that higher value is increasingly concentrated at the upstream end through activities such as R&D and design, as well as at the downstream end including marketing, branding and services. Meanwhile it generates lower value in the middle part of the value chain, which is mainly manufacturing and standardized services (Figure 3). As in most industries, the high value added activities (e.g. R&D, design) are largely controlled by firms from developed economies; however the “spillover” effect between them and the firms from emerging economies has given the latter a chance to “catch-up”.

Figure 3. Mudambi's smile of value creation



Source: Mudambi, 2008

Yes, we have witnessed the rising of a handful ICT firms like Acer and HTC from emerging economies, but a very large proportion of the firms are still getting stuck in the low value added end of simple manufacturing and assembly. How did those successful ones manage to climb up? Are they only some special cases, or is there anything in common that can be learned by the others? This leads to the research question:

**How can the ICT manufacturing firms from emerging economies
move up along the Smiling Curve?**

1.3 Research Purpose

The authors believe that certain circumstances must be fulfilled for a firm to move up the value chain. Although it may not be possible for all the firms to do so, there might be a “common pattern” behind the firms that have successfully moved up towards the higher end of the value chain. The purpose of the study is to find out whether this common pattern exists, and if yes, what does it look like? The authors are aiming at proposing a conceptual model of the essentials of the successful strategy examples, and hoping that the findings may help other firms to earn useful insights about how to achieve better value appropriation positions on their value chains.

1.4 Research Scope and Delimitations

The Smiling Curve is a beautiful concept created by Stan Shih. It is rooted in the computer industry, which can also be considered as a subbranch of the ICT industry. However, the shape of the value-added curves changes from time to time and differs from industries, e.g.



the assembly of computers used to capture high value added, and the petrochemical industry even has a curve like a reversed smile (Shih, 2005, pp. 213-215).

As for this study, the authors limit the scope within the ICT industry which is recognized as a representative of the value chain concept as well as the Smiling Curve. Moreover, with the purpose to find out the move-up process of the value chain, the authors naturally focus on the firms from emerging economies, many of which have just experienced or are still experiencing this dramatic change of their business, no matter they succeed or not. For the same reason, the authors also narrowed the study within the process itself, in other words, what firms do to retain their positions on the value chain after they have moved up falls outside the research scope.

The authors assume the Smiling Curve is factual when conducting this study, although being aware of it as a controversial concept. Questions regarding the validity of the Smiling Curve and whether firms should (try to) move up also lie outside the present study. However, the authors will come back to these in the further research suggestions (Chapter 6.2).

1.5 Thesis Deposition

Whereas the introduction chapter briefly provides the background and objective of the study, the remainder of the thesis is composed as follows: Chapter 2 builds up a conceptual framework with several theories related to subject and proposes a conceptual model of value chain movement. Chapter 3 unveils the methodology the authors used to carry out the study and Chapter 4 represents the empirical evidences of three case companies that are from emerging economies. The authors then analyze those evidences within the umbrella of conceptual framework and finally come up with a revised conceptual model in Chapter 5. Last but not least, the conclusion of the study and further research suggestions are drawn in Chapter 6.



2. Conceptual Framework

The purpose of the conceptual framework is to provide a theoretical umbrella of the concepts and hypothesis that will have impacts on the research being conducted. As for the study on the Smiling Curve, three main theories will be discussed with details in this chapter, and a conceptual model of the value chain move-up process is proposed thereafter.

2.1 Global Value Chain (GVC) Upgrading Theory

According to Humphrey (2004), more and more new low-cost producers are entering the global markets to leverage the low-cost advantage, apparently making the market highly competitive for manufacturing industries. Thus pressure mounting for firms from developing countries to improve their performances as it also imposing challenges to attain and/or retain their competitiveness; such challenges require firms to *respond* while remaining competitive in the business. In that case, followed by the literature on competitiveness, Cattaneo, Gereffi, & Staritz (2010, p. 129) noted: “the most viable response is to ‘upgrade’: to make better products, make them more efficiently, or move into more skilled activities”; such view was also strongly urged by Kaplinsky (2000) and Humphrey (2004).

Similarly, Humphrey & Schmitz (2005) viewed that typically suppliers / producers from developing countries are expected to meet buyers’ requirements which extract the demand from advanced markets. To be able to meet such demand often requires supplier firms to add or develop skills. As a result, it enhances firms’ capabilities, which may also allow them to tap into new market niches (Cattaneo, Gereffi, & Staritz, 2010, pp. 128-129; Kaplinsky, 2000). These shifts in activities can be referred as upgrading, which is also argued to be particularly significant for low-cost producers new to the global market (Humphrey, 2004).

The GVC literature suggests that upgrading can be identified in a chain perspective as following: *process upgrading* refers to transforming inputs into outputs more efficiently by reorganizing and/or introducing superior technology to the production system; *product upgrading* facilitates the firm moving into further complicated product lines; *functional upgrading* aims at acquiring new functions (or abandoning existing functions) to increase the overall skill content of firm. This leads the firms to generate higher income and conversely, and “cease from low-income activities” (Humphrey & Schmitz, 2000). It also indicates that firms may change their positions on the value chain, for example, moving from merely production to design or branding.



On the other hand, the GVC literature suggests that there are “inter-firm” linkages and the knowledge required for upgrading actually flows throughout the value chain (Cattaneo, Gereffi, & Staritz, 2010). The role of powerful lead firms was particularly noted by Gereffi (1999) as these firms undertake the functional integration and coordination of their activities which are internationally dispersed along the value chain. For instance lead firms may engage into importing or sourcing raw materials, components or even finished products (e.g. ready-made garments) from different locations. At this premise, Humphrey & Schmitz (2005) argued that global value chain offers a possibility for local producers to learn a great deal from global buyers about how to improve their production processes, attain consistency and high quality while minimizing lead-time. In addition, there is scope for product upgrading as Gereffi (1999) attributed this to “organizational succession” - a process by which manufacturers often start with producing simple, non-complex products (low value added) and then move to producing further complicated products allowing higher value added.

The chain perspective also emphasizes a further category as functional upgrading. As noted earlier value chain analysis is identified with production networks dispersed geographically. This also means firms and/or localities may specialize in a specific function or “a narrow range of activities”; particularly developing countries that seem to specialize in manufacturing activities, however, they play little role in product design, marketing or branding (Humphrey & Schmitz, 2005). Therefore, acquiring new functions offers an opportunity for these firms to generate higher income, which is potentially a crucial part of an upgrading strategy (ibid).

2.2 Industrial Organization (IO) Theory

Industrial organization concerns the mechanism of markets and industries, particularly the relationship between firms in a market and the linkages within the structure of its industry (Cabral, 2000, p. 3; Ferguson & Ferguson, 1994, pp. 2-3; Shy, 1995, pp. 3-7). The main reason for considering the IO theory is its emphasis on firms’ strategies that characterizes their market interactions, such as price, competition, product development, advertising, entry barriers and etc.

Most economists often view the industrial organization referring to a framework known as the *Structure-Conduct-Performance* paradigm. *Structure* describes the composition of markets and industries in an economy; it can refer to the number and size of the distribution of firms in the economy as a whole and portray the environment (particular market) within



which firms operate (Cabral, 2000, p. 3). *Conduct* refers to the behaviour or actions of firms - signify the decisions firms make in the market and the ways those decisions are taken. For instance, how firms set prices and decide on R&D budgets, advertising and etc. are some attributes to firms' behaviour. *Performance* leads to the key question of whether or not firms' operations "contribute to overall economic welfare", which can be dealt with how well firms satisfy the consumers in a given period within an economy (Ferguson & Ferguson, 1994, p. 15). The sense of these terms within the paradigm carries significant meaning: it argues that performance is determined by the conduct of firms, which is determined by the characteristics of the market structure (Cabral, 2000, p. 12). This linkage between structure, conduct and performance is endeavoured to fit in the structural characteristics of a market such as the models of perfect competition or imperfect competition, monopoly and oligopoly. Such relatedness identified by the paradigm will certainly help to map out firms' behaviour within a particular market structure.

According to the IO theory, in a perfect competition model (numerous buyers & sellers) firms are engaged into fierce competition (e.g. price war), which leaves them unable to influence the price determined by the market thus likely to gain only marginal profit in long term. Firms struggle with attaining as well as retaining competitive advantage in such condition where the market structure determines their performance. In contrast, this traditional premise of structure determining performance seems "unsound" according to a number of theorists and economists (Ferguson & Ferguson, 1994, pp. 17-19). Literature for "new industrial organization", for example Tirole (1994) and others, stirred away from the prominence of structure, rather arguing *conduct* as the key element, which interacts both structure and performance.

Concerning the conduct or firm's behaviour, Russo & Fouts (1997) claimed the resource-based view (RBV), which will be discussed later, grew out of a frustration with the Structure-Conduct-Performance paradigm of the IO view. Referring to the work of Porter's "Competitive Strategy" in 1980 and Bain's "Industrial Organization" in 1959, they argued the IO view - that a firm's success is wholly determined by its external environment - to be unrealistically limited. To counter the IO view, theorists like Prahalad & Hamel (1990) and others built the RBV theory around the internal competencies of firms, which determines its competitiveness over others.



2.3 Resource-Based Theory

The resource-based theory, also known as RBV, deals with firm's ability to deliver sustainable competitive advantage. According to Wernerfelt (1984), the underlying principle of RBV implies the basis for competitive advantage of a firm "primarily lies in the application of bundle of valuable resources at the firm's disposal." Based on Daft's (1983) previous work, Barney (1991) defined *firm resources* as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness." He argued that the heterogeneity and immobility of the resources made it possible for a firm to obtain sustainable competitive advantage.

Amit & Schoemaker (1993) further distinguished the differences between *resources* and *capabilities*, as resources are tradable and non-specific to the firm while capabilities on the other hand are deeply embedded in the firms. Makadok (2001) defined *capability* as a special type of resource - an organizationally embedded non-transferable firm-specific resource whose purpose is to improve the productivity of the other resources possessed by the firm. Thus there are two managerial mechanisms can be applied. The resource-picking mechanism asserts that firms create economic rent by being more effective than their rivals at selecting resources, while the capability-building mechanism emphasizes on being more effective at deploying resources.

Later, scholars added the organizational view into the resource-based theory. For instance, Barney further developed the 1991 VRIN framework to *VRIO*, arguing that Value, Rarity, Inimitability and Organization are the four criteria to examine the competitive potential of a firm's resources, thus emphasizing more on the organization's capability to support and deliver the exploitation of its valuable, rare and costly to imitate resources (Barney, 1991; Barney & Clark, 2007, pp. 69-72). Similarly, Teece et al. (1997) proposed *dynamic capabilities*, "the ability to integrate, build, and reconfigure internal and external competencies to address rapidly-changing environments." By using this new term, they concentrated on organizational learning, firm's ability to develop and leverage its strategic assets while being able to reconfigure its existing assets for transformation as a necessary component to respond the changing environment. As Barreto (2010) identified: "A dynamic capability is the firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base."

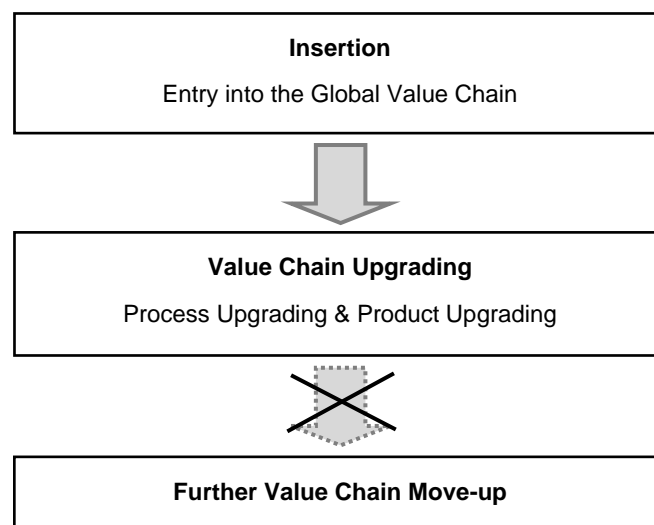


To sum up, the resource-based theory addresses the *fitness* between ability and opportunity: what the firm is able to do and the opportunity it has to do, as Russo & Fouts (1997) argued that firm’s resources only become valuable under the conditions where the external factors meet firm’s internal capabilities. They quoted from Collis & Montgomery (1995): “Resources cannot be evaluated in isolation, because their value is determined in the interplay with market forces. A resource that is valuable in a particular industry or at a particular time might fail to have the same value in a different industry or chronological context.” However, the weakness of the resource-based theory remains as little is considered how these resources and capabilities are developed, integrated or even employed within as well as outside the firm (Barreto, 2010).

2.4 Conceptual Model

In earlier sections several theories have been introduced, embarking upon global value chain network, market structure, firms’ performance, resources, capabilities and etc. Based on that, the authors intend to develop a conceptual model, which corresponds with those theoretical premises. Referring to the development of a conceptual model, Järvelin & Wilson (2003) noted that all research has an underlying model of the phenomena it investigates, regardless if that is tacitly assumed or explicitly, such model provides “a working strategy, a scheme containing general, major concepts and their interrelations.” In that case, acknowledging GVC as an underlying phenomenon, the following model (Figure 4) is proposed, trying to understand as well as explain firms’ value chain move-up process in accordance to theories.

Figure 4. Conceptual model of value chain movement



Source: Authors

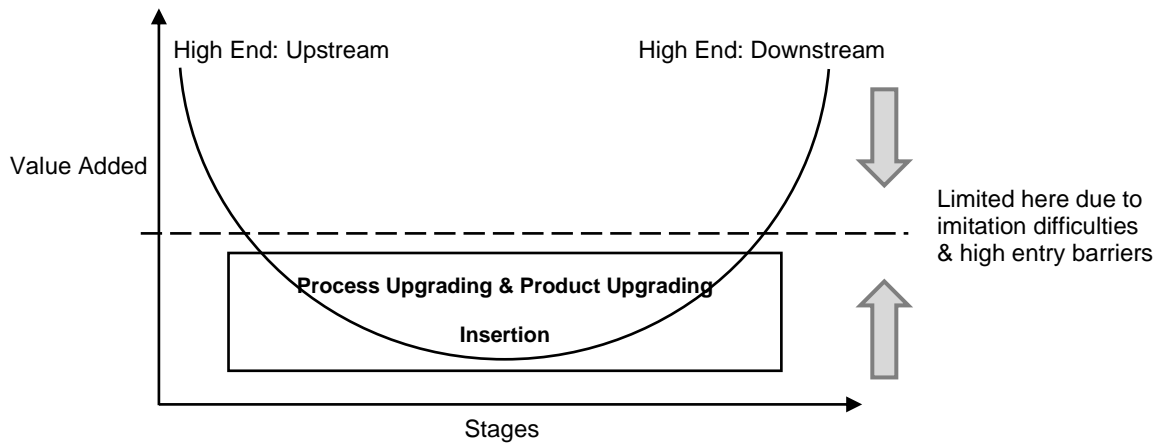
In the model, **insertion** refers to firms being in a certain GVC or an international production network where they may just produce a small part of the final products. However, insertion to such network or GVC carries intrinsic value for suppliers as it can open up further possibilities leading to upgrading (UNIDO, 2002). Humphrey (2004) argued that once entering into GVC there are technological learning effects that arises from supplier-buyer relationship, which promotes the upgrading. Firms from emerging markets enhance their production capability by upgrading their process technologies and etc, and later intend to produce advance or further complicated products, which can be captured mainly as **process upgrading** and **product upgrading**. They are capable to do those upgrading not only due to their intrinsic motivation such as improving the efficiency and being more profitable, but also due to the extrinsic pressure and requirements from their advanced customers by whom the possible knowledge sharing and transfer are “permitted”. However, they shall go no further.

According to Grant (1991), competitive advantage of a firm is determined by the firm’s capability or competency to utilize its assets to generate superior performance. With respect to the RBV, those resources or capabilities are described as valuable, rare and most importantly, inimitable. Thus if the firms from emerging markets want to further move up along the value chain, they will face huge challenges as they lack the capabilities to compete with the incumbent firms nor can they imitate those core competences. Moreover as indicated by the IO theory, firms in the perfect competition market cannot make any more money than necessary to cover its economic costs. The manufacture supplying market of ICT products is quite close to the perfect competition, thus those firms are struggling with low profit and facing difficulties to invest in alternative solutions. Last but not least, high entry barriers to the upstream and downstream also block the manufacturers’ presence there, as they are likely to lag behind in R&D competences, technical and market development skills, as well as distribution channels.

Figure 5 is endeavoured to apply the conceptual model over the Smiling Curve. The figure indicates there are strong incentives for firms to move towards the high end of the value chain since it offers further value appropriation potentials. It is true that insertion into the global network and deployment of process and product upgrading can gain the latecomer firms some value added benefits, however, the authors argue that firms cannot move up further due to the inimitability of core resources required to catch up on high end of the value chain as well as the high entry barriers that exist.



Figure 5. Applying the conceptual model over the Smiling Curve



Source: Authors

3. Methodology

This chapter provides the methodologies employed to carry out the research as well as some reasoning behind the authors' choices. It covers the choice of literature, research approach, design and process, as well as the case selection and data collection.

3.1 Choice of Literature

Since the Smiling Curve is one way to illustrate the value chain and the purpose is to study firms' movement along the curve, the authors first focus on the global value chain upgrading theory which provides the basic structure and perspectives of the research. The industrial organization theory and resource-based theory that emphasize the power of market structure and firms' capabilities respectively are also included. Those three theories set up the main theoretical umbrella of the thesis.

3.2 Research Approach

In order to investigate the research question, a deductive approach is employed. This approach commences from a general theoretical understanding where the researcher derives (deduces) an expected proposition, which is then tested through observations and finally confirms the probable outcome (Babbie, 2010, pp. 48, 51). Correspondingly, in this research a conceptual framework provides the theoretical ground, based on which a conceptual model is developed and tested by empirical study, and finally leads to a revised model to corroborate the conclusion.

Moreover, the authors employ case studies during the empirical section. According to Yin (1994, p. 37), case studies are appropriate when it addresses questions such as “how” and “why” while it aims to observe a phenomenon within the “real-life” context. In addition, case studies allow researchers with opportunities not only to challenge or confront models and theories, but also engage with authors' own understandings and experiences in order to “confirm, challenge or extend the theory” (ibid). Therefore, a case study approach appears to be appropriate for this research as it provides a practical platform of value chain movement conformed by companies.

3.3 Research Design

3.3.1 Research Process

The research begins with a conceptual framework providing the theoretical ground. The purpose of the conceptual framework is to identify and understand theories related to value



chain movement as well as to gain a preconception on the research enquiries. Based on the issues identified with conceptual framework, the authors develop a conceptual model that aims to configure the value chain move-up process under the theoretical umbrella. In order to test and validate the proposed model, further observation is required which primarily calls for empirical study.

The empirical study is conducted through three cases related to value chain move-up process. After gathering the case data, the next step moves to the interaction and interpretation between the conceptual framework and empirical evidences. This allows the initial conceptual model to be confronted with reality. While proceeding, however, the authors find certain assumptions of the initial model are disconfirmed by empirical verification. It then leads to the redevelopment of the conceptual model which describes the move-up process and finally finds convergences of the existing theories and cases.

3.3.2 Case Selection

There are a handful of ICT companies from emerging economies that have successfully moved up along the Smiling Curve, while a much larger proportion of them haven't. The three case companies Foxconn, Acer and HTC that are chosen for this study all come from Taiwan. The case selection is made upon convenience sampling, by which "elements for the sample are selected for the convenience of the researcher" (Black, 2009, p. 224). This is due to the facts that 1) one of the authors is Chinese thus more familiar with the related business environment and also able to investigate more data that is written in case companies' mother language apart from English; and 2) being a pillar industry of the Taiwan economy, the ICT industry has bred quite a number of successful companies that fit the study. Meanwhile, the authors are also aware that bias is introduced by using convenience sampling technique (Black, 2009, p. 226), however this is hard to avoid anyway considering the number of the possible case samples available and the scale of the study.

Among the three case companies, Foxconn is a typical example of no-move-up, as it has been an unknown manufacturer behind lots of famous brands and products for years. Only until recently its name became more familiar to the public due to the infamous employee suicide clusters (Branigan, 2010), which clearly is not the way that Foxconn had ever wished.

On the other hand, computer giant Acer has long time been recognized as a symbol of the latecomers that has successfully seized its position on the value chain high end, while HTC earned its reputation as a branded mobile phone supplier very recently. Both of the two



companies have their own strategies to capture higher value added and the authors tend to search for the common essences among them.

3.3.3 Data Collection

The case studies are conducted based on secondary data by using company official websites, books, written cases, newspaper reports, journal articles and etc. This is due to the facts that 1) the top management who are capable / authorized to answer the strategic questions regarding value chain movement are extremely difficult to get contact for a deep interview; and 2) the behaviour and performance of the firms in the past years are quite easy to observe even as an outsider, since all of the three case companies are public listed.



4. Empirical Evidence

Three ICT firms from emerging economies are presented in this chapter for in-depth empirical study. All from Taiwan, Foxconn, Acer and HTC are operating in the electronics manufacturing, computer and telecommunication business respectively. The discussion of each company proceeds as following: a company background presenting how they initiated their business, a description of their development over the years and lastly where they stand today. The chapter is then winded up by a brief summary of the case companies.

4.1 Foxconn

The low profile Hon Hai Precision Industry Company Ltd (thereafter as “Foxconn”), the anchor company of Foxconn Technology Group, is the world’s leading EMS provider. It offers joint-design, joint-development, manufacturing, assembly, and after-sales services to global computer, communication and consumer-electronics leaders (Foxconn, 2011).

Foxconn was founded by Terry Gou in Taiwan 1974 with USD 7,500, started as a manufacturer of plastic channel-changing knobs for black-and-white television sets. Foxconn entered the PC industry by producing connectors in the early 1980s and by 1985 it has established the US branch and introduced its own brand “Foxconn”. The company set up its first factory in Mainland China in 1988 to take advantage of the cheap labour and land rental cost, where its major production sites now locate (Dean, 2007; Foxconn, 2011; ifeng, 2010).

Foxconn expanded extremely fast in the 1990s with the growth of the PC industry and the prevailing of Internet. As a result, it was listed on the Business Week IT 100 in 1998 for the first time and two years later reached the revenue of USD 3 billion. Foxconn went through a series of merge and acquisitions during the 2000s. It became world’s largest EMS provider in 2004 with the revenue of USD 17.2 billion, later also as world's largest handset and digital still camera manufacturing services provider. In 2010 it was listed No. 122 of the Fortune Global 500. Nowadays with over 700,000 employees worldwide, Foxconn is listed in Taiwan, London, Hong Kong and NASDAQ stock markets together with some of its subsidiaries (Fortune, 2010; Foxconn, 2011; Hon Hai, 2010).

Foxconn’s current products include PC components and connectors under its own Foxconn brand which may somehow help to lower the OEM production cost, but the majority of its production capability is to provide EMS to customers, including Hewlett-Packard, Dell,



Sony, Nokia, Motorola, Nintendo, and most notably Apple (Dean, 2007). With the boost of Apple iPhone and iPad, Foxconn is predicted to take half of the global EMS market in 2011 (Dinges, 2010). However, the fast growing market share and revenue (CAGR>50%) do not guarantee higher profit, its gross profit in 2010 further decreased to 8.1% from 9.5% the year before (Foxconn, 2011; Liao, 2011; TWSE, 2011).

In fact, although Foxconn is focusing on fields of nanotechnology, wireless connectivity, material sciences, and has set up several R&D centres around the world (Foxconn, 2011); it is still mainly operating in the low value added manufacturing activities and fights for larger economies of scale, particularly compared with Apple which is known for strong control of the value chain. For example, Foxconn's estimated revenue of assembling one iPad 32G CDMA version is merely USD 10, which accounts only 3% of Apple's total manufacturing cost (USD 333) and 1.4% of the retail price (USD 729) (Rassweiler, 2011). With its continuously large investment of the production facilities in China, we see no signal that Foxconn is going to change the strategy and move towards higher value added activities in the near future.

4.2 Acer

Acer is a Taiwan-based multinational enterprise engaged in research, design, manufacture and distribution of computers, peripherals, media electronics and related IT products. Its product range includes desktop PC, notebook computers, mainframe servers, high-definition televisions (HDTVs), liquid crystal display (LCD) monitors, projectors, handheld & navigational devices, and most recently smartphones. Acer is headquartered in Taiwan and has a global workforce of 8,000 employees (Acer, 2011a).

The company was established in 1976 as Multitech International Corporation. Founded by Stan Shih, his wife and a group of friends, it began with only eleven employees and a capital of USD 25,000. Initially, Multitech was primarily a distributor of electronic components until offered its first PC in 1981. In 1982, the company introduced a Chinese home computer for the Taiwanese market. It started to manufacture IBM-compatible PCs the same year while in 1984 introduced its own IBM-compatible PC. The company changed its name to Acer in 1987 and went public on the Taiwan stock market next year.

Acer had its first annual loss of USD 22.7 million in 1991, of which USD 20 million came from Acer America, thus called for restructuration of the company globally. The famous



strategies such as “fast food production”, “client-server organization” and “global brand, local touch” are developed during this period (Dedrick, Kraemer, & Tsai, 1999; Shih, 2005, p. 175). After the successful reorganization, Acer achieved an annual growth of over 70% during 1992-1995 to reach the revenue of USD 5.7 billion (Mathews, 2002, p. 64). Meanwhile the company also grew to be ranked as the 8th largest PC brand in the world. However, as Acer ran into severe price competition with leading PC makers and continuously faced difficulties with its DRAM operation, the revenue growth stagnated with profits declined by 68% from 1995 to 1997 (ibid). Hard competition due to the rise of cheaper PCs in 1999 caused Acer to cut jobs in the US. While this allowed the company to “streamline” the operations, it also came along with the withdrawal from the US retail market (Slob, 2005). Acer soon concentrated on providing online sales & services of software and hardware products as well as customer support for users. Launching a digital service business and a venture capital operation to invest in promising Internet start-ups are some of the examples of its new focus (ibid).

Meanwhile, Acer also experienced many merge and acquisitions, even pill-offs. For example, it took over Altos Computer Systems in 1990 and bought Texas Instruments’ mobile PC division in 1997. In 2001, Acer spun off its contract manufacturing and peripherals units, which were renamed as Wistron and BenQ respectively. It reinforced the presence on the US and European markets by purchasing Gateway and Packard Bell in 2007 and 2008. Today Acer ranks No. 2 both for total PC and notebook shipments, with the revenue of nearly USD 22 billion in 2010 (Acer, 2011a, 2011c; Datamonitor, 2010; Shih, 2005, pp. 277-279).

Acer is widely known for its acute focus on technology driven innovation and its strength lies in the portfolio of products under strong R&D capabilities. With the R&D centres located in the US, Taiwan and Mainland China, rigorous product design and development have allowed the company to compete ahead of others (Tsai & Cheng, 2006). However, the recent period holds out a different scenario. Acer suffered a net profit decrease by 3.3% from 2008 to 2009, also with its PC market share declined from 13.3% to 12.7% in 2010 (Datamonitor, 2010). Situation mounted up when the CEO of Acer was let go in April 2011 as an effort to seek new leadership in order to reinvent the company’s development, or in Stan Shih’s words “focusing on profit margin rather than sales volume”. Acer is said to pay more attention on the Tablet PC and smart phone markets, trying to regain its market power in the coming years (Kuang, 2011; Lee & Ong, 2011).



4.3 HTC

HTC Corporation (thereafter as “HTC”) is a leading innovative supplier of mobile information and communication devices, especially in the current fast-growing smartphone segment. HTC has around 9,000 employees, with its headquarters, main R&D centre and manufacturing facility based in Taiwan (HTC, 2011a).

Formerly named High Tech Computers Corporation, HTC has a relatively short history. It was founded by Cher Wang, HT Cho and Peter Chou in Taiwan 1997, started as notebook computer manufacturer. Ms. Wang foresaw the bright future of hand-held devices and pushed the company shifting to cellphone business, and that brilliant decision has made all the differences. HTC went public on Taiwan stock market in 2002, entered Business Week’s IT 100 list in 2005 for the first time and lifted from No. 11 to No. 3 one year later. HTC started to market the products under its own HTC brand since June 2006, and thus ended the era as an OEM supplier only (Holson, 2008; HTC, 2011a). In 2010, it achieved the revenue of USD 9.6 billion, nearly doubled the number of 2009 and ranked as the 31st most innovative company in the world by Fast Company (Fast Company, 2010; HTC, 2011c). According to Bloomberg, HTC has surpassed handset giant Nokia in terms of market value recently, and is now ranked third behind Apple and Samsung among smartphone makers in the same term (Forbes, 2011).

The success of HTC can be attributed to its new business model to some extent. Knowing the OEM services can only generate low value added, HTC decided to bypass the mobile giants such as Nokia but to set up direct contacts with their clients, the international telecom operators such as Orange, T-Mobile, Vodafone and Verizon. In fact, it has established partnerships with the leading five operators in Europe, the top four in the US, and many fast-growing Asian operators. In other words, HTC designs and manufactures the products according to different operators’ requirements, which not only can save cost for both parties but also speed up the reaction to the market (HTC, 2011a; Zhang, 2005). It is also worth to mention that unlike other firms from emerging markets, HTC went for the developed countries earlier than its local market. Years after its success in the US and Europe, HTC launched its brand in China only in July 2010 and announced its partnership with China Mobile (HTC, 2010).

On the other hand, HTC is also known for its strong R&D capability and innovation. Not only the R&D team accounts for 25% of the total headcount, but also will it set up the third



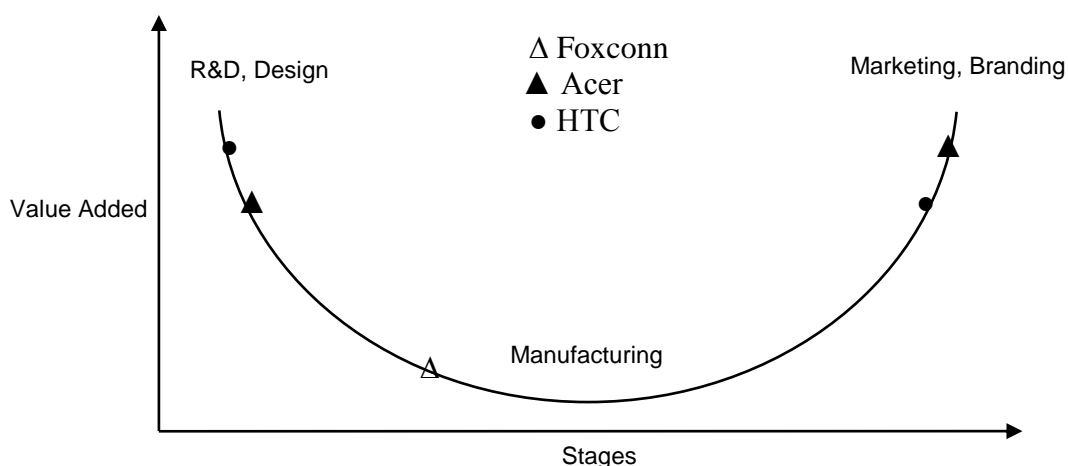
R&D offices in the US apart from the main research centre in Taiwan (CNET, 2010; HTC, 2011a). HTC has achieved a series of “first”. Being a long-time partner of Microsoft, it made the first Microsoft Pocket PC in 2000, the first Microsoft wireless Pocket PC as well as the first Microsoft powered Smartphone in 2002, later even the first Microsoft 3G Phone in 2005 (HTC, 2011a). In 2008, HTC produced the first Google phone HTC Dream (T-Mobile G1) and shifted its focus from Windows Mobile OS to Google Android OS. It then opened a new chapter not only for the smartphone business but also for itself, since the Android OS soon be welcomed as a popular new platform after Apple’s iOS (HTC, 2008).

But the story does not end here. HTC has announced the plan to unveil its first Tablet PC HTC Flyer in mid-2011, which might be a potential strong competitor against Apple’s iPad (HTC, 2011b). Moreover, HTC has been reported to be a possible bidder for the struggling Palm, thus may introduce its own smartphone operation system in the future to compete with current market leaders Apple, Google and Microsoft (Culpan, 2011).

4.4 Summary of Case Companies

All of the three case companies are from Taiwan, operate in the electronics manufacturing, computer and telecommunication business respectively and provide all kinds of electronic products (computers, cellphones and etc.). Among them, Foxconn is the only firm that has not moved up along the value chain but still concentrates on manufacturing; both Acer and HTC have found their ways to engage with higher value added activities. Acer is considered to be better at downstream distribution channels while HTC is relatively stronger in the upstream R&D. The positions of them are mapped on the Smiling Curve as Figure 6.

Figure 6. The position of case companies on the Smiling Curve



Source: Authors

Some basic facts of the three case companies as well as their financial data in fiscal year 2010 are presented in Table 1.

Table 1. Summarized facts of the case companies

Facts		Foxconn		Acer		HTC	
Business Area		EMS		computers, media electronics, IT		mobile information and communication devices	
Major Products		PC components & connectors under Foxconn brand, OEM products for others		desktops, notebooks, netbooks, servers, HDTV, LCD and etc.		smartphones	
Year of Establishment		1974		1976		1997	
Founder		Terry Gou		Stan Shih & associates		Cher Wang, HT Cho and Peter Chou	
Started as		manufacturer of plastic components		distributor of electronic components		notebook computer manufacturer	
Moved to		PC industry by producing connectors in 1980s		computer industry (OEM, ODM, OBM) in 1980s		hand-held devices, and launched the HTC brand in 2006	
Current Position		No. 1 EMS provider		No. 2 in global PC and notebook shipments		No. 3 smartphone makers in terms of market value	
Stock Listed in		Taiwan, London, Hong Kong and NASDAQ		London and Taiwan		Taiwan	
Fiscal Year 2010 (million USD)	Revenue	102,855	100%	21,595	100%	9,570	100%
	Gross Profit	8,380	8%	2,214	10%	2,879	30%
	Operating Income	2,955	3%	625	3%	1,515	16%
	Net Income	2,649	3%	519	2%	1,357	14%
	ROA	6%		5%		21%	
	ROE	15%		16%		53%	

Source: Authors' compilation



5. Analysis

The purpose of this chapter is to build the bridge between the conceptual framework and the empirical data in order to answer the research question. The analysis is carried out in two folds. First the theoretical assumptions are applied onto the empirical evidences from case companies to test if they match. Following this, a revised conceptual model is presented, which reflects upon the first conceptual model. Finally the chapter is concluded with discussion on the limitations of the model.

5.1 Global Value Chain and Latecomer Upgrading

An international production network or the GVC enables local producers to learn a great deal from the global leaders. Such learning opportunity apparently offers the scope for upgrading through the acquisition of technological capabilities within the value chain. Firms introduce “process upgrading” and “product upgrading” by adopting process and product technologies; finally acquiring entirely new skills allows the firms to move into “functional upgrading” where they stretch into new business areas. The upgrading behaviour appears to be driven by firms’ value seeking motives since possessing more capabilities is likely to generate more value. Therefore, insertion into a GVC network promotes upgrading, providing the means for moving up along the value chain. In other words, the GVC is the “entry point” that opens up possibilities for further development, and firm’s ability to identify higher return opportunities is the key to value appropriation. However, it is yet to configure how the upgrading activities proceed and their due implications.

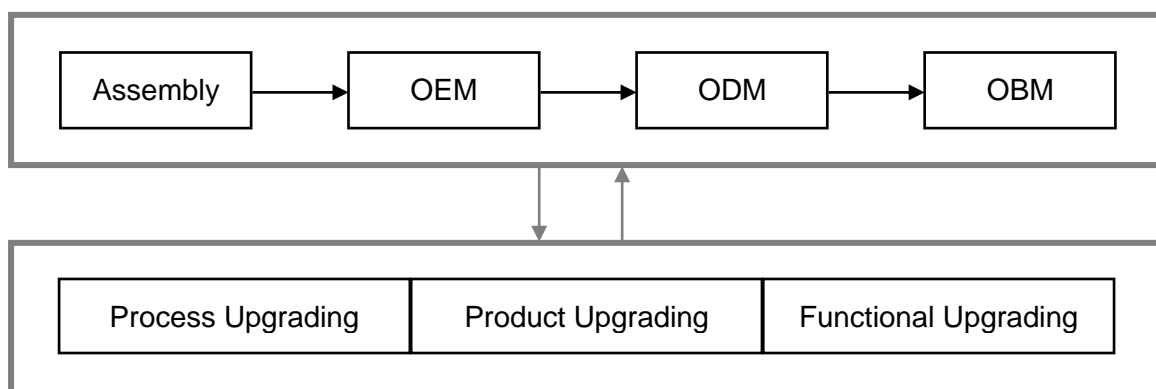
5.1.1 Is Upgrading an Incremental Process?

The upgrading strategies comprise not only the acquisition of capabilities as Hobday (1998) stated, but also involve changing relationships with buyers and markets: as firms acquire further capabilities, they too require finding buyers and markets in order to supply products that embraced with those capabilities. This process of incorporating capabilities, buyers and markets may be led by certain sequences. Following the footsteps of Wortzel & Wortzel (1981) who underlined the export marketing behaviour of developing countries and Hobday (1998) who investigated technology upgrading of electronics production (somewhat ICT industry) occurred to Newly Industrializing Economies in East Asia during the 1980s to 1990s, an “upgrading trajectory” of manufacturing firms from emerging economies was illustrated by Humphrey (2004) (Figure 7).



From an industry perspective, an important transition can be identified in Figure 7, which indicates the shift from Original Equipment Manufacturer (OEM) to Original Design Manufacturer (ODM) to Original Brand Manufacturer (OBM). In contrast to technologically advanced firms from developed countries, latecomers from emerging markets have exposed quite a different pathway of upgrading. They are perceived to be moving backward from the mature stages of product cycle (e.g. process innovation) to early stages (e.g. product development), which stands as a reversal of product life cycle proposed by Vernon in 1960s (Hobday, 1995; Hsu, Poon, & Yeung, 2008).

Figure 7. Upgrading trajectory



Source: Humphrey, 2004

Indeed, firms were confined to assembly services under early forms of OEM, which were soon overcome by producing small and/or non-complex components. On the contrary, ODM signifies firms’ acquisition of complex production technologies and component design abilities, allowing them to supply higher value added products and eventually lead to OBM. Then again, although the latecomer firms seemingly engage in an incremental process of technological acquisition, the “linear progression” suggested in Figure 7 might not occur. Hobday (1995, 1998) observed some early entrants such as Samsung from Korea commenced with simple tasks, and then gradually developing skills and knowledge in a cumulative manner. However, later entrants such as HTC and Acer may rather “jump” into more advanced levels while missing out the early stages or “embodying” several stages simultaneously.

HTC almost skipped the OEM stage and commenced as an ODM - design and manufacture PDA and phones for branded companies and telecom operators such as Hewlett-Packard and T-Mobile (Hsu et al., 2008). Earlier HTC operated as a contract manufacturer with little

connection to end-users until it won the ODM contract for T-Mobile G1 smartphone powered by Google’s Android operating system. It was shortly after the G1 substantially struck the market that the company started to offer Android phones under its own brand (ibid).

Similarly, Acer didn’t necessarily follow the “upgrading trajectory”. Table 2 presents a few of Acer’s achievements during the early phase of its development, which reveals that the company was engaging into OEM and OBM simultaneously while designing PC components. During the 1980s and 1990s, Acer upgraded its capabilities through a number of innovations based on solid product and process technologies. Meanwhile the company directly distributed its own branded products to the customers in the US and European market during 1992-93. However, despite progress in design and branding, Acer still relied on OEM for around 50 percent of its monitor sales and a significant proportion of PC sales in 1992 (Hsu et al., 2008). This led to the question: where and how firms get such upgrading know-how?

Table 2. Some early-phase activities of Acer

1982	Manufactured & assembled IBM-compatible PCs
1984	Developed its own version of 4 bit microcomputer
1986	Launched the world’s second 32 bit PC, after Compaq but ahead of IBM
1988	Began developing supercomputer technology using Unix operating system
1989	Produced its own semiconductor ASIC to compete with IBM’s PS/2 technology
1991	Formed a joint venture with Texas Instrument to make memory chips (DRAM)

Source: Dedrick et al., 1999; Hobday, 1998

5.1.2 Acquiring Upgrading Know-How

Key global buyers opt to help local producers from emerging economies to improve technical and organizational skills in order to raise their product quality and production efficiency; in return, the buyers also benefit from scale economies. However, the critical question is how value chain relationships affect the process of learning, innovation and the acquisition of technological capabilities. On one side, the global buyers can provide product outline, assist with design and specification, deliver information on current market goods, production processes and etc. On the other side, knowledge creation and technology transfer can be stimulated by the means of Contract Manufacturing, Joint Venture, Licensing and etc., thus improve firm’s overall capabilities. Moreover, there is also “learning-by-doing” approach that may force suppliers to upgrade their design and integration skills in order to meet the buyers’ demand better and more flexibly.



As for the case companies, Acer was a major OEM supplier to Hitachi, Canon, AT&T and etc. at the time, and diversified into semiconductor business by forming a joint venture with Texas Instrument in 1991 which allowed it to design and produce DRAMs in Taiwan. Furthermore, although Acer used to be dependent on leaders for core design technologies under its OEM business, this early OEM experiences did lead Acer to work as a subcontractor for Intel in 1993 and thus opened a brand new chapter of its business later (Hobday, 1998).

5.2 Functional Upgrading – from Imitation to Innovation

So far, the successful insertion into the GVC is seen as a result of “supply-side” development that intensely focuses on process and product upgrading. It is also acknowledged that the value-seeking incentives motive the firms to move further and approach functional upgrading. The underlying question is how a firm can achieve a successful upgrading on its value chain by acquiring new functions. It is obvious that they will need new sets of skills. The authors assume it is a process from imitation to innovation.

According to the resource-based theory, firms need certain resources or capabilities to gain and sustain the competitive advantages against the others. As for the latecomers, it will be natural to begin with some extent of imitation of the incumbent firms in these new areas. But on the other hand, the same theory also identifies the difficulty to imitate the true “core capabilities” as they are defined to be “inimitable”. Then, how can the latecomers do it?

One of the answers might be to start with easier things first. Yes, capabilities are usually embedded within the firms and thus hard to be imitated; however business models, company strategies, even some features of the products are protected by lower barriers. Many firms amend the ideas from their advanced rivals - often through adoption and minor modification, and offer less complex products to the lower end of the market. Moreover, accumulation of capabilities is time-consuming and can not be achieved without real business involvement, so to start with imitating the imitable could be a good approach for the beginners, although it is short-term oriented and can not last for long.

Being a copy cat means you always have to follow the others. It is not the ideal way to win the leading position as it is too difficult to succeed. This is the time that innovation steps in, which is the key factor to move up the value chain, and/or to stay at the high end of it.



5.2.1 Product and Process Innovation

As Dicken (2007, pp. 93-95) noted, a continuous stream of new products and an advanced production process are essential for a firm to seek profitability and survival in an intensely competitive environment. Hence, product innovation derives from the concept of product life cycle, which points out the demand for a product will decline over time. Besides, only product innovation can assure the long run growth for a firm under a dynamic environment with increasing customer demands and requirements. In other words, being the key to the question “what can we bring to the market?” product innovation targets at providing better or different products compare to those that are available on the market at the time.

On the other hand, process innovation offers a close relationship between the progress of a product through its life cycle and the way it is made (Milling & Stumpfe, 2000). It focuses closely upon interrelated decisions such as the technique or the scale of production, and aims at converting the production into a more effective and efficient way. That is to say, process innovation is the technological and/or organizational answer to the question “how can we do it more productively?”

Before going further, it is necessary to stress the difference between product and process “innovation” and “upgrading” as they are quite easy to be confused. Upgrading means to improve to a higher standard, for example, intensifying a firm’s competence through adding or replacing skill is considered as an upgrading activity. On the other hand, innovation is very much linked with invention, in other words, introducing something entirely new. Thus product and process upgrading refers to firm’s acquisition of capabilities to improve the current ones, while product and process innovation implies firm’s own creation of new product and process.

As for the case companies, both product and process innovation are witnessed. For instance, in 2005 Acer released Ferrari 4000 notebook, the first ever notebook in the world that incorporated technology pioneered by Formula One and aerospace industry (Slob, 2005). The following year it launched Small Form Factor (SFF) PC, meeting the demands for heat dissipation and energy efficiency (Acer, 2011b). Moreover, Acer released the world’s first Dual-SIM smartphone supporting both 3.5G (HSDPA) and 2.75G (EDGE) SIM cards in 2009 (Datamonitor, 2010). Likewise, Acer also set a good example of process innovation. It went through a series of organization restructure in the 1990s under three major strategies. One of them, the “fast-food business model” coined by Stan Shih, shaped Acer’s operational



procedures and enabled it to assemble computers around the world. By decreasing the distance between supply and market, Acer's inventory turnover was cut by half (Shih, 2005, p. 125). Acer was not only focusing on organizational process innovation but also technological process innovation. Its "ChipUp" technology raised the idea of replacing only the CPU to upgrade the computer and greatly accelerate its operating speed. Acer was then able to develop a motherboard that ran all kinds of Intel microprocessors. Furthermore, with Acer's "Screwless Housing" innovation, it took only 30 seconds to assemble one computer (Shih, 2005, p. 178). Those two technologies made the final assembly of computers very simple and significantly speeded up Acer's manufacturing process.

5.2.2 Innovation Forecast

The ICT industry is extreme competitive and dynamic and with short product cycle, making innovation forecast even more important. On one hand, consumers are obsessed by new features of the products, therefore every month loads of latest attractive products would hit the market. On the other hand, it takes time for the consumers to get used to a product thus the switching cost especially when switching between brands with different operation systems could be relatively high. Hence providing the "right" products for consumers is crucial for the ICT firms.

However, in such a complicated fast-changing market, the traditional market research methods do not fit any more. This is not only due to the time pressure but also the limitation of potential users' own real-world experience. In other words, normal consumers have difficulties to identify what kind of new products / features / functions they mostly would like to have. Von Hippel first introduced the term *lead users* in 1986, arguing not only can they serve as a need-forecasting laboratory, but also provide new product concepts and design preferences. He defined lead users of a product, process or service as who 1) are at the leading edge of important trends in a marketplace and currently experiencing the needs months or years before the bulk of that marketplace, and 2) are positioned to relatively high benefits by obtaining a solution to those needs and so may innovate (Franke, von Hippel, & Schreier, 2006; von Hippel, 1986). Many empirical studies have shown the effectiveness of the lead user theory and the idea is also spreading rapidly in the business world. For example, the average annual sales of lead-user project products at 3M was found out to be eight times higher than the sales of products conducted by more traditional projects (Lilien, Morrison, Searls, Sonnack, & von Hippel, 2002).



As for the ICT industry, the majority of the customers can be described as care for the technologies embedded in the new products but also behave more sensitive to the price, service and other relative factors. Mouth-to-mouth communication counts a lot for their buying decision, and they are also more likely to use the call centres and retail shops to keep contact with the firms when necessary. On the other hand, lead users is a small group that very keen to the new technology development and would like to experience the new generation products as soon as possible. The high switching cost of getting used to the products (not the purchasing price though) that applies to the normal customers is likely to be considered as fun rather than cost. Those enthusiastic consumers are more willing and also more capable to provide their thoughts, feedback and expectations of the products through online forum, blogs, company websites and other channels. In fact, a considerable proportion of the lead users actually work in or are closely related to the ICT industry, so pursuing new technology trends is not only a hobby but may also benefit their own jobs.

Although the normal users of ICT products can spread around the world, the leader users are mostly located in the developed countries, especially in the US and Western Europe. One of the reasons is that new products are usually available in those markets earlier than the rest of the world. For example, Apple’s latest product iPad 2 was launched in the US market on March 11, 2011, supplied to other western countries from March 25, and will be available “in many more countries around the world in the coming months” (Apple, 2011). In such a dynamic industry, if your access to the product is months later than the first customers, you certainly can’t be considered as a lead user.

Not surprisingly, all of the three case companies have part of their R&D facilities located in the developed countries (Table 3). Apart from the advanced R&D capabilities, the authors believe that the close distance to the leader users may also be a reason.

Table 3. Selected R&D facilities of the case companies²

Firm	R&D facilities in emerging markets	R&D facilities in developed countries
Foxconn	China, Taiwan, Korea, India	US, Denmark, Hungary
Acer	China, Taiwan	US
HTC	Taiwan	US

Source: CNET, 2010; FIH, 2011; Tsai & Cheng, 2006, pp. 197-199

² Not all R&D facilities are listed.



By cooperating with leader users, firms may stay at the cutting-edge of the innovation. Although generally speaking there is no doubt that innovation is crucial to a company's success, the fail of many original / leading innovation firms have also been witnessed in the real business world. Sometimes it is the problem of whether the product fits the market; others simply hand over the market power to the latecomers due to various reasons. For example, IBM produced the first widely adopted PC but more profits of which were ultimately captured by Intel and Microsoft, and finally sold its PC division to Lenovo in 2005.

Teece's profiting from innovation theory provides a good framework for the analysis, which argues that the *complementary assets* is one of the three fundamental elements that decide who can benefit from innovation. The complementary assets can be categorized into three classes - generic, specialized and co-specialized. Generic assets are general-purpose assets that need not to be tailored to the innovation in question. Specialized assets are unilateral dependent with the innovation, while co-specialized assets have bilateral dependence (Teece, 1986).

Dedrick, Kraemer, & Linden (2008) made an extraordinary study to see who profits most from the iPods and notebook PCs. The result turns out to be quite surprising - it is not the original innovators that enjoy the highest margin, but the ones that provide key complementary assets such as Broadcom and Microsoft (Table 4).

Table 4. Gross profit comparison of key inputs in the Apple iPod and HP nc6230

Product	Type	Input	Supplier	Price as % of Factory Cost	Supplier Gross Profit Rate
Apple 30GB 5th-Generation iPod (Video iPod), 2005	Processors	Video/Multimedia Processor	Broadcom	6%	52.5%
	Processors	Controller chip	PortalPlayer	3%	44.8%
	-	-	Apple	-	36%
Hewlett-Packard nc6230 Notebook PC, 2005	Processors	Main Chipset + Wi-Fi	Intel	24.0%	59%
	Software	Windows XP Pro OEM license	Microsoft	11.7%	85%
	-	-	HP	-	28%

Source: Dedrick et al., 2008

As the innovator is also dependent on the owner of them, the specialized and co-specialized assets become the key factors to appropriate value added of the final product. Thus large firms are more likely to possess the relevant key complementary assets within their boundaries at the time of new product introduction, while small firms are less likely to do so



due to the cost (Teece, 1986). But if think from the another angle, firms are then not necessary to be the leading innovators of the final products in order to capture more value; instead they may specialize in producing the important complementary assets or even try to innovate products which might become the key complementary assets of others.

5.3 Market Creation

In the previous sections, the upgrading process that firms may go through in order to move up along the value chain has been described. The process and product upgrading are likely to be welcomed by the global buyers as themselves could also benefit from cost saving. However, functional upgrading is a different story since it steps from partners into competitors. It is not surprising when the firms from emerging markets want to possess further value added they will have to encounter the competition with their former partners, and the great difficulties that lie ahead are imaginable. Apart from the lack of resources, there is also high possibility that those former partners which are not willing to nurture a new competitor would boycott, threaten to cancel the orders or even put the end of the partnership. And this is one of the reasons why so many firms are still stuck at the low end of the value chain - they simply cannot afford the consequences of losing current big customers. The typical example came from the Foxconn-Apple partnership. “Foxconn will never do what HTC and such have done”, quoted from its ex-employee. Apple shares a similar view, as one of its ex-manager commented that to launch Foxconn’s own brand doesn’t make sense, believing that Foxconn will not betray its customer and is actually in line with Apple’s business strategy (Global Supply Chain Council, 2010).

But what did the successful firms do to solve this dilemma? Well, the common strategy is to avoid the head-to-head competition but go the other way round. They tend to look out for new market opportunities and develop their own niches, either by introducing new product standards or by entering new market segments. Those efforts will eventually lead to creating a new value chain with high end topped by themselves.

5.3.1 New Product Standards

Another fundamental element of Teece’s profiting from innovation theory is the *dominant design*, the existence of which defines the tune of innovation and significantly affects the distribution of profits between innovator and follower. Before the dominant design appears (preparadigmatic stage), or in other words when there is no single generally accepted conceptual treatment, firms compete with each other on innovation of different solutions, hoping their own design will become the dominant one. Once the product design stabilizes



(paradigmatic stage), it is likely to have a surge of process innovation as producers attempt to lower production costs for the new product, and the competition shifts to price. The followers have better chances to catch up with the leading firms at this stage, if they can manufacture the products at a lower cost and with a faster speed.

Thus the best way to appropriate value added of an innovation is to set up the new standards of a series of products. Take the smartphone market as an example, where Apple's iPhone is considered as a dominant design. The latest market survey shows that being the largest single smartphone business (although on par with RIM BlackBerry), iPhone captures 27% of the US market. But just like Apple Mac vs Microsoft Windows PC, the Apple iOS also has its competitors, for example Google Android. Actually Android has become the most popular OS devices in the US, occupying 29% of the market as a whole, with HTC, Motorola and Samsung being the largest three operators (Nielsen, 2011). It might be a little bit surprising to see HTC on this list, but in fact the first Android phone was produced by HTC in late 2008 (HTC, 2008). Since then the advantages of the Android platform has been welcomed by the customers as well as different operators, but it was HTC that set up the new product standard declaring the Android powered smartphones can compete with the iPhone which hit the market a year earlier. HTC has been working closely with Google to provide new Android phone models on the market while benefit from its first-mover advantage. HTC's success can not only be attributed to luck, but also due to its amazing insight into the smartphone business and the wise decision to grab the market opportunity. Otherwise it will still be an unknown OEM supplier as Foxconn.

5.3.2 New Market Segments

Another way to play the indirect competition strategy is to enter new market segments, or even develop the segments by oneself. As Hobday (1998) described, the latecomer firms from emerging economies began to introduce their own designs for low-end goods after they gained large shares of production. This low-end market that requires lower price and less complex goods is actually a new market segment created by those firms that produce the corresponding goods. For example, Acer started to cultivate the Mexican market in 1994, and actually captured the largest market share in Latin America the same year, its Latin America subsidiary even went public on Mexico stock market in 1996 (Shih, 2005, pp. 278-279). It is quite obvious that the other computer firms were not taking the Mexican market seriously thus Acer could become the local leader.



The new market segment can also be a supplementary niche to the existing product range. Acer made a successful entry into new PC segment called “netbook”, which is referred to a kind of smaller and lighter notebook mainly associated with Internet use. Although the segment was initiated by another Taiwanese giant Asus in late 2007, Acer responded quickly as the second entrant of the new segment by launching its own netbook Aspire One in July 2008 (BusinessWire, 2008). It soon aggressively seized the market as the leader and outweighed Asus. By December that year, Acer had already captured 38.3% of the market share compared with Asus’ 30.3% (Guardian, 2008).

It is also worth noticing that the new product standards and the new market segments are not isolated, sometimes they actually come hand by hand. The instance is still Acer. In the early 1980s, its co-innovation of “Cangjie input method” by which Chinese characters can be entered into a computer using a standard keyboard became the industry standard at the time, and meantime Acer designed the first Chinese computer “Dragon” that later also became a standard in Asia (Hobday, 1998; Shih, 2005, pp. 44-46). Those product standards naturally helped to develop the Asian especially the Chinese computer market - a new segment was thus created.

5.4 Revised Conceptual Model

During the case studies on the ICT firms from emerging economies, the authors have witnessed similarities, patterns and trends, which also correspond under theoretical premises. Although the original conceptual model argues firm’s movement on the value chain should be limited, the empirical data shows that firms *can* catch up. Thus, the conceptual model is revised based on the empirical data and analysis above (Figure 8).

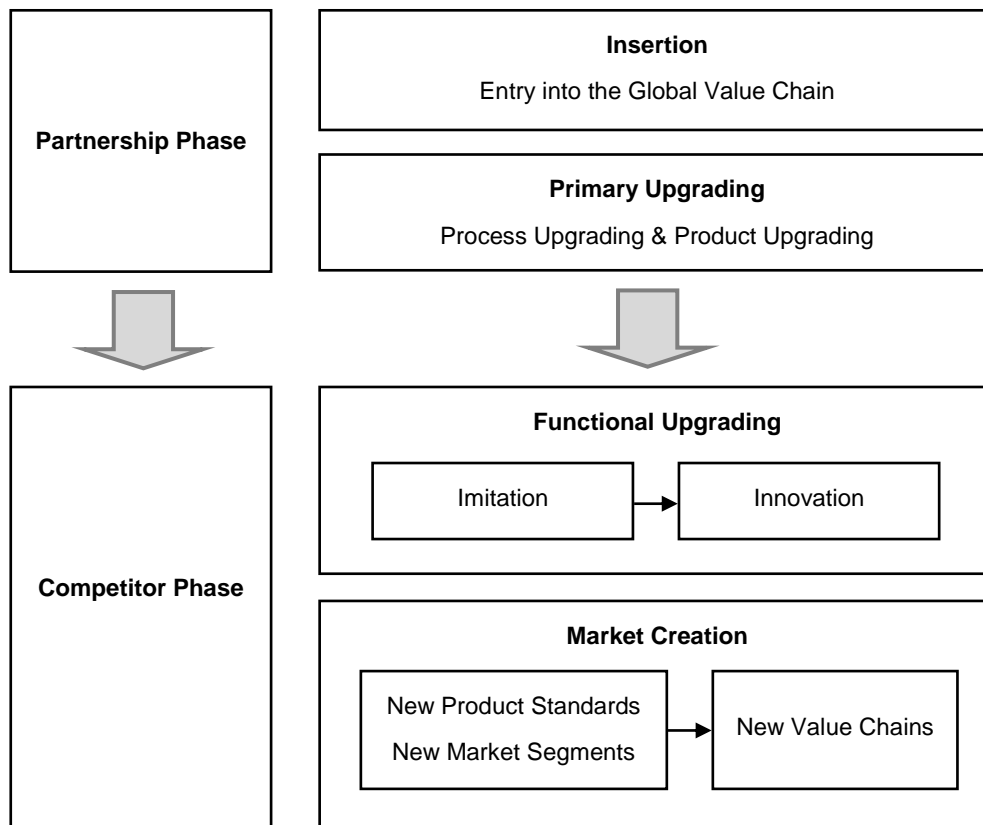
First, the original conceptual model (Figure 4) is concluded as in the **Partnership Phase**, where supplier-buyer interactions set the basic tune. The supplier firms from emerging markets usually acquire process and product upgrading know-how from their global buyers. This enables local firms to learn and accumulate technological capabilities while increases more value added. It also provides a “sense” of opportunity to expand their business.

As firms developing their capabilities, the nature of their insertions into the GVC is needed to change in order to be able to capitalize those capabilities. Therefore firms seem to deploy **functional upgrading** which means to shift towards new functions (e.g. marketing, R&D) that is likely to generate higher profits. Such upgrading activities demand to acquire “new” functional skills, but firms should map out what functions to tap first. Certain challenges are



underlined at this “transition” period from primary upgrading to functional upgrading. Firms will need new capabilities to explore those new functional areas. They may start with learning from the incumbent firms and amending their ideas - often through adoption and minor modification. But firms need to turn **imitation** into developing their own **innovation** capabilities eventually, if they would like to keep on moving up the value chain as well as sustain their positions at the high end over long run.

Figure 8. Revised conceptual model of value chain movement



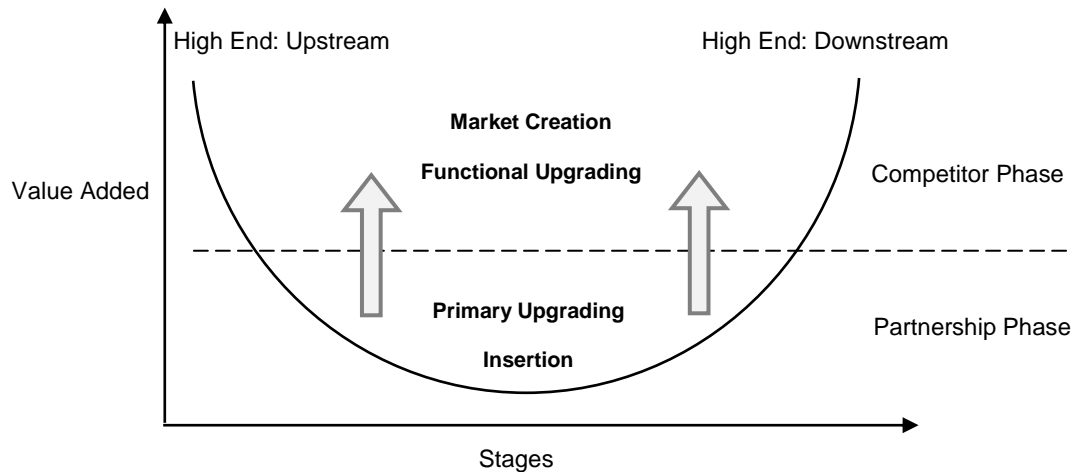
Source: Authors

By doing so, firms actually enter the **Competitor Phase** as they no longer remain as mere suppliers since they begin to develop, produce and market their own products. It could be a dangerous step, not only due to the lack of resources but also the possibility to annoy the former “partners” by being a new competitor in their own areas. If the partnership is ended before the firms can find their footing in the new functions, it would be a disaster.

However, the Competitor Phase does not mean that firms have to go head-to-head with incumbent firms; there are also some **market creation** strategies with indirect competition. Firms can set up **new product standards** through innovation and/or develop **new market**

segments by wise industry forecast, which may eventually lead to create their own **new value chains** that enable them to capture the most value added. Figure 9 illustrates the moving up process along the Smiling Curve by applying the revised model.

Figure 9. Applying revised conceptual model over the Smiling Curve



Source: Authors

5.5 Limitations of the Conceptual Model

The revised conceptual model employs theoretical implications of the global value chain, resource-based view and innovation theories, and has tried to show how the empirical evidences contrast with conventional ideologies. The proposed model is based on several cases of ICT firms from one emerging economy, and the authors acknowledge that the evidences are quite limited to analyze the value chain move-up process of the ICT industry as a whole.

While supplier-buyer interactions are emphasized for know-how acquisition, little is known how the knowledge and technology is actually shared and/or transferred between partners and under what conditions. On the other hand, functional upgrading depicts firm's reassignment from imitation to innovation, but how firms acquire such capabilities is still not clearly evident.

Furthermore, although suggested in the model that innovation plays a more important role in the functional upgrading than in the process and product upgrading, the possibility that firms may also be involved with innovative activities at their primary upgrading stages shall not be excluded. In fact some empirical evidences (e.g. Acer) do reveal that firms may engage with product innovation in their early phase of development.

6. Conclusion

This chapter summarizes the overall findings and concludes the thesis with final remarks on the study. Research contributions as well as directions for future study are also outlined.

6.1 Concluding Remarks

The value chain analysis is a useful tool to gain insights into an industry. The Smiling Curve concept proposed by Stan Shih in 1993 has enlightened Acer and some other firms from emerging economies to move up the value chain from a mere assembly manufacturer. They set up R&D facilities, develop distribution channels and promote their own brand names in order to appropriate higher value added. In this meaning, Mudambi's (2008) explanation of "spillover" and "catch-up" effects are not sufficient to cover the whole phenomenon. To take an example, why would the leading firm be willing to promote a firm from emerging economies to be a competitor of itself?

For this study, the authors present and analyze several cases, trying to unveil the value chain movement for the latecomers in the ICT industry. A conceptual model is constructed to illustrate the move-up process, which is differentiated by two phases named as partnership and competitor. Firms from emerging economies usually start as a partner to their global buyers. At this phase, the supplier-buyer relationships count a lot since the buyers may transfer certain knowledge to help the local suppliers to improve and grow, which is considered as a win-win solution for both parties. This should also be the phase that Mudambi has described. Many of the firms actually stop here, satisfied as a partner sometimes even an "important partner" such as Foxconn, while others don't. Despite the risks that come along, those firms gradually enter the competitor phase although they tend to not compete head-to-head against the incumbent firms, in many cases their former or even current partners. This is not only due to their relatively weak capabilities to compete but also the attempt to avoid annoying the leading firms and the revenge that may come after.

Then how can they do it? The authors believe that capturing the new product standards and exploiting the new market segments are two typical market creation strategies that latecomer firms apply. The technical shift is one of the determinable factors, which makes it possible for the latecomers to jump directly to the next generation of the products and set up their own advantages. The new market segments can be geographically undeveloped markets, the



supplementary niche to the current product range and etc. However, both of those two strategies require innovation capabilities, especially in such a dynamic industry as ICT.

6.2 Contributions and Suggestions for Future Research

Several different theories are introduced to explain a very complex phenomenon - value chain move-up process in the ICT industry. By dividing the process into partnership and competitor phases, the authors believe it can better picture the situation and also solve the controversial arguments regarding relative companies' intention and activities. As a partner, both leading and latecomer firms enjoy knowledge share and productivity improvement; as a competitor even an indirect one, it is natural that the supportive manners would generally decrease. To sum up, firms apply quite altered strategies at different phases while they move from imitation and upgrading to innovation and market creation. The authors hope that the proposed model as well as the strategy analysis may offer some inspiration for the firms from emerging economies that are aiming at moving up their value chains.

As for suggestions of future research, the authors would first propose more empirical studies to testify the conceptual model, either within the ICT industry or outside it. Besides, since the model is somehow shadowed by the vague evidence of how the latecomers imitate the “ought-to-be” inimitable capabilities of the incumbent firms when they begin functional upgrading, further research is also suggested. Moreover, it may also be worthy to investigate what conditions shall the latecomer firms fulfil in order to move up the value chain as it is not a strategy preferred by all (e.g. Foxconn), as well as the reasons behind those companies' decisions for not taking the venture.

In addition, several crucial time points of the move-up process can be interesting to study, such as 1) the time that firms feel they shall move up and the time they actually take the action; and 2) the “transition period” from partnership phase into competitor phase when behaviour and bargain power between the buyer and supplier may change. Furthermore, moving up along the Smiling Curve is not the end of the story. The authors propose in the model that latecomer firms tend to avoid fierce head-to-head competition while they are still in the process of moving up, but will they apply different strategies when they are eventually positioned at the high end of the value chain? The answer is probably yes but when is that changing point coming? How can firms realize it and what will they do to respond to this significant change?



Last but not least, the authors are aware that there is concern of the validity of the Smiling Curve. For example, Shin, Kraemer, & Dedrick (2010) tested it in the global electronics industry using the Electronic Business 300 data set of 2000-2005, finding that lead firms and component suppliers did earn higher gross and net margins compared to contract manufacturers but the differences of return on investment (ROA and ROE) were minimal across the curve. They argued that high cost to sustain a position on upstream and downstream of the curve may have compromised firms' return on investment, but is that true both in short-term and long-term? Moreover, the financial data that authors collected for the case companies (Table 1) actually show firms that have climbed up the value chain enjoy both higher margins and return on investment than the ones that haven't (HTC vs Foxconn). Thus, to what extent is the Smiling Curve valid can be another subject to future study.



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