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Ports, regions and manufacturing systems: Automobile manufacturing in Kyushu, Japan

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ABSTRACT

The locations of seaports and manufacturing activities in Japan have changed considerably since World War II. Despite the geographic spread of economic activities over decades and the uneven development of ports, the cores of both systems have long remained in the same metropolitan areas. While co-location does not provide necessary or causal connection, strong a priori grounds can be offered to posit that a necessary relationship exists between the Japanese manufacturing system's geographic expansion and changes in the maritime transport network. A case study of automobile industry's recent development in the peripheral region of Kyushu identifies some drivers of these evolutions at the level of one particular sector. This suggests that, despite the development of high capacity transport infrastructure and manufacturing facilities in the Japanese periphery, the current manufacturing core is not yet threatened.

1. Introduction

This paper explores the relationships between regional manufacturing systems and seaports; the core/periphery approach is used to conceptualize their interactions.

Despite the potential understanding the driving forces of globalization, few works have analyzed the nexus between regional manufacturing and maritime transport systems (Ducruet et al., 2014; Hall and Jacobs, 2010). However, transport improvements have played a major role in the historical extension of manufacturing systems. The Roman Empire's completion of a road network system or the development of steam engine's development in the nineteenth century are examples of advances in transportation that have set the pace of capitalist expansion, driving major shifts in both production and trade. The increase in transportation efficiency notably allowed large-scale manufacturing, implying further economic specialization in countries and regions, and favoring economies of agglomeration. Consequently, territories became increasingly interdependent. Among the different transport modes involved in the economic interaction between cities and regions, maritime has historically played a major role, enabling the emergence and development of a network of cities in the Mediterranean as early as the first millennium B.C. The region's success layed in such manufacturing activities as the production of textiles and olive oil, which were heavily dependent on overseas inputs (Sherratt and Sherratt, 1993). Today, 80% per cent of international merchandise trade, measured in tons-kilometers, is carried by sea and handled by seaports worldwide (UNCTAD, 2014). Maritime transport's dominance is not limited to long-distance trade, as it also plays an important role in medium- and short-distance connections. Markets can only expand overseas if they benefit from frequent and reliable maritime transport services.

This paper aims to contribute to a better understanding of the interplay between maritime transport and regional manufacturing. Japan has been selected because its status as an insular country, providing relevant grounds to observe port-manufacturing interactions with less ground transport interference. Moreover, it is a rare country in which where detailed port traffic and employment data are available over several decades. The study focuses on the automobile industry in a peripheral Japanese region as an example to understand how the core and periphery interact. This industry is strongly reliant on frequent maritime transport services between its historical centers and new manufacturing areas. Specifically, we propose the case study of northern Kyushu because it has two important specificities: first, its location in southwestern Japan allows for the daily deliveries of automotive

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parts by either ship or truck from central Japan as well as low-cost suppliers in South Korea and China. Second, a relatively dense network of local suppliers has been progressively developed.

This research studies these interactions by building on the frameworks of the core–periphery model and global commodity chains, which are presented and criticized in Section 2. The area of study is defined in Section 3, and long term (1945–1990) locational manufacturing and seaport trends are presented in Section 4. We investigate the recent changes in manufacturing and port systems (1990–2010) and their geographical expansion in Section 5 and in Section 6 we rely on a case of automobile manufacturing in northern Kyushu to explain the evolving relationships between port and manufacturing systems. Finally, Section 7 presents a discussion of our results and conclusions.

2. Core–periphery and commodity chains: conceptualizing the regional shifts in manufacturing and seaports

Wallerstein's world-systems analysis provides a compelling framework to analyze the evolving locations of ports and manufacturing activities, as it aims to understand how the dynamic of capital accumulation contributes to shape the world as a core–periphery structure that relies on two basic dichotomies (Wallerstein and Sherratt, 1976). The first is a class dichotomy, in which ruling groups' control depends on their capacity to make decisions regarding the nature and quantity of the production of goods-via property rights, accumulated capital, control over technology and so on. The second dichotomy, which is particularly relevant to our study, is the spatial hierarchy of economic specialization, or core versus periphery. This involves an appropriation of surplus from the producers of low-profit goods, by the producers of high-profit goods in a purported "unequal exchange". Spatial hierarchies change to respond to the pressures of cyclical economic crises within the system, but without significantly changing class hierarchies (Wallerstein and Sherratt, 1976). The core and periphery can then be considered as only temporary outcomes of the capitalist system. Core processes imply high wages, high technology and high profit input; periphery processes imply the opposite. A transnational firm's managing of a commodity chain is an example of a core mechanism. These processes tend to spatially concentrate and segregate over time, reflecting the evolution of market power, entry barriers, and forms of chain governance (Brown et al., 2010). This dynamic produces places in which core processes are dominant and places where periphery processes are dominant, or the "core" and "periphery" places, respectively. Naturally, core places also host peripheral processes; some core processes could eventually occur in a periphery.

Wallerstein's model (Wallerstein, 1979, 2004) provides a rather sophisticated approach to the relationships between core and periphery, rather than suggesting a dual world. This offers valuable insight to understand the hierarchical relationships within urban systems (Flint and Taylor, 2007; Beaverstock et al., 2000), and explains the concentration of decision-making activities in a few large urban areas. This configuration leads to income disparities between the core (some large urban areas) and the periphery (the rest) (Abdel-Rahman and Wang, 1995). The commodity chain concept is used to explain how value is transferred from the periphery to the core, maintaining or deepening the differences between both. Hopkins and Wallerstein (1986) define it as a "*network of labor and production processes whose end result is a finished commodity*". Further developed by Gereffi and Korzeniewicz (1994), the (global) commodity chain is considered a system of value creation employed by firms and other agents, in which market power asymmetries lead to unequal value distributions. Participants along the chain are unequally able to appropriate rents and barriers to entry exist. Lead firms act as chain drivers, commanding the coordination of the whole commodity chain, by controlling the other firms in the chain (Gereffi, 2001). The lead firms' superior profitability is a result of their capacity to generate different types of rents, using scarce assets (i.e., infrastructure, machinery, brands, marketing, etc.). These assets lead to the creation of barriers to entry and result in different types of high rents (Gereffi, 2001), which allow the firms ensuring core processes to be relatively insulated from capitalist competition. Conversely, firms realizing peripheral processes would not have the power to contest the organizational leadership, and are more exposed to competitive pressures (Gereffi and Korzeniewicz, 1994). Despite its utility in describing the relationships between firms, the global commodity chain approach has been criticized for simply assuming the power differential between firms implied in a chain, without providing a more general explanation of how these differences have been created (Taylor, 2007; Starosta, 2010). According to these critics, chains should be further conceived as moments in a global circuit of capital (Taylor, 2007). The connection between commodity chains and the general dynamics of capitalism would be partially reached using the Marxian law of value (Starosta, 2010). Indeed,

> the formation of commodity chains is therefore the concrete form taken by the competition among normal or average capitals over extra surplus value that escapes the hands of small capitals. (Starosta, 2010:451)

The trend of outsourcing manufacturing activities can then be regarded as a method for large firms to multiply the sources of extra surplus value released by small capitals. The lead firm is in the best position to coordinate the entire chain and exert control on the other firms to capture the *"extraordinary profits flowing out of small capitals"* (Starosta, 2010).

The automobile industry is one of the most extensively researched commodity chain (Gereffi, 1999; Barnes and Morris, 2004; Kaplinsky, 2000; Humphrey, 2003), and illustrates how profits freed by small capitals are captured by normal capitals. Three main players exist within this particular chain: car manufacturers, first-tier suppliers, and lower-tier suppliers. Automobile chain is controlled by automobile manufacturers, which typically play a central role. They are large firms with highly automated labor processes. The chain is highly hierarchical with multilayered production systems involving thousands of firms.

The automobile value chain's situation has changed in the 1990s; the hierarchical restructuring into tiers became even more pronounced (Gereffi, 1999), following a decrease in the number of suppliers at all levels, with each manufacturer relying on a small group of first-tier suppliers. These large suppliers not only operate large plants, but they have also assumed over many of the functions previously centralized by car manufacturers, and are often responsible for the design, manufacturing, and delivery of complete modules to automobile assembly plants. The latter have become responsible for selecting lower-tier suppliers and coordinating the automobile supply chain's core segments at a global level. According to Gereffi, top first-tier suppliers are "challenging the assemblers to control over the key high value activities in automobile production" (Gereffi, 1999, p. 5). As many of the leading auto suppliers manufacture parts in the periphery, this could provide a chance for its firms to move up in the industry. However, not all the major first-tier suppliers succeed in capturing higher value in the chain, and some are experiencing difficulties (Frigant, 2009). Further, some lower-tier suppliers can eventually capture higher value from the chain. One example involves steel producers, where the invention of new processes generates opportunities for product innovation and the creation of higher value steels through forming and shaping new and existing materials (Hudson, 2012). Finally the core/periphery structures

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