

Abstract

In light of the significant economic achievement in Hong Kong while no substantial industrial base exists, we attempt to compare Hong Kong's manufacturing strategy with that of America. Preliminary observations are that these two economies formulate and use different strategies for product functionality development. This in turn may have implications on their long term development capabilities and their future international competitiveness.

1. Introduction

It is widely believed that manufacturing industries stands at the foundation of a country's economic strength [1]. Yet, despite lack of actual producing or manufacturing, Hong Kong's per capita GDP at 2002 stood at ~ \$US 25,000, dominated overwhelmingly by a 86% component in service. This prompts us to ask if Hong Kong has developed an alternative manufacturing model and if yes, what are the correspondingly success factors? We attempt to compare Hong Kong's manufacturing with that of America, especially from the standpoint of how do they utilize manufacturing technologies to create new product functionalities and generate wealth. The Hong Kong case presents us a dilemma. If Hong Kong has minimal manufacturing, how should we map out its manufacturing infrastructure and compare it with that of America? As it turns out, Hong Kong based companies operate off-shore production networks extended to other low production cost regions. These companies' management of such networks will therefore become our object of study of Hong Kong's manufacturing. While this comparative study is by no means exhaustive, we hope we can suggest and outline an initial analytical framework to be refined in subsequent works.

2. Review of Existing Works

Our work takes as a point of departure the "Made in America" [2] and "Made by Hong Kong" [3] studies first undertaken by MIT in 1989 and 1997 respectively. The former study was conducted by the MIT Commission on Industrial Productivity and focus on how to regain the productivity edge of the US industries by first exposing and

explaining the various problems in the US industries at-large. These problems include: weakness in development and production, neglect of human resources, failure of cooperation and government and industry are at cross-purposes. It then went on to suggest a list of imperatives for a more productive America. These general imperatives include: innovate in production processes, blend cooperation and individualism, (workers) learn to live in the world economy as is driven by globalization, provide for the future and cultivate economic citizenship and human resources.

The "Made by Hong Kong" study focused on the management of HK based off-shore production networks for labor-intensive production steps in the southern part of China, essentially the Pearl River Delta Region. It calls for industrial upgrading of these networks through the specific strategy of *service-enhanced products* due to increasing competition. In addition and in the long one, the Hong Kong Government must take on an active role to improve the technological capability of Hong Kong by acquiring technical knowledge from outside, strengthening HK's R&D base, promoting capabilities in IT, upgrading from OEM to ODM, fostering home-grown, technology-based enterprises and building a safe harbor to stimulate entrepreneurship etc. The idea is clear: Hong Kong needs to pragmatically capture the highest value added activities in the manufacturing value chain.

3. Analytical Framework

Based upon the foundations of these studies, we are interested to compare how these two economies create wealth from a manufacturing oriented perspective, specifically the strategies they use to create product functionalities or new features. The economics of product differentiation is such that suppliers with unique features can charge higher price and avoid competition based on price alone such as for commodity products. This is a standard theme in the industrial organization literature [4]. While higher profit is a general motivation for new functionalities creation or product differentiation, how these economies choose their differentiation strategies will have long term impact on their dynamic capability. Dynamic

capability [5] is a new perspective towards the study of competitive advantages or competitiveness.

Dynamic capability (see Fig.1) asserts the importance of path dependency, technology opportunities, complementary assets, transaction costs and selection environment in determining an organization or an economy's strategic options. Firms or nations cannot overnight build an important technology base or accumulate technological expertise of a certain kind. Human resources take months, if not years, to be trained. These constrain the actual pathways economies can take to meet future competitive challenges. As a result, we will attempt to use both the product differentiation and strategic management frameworks to compare the manufacturing aspects of these two different economies.

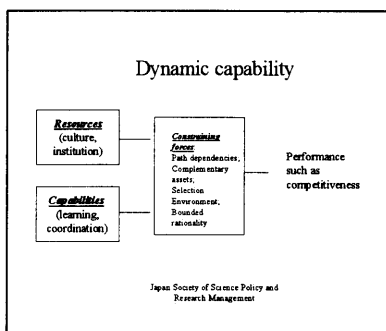


Fig.1. A conceptual diagram of dynamic capability which is adapted from [5].

4. Results

4.1 Made by Hong Kong

The made by Hong Kong model refers to the production network that is operated by companies based in Hong Kong and extended to other parts of the world with low cost of labor and close proximity to the customers. A critical strategy for the operation of such off-shore production networks is that of forward integration. These networks will utilize the outputs or services that are produced in the Hong Kong proper. These services refer to industry value-added services (IVAS). IVAS are components in the primary value chain such as research and development, product engineering, warehousing and logistics and other support oriented value chain services such as financial services, quality control, testing and certification, vocational training, marketing etc. These services constitute a major portion of the added values compared to the activities of physically

producing the products in the factory floor. A rough estimate is that for one dollar of output manufactured by such networks, manufacturing added value may account for only 20 to 25 cents while the rest, or about 75 cents, is associated with *intangible* services not responsible for direct production.

Understanding the significance of value added of intangible services, the “Made by Hong Kong” model concentrates on strategizing the role and provision of those intangible services; namely, a business model of using high value-added services to differentiate or customize the products emerges. In this way, the customization process is *separated* from the actual production of the products and that the customization is achieved or implemented via services providers in the Hong Kong proper. This business model can be regarded as using services to enhance manufacturing or *service-enhanced manufacturing*.

Formally, service-enhanced products bundle together, in desirable combination, the capabilities of advanced manufacturing systems and new possibilities in design, customization, rapid delivery, quality, product novelty and uniqueness – all enabled by the information technologies [3]. In this way, the “Made by Hong Kong” model formulates the customization of products in terms of using services to enhance the user experiences beyond the tangible, hardware aspect. This fully leverages the service oriented economy in Hong Kong and the existing excellent IT infrastructure of an all digital backbone. The sustaining of this intangible service-oriented manufacturing model depends also upon the capacity of public institutions to set and enforce standards, to repress intellectual property and brand-name violations or other so-called societal capabilities [3] at large. A *virtuous cycle* with respect to the service provision to manufacturing will result. This further perpetuates the services orientation of the Hong Kong economy. An immediate upshot is that of the division of labor or the emergence of separate industrial service sectors. This fulfills Adam Smith’s principle that the division of labor is limited by the *extent of the market*: as long as there is enough (services) demand, it will justify dedicated operations and divisions for *continual improvement* in the provision of professional business services to differentiate the products.

Now that the prevalence of a service oriented economy in Hong Kong is beyond doubt and argument. However, technology-based industries or manufacturing do exist in Hong Kong. The government also sets up different policies and an institutional environment to promote the emergence of high technology product design and manufacturing. Yet most of the existing technology ventures belong to the mid-tech categories and involve (only) providing a missing link to re-combine existing technologies. Hong Kong lacks an

accumulated dynamic capability to engage in original high technology research. Due to emphasis upon services, Hong Kong has to surmount time diseconomy and mass specificity [7] in order to gather enough technological resources in due time to engage in high technology manufacturing ventures. Exogenous acquisition of expertise will alleviate the problem but Hong Kong must still have the absorptive capacity to learn.

4.2 Made in America

Contrary to the situation in Hong Kong, even though *outsourcing* of manufacturing is increasingly adopted by a lot of US-based firms and that total employment in manufacturing has been steadily decreasing, manufacturing still matters a lot to America. Indeed, it is tempting to apply the same argument in the Hong Kong case that a transition from manufacturing to service as an inevitable and desirable change in the economic development of America. However, if large sections of American industry were outsourced to other countries, high wage non-manufacturing services such as product design engineering will also go with them. This will lead to a “hollowing out” effect of American firms’ core competencies. By selectively outsourcing and retaining those aspects of manufacturing which have synergies with other high value-added manufacturing services, America competes with new product functionalities (innovation) and advanced manufacturing technologies or paradigms rather than service-based differentiation as in the Hong Kong case. Despite there is a lack of a unified taxonomy, it is instructive to roughly review or map the evolution of different production paradigms:

- *Mass Production* such as single product flow as is exemplified by Henry Ford’s Model T production – customers can have any colors as long as it is black!;
- *Lean Production* with reduced operational inventories of works in progress (WIP) to reveal bottlenecks and improve efficiency;
- *Continuous Improvement (Kaizen)*, multi-products flow and the Toyota Production Systems¹;
- *Innovation Mediated Production* IMP [8];
- *Mass Customization using product platform* aiming at customization at an efficiency level of mass production [9];
- *Agile Production Systems* [10];
- *Design Modularization and Decentralization based on an industry standardized platform* [6];

These various increasingly sophisticated manufacturing paradigms not only captured the advancement of production and product technologies, they also indicate the

¹ The paradigms of mass production, lean production and continuous improvement are standard topics in operations management course.

increasingly incorporation of customer requirements in the production process. In fact, in a still more provocative manufacturing paradigm, users or customers are counted on as sources of innovation [11]. Design diffusion or decentralization based upon a standardized industry platform is an ultimate development in this customer-centric direction to allow customers or users’ participation to differentiate for their own applications. Such distributed development based on an industry standard is an important contributor to economic development [12]. Meanwhile, America’s high technology tradition and institutional socio-economic characteristics favors such a development at the industry level.

America has an unexcelled advantage in basic technologies research both at the federal government and private firm level. The federal government has always encouraged investing in the research and development of basic technologies which spillover to private industries. Some of the firms in the industry control key component *generic* technologies that constitute an industry level platform (such as Intel’s microprocessor technology and Microsoft’s operating systems technology constituting and controlling the PC platform) and become platform leaders which drive industry-wide innovation for an evolving system of other separate component technologies making up the rest of the industry platform.

These platforms, as mentioned, are used by *intermediate* applications developers in the industries at-large for the development of more specific end users applications in their domains. America possesses a particular suitable institution for entrepreneurship for such product innovations. The emphasis and respect for individual value and a strong enforcement of intellectual property rights is conducive to creativity, experimentation and entrepreneurship. In addition, entrepreneurs, investors and venture capitalists share control and risks in new ventures, furthering the incentives for entrepreneurs to experiment and put forward their ideas. United States therefore has both the dynamic capability and the institutional elasticity with respect to new technology ventures formation to enable design diffusion and trigger self-propagating [13] effects in high tech functionality development, based on a standardized platform.

4.3 Short summary of the comparison

Hong Kong model [♣♣+♠♠]: *services-based customization* which leverages manufacturing technologies to achieve mass production level efficiency and uses information technologies to create new service-oriented functionalities. This is known as service-enhanced

manufacturing and depends upon a global network of complements in the demand and supply chains.

USA model [♣♣+♦♦]: *production-based customization* which leverages advanced manufacturing technologies or paradigms to create new functionalities at mass production level of efficiency which may be a contradictory requirement. This involves continual evolution of production paradigms that increasingly incorporate customers or users preference and their creativity and also mitigate the trade-offs between customization and costs.

	Production Of Commodities	Creation Of new functionalities
Manufacturing Technologies	♣♣	♦♦
Information Technologies (Services)		♣♣

Figure 2. Different business models due to different methods to create new functionalities or customization.

5. Conclusion

5.1 New findings

The differences between the manufacturing strategies of Made by Hong Kong and Made in America are now becoming clear. In the Hong Kong case, product customization or creation of new functionalities is separated from the production process and is enabled by intangible services to be augmented or superimposed upon the products themselves. Differentiation is service driven. In the America case, while services may also be used as a differentiator, it is the advancement of product and production technologies and paradigms that *internalize* the contradictory requirements of product functionalities creation at mass production efficiency level that is the key to value added in the manufacturing process.

5.2 Policy implications

This section concerns the role government or policy makers can play for the pursuit of different functionalities development strategies. As is evident in the above discussion, the sustaining of the services-oriented

manufacturing paradigm is contingent upon societal capability which is the capacity of public institutions to set and enforce standards in the society at large to repress intellectual violations to service-based innovations. Similarly, design diffusion and decentralization based on a standardized industry platform in the production-based customization strategy is especially prone to intellectual property violation and must be maintained by governmental fiat. Both suggest that an institution with strong intellectual property regime is critical for either functionalities development strategies to take off.

5.3 Future works

Apart from institutional considerations, future research may be directed towards how these customization or functionalities creation strategies will further influence the progress or build up of the manufacturing capability of these two economies, especially with regard to the requirement to support self-propagating characteristics in functionality development requirements for IT intensive products and applications in the information era. Here we speculate that a strategic combination of the service-based customization and production-based customization or even to build a virtuous cycle between these two modes of functionalities development may be the essence to meet this new competitive challenge. A first step in this research direction is to understand the interdependency between these two development strategies.

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