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China's increasing participation in ICT's global value chain: A firm level analysis

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ABSTRACT

This paper synthesises evidence from international trade data of China-based ICT companies in order to map their involvement in the ICT global value chain (GVC). The ICT GVC is divided into three types of companies: Own Brand Manufacturers (OBMs), component companies and Electronic Manufacturers (EMS)/Original Design Manufacturers (ODMs). The firm-level trade data provide us with a clear overall picture of the structure and relationships of the three types of companies, while identifying the key players. The evidence shows that China's increasing participation in the ICT GVC is related to modularisation of product architecture, globalisation of production, and outsourcing and offshoring of manufacturing, and while several Chinese companies are rising rapidly, China continues to linger in the low value-added segments of the ICT GVC because of its ongoing dependence on foreign technology and its associated intellectual property (IP).

1. Introduction

The global value chain (GVC) of the information and communications technology (ICT) sector has undergone considerable evolution in recent decades, with China's participation in this chain growing in significance (Cooke, 2013a). Although the most innovative aspects associated with shaping the trajectory of internet-related activities continue to be dominated by western technology corporations, the centre of gravity of most of the manufacturing and assembly work of the key products and devices has shifted to Asia, with China playing an increasingly important role in production (APEC Policy Support Unit, 2013; Schimmer, Mueller-Stewens, & Sponland, 2010). In tracing the evolution of the ICT GVC, it is necessary to examine various elements including the rapid pace of change in the technology itself, in the complex interconnected network of many companies involved, and in the spatial evolution of the value chain with the ongoing search for greater levels of competitiveness. All of these elements need to be explored in order to explain changes in the global value chain, and the increasing role played by major companies and locations in China in these developments.

Before outsourcing and offshoring of manufacturing to China was feasible, the whole range of functions remained vertically integrated within large corporations. Over time, however, what had been complex tasks based on tacit knowledge became more codifiable and digitisable, and therefore more amenable to outsourcing (Sturgeon, 2003). As these functions

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became more standardised it was possible to contract companies in ever more competitive locations to take on substitute roles for part of the overall process of production. While China has evolved to become the one of the most significant centres for ICT production worldwide, much of the activity located there continues to be related to manufacturing and assembly, with the greater proportion of the key components being developed outside China and being imported as intermediate products before being re-exported as finished products or increasingly sold in the domestic market (Guillaume, Lemoine, & Unal, 2011). In terms of governance and control of the GVC, Gereffi (2014) suggested that this was related to the complexity of knowledge being transferred from lead companies to networks of suppliers. For example, although a company like Apple has an increasing impact on the dynamism of China's high tech exports, in terms of international trade statistics it remains quite invisible, even though its managers are involved in monitoring production in its supplier factories and suppliers in some cases use equipment purchased by Apple (Chan, Pun, & Selden, 2013; Clelland, 2014).

This is not to suggest that there are not considerable levels of innovation in China, but much of it is incremental in nature and is related to the functions in which most ICT companies in China are specialising, such as assembly (Brandt & Thun, 2011; Breznitz & Murphree, 2011). Because of this reality, while the Chinese economy has benefited hugely from having much of the world's high tech manufacturing located in it, the added value accruing to China through manufacturing sophisticated products such as the iPhone for companies like Apple is only a small proportion of that which accrues to companies who own and control the core intellectual property (IP), and therefore have considerable power in dictating the rules governing the GVC and the supplier companies (Xing & Detert, 2010). It is this key issue of China being increasingly central to the ICT GVC globally, while continuing to play a relatively subordinate role within it that this paper seeks to elaborate.

As China's economy itself undergoes considerable changes with a significant reduction in labour supply, rising labour costs, the unsustainable nature of further growth in investment in export processing and the pressure of natural resource consumption and environmental pollution, Chinese policymakers are attempting to transition China's role through promoting indigenous innovation by using domestic technical standards, and seeking intellectual property in exchange for access to the public procurement market (Grimes & Du, 2013; Xia, 2012a, 2012b). While China is no longer willing to continue playing a subordinate role in the ICT GVC, it faces a major dilemma in balancing its need to exploit its growing participation in globalised high tech activity, and at the same time boosting its ownership of intellectual property. Referring to China's lack of fundamental competiveness in high-tech value added production, Chen and De Lombaerde (2013) claim that there is no consensus within Chinese political circles on how China could move up the value chain. China's main bargaining chip in making demands on foreign investors remains its rapidly growing market in a world where growth in other regions is disappointing.

To date, however, despite the fact that increasingly sophisticated ICT production is being located in China – although for the most part controlled by non-Chinese companies – China has made only modest progress in key areas such as the software architecture of operating systems or in semiconductor chip design, two core areas which continue to determine the trajectory of the industry (Lin, Wang, Zhou, Sun, & Wei, 2011). The on-going fascinating strategy of mainly western technology corporations, together with companies from Japan, South Korea and Taiwan who continue to dominate the upper reaches of the value chain or smiling curve, to use a different analogy, who seek to exploit the competitive features of locations in China, without losing control of the key elements of the GVC through IP leakage, is one of the key questions to be explored in this paper.

We will seek to examine the extent to which there has been a substitution process over time in which companies from Taiwan initially, and more recently from China, take over more ever complex processes in the ICT GVC. One of the interesting questions that arises in relation to this is whether so much of the fundamental activity (even if it is at the lower levels of the GVC) which has now been located in China makes these locations considerably indispensable to the GVC for a long period to come, and whether the gradual process of substitution and upgrading that has characterised the evolution of the ICT GVC in China could have major implications for the control of these activities in the future. Is there a tipping point at which a location like China becomes indispensable to major global corporations if they are to remain competitive? Or can these global corporations continue to keep China in a subordinate role in the ICT GVC, similar to what some have described as the 'modularity trap', which could make advancing up the value chain very challenging?

2. Conceptualising the ICT GVC

In their attempt to explain these major developments in the ICT sector, scholars have been evolving their conceptualisations, using a variety of frameworks ranging from the GVC, global production networks (GPN) and global innovation networks (GIN) (Cooke, 2013a; Gereffi, 2014; Yeung & Coe, 2014). This evolution has been partly related to the shift from a more productivist perspective initially to a greater emphasis on the role of innovation more recently (Cooke, 2013a). An important element in this research to date has been the focus on how power and control is exercised by leading firms in the global value chain, in order to achieve dominance in the market. Because of their leadership in technological innovation, product design and marketing, major corporations such as Apple play a leading role in the overall trajectory of the sector and in controlling elements of the value chain. Through their control of core intellectual property in operating systems and chip design, leading companies are in a position to dictate the terms of operation for many supplier companies, who are positioned further down the value chain (Clelland, 2014). In addition to significant investment in R&D, major companies like