Firm Characteristic Determinants of SME Participation in Production Networks

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August 2014

Abstract: This paper provides an empirical analysis of small and medium enterprise (SME) participation in production networks. It gauges firm characteristic determinants of SME participation in production networks. The empirical investigation utilizes results obtained from an ERIA Survey on SME Participation in Production Networks, conducted over a three month period at the end 2009 in most ASEAN countries (i.e., Thailand, Indonesia, Malaysia, Philippines, Vietnam, Cambodia, and Laos PDR) and China.

The results suggest that productivity, foreign ownership, financial characteristics, innovation efforts, and managerial/entrepreneurial attitudes are the important firm characteristics that determine SME participation in production networks. The paper extends the analysis to identify the determinants that allow SMEs to move from low to high quality or value adding participation in production networks. The results suggest that size, productivity, foreign ownership, and, to some extent, innovation efforts and managerial attitudes, are the important firm characteristics needed by SMEs to upgrade their positions in production networks. The finding suggests that SMEs really exploit competitiveness from economies of scale only when they are able to engage in production networks.

***Keywords*:** Small and Medium Enterprises (SMEs), Production Networks, Firm characteristics, East Asia.

***JEL Classification*:** L20, L25

1. Introduction

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It is generally a well accepted argument among policy makers and scholars that small and medium enterprises (SMEs) play pivotal role in economic development of a country. Generating employment, alleviating poverty, and distributing wealth are, among others, the commonly cited benefits arising from the growth of the SME sector. Promoting a sustained and strong growth of SMEs, however, has always been, and continues to be, a challenging task. SMEs are inherently constrained by their capacity to grow and they usually face much stronger business challenges relative to their large counterparts.[1] More importantly, and this is particularly important in the globalisation era, is the challenge of an increase in the threat of survival that comes from much tougher competition among firms in a globalised business environment.

It is commonly argued that globalisation does not necessarily pose a threat for SMEs; in fact, it could present favourable business opportunities. An ideal way for this to occur is by increasing the extent of SME participation in regional production networks. As a number of scholars have put forward regional production networks have uniquely been developed in the past few decades, particularly in East Asia.[2] A better understanding of firm characteristics that likely determine greater SME participations in production networks is, therefore, needed. This paper aims to gauge some of these characteristics, utilizing the results of a firm-level survey conducted in some ASEAN member countries.[3]

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[1] Many, if not most, of these benefits are well covered by the literature. See, for example, Harvie (2002; 2008), Harvie and Lee (2002; 2005), and Asasen *et al*. (2003).

[2] See, for example, Ng and Yeats (2003), Kimura and Ando (2005a; 2005b), Ando (2006), and Athukorala and Yamashita (2006) for studies that document evidence on increased production networks between countries in East Asia.

[3] The surveys were conducted as a part of ERIA research on SMEs in 2009.

The rest of this paper is organised as follows. Section 2 discusses pertinent literature to provide a framework for our analysis and to establish some testable hypotheses. Section 3 presents the methodology for the empirical exercise, including a brief description of the survey from which the data for this study was drawn. Section 4 and 5 presents the results of the empirical exercises and Section 6 summarises the key findings and presents the key conclusions from these findings.

2. Analytical Framework and Testable Hypotheses

The trade pattern in East Asia has changed from the traditional pattern where final products, such as consumer goods, intermediate goods, and capital goods, were predominant in trade, to one where predominance is now given to parts and components (Lim and Kimura, 2009; Athukorala and Kohpaiboon, 2009). Intermediate goods trade amongst Asian countries has expanded intra-industry and intra regional trade.

Trade patterns have now become quite different from the traditional pattern based on static comparative advantage. Production processes now involve sequential production blocks that locate across countries. Different stages of production are located in different countries and undertaken by different firms, consequently products traded between different firms in different countries are components instead of final products. While networks can be formed in various industries the most important ones in East Asia are those in the machinery industries, including general machinery,

electric machinery, transport equipment and precision machinery (HS 84-92) (Kimura, 2009).

This phenomenon is known as cross border production sharing or fragmentation of production. The literature on fragmentation theory and its empirical verification expanded rapidly after the seminal contribution of Jones and Kierzkowski (1990)[4], proving its applicability in analysing cross border production sharing at the production process level (Kimura and Ando, 2005a). Looking from an East Asian perspective, however, production/ distribution networks have become quite distinctive and the most developed in the world (Kimura and Ando, 2005b) as measured by their significance for each economy in the region, their extensiveness in terms of country coverage, and their sophistication which can involve subtle combinations of intra-firm and arm's length (inter-firm) transactions. Consequently, these networks have developed beyond the original idea of fragmentation, requiring a re-appraisal and expansion of the original analytical framework in order to capture more subtle and sophisticated intra-firm and arm's length (inter-firm) transactions. In this context Kimura and Ando (2005a) propose the concept of two dimensional fragmentations to analyse the mechanics of production/ distribution networks in East Asia[5].

Fragmentation theory focuses on the location of production processes, where processes are fragmented or separated into multiple slices and located in different countries to lower total production costs of firms. The fragmentation occurs for the following reasons. First, there must be production cost saving in fragmented production blocks where firms can take advantage of differences in location

[4] See also Arndt and Kierzkowski (2001), Deardorff (2001) and Cheng and Kierzkowski (2001) for further elaboration of the fragmentation theory.

[5] See Kimura and Ando (2005a), especially pages 7-13.

advantages between the original position and a new position. Second, the service link costs involved in connecting remotely located production blocks must be low. Finally, the cost of setting up the network must be small**.** The feasibility of fragmented production/distribution (location and by firm) in an industry is heavily influenced by: the number of parts and components required in the production of the final product, the greater the variety of technologies utilized in the production of these parts and components, and the economic environment within individual countries and for the region as a whole.

Kimura and Ando (2005a) organise and categorise various type of fragmentation activities into two groups: fragmentation based on distance and fragmentation based on firm disintegration. There are advantages and disadvantages arising from both these forms of fragmentation. Table 1 shows that fragmentation by distance, involving intra and/or inter firm fragmentation (both domestic and cross border), is likely to increase service link costs (greater transportation, telecommunications, logistics, distribution, coordination and cross border) but have the potential to reduce production costs from location advantage (wages, access to resources, lower utility costs, access to technological capability). Fragmentation by firm disintegration, involving intra and/or inter firm fragmentation (both domestic and cross border), is likely to increase service link costs (related to loss of control and lack of trust) which include additional information costs in seeking a suitable partner, monitoring cost, contract costs, dispute settlement costs, legal costs, legal and institutional system deficiencies. However, this is potentially offset by reduced production costs due to the increased availability of business partners, both domestic and foreign, the development of supportive industry, institutional capacity for various types of contracts and the

degree of complete information. It is, therefore, apparent that reductions in service link and production costs can trigger a further rapid expansion in product fragmentation.

Table 1. Trade-offs in Two Dimensional Fragmentation

	Service link cost connecting production blocks	**Production cost in production blocks**
Fragmentation by distance (intra and inter firm, domestic and foreign)	Cost will increase with geographical distance: • Transportation, telecommunications, logistics and distribution (inefficiency) • Trade impediments • Coordination cost	Cost reduction from location advantage: • Wage costs • Access to resources • Infrastructure service inputs (utilities, industrial estates) • Technology capability
Fragmentation by firm disintegration	Increased transaction costs from loss of control/trust: • Information cost from seeking suitable business partner. • Monitoring cost • Contract costs • Dispute settlement cost • Legal system and institutional system deficiencies	Cost reductions from disintegration: • Availability of various types of potential business partners including foreign and indigenous firms • Development of supporting industry • Institutional capacity for various types of contracts • Degree of complete information

Source: Kimura and Ando (2005a).

As production/distribution networks and their sophistication expand, SMEs have the opportunity to play a crucial role both as indigenous and foreign based firms in the network on an arm's length basis in various forms, including subcontracting arrangements and OEM contracts. SMEs are also essential components of industrial agglomeration. In this context, not only multi-national SMEs but also local SMEs can be important participants in a vertical arm's length division of labour.

SMEs need to overcome barriers related to their size and to develop capacities enabling them to become more intrinsically engaged and competitive in global markets, in order for them to fully participate in regional production networks. Their capacity constraints, or barriers, are multi-dimensional in nature and can be usefully highlighted and explored in the context of the integrative analytical framework summarized in Figure 1. We adapt this framework with application to the case of SME participation in production networks.

Figure 1. SMEs and Production Networks – Framework Outline