Chapter **4**

Constraints to Growth and Firm Characteristics Determinants of SME Participation in Production Networks

CHARLES HARVIE
Centre for Small Business and Regional Research,
School of Economics, Faculty of Commerce
University of Wollongong, Australia

DIONISIUS NARJOKO
Economic Research Institute for ASEAN and East Asia (ERIA)
Jakarta, Indonesia

SOTHEA OUM
Economic Research Institute for ASEAN and East Asia (ERIA)
Jakarta, Indonesia

March 2010

Constraints to Growth and Firm Characteristics Determinants of SME Participation in Production Networks

CHARLES HARVIE
Centre for Small Business and Regional Research,
School of Economics, Faculty of Commerce
University of Wollongong, Australia

DIONISIUS NARJOKO
Economic Research Institute for ASEAN and East Asia (ERIA)
Jakarta, Indonesia

SOTHEA OUM
Economic Research Institute for ASEAN and East Asia (ERIA)
Jakarta, Indonesia

This chapter provides empirical analyses of SME participation and performance in production networks. It gauges the constraints of SME growth and firm characteristics determinants, building on the framework discussed in previous chapters and based on the ERIA Survey on SME Participation in Production Networks.

The results of perception survey indicate differences in the constraints facing SMEs that operate in production networks, compared to those that do not operate in the networks. SMEs in production networks consider distribution-logistics and business environment barriers more importantly than those out of the networks do. The descriptive and econometric results suggest that productivity, foreign ownership, financial characteristics, innovation efforts, and managerial/entrepreneurial attitude are the important firm characteristics that determine SME participation in production networks.

This chapter extends the analyses by considering the issue of SMEs and moving up to higher quality tiers in production networks. For those that are in lower quality of production network, internal constraints are critical to them in contrast to external constraints faced by those that are in higher quality of production network. Meanwhile, the econometric analysis reveals similar characteristic determinants as those SME that participate in production network, the difference is that, now size becomes an important determinant while effort to innovate and managerial attitude become less important determinants.

1. Introduction

This chapter provides empirical investigation on the participation of SME in production networks. It attempts to reveal the constraints to growth and firm characteristics determinants of SME participation in production networks. The chapter builds on the background and analytical framework presented in the previous chapter in its approaches to the investigation and analysis.

The empirical investigation relies on the results of the ***ERIA Survey on SME Participation in Production Networks***, which was conducted over the period two to three months period at the end 2009 in most of ASEAN countries and China. The ASEAN countries covered are Thailand, Indonesia, Malaysia, Philippines, Vietnam, Cambodia, and Laos PDR.

The rest of this chapter is organized as follows. Section 2 explains the survey conducted for this study. Section 3 presents the survey results and empirical investigation on the constraints to grow. Section 4 to 6, meanwhile, addresses the empirical analysis on the determinants of SME participations. Section 4 in particular presents the hypotheses for the determinants and Section 5 describes the adopted methodology for the empirical analysis. Section 6 presents the empirical results and analysis of the determinants of SME participation in production networks. Extending the previous section, Section 7 discusses key characteristics of SMEs participation in higher quality tiers of production networks. Finally, section 8 summarizes and concludes the empirical investigation.

2. The Questionnaire and Sample

Empirical works documented in this report are based on results of questionnaire survey conducted during two to three months at the end of 2009. The questionnaire aims at collecting information on SME characteristics and perception of manager on the factors that constraints SME growth.

The questionnaire survey is presented in Appendix 1. It is divided to two parts, each of which addresses each of the survey's objectives. The first part tries to collect

information of the characteristics of the SME. This form the first part of the questionnaire, and it focuses on collecting information on the following characteristics: basic characteristics (i.e., size, age), ownership, cost and input structure, performance (i.e., sales, sales growth, profit rate, etc.), location in terms of distance to ports or industrial parks/economic processing zones (EPZs), source of finance, and capability to innovate. Meanwhile, the second part addresses the manager's perception on barriers to growth.

The second part follows OECD (2008) that all SMEs in the sample are asked to assess the importance of 44 barriers using a five-point Likert scale ("(1) very significant" to "(5) not significant") and they were also asked to rank their constraints by 8 main categories, ranging from "very important" (1) to "less important" (8). Moreover, the SMEs were asked whether they have received any assistance from governments or non-governmental organizations (NGOs) and rate the effectiveness of those assistances which comprise of 7 main components using the same five-point Likert scale. Finally, they were asked to rate the importance of the assistances they wish to receive.

In total, there were 912 SMEs completed questionnaires. Table 1 shows a summary of the surveyed SMEs. In this survey, the firms with more than 200 workers are dropped from the sample, and there are about 780 SMEs remaining as presented in Table 1. In the sample, SMEs with staff numbers from 6 to 49 accounts for 52% of the total SMEs, followed by 18.3%, 18%, and 11.3% for those with staffs from 100 – 199, 50 – 99, and 1 – 5, respectively. The average ages of the SMEs are more than 10 years. Most SMEs in the sample are domestically owned, accounting for more than 70% of the total share in the companies.

For both 2007 and 2008, most SMEs reported growth in sales and a profit rate. Raw materials/intermediate input is the biggest part of the sampled firms' cost, on average accounting for more than 50% of total cost, followed by labor cost, utilities, and other costs, averaging about 20%, 12%, and 10%, respectively. An interest payment accounts for less 5% of total cost.

In terms of the education level of the employees, the majority of the workers have some vocational training as well as high school or lesser education. The surveyed SMEs reported that internal financing is the main source of their financing. The

majority of their working capital finance comes from retained earnings and other sources. Average borrowing cost is less than 10%. Though most SMEs sell large proportion of their products domestically, larger SMEs tend to engage more in exporting markets.

Table 1. Characteristics of the Surveyed SMEs

Characteristics	1 – 5 Persons			6 – 49 Persons			50 – 99 Persons			100 – 199 Persons		
	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D
Age (year)	87	13.6	10.5	384	11.3	9.9	128	13.8	11.0	126	15.6	10.4
Ownership (%)												
Domestic	89	96.0	18.9	413	93.3	23.1	141	83.8	34.5	144	74.2	40.4
Foreign	89	4.0	18.9	413	6.2	22.6	141	14.5	33.5	144	22.4	39.6
Sale growth (%)												
2007	80	13.5	52.7	364	16.7	26.1	116	18.3	61.4	125	45.2	281.5
2008	81	6.4	23.4	365	32.5	206.6	117	28.6	100.9	127	16.1	29.2
Profit (%)												
2007	83	18.3	11.0	382	13.9	14.2	123	8.3	17.5	129	7.1	16.4
2008	84	18.5	15.2	398	11.7	27.3	135	6.2	27.2	141	8.8	17.9
Cost Structure 2008 (%)												
Labor	84	19.0	13.6	384	21.2	15.1	113	21.5	16.9	120	20.7	13.3
Raw Materials	84	48.0	17.6	392	53.2	19.8	129	58.4	21.7	137	57.7	20.6
Utilities	85	12.9	11.5	387	12.5	12.8	118	13.4	17.2	122	12.0	15.9
Interest	56	3.6	6.2	237	3.7	5.9	78	3.7	5.0	102	4.4	6.3
Other costs	76	9.4	8.7	348	10.8	10.8	99	12.0	15.8	106	12.0	15.4
Employees by Education (%)												
Tertiary	89	6.6	20.2	413	15.6	24.1	141	28.0	25.9	144	24.3	25.4
Vocational	89	14.5	30.5	413	23.8	29.5	141	18.9	18.6	144	21.3	21.7
High school or less	89	76.9	38.2	413	59.6	37.2	141	50.7	34.2	144	52.3	34.4
Source of Working Capital (%)												
Retained Earning	89	72.7	36.2	413	59.8	38.0	141	53.3	42.3	144	48.5	38.3
Bank	89	8.4	18.4	413	10.2	21.2	141	12.8	23.3	144	18.3	26.3
Other Financial Institutions	89	0.6	3.4	413	1.4	8.0	141	1.6	7.9	144	2.7	9.5
Others	89	18.4	33.2	413	25.6	34.0	141	24.4	36.5	144	27.1	37.9
Average Cost of Borrowing (%)	54	5.4	9.0	192	8.6	9.0	76	7.7	4.4	87	8.2	4.7
Sale Destination (%)												
Domestic	88	96.9	16.5	382	93.1	22.3	114	75.9	32.3	117	60.2	39.7
Export	2	90.0	14.1	49	56.2	36.2	55	54.3	29.7	82	60.5	34.9

Source: ERIA – SMEs Survey 2009.

3. Constraints to Growth

This section presents an analysis on constraints faced by SMEs to grow. The analysis utilizes the information drawn from the perception part of the questionnaire.

3.1. Constraints Faced by the Surveyed SMEs

Table 2 presents the top 10 out of 44 barriers as seen by the surveyed SMEs are ranked using the average response rate (mean) and the complete results for all barriers are given in the appendix.

For the ranking of top 10 constraints for the whole sample, the first ranked constraint, "Offering competitive prices to customers" and seventh, "Difficulty in matching competitors' prices", belong to the "Product and Price Barriers" which also rank first in Table 2. The second ranked constraint, "shortage of working capital to finance new business plan" and fourth "Lack of production capacity to expand", all reflect "Functional Barriers" that are ranked second on the main constraint categories in Table 3. It is followed by "Poor/deteriorating economic conditions (home)" which reflects the "Business Environment Barrier". Ranked fifth, sixth, and eighth highlights the "Information Barriers" category. Lastly, ranked tenth "Establishing and maintaining trust with business partners" is in the "Distribution, logistics, and Promotion Barriers".

For SMEs in the production network, the ranking of top 10 constraints is quite similar to the whole sample, retaining 7 out of the top ten ranked constraints as in the whole sample. Among the 3 different constraints in the top 10 from the whole sample are: "Perceived risks in your current and new business operations" rank second, "High tax and tariff barriers (home)" rank sixth, and "Political instability (home)" which ranks seventh.

Table 2. Ranked Top-Ten Constraints Faced by the Surveyed SMEs and by Status in Production Network

Rank	Whole Sample	Production Network	
		IN	OUT
1	B14. Offering competitive prices to customers	B14. Offering competitive prices to customers	B7. Shortage of working capital to finance new business plan
2	B7. Shortage of working capital to finance new business plan	B35. Perceived risks in your current and new business operations	B14. Offering competitive prices to customers
3	B28. Poor/deteriorating economic conditions (home)	B28. Poor/deteriorating economic conditions (home)	B6. Lack of production capacity to expand
4	B6. Lack of production capacity to expand	B19. Establishing and maintaining trust with business partners	B2. Unreliable market data (costs, prices, market shares)
5	B1. Limited Information to locate/analyze markets/business partners	B1. Limited Information to locate/analyze markets/business partners	B1. Limited Information to locate/analyze markets/business partners
6	B2. Unreliable market data (costs, prices, market shares)	B31. High tax and tariff barriers (home)	B28. Poor/deteriorating economic conditions (home)
7	B15. Difficulty in matching competitors' prices	B30. Political instability (home)	B15. Difficulty in matching competitors' prices
8	B3. Inability to indentify and contact potential business partners	B15. Difficulty in matching competitors' prices	B3. Inability to indentify and contact potential business partners
9	B19. Establishing and maintaining trust with business partners	B6. Lack of production capacity to expand	B8. Difficulty in getting credit from suppliers and financial institutions
10	B4. Lack of managerial time to identify new business opportunities	B2. Unreliable market data (costs, prices, market shares)	B5. Insufficient quantity of and/or untrained personnel for market expansion

Source: ERIA – SMEs Survey 2009

The ranking for those SMEs out of the production network retains 9 out of top-ten constraints as in the whole sample ranking with only differences in order of the ranking.

The difference is "insufficient quantity of and/or untrained personnel for market" ranked tenth.

Table 3 shows the ranking of main category of constraints by the surveyed SMEs. The ranking is the same for the whole sample and those SMEs that are not in the production network. However, while the "Product and Price Barriers", "Functional Barriers", and "Business Environment Barrier" rank first, second, third top for the three groups, the "Informational barriers" rank lowest for SMEs that are in the production network compared with for the whole sample and those SMEs that are not in the production network.

Table 3. Ranked Constraints by Category Faced by the Surveyed SMEs

Rank	All sample	Production Network	
		IN	OUT
1	Product and price barriers	Product and price barriers	Product and price barriers
2	Functional barriers	Functional barriers	Functional barriers
3	Business environment barriers	Business environment barriers	Business environment barriers
4	Informational barriers	Distribution, logistics and promotion barriers	Informational barriers
5	Distribution, logistics and promotion barriers	Procedural barriers	Distribution, logistics and promotion barriers
6	Procedural barriers	Tax, tariff and non-tariff barriers	Procedural barriers
7	Tax, tariff and non-tariff barriers	Informational barriers	Tax, tariff and non-tariff barriers
8	Other barriers	Other barriers	Other barriers

Source: ERIA – SMEs Survey (2009).

In summary, results from the survey on constraints faced by SMEs reaffirm that most surveyed SMEs are operating under severe constraints internal to them. For all SMEs in the survey, both the detailed and main category ranking of constraints is consistently high on "Functional Barriers" and "Product and Price Barriers". However,

the "Informational barriers" seems to be lower for SMEs that are in the production network compared with for the whole sample and those SMEs that are not in the production network.

3.2. Ranked Effectiveness and Perceptions of Needs-Assistance

The SMEs were also asked whether they have received any assistance from government or non-governmental organization (NGOs) and rate the effectiveness of those assistances which comprise of 7 main components. Table 4 shows the effectiveness and needs of assistances for all the surveyed SMEs. On average, between 32 to 48 % of SMEs have reported received assistances.

Table 4. Ranked Effectiveness and Perception of Needs-Assistance to the Surveyed SMEs by Degree of Importance – All Sample

Rank	Effectiveness of Assistance	% of Assisted SMEs	Perception of Needs- Assistance
1	Financing	31.5	Financing
2	Technology development and transfer	33.3	Information
3	Counseling and advice	35.8	Business linkages and networking
4	Overall improvement in investment climate	37.2	Overall improvement in investment climate
5	Business linkages and networking	40.2	Training
6	Training	41.1	Technology development and transfer
7	Information	47.7	Counseling and advice

Source: ERIA – SMEs Survey (2009).

As for the effectiveness of the assistance, "Financing", and "Technology development and transfer" rank first and second, and followed by "Counseling and advice", "Overall improvement in investment climate", "Counseling and advice", "Business linkages and networking", "Training", and last "Information".

It should be logical that the assistances that are ranked top on their effectiveness should be rank lower in terms of needs-assistances for the SMEs. This is the case for "Information" which is given high priority. However, "Financing" is still the top priority of assistances needed by the SMEs. This could suggest that "Financing" is the overriding factor to facilitate further SMEs development.

When distinguishing between those that are in production network and those that are not, Table 5 shows that both groups reported to have similar proportion of assistance from NGOs or government. For those that are in production network, effective supports are in "Technology development and transfer", "Financing", "Counseling and advice", "Overall improvement in investment climate". "Business linkages and networking" and "Information" are the least effective supports they received. For those SMEs that are not in the production network, the rankings are quite similar, except that "Financing" ranks top, and "Business linkages and networking" is ranked a bit higher than those that are in production network.

As far as the perception of needs-assistances are concerned, "Overall improvement in investment climate", "Financing", and "Business linkages and networking" are the top priority for those SMEs that are in the production network. For those SMEs that are not in the production network, "Financing", "Information", followed by "Training" are their most wanted supports. Again, "Financing" is still the top priority of assistances needed by both groups underlying the fundamental constraints faced and necessity of supports needed by all SMEs.

In summary, less than half of SMEs in the surveyed sample have received assistances from NOGs or government. Even though most of SMEs are satisfied with the assistances in "Financing", it still appears to be the most important area of supports underlying the fundamental constraints faced and relevant of supports needed by all SMEs. On top of that for SMEs in general and those that are not in the production network, supports in "Information", "Business linkages and networking", and "Training" are their most wanted supports. However, for SMEs that are in the production network, "Overall improvement in investment climate", "Financing", and "Business linkages and networking" are the top three supports they need.

Table 5. Ranked Effectiveness and Perception of Needs-Assistance to the Surveyed SMEs by Degree of Importance and their

Rank	In Production Network			Out Production Network		
	Effectiveness of Assistance		Perception of Needs-Assistance	Effectiveness of Assistance		Perception of Needs-Assistance
	Rank (mean)	% of Assisted SMEs		Rank	% of Assisted SMEs	
1	Technology development and transfer	30.2	Overall improvement in investment climate	Financing	31.8	Financing
2	Financing	31.0	Financing	Technology development and transfer	34.7	Information
3	Counseling and advice	35.9	Business linkages and networking	Counseling and advice	35.8	Training
4	Overall improvement in investment climate	36.7	Information	Overall improvement in investment climate	37.4	Business linkages and networking
5	Training	40.7	Training	Business linkages and networking	38.8	Technology development and transfer
6	Business linkages and networking	43.1	Technology development and transfer	Training	41.2	Overall improvement in investment climate
7	Information	48.4	Counseling and advice	Information	47.4	Counseling and advice

4. Hypotheses for Firm Characteristic Determinants of SME Participation in Production Networks

The previous section identifies the constraints of SME growth, either for all SMEs or when the SMEs are grouped into two groups according to their status in production networks. The analysis presented in the previous section is continued by another analysis on the firm characteristic determinants of SME participation in production networks. These analyses are different, yet they are related. One may view the characteristics determinants as 'internal' constraints to grow for firms that intend to participate in production networks. Indeed, the previous analysis points to the impression that SMEs operate under a rather severe internal constrains. All in all, the two analyses looking both from the perception and empirical results are useful for analyzing SME participation and performance in production networks, and hence, having these in our study is well justified.

Emphasizing the role of firm characteristics has become an increasingly important consideration in the empirical studies examining performance of firms. Geroski (1998) observes that size seems to be an important characteristic associated with systematic differences in firm performance. Based on this observation, he further argues that understanding and identifying the source of firm heterogeneities is a key to making some progress in explaining heterogeneity in their performance.

Justification for this approach can also be derived from the resource-based theory of firms. According to this theory, the differences observed in firms' performance can be explained by some specific factors attached to the firms (e.g. Rumel 1984; Barney 1992). There is no clear definition, however, about which resources constitute the firm-specific resources. Nevertheless, Barney (1992) argues, these resources can be defined to include all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc that are controlled by firms. Dierickx and Cool (1989) argue that the most important element of these resources is that they are not available in the market but must be developed by firms.

If firm heterogeneity matters in determining participation and performance of SMEs in production networks, the question is, what are the characteristics of firms that

represent the sources of this heterogeneity? Drawing from the discussion in the previous chapter, as well as from that in the general economic literature, the following lists the characteristics considered by this study. The discussion puts forward the hypotheses on the relationship between the characteristics and SME performance, as well as participation, in production networks.

a. Size

This study addresses small and medium firms, and therefore, it does not seem logical in considering size as a candidate for a determinant of SME participation and performance in production networks. However, and as indicated in our sample and other studies, there is still large variation in the size across even the very narrow-defined small and medium firms. Hence, it turns out that size could be an important determinant.

Larger SMEs have higher chance to participate and perform better in production networks. Traditionally, the importance of size is related to scale economies in production. If economies of scale in production exist, large firms may outperform small ones in a low demand situation by setting lower prices.[1]

The perspective of the five internal resources for capacity building of SMEs (see discussion in the previous chapter) also motivates the positive size-performance relationship, particularly in the context of this study. Access to the many of these resources is likely to be stronger for larger firms. In general, it is reasonable to argue that larger firms have greater access to resources, including those deemed important for SMEs growth. Consider, for example, access to finance. Larger firms also tend to be better connected to banks or other formal sources of finance. Supporting this, Claessens et al. (2000) found that the bank-dependent firms in Asian countries are mostly large firms.

b. Age

The reasoning below suggests a hypothesis of positive relationship between firm age and SME performance, as well as, participation in production networks.

---

[1] While theoretically sounds, this argument sometimes does not fully backed up by evidence. Literature recorded mixed findings on the positive relationship between firm size and performance.

The importance of firm age is mostly related to the experience and knowledge that a firm is able to accumulate. Theoretical explanation can be derived from Jovanovic (1982) which postulates that overtime firms learn and improve efficiency. The experience and knowledge essentially come from many sources, but in the context of this study, the most likely source is networks of firms. These networks are particularly important because it facilitates peer-based learning and allows SMEs to reconfigure relations with suppliers (see the discussion in the previous chapter on this).

Firm age is also important because credit rationing can be expected to be more adversely affect smaller firms. Central to the proposition is that the risk associated with any loan varies with respect to the duration of relationships between firms and financial institutions (Diamond 1991).

Having mentioned the arguments above, a negative relationship involving firm age might also be observed. This is because adjustment generally is more difficult to happen in older firms – Jovanovic's firm growth model indeed suggests a more dynamism of younger firms. Therefore, one could predict that it is much easier for younger SMEs to join a production network compared to the older ones.

c. Foreign Ownership

Foreign ownership is hypothesized to positively related to SMEs performance and participation in production networks.

Forming a joint venture arrangement with foreign firms is clearly favourable strategy for any SME to engage and perform well in production networks. As discussed, doing so allows SMEs to exploit firm-specific assets owned by the foreign partners, and hence improve the competitiveness of the SMEs in global markets. In practice, the advantage of this mechanism usually comes from technology transfers and sometime from financial supports.[2]

The significance of foreign ownership, however, may depend on the share of the ownership. In other words, it depends on whether or not the foreign party control the domestic firm. Literature on multinationals indicates that foreign parent companies may

---

[2] In a more general firm performance context, Desai et al. (2004) and Blalock and Gertler (2005), for example, argue and show that domestic firms with share of foreign ownership are able to overcome financial difficulties during the 1997 Asian financial crisis.

restrict the transfer of the firm-specific assets if they do not hold a significant control over the domestic firms.

d. Productivity

Firm-level productivity is hypothesized to improve both the chance of SME participation into and performance in production networks. This hypothesis draws from the most recent findings in the research of firm exporting behaviour which find that exporters are more productive than non-exporters.[3] The superior productivity of exporters is due to what so-called 'selection hypothesis', which argues that only the most productive firms are able to survive in the highly competitive export markets. The hypothesis is based on the presumption that there are additional costs involved in participating in export markets. These costs, which usually involve high fixed costs, include transport costs and expenses related to establishing distributional channels and production costs in adapting products for foreign tastes (Bernard and Jensen 1999).

Even when a firm has managed to grow from non-exporter to become an exporter, productivity still matter for the exporter's overall performance. This comes from learning from what so-called 'learning-by-exporting hypothesis', which argues that there is a learning effect from participating in exporting activities which will result in productivity improvement.[4]

The logic coming out from the exporting literature can be applied in the context of SME participation in production networks, and hence it justifies our hypotheses. As explained, SMEs tend to suffer from many competitiveness issues, compared to larger firms. The fact that most of end products produced by networks of productions are exported final goods, it is sensible to argue that SMEs wanting to participate in production networks need to mimic the characteristics of exporters in general. The literature briefly reviewed above suggests that productivity matters in determining a firm ability to serve export markets. In the context of SMEs and production networks,

---

[3]   Bernard *et al.,* (1995) and Bernard and Jensen (1999), for example, documented this for US manufacturing firms, while Aw and Hwang (1995) and Sjoholm and Takii (2003) document the same fact for the Taiwanese and Indonesian manufacturing, respectively.
[4]   One example is that exporters are often argued to be able to gain access to technical expertise, including product design and method, from their foreign buyers (Aw et al. 2000, p.67).

an important aspect of this perhaps is translated in the ability of SMEs in meeting strict requirement demanded by the higher – and larger – firms in networks of production.

The reasoning above also justifies our hypothesis that productivity is not only expected to improve the chance of SMEs to participate in production networks, but also to improve the SMEs' performance once they are already in the networks, and/or exporting at the same time.

e. Financial Characteristics: Access to Finance and Financial Leverage

SMEs with better access to finance are hypothesized to have higher chance to engage and perform well production networks. The potential for credit rationing – defined as the degree to which credit/loan is rationed, as an impact of imperfection in capital market (Stiglitz and Weiss 1981) – is thought to be higher for smaller firms. Petersen and Rajan (1994) argue that the amount of information that banks could acquire is usually much less in the case of small firms, because banks have little information about these firms' managerial capabilities and investment opportunities. The extent of credit rationing to small firms may also occur simply because they are not usually well-collaterized (Gertler and Gilchrist 1994).

Ability of a firm to get loan depends on the how the firm is able to service the debt. This, in turn, depends on the net worth of the firm, such as the value of cash inflow and liquid assets that the firm is able to generate. Lower net worth implies lower ability to service debt and hence it reduces the chance of a firm in getting loan or higher amount of credit. Banks, or any other lending institutions, are likely to attach high risk premium to firm with low net worth position.

SMEs that participate in production networks have a chance to have better cash flows than those that do not. SMEs in production networks have more certainty in terms of their production, since most of the time they operate based on larger, stable, and more certain buying orders from other firms in the networks. A more formal and modern managerial practice by firms operating in production networks, in addition to likelihood of more interactions with banks, also helps SMEs that operate in production networks to gain more 'trust' from banks or other formal financial institutions.

All these, which commonly known as the 'balance sheet channel' in financial economics literature, suggest that highly leveraged SMEs are expected to have lower chance to engage and perform well in production networks.[5]

f. Innovation Efforts

SMEs that have significant efforts to innovate are expected to have higher chance to engage and perform well in production networks. This study considers two types of innovation efforts: business- and technology-innovation effort. Business-innovation efforts improve various aspects of business strategies necessitated by firms that want to participate and grow in production networks. Efforts to meet international standards or widen business networks, for example, should improve the chance of SMEs in acquiring contracts from final assemblers or higher tier firms.

Technology-innovation efforts improve firms' capability of production. As explained, SMEs are usually located in low tiers of production network. Here, an improved or better production capability is critical, because the high-tiers firms demands strict requirement for the goods supplied by SMEs. Technology-innovation efforts are widespread, including improving machinery and accumulating knowledge/know-how. Having an improved production process increases a chance of SMEs to participate in production networks.

g. Location

The basic economics of the fragmentation approach of production networks are production-blocks separation with some potential cost-saving benefits (Kimura and Ando 2005). As modelled by Kimura and Ando, here the 'distance' create what so-called 'service-link costs' that are borne because of the geographical distance between the blocks, including transportation cost, communication cost, intra-firm coordination cost, etc. Therefore, cost-saving benefits need to be borne from location-specific advantages. These include not only the traditional economic factors, such as wage-level

---

[5] See Bernanke (1993) for the review of literature and discussion about the 'balance-sheet channel' as well as other relevant subjects.

and resource availability, but also the existence and quality of infrastructure and infrastructure services, and the policies of the host-country's governments.[6]

SMEs which are located near the production blocks or ports offer some saving of the service-link costs borne by geographical distance. Hence, this study hypothesizes that SMEs located near industrial parks or export processing zones (EPZs), as well as located near ports, are hypothesized to have higher chance to participate and perform well in production networks. Industrial parks or EPZs are the common place for the establishment of the production blocks.

h. Entrepreneurial and Managerial Attitudes

Previous chapter discusses the importance of management and entrepreneurial attitudes in determining the performance of SMEs. This study considers these attitudes as potential determinants of SME participation and performance in production networks. Specifically, it hypothesizes that willingness to take risks or new business ideas improve the chance of SME in participating and performing well in production networks. Positive attitude towards risks and new business ideas is clearly necessary to be adopted by SMEs managers given the tight competition for operation in production networks. As explained, SMEs operating in production networks tend to face a constant and high survival threat, owing to the nature of SMEs involvement in production networks that usually buying contracts from larger firms in the networks.

5. Statistical Framework and Measurement of Variables

Data for the empirical analysis are constructed from the survey results. The data integrate, or pool, the survey results from all countries participate in the survey. Considering the focus of small and medium enterprises, the analysis excludes the 'large' firms from the sample. Firm size is defined in terms of employment and the large firms are defined as those with employment of more than 200. In other words, the sample size contains observations of firms with maximum employment of 200.

---

[6] These policies include favorable investment climate, liberal trade policy, flexible labor policy, etc. (Kimura and Ando 2005).

Some adjustments have been made to prepare the data for this study. In most cases, this involves adjustments to make the data consistent and comparable across the countries. An example is transforming the unit value of sales from local currency to US dollars. Adjustments were made for some obvious errors in data entry process. As in the typical firm-level survey, there are always incomplete or missing information. This study, however, did not attempt to replace the missing information with its prediction value. This approach is taken to minimize the potential error from the prediction values, given that sometimes there is no certainty of whether or not the existence information from the survey is sufficient to produce reliable predictions. The adjustments made and missing information reduce quite significantly the number of observations for econometric analysis, from about 700 to 350 small and medium firms.

The determinants of SME participation in production networks is examined by way of statistical regression. The statistical model in its general form is given as the following:

$$PN_i = \gamma_0 + \Gamma' X_i + \varepsilon_i \tag{1}$$

where (1) is the equation for participation in production networks. i represent firm i and X_i is set of set of explanatory variables that capture firm characteristic determinants. Industry and country-group dummy variables are included for differences across industries and countries. The industry dummy variables identify whether firms are in the following sectors: garments, auto parts and components, electronics – including electronics parts and components, or other sectors. Meanwhile, country-group dummy variables identify whether a firm operates in the group of developed ASEAN countries (i.e., Thailand, Malaysia, Indonesia, and Philippine) or group of new ASEAN member countries (i.e., Cambodia, Lao PDR, and Vietnam).

The dependent variable, or PN_i, is a binary variable and identifies whether or not a firm participate in production networks. That is, $PN_i = 1$ if a firm participates in production networks and $PN_i = 0$ otherwise. A participated firm is defined if it meets the following requirements: first, it supplies to any tier in a network of production

87

defined by Abonyi (2005), and second, it either imports intermediate inputs or exports some of its products.[7]

Equation (1) is estimated within the framework of binary choice models (i.e., probit or logit model), instead of linear probability model (LPM). This is mainly because the predicted probability derived from LPM may lie outside the 0-1 region, which is clearly not reasonable in practice. Despite this, a binary response model also has a number of shortcomings. One important one is that the potential for bias arising from neglected heterogeneity (i.e. omitted variables) is larger in a binary choice model than in a linear model. Nevertheless, Wooldridge (2002) points out that estimating a binary response model by a binary choice model still gives reliable estimates, particularly if the estimation purpose is to obtain the direction of the effect of explanatory variables.

5.1. Measurement of Variables

The following variables are employed to account for the hypothesized firm characteristics. Firm size is proxied by number of employees. The other common alternatives, such as output or profits, are not used as they tend to be more sensitive to changes in the business cycle or macroeconomic variables. The head-count measure is chosen because the number of hours worked, which is the ideal measure of employment, is not available.

Meanwhile, age of firm is proxied by the number of years the plant has been in commercial production.

Foreign ownership is proxied by the percentage share of foreign ownership. This study does not consider the discrete measure of foreign ownership (i.e., dummy variable that identify whether a firm has foreign ownership share) because, as suggested by the literature, behaviour of foreign business partners in sharing their firm-specific assets depends on the extent of the ownership of the foreign investors in a joint venture firm.

This study employs output per labor as a proxy for labour productivity. Output is proxied by the sales of firms. The more traditional approach of using value added as numerator is not adopted because value added information is not available. However,

---

[7]   See Figure 2 in Chapter 3 for the description of tiers and location of SMEs in a network of production.

the use of output is acceptable and in fact more appropriate because output is measured at firm level.

Loan interest rate is measured by the interest rate of the loan that SMEs in the sample are able to get. This tends to be firm-specific since it reflects the risk premium valued by the banks or other lending institutions that give the loan to the SMEs. Meanwhile, this study employs interest coverage ratio, or ICR, to measure a firm financial leverage situation. It is defined as

$$(\text{Interest coverage ratio})_i = \frac{(\text{EBIT})_i}{(\text{interest payments})_i}$$

where EBIT is equal to sales (or earnings) before deduction of interest payments and income taxes.

Interest coverage ratio measures the number of times a firm's earnings exceed debt payments. In other words, it indicates how well a firm's earnings can cover interest payments. In general, a low ICR implies a firm is highly leveraged and has low capability to take on additional debt (i.e. more financially constrained).

It is worth mentioning that ICR is very approximate. This is because the ratio tends to understate the true extent of a firm's financial leverage. It focuses only on servicing the interest liability and does not take into account debt repayment. Usually, repayment of debt principal is higher than the interest payment, and therefore drains a larger amount of cash than the interest payment. In addition, the ratio does not take into account other mandatory and discretionary items, such as dividends and capital commitment, which are not included in the earnings figure.

Distance to industrial parks or EPZ and distance to ports are employed to measure the location characteristic. As the questionnaire asks, the distance variables are measured in terms of physical distance (i.e., kilometres) and time (i.e. hours). This study experiments with these two types of unit measurements in its empirical analysis.

As commonly applied in other empirical study, this study employs skill intensity variable to proxy the human capital resources of firm. It is defined as the ratio of non-production to production labour,

$$(\text{Skill intensity})_i = \frac{(\text{total number of employee with tertirary or vocational eduation status})_i}{(\text{total number of employee})_i}$$

To measure the extent of firm's business-innovation efforts, four dummy variables are created to identify whether a firm: (1) meets international standards, (2) introduces ICT, (3) establishes new divisions/plants, and (4) attends/ involves in business networking activities (e.g. business association, cooperation with other firms, R&D networks, etc.).

Meanwhile, to measure the extent of firm's technology-innovation efforts, four dummy variables are created to identify whether a firm: (1) buys new machines, (2) improves its existing machinery, (3) introduces new know-how or knowledge on production, and (4) introduces new products or services to markets.

The value of all of these variables is equal to unity if a firm conducted the effort attached to each of the variables in the past three months from the survey, or zero otherwise.

Two dummy variables are created to measure firm managerial and entrepreneurial attitudes. The first dummy variable is created to identify perception on taking business risks. It takes the value of unity if managers/owners have a positive attitude towards taking business risks or zero otherwise. The second dummy variable is created to identify willingness of the managers/owners in their willingness to adopt new business strategy. The variable takes the value of unity if there is a positive attitude towards adopting new business strategy or zero otherwise.

6. Results and Analysis

It is useful to describe some descriptive analysis before presenting and discussing the econometric results. To do so, we compare the 'average' value of SME characteristics between SMEs that participate and do not participate in production network. Table 1 shows mean value of some characteristics for these two groups. The table also compares the mean values and statistically determine whether or not they are different.

Table 6 indicates that SMEs participated in production networks are importantly different than those are not participated. As shown in Table 6, the participated SMEs in the sample are larger, younger, and involves more of foreign ownership than those the non-participated ones. All these characteristics are statistically difference. In terms of foreign ownership, the difference is quite substantial; that is, the share of foreign ownership of SMEs in the participated group, on average, is about two times higher than of the SMEs in non-participated one.

It is important to mention that although larger, the average of foreign ownership share in the participated group is below 51%. This means that, on average, foreigners/parent foreign partners are not likely be the dominant owner. The implication is that, SMEs are may not have a strong flow of information spillovers from their foreign partners. Nonetheless, the higher foreign ownership share in the participated group indicates that somehow, SMEs still benefits from their foreign partners for their participation in production networks.

Table 6. Average Value of SME Characteristics, between SMEs Participated and Not Participated in Production Networks

Characteristic	In Production Networks	Out of Production Networks	Statistically different
Size (employees)	66,2	52,1	Yes[+]
Age (years)	10,6	13,8	Yes[**]
Share of foreign ownership (%)	18,2	7,2	Yes[**]
Labor productivity (sales/employee, thousand USD)	26,8	23,0	No[2]
Loan interest rate (%)	6,1	8,9	Yes[**]
Interest Coverage Ratio, ICR[4]	250,0	77,5	Yes[*]
Credit interest rate (%)	6,2	8,9	Yes[**]
Distance to industrial parks or EPZs (hours)	1,0	0,9	No[3]
Distance to port (hours)	1,3	1,2	No[3]
Skill intensity[5]	0,4	0,3	Yes[**]

Notes:
1. + significant at 10%; * significant at 5%; ** significant at 1%
2. Significant at 65% confidence level.
3. Significant at 60% confidence level.
4. ICR is defined as the ratio of sales to payment for interest.
5. Skill intensity is defined as the proportion of skilled labor (i.e., employees with tertiary and vocational education level) in a firm total employment)
Source: ERIA Survey on SME Participation in Production Networks

The descriptive results, surprisingly, do not show much difference in SME productivity level between the two groups. This is rather puzzling given that one would expect that productivity should be one of the most important firm-characteristics determinants. The final inference on the importance of productivity, however, needs to confirmed by the econometric analysis.

Table 6 suggests that SMEs in production networks are less financially constrained The ICR is significantly larger for these SMEs. The difference in the mean of ICR between the two groups is also statistically significant. The larger ICR suggests that SMEs in production networks are able to service their loans than SMEs that are not part of the networks.

The table further suggests that SMEs in production networks are better connected to financial sectors. This is indicated by the realized interest rate on the loan which, on average, is lower for SMEs in this group, compared to the average interest rate for SMEs out of production networks. Again, the difference in the interest rate is statistically different. Moreover, the difference is suggested to be quite large. As for SMEs in the sample, and on average, those participated group managed to get 3 percentage points lower of interest rate compared to those in non-participated group.

The differences in the average of firm financial characteristics give some support to the argument that SMEs in production networks have better cash-flow due to large, stable, and more certain buying order from other firms in the networks. Moreover, it also supports the idea that SMEs in production networks are able to convey more information to the bank which reduces the extent of asymmetric information. This improves the trust of banks, or other financial institutions, on these SMEs which then reduces the risk premiums assigned to the SMEs.

Meanwhile, Table 6 does not seem to suggest the importance of location in determining SME participation in production networks. It shows that there is not much different in the distance to industrial parks or EPZ, and to ports. This is the distance when it is measured in terms of time (i.e., in terms of hours of journey). This study experiments with the distance in terms of geographical distance (i.e., in terms of kilometers) and the same results are achieved.

Table 7 and 8 presents attempt to show the 'average' characteristics of business- and technology-innovation efforts and managerial/entrepreneurial attitudes. Because of

the variables that represent these characteristics are dummy variables, the tables present the frequencies of SMEs with unity value of the dummy variables. The frequencies are produced for two groups, one for SMEs that participate in production networks and the other for SMEs that do not participate in the networks.

Table 7. Innovation Efforts Characteristics, Frequency (in %) of SMEs Participated and Not Participated in Production Networks

Characteristic	In Production Networks	Out of Production Networks	Statistically different
Met international standards (e.g. ISO, etc.)	44,4	36,5	Yes[*]
Introduced information and communication technology	35,5	36,0	No[2]
Established new divisions or plants	27,0	18,8	Yes[*]
Involved in business network activities	52,6	47,1	No[3]
Bought new machinery with new functionality	58,4	47,9	Yes[**]
Improving the existing machinery	72,5	59,1	Yes[**]
Introduced new know-how in production method	49,6	40,7	Yes[*]
Recently introduced new products	63,4	55,1	Yes[*]

Notes:

1. + significant at 10%; * significant at 5%; ** significant at 1%

2. Significant at 10% confidence level.

3. Significant at 84% confidence level.

Source: ERIA Survey on SME Participation in Production Networks.

Table 7 indicates that SMEs in production networks conduct have superior characteristics in terms of their efforts in conducting business innovation. It shows that the number of SMEs that conducted the wide range of business innovation over the last three months is mostly larger for this group. The table suggests SMEs in and out of production networks are not different in terms of introducing ICT and being involved in business network activities, such as business association, R&D networks, etc. SMEs between these two groups are quite different in terms of efforts to meet international standards or establish new divisions/plants.

SMEs that operate in production networks seem to have stronger technology-innovation efforts. Table 7 shows that SMEs in this group adopted new production method, bought more of new machinery, and upgraded their existing machinery in the last over the last three months to the survey. Over this period, these SMEs also introduced new production know-how and knowledge more than those that do not participate in the production networks.

Table 8 suggests that SMEs participated in production network are different than those out of the networks in terms of managerial/entrepreneurial characteristics. There is larger number of SMEs that acknowledge the risks in doing business for the participated group. In other words, there more SMEs in participated group that have positive attitude towards business risks, compared to those in the non-participated group. Not only this, the table shows that the there is larger number of SMEs that have more willingness to adopt new business strategy in the group of participated SMEs, compared to those in the other group.

Table 8. Managerial/entrepreneurial Characteristics: Frequency (in %) of SMEs Participated and Not Participated in Production Networks

Characteristic	In Production Networks	Out of Production Networks	Statistically different
Considering risk in business operation	52,7	30,7	Yes[**]
Willingness to adopt new business strategy	42,3	26,6	Yes[**]

Notes:
1. + significant at 10%; * significant at 5%; ** significant at 1%
Source: ERIA Survey on SME Participation in Production Networks

Table 9 reports the results of maximum likelihood estimation of equation (1) for the subset of sample which consists of all firms/SMEs with the maximum size of 200 employments. The table reports the final specifications that give the best results, while the other specifications estimated during experiment stage are not reported here in the table for the reasons of less favorable results. The Wald test of overall significance in all specifications passes at 1 percent level. The table reports robust standard errors for the reason of heteroscedastic variance.

Table 9. Firm Characteristic Determinants of SMEs in Production Networks

Independent variable	Dependent variable: (Participation in Production Network)$_i$												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(Size)$_i$	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(1.60)	(1.56)	(1.45)	(0.40)	(0.33)	(0.33)	(0.63)	(0.65)	(0.77)	(0.88)	(0.49)	(1.31)	(1.19)
(Size^2)$_i$	-0.000	-0.000	-0.000	0.000	0.000	0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000
	(1.13)	(1.59)	(0.89)	(0.10)	(0.21)	(0.27)	(0.10)	(0.13)	(0.23)	(0.31)	(0.11)	(0.70)	(0.71)
ln(Age)$_i$	-0.075	-0.055	-0.038	-0.049	-0.049	0.005	-0.038	-0.048	-0.042	-0.029	-0.063	-0.044	-0.040
	(0.69)	(0.52)	(0.55)	(0.62)	(0.63)	(0.06)	(0.49)	(0.62)	(0.53)	(0.36)	(0.81)	(0.63)	(0.57)
(Labour productivity)$_i$	0.004	0.005	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
	(1.91)+	(1.88)+	(2.12)*	(2.01)*	(1.97)*	(2.29)*	(2.19)*	(2.04)*	(2.33)*	(2.30)*	(2.08)*	(2.44)*	(2.32)*
	0.588	0.533	0.415	0.330	0.402	0.433	0.425	0.381	0.430	0.439	0.403	0.378	0.403
(Foreign ownership share)$_i$	(1.97)*	(2.01)*	(2.18)*	(1.49)	(1.81)+	(1.97)*	(1.93)+	(1.74)+	(1.93)+	(1.98)*	(1.83)+	(1.93)+	(2.09)*
(Loan interest rate)$_i$	-0.035	-0.031	-0.033	-0.031	-0.030	-0.029	-0.031	-0.032	-0.031	-0.031	-0.031	-0.012	-0.013
	(2.71)**	(2.52)*	(2.72)**	(2.41)*	(2.33)*	(2.26)*	(2.43)*	(2.46)*	(2.35)*	(2.37)*	(2.41)*	(1.07)	(1.25)
	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
(Interest Coverage Ratio)$_i$	(1.74)+	(1.48)	(2.42)*	(2.69)**	(2.65)**	(2.47)*	(2.64)**	(3.00)**	(2.56)*	(2.40)*	(2.65)**	(2.41)*	(2.52)*
(Skill intensity)$_i$	-0.025	-0.022	-0.432	0.148	0.083	0.166	0.143	0.136	0.142	0.204	0.073	-0.468	-0.459
	(0.06)	(0.07)	(2.48)*	(0.64)	(0.34)	(0.71)	(0.60)	(0.59)	(0.61)	(0.86)	(0.30)	(2.61)**	(2.58)**
(Distance to industrial parks or EPZs)$_i$	0.096	0.161											
	(0.66)	(0.96)											
(Distance to port)$_i$	0.160		0.168	0.152	0.174	0.129	0.145	0.145	0.143	0.136	0.132	0.135	0.137
	(1.27)		(1.51)	(1.52)	(1.75)+	(1.32)	(1.49)	(1.49)	(1.47)	(1.37)	(1.34)	(1.35)	(1.42)

Table 9 continues

Table 9. continued

Independent variable	Dependent variable: (Participation in Production Network)$_i$												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(Dummy variable for meeting international standard)$_i$				0.298									
				(2.14)*									
(Dummy variable for have introduced ICT)$_i$					0.352								
					(2.30)*								
(Dummy variable for have established new divisions)$_i$						0.603							
						(3.69)**							
(Dummy variable for involving in business networks)$_i$							0.151						
							(1.11)						
(Dummy variable for acquiring new machinery)$_i$								0.256					
								(2.05)*					
(Dummy variable for improving existing machinery)$_i$									0.414				
									(3.31)**				
(Dummy variable for acquiring production knowledge)$_i$										0.417			
										(3.18)**			
(Dummy variable for ability of introducing new products)$_i$											0.312		
											(2.36)*		
(Dummy variable for considering risk in business operation)$_i$												0.361	
												(3.25)**	
(Dummy variable for willingness to adopt new business strategy)$_i$													0.238
													(2.06)*

Table 9. concluded

Independent variable	Dependent variable: (Participation in Production Network)$_i$												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(Dummy var. for garment sector)$_i$			-0.047	0.048	0.042	0.039	0.002	-0.014	-0.004	0.079	-0.015	-0.057	-0.052
			(0.33)	(0.30)	(0.25)	(0.24)	(0.01)	(0.08)	(0.02)	(0.47)	(0.09)	(0.40)	(0.37)
(Dummy var. for auto parts and components)$_i$			0.394	0.289	0.378	0.305	0.263	0.232	0.272	0.365	0.208	0.408	0.398
			(2.29)*	(1.41)	(1.81)+	(1.44)	(1.26)	(1.12)	(1.30)	(1.71)+	(0.98)	(2.35)*	(2.31)*
(Dummy var. for electronics, and electronics parts and component)$_i$			0.259	0.355	0.400	0.394	0.372	0.334	0.352	0.447	0.307	0.264	0.259
			(1.55)	(1.88)+	(2.12)*	(2.08)*	(1.98)*	(1.81)+	(1.88)+	(2.36)*	(1.64)	(1.56)	(1.54)
(Dummy var. for country group)$_i$			1.163	1.210	1.319	1.273	1.238	1.168	1.148	1.264	1.166	1.092	1.139
			(8.27)**	(7.77)**	(8.32)**	(8.02)**	(7.93)**	(7.47)**	(7.34)**	(8.01)**	(7.45)**	(7.65)**	(8.09)**
Constant			-1.259	-1.769	-1.862	-2.014	-1.803	-1.781	-2.030	-2.550	-1.689	-1.330	-1.303
			(5.21)**	(3.13)**	(3.29)**	(3.69)**	(3.10)**	(3.20)**	(3.45)**	(3.84)**	(2.98)**	(5.50)**	(5.42)**
Observations	543	543	713	543	543	542	541	543	543	539	540	713	713

Notes:

1. Robust z statistics in parentheses

2. ** significant at 1%;

   * significant at 5%;

   + significant at 10%,

Specification (1) to (3) are the baseline. They consider all variables except the dummy variables for the innovation efforts and managerial/entrepreneurial attitudes. These specifications are different in the way of how distance variables are included in the regression. Specification (1) include both of the distance variables, i.e., the distance to industrial parks or EPZs, while specification (2) and (3) enter each of these variables separately. Specification (1) and (2) are motivated because of potential collinearity of the two distance variables.

The key point of coming out from these specifications is the evidence that location is not an important determinants of SME participation in the networks. The estimated coefficients of the two distance variables are all statistically not significant across the specifications. In addition, all of these coefficients are positive, which are not as hypothesized.

A possible explanation points to the role of infrastructure. If theory and other empirical studies underlines that distance matter because it increases the 'service-link costs', good transport infrastructure could cut the disadvantage of being far from clusters of firms such as in industrial parks or EPZ which usually shelters firms that involved in production networks. This proposition deserves some supports. According to the 'flowchart approach' of cluster development (Kuchiki 2005), good infrastructure facilities are necessary to attract both so-called 'anchor firms' as well as other firms that support these firms. Firms that support these anchor firms in many cases are SMEs.

Firm productivity determines the participation of SMEs in production networks. The estimated coefficients of labor productivity are positive and, more importantly, statistically significant at 1 percent level in most of specifications. This is one of the robust findings coming out from the regressions. This finding supports our hypothesis of positive relationship between productivity and SME participation in production networks. Moreover, it accords to our argument that SMEs who plant to participate in production networks need to prepare themselves by mimicking the characteristics of exporting firms in general, and one of the most important characteristics is superior productivity – compared to non-exporting firms. As an example, a superior productivity level of SMEs operating in production networks is clearly needed given the usually strict requirement of goods produced demanded by other firms in the higher tiers of the networks.

The results suggest that foreign ownership significantly determines the participation of SMEs in production networks. This accords our hypothesis on the characteristic foreign ownership and is consistent with the key observation pulled out from the descriptive statistics presented earlier. Moreover, the magnitude of foreign ownership in determining the participation is large, indicated by the larger value of the estimated coefficients across all specifications. Foreign ownership, however, is not as importance as labor productivity in determining the SME participation. The statistical significance of the estimated coefficient is only moderately, switching either at 5 or 10 percent significance level across the specifications.

Nonetheless, this finding, together with that from the descriptive analysis, supports the argument that SMEs are able to exploit firm-specific assets owned by their foreign partners to improve their competitiveness – something that is really needed for the SMEs' successful performance in production networks. The high impact of foreign ownership variable, meanwhile, indicates that SMEs are able to get high marginal benefit from having greater involvement of foreign investment in their firms. This clearly underlines a strong dependency of how much firm-specific assets or knowledge can be shared to SMEs on the shares of foreign ownership.

SMEs that conduct more actively business-innovation activities are suggested to have higher chance to participate in production networks. The estimated coefficient of the three – out of four – dummy variables of business-innovation efforts is positive and statistically significant. These are shown in the results of specification (4) to (7). The only business-innovation efforts variable that is not significant is the dummy variable for attending business networks (e.g. business associations). This confirms the earlier observation from the descriptive analysis which indicates that SMEs participated in production networks are not much different with those out of the networks in terms of business innovation activities they do.

Strong efforts in conducting technology innovation significantly determine SME participation in the networks. The estimated coefficients of all dummy variables that represent these efforts are positive and statistically significant. These are shown in the results of specification (8) to (11). The results suggest that the efforts of SMEs in conducting more actively technology innovation process significantly increase a chance of SMEs to participate in production networks. Moreover, the impact of the innovation

efforts is quite large, as it is indicated by the large value of the estimated coefficients, at least relative to the estimated coefficients of the dummy variables that represent business-innovation efforts.

The finding on the innovation efforts underlines the importance of having all necessary technology and know-how if for both getting invitation to participate in as well as survive better in production networks. As noted, production networks pose a hostile environment to SMEs, which mostly comes from strict product requirement that clearly needs adoption of advanced technology and a characteristic of SMEs that they tend to be located at lower tiers of production networks.

The results suggest that the characteristic of firm toward risk or adoption of new business idea is an important determinant of SMEs participation in production networks. The estimated coefficients of the two dummy variables that represent this, i.e., consideration on risk in business operation and willingness to adopt new business strategy are all positive and statistically significant. The magnitude of the coefficient further suggests the importance of this characteristic in increasing the probability of SMEs to participate in production network. This finding is consistent with the view that SMEs in production networks operate in a tough business environment and faces a constant and continuously survival threat. While it is not immediately relevant, it is worth mentioning that the results provide supports for the importance of psychological factors in determining performance of SMEs in general.

The result on skill intensity variable does not accord our prediction. The estimated coefficient changes sign across the specifications. In most cases, the coefficients are usually not statistically significant when they are positive (i.e., the predicted sign) but they are statistically significant when the sign is not the predicted one. This is rather surprising given the results of the other variables. However, this may be caused by strong correlation of skill intensity variables with the other variables, in particular the dummy variables for innovation efforts. It is natural to expect that firms with strong innovation efforts tend to employed more skilled workers than those with weak technological capability.

The econometric results confirm our earlier observation on the relationship between, on the one hand access to finance or financial leverage, and on the other, SME participation in production networks. It is now more convincingly to conclude that both

of these characteristics determine the chance of SME participation in production networks. In particular, stronger access to financial institutions increases the chance of SMES to participate in production networks. As noted, the results indicate that SMEs participated in the networks suffer from lower credit-rationing problem, which arises from incomplete information, than those operated outside of the networks. This is another important characteristic to bear in mind. Meanwhile, higher chance to participate in production network is attached SMEs which are able to service their debts. This is apparent from the results of ICR variable. However, the impact of financial leverage characteristic is small, as it is indicated by the very small estimated coefficient of this variable.

7.   Stairway to Higher-quality Production Networks

This section extends the analysis of the previous sections by focusing more on firms/SMEs that participate in production networks. It relies on the framework of quality-intensity nexus in production networks explained in the previous chapter. Groups of firms operating in production networks can be classified into four types according to different quality and intensity, as those drawn by Figure 3 of Chapter 3.

This section examines the low- and high-quality groups in its empirical analysis. Relying on the quality-intensity nexus framework, this section asks question of how the constraints to grow are different between the two groups and how an SME can move from the low to the high group. This means that the analysis takes a comparison of firms in both quadrant II and III with firms in quadrant I and IV, referring to Figure 1. As explained, the low quality group is defined to consist of firms in Tier 3 and/or 4 of a production network structure. The high quality one, meanwhile, is defined to consist of firms in Tier 1 and/or 2.

7.1. Constraints and Assistances to the Surveyed SMEs Distinguished by Their Quality in Production Network

In order to move our discussion on the perception of constraints and assistances to SMEs one step further, we divide those SMEs that are in production networks into two groups. For those that are in higher quality of production networks, they belong to the top tier in the production network and the rest are in lower quality production networks.

Table 10.   Ranked Top-Ten Constraints Faced by SMEs

Rank	In Low Quality Production Network	In Higher Quality Production Network
1	B35. Perceived risks in your current and new business operations	B30. Political instability (home)
2	B14. Offering competitive prices to customers	B28. Poor/deteriorating economic conditions (home)
3	B19. Establishing and maintaining trust with business partners	B31. High tax and tariff barriers (home)
4	B6. Lack of production capacity to expand	B14. Offering competitive prices to customers
5	B1. Limited Information to locate/analyze markets/business partners	B19. Establishing and maintaining trust with business partners
6	B28. Poor/deteriorating economic conditions (home)	B1. Limited Information to locate/analyze markets/business partners
7	B15. Difficulty in matching competitors' prices	B9. Developing new products
8	B21. Excessive transportation/insurance costs	B29. Inadequacy of basic and IT infrastructure (home)
9	B2. Unreliable market data (costs, prices, market shares)	B35. Perceived risks in your current and new business operations
10	B4. Lack of managerial time to identify new business opportunities	B37. Willingness to adopt new business strategy or ideas

Source: ERIA – SMEs Survey (2009).

Table 10 shows the top ten out of 44 constraints faced SMEs distinguished by their quality in production networks. For those that are in lower quality of production network, "Perceived risks in your current and new business operations" under "Other Barriers" category ranks top, followed by "offering competitive prices to customers" and "difficulty in matching competitors' prices" of "Product and Price Barriers" category that are ranked second and seventh. Ranked third and eight are "establishing and maintaining trust with business partners" and "excessive transportation/insurance costs" that are in "distribution, logistics and promotion barriers" category. The "lack of production capacity to expand" and "lack of managerial time to identify new business

opportunities" that are ranked fourth and tenth are under the "Functional barriers" category. The rest are in "Informational Barriers" and "Business environment barriers" category.

For those that are in higher quality of production network, the perception of their constraints is quite different from those in the lower quality. The top two constraints are "Political instability (home)", "poor/deteriorating economic conditions (home)", and eighth "Inadequacy of basic and IT infrastructure (home)" are under the "Business environment barriers" category. They are followed by "high tax and tariff barriers (home)", "offering competitive prices to customers", "establishing and maintaining trust with business partners", "limited Information to locate/analyze markets/business partners", "developing new products" , "perceived risks in your current and new business operations", and "willingness to adopt new business strategy or ideas" that are belong to "Tax, tariff and non-tariff barriers", "Product and price barriers", "Distribution, logistics and promotion barriers", "Informational Barriers", "Functional barriers", and "Others barriers" category.

However, when ranked by main category, "Product and price barriers", "Functional barriers", and "Business environment barriers" are the top main constraints faced by both groups of SMEs in quality production network as shown by Table 11. "Informational Barriers", and "Others barriers" category rank lowest.

In summary, constraints faced by SMEs are different between those that are in lower quality production network than those in the higher quality one seeing from the top ten and detailed rankings of constraints. For those that are in lower quality of production network, internal constraints are critical to them in contrast to external constraints faced by those that are in higher quality of production network.

Table 11. Ranked Constraints by Category Faced by SMEs and their Quality in Production Network

Rank	In Low Quality Production Network	In Higher Quality Production Network
1	Product and price barriers	Product and price barriers
2	Business environment barriers	Functional barriers
3	Functional barriers	Business environment barriers
4	Procedural barriers	Distribution, logistics and promotion barriers
5	Distribution, logistics and promotion barriers	Procedural barriers
6	Tax, tariff and non-tariff barriers	Tax, tariff and non-tariff barriers
7	Informational barriers	Informational barriers
8	Other barriers	Other barriers

Source: ERIA – SMEs Survey (2009).

The effectiveness and needs for assistances are shown by Table 12. On average, 60 % of SMEs in both groups of quality in production network have reported received assistances.   "Financing", "Overall improvement in investment climate" and "Technology development and transfer" are reported to be effective for those that are in lower quality of production network. "Counseling and advice", and "Training" are the less effective. However, judging from the needs for assistances, "Overall improvement in investment climate" and "Financing" are ranked top the list underlying the critical supports for those SMEs that are in lower quality of production network.

For those that are in higher quality of production network, "Financing", "Technology development and transfer", and "Business linkages and networking" are ranked the most effective supports they have received. "Information" and "Counseling and advice" are the less effective. For the needs for assistances, they rate "Overall improvement in investment climate", "Business linkages and networking" and "Financing" are top priority for them implying that continuing effective supports in

these areas are very important for those SMEs that are in higher quality of production network.

In summary, about 60 % of SMEs in both groups of quality in production network have reported received assistances. Among others, "Financing" continues to be the pressing needs of supports together with "Overall improvement in investment climate" for both groups. However, support in "Information" is more important for that are in lower quality of production network and "Business linkages and networking" for those that are in higher quality of production network.

Table 12. Ranked Effectiveness and Perception of Needs-Assistance to the Surveyed SMEs by Degree of Importance and Quality in Production Network

| Rank | Low Quality Production Network | | | High Quality Production Network | | |
| | Effectiveness of Assistance | | Perception of Needs-Assistance | Effectiveness of Assistance | | Perception of Needs-Assistance |
	Rank (mean)	% of Assisted SMEs		Rank	% of Assisted SMEs	
1	Financing	55.8	Overall improvement in investment climate	Financing	56.4	Overall improvement in investment climate
2	Overall improvement in investment climate	63.0	Financing	Technology development and transfer	54.3	Business linkages and networking
3	Technology development and transfer	56.5	Information	Business linkages and networking	62.8	Financing
4	Business linkages and networking	70.1	Business linkages and networking	Training	64.9	Training
5	Information	74.0	Training	Overall improvement in investment climate	59.6	Information
6	Counseling and advice	57.1	Counseling and advice	Information	66.0	Technology development and transfer
7	Training	59.1	Technology development and transfer	Counseling and advice	50.0	Counseling and advice

Table 13 below shows estimation results for the firm characteristic determinants of a better-quality SMEs that participate in production network. It attempts to answer the second question posted by this section by gauging which characteristics that allow SMEs to move toward better-quality SMEs (i.e., moving from tier 3 or 4 to tier 1 or 2). The estimations utilized the ordinal logit model that allows identification of a firm/SME according to the different quality of its participation in production networks. Thus, it estimates the general form of statistical model:

$$QPN_i = \gamma_0 + \Gamma'X_i + \varepsilon_i \qquad (2)$$

where QPN_i is a discrete choice variable and $QPN_i = 1$ if a SME operate as firm in Tier 3 or 4 (i.e., low-quality SME) and $QPN_i = 2$ if a SME operate as firm in Tier 1 or 2 (i.e., high-quality SME). i represent firm i and as in the previous section, X_i is set of set of explanatory variables that capture firm characteristic determinants. Estimations also include dummy variable for industries and country groups. Estimations are conducted only on the sample of SMEs that participate in production networks, which give the number of observation of about 190 firms/SMEs.

The results presented in Table 13 indicate rooms for improvement for SMEs that have successfully participate in production networks. This is indicated by the importance some characteristics from the estimation results.

107

Table 13. Firm Characteristic Determinants of Better-quality SMEs Participated in Production Network

	Dependent variable: (Dummy variable for the quality of participation in production networks)$_i$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(Size)$_i$	0.010	0.009	0.011	0.010	0.011	0.011	0.013	0.011	0.011	0.010
	(2.60)**	(2.23)*	(2.93)**	(2.67)**	(2.86)**	(2.87)**	(3.32)**	(2.89)**	(2.85)**	(2.70)**
(Size^2)$_i$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.68)	(0.55)	(0.80)	(0.67)	(0.85)	(0.76)	(0.77)	(0.76)	(0.73)	(0.63)
ln(Age)$_i$	0.102	0.090	0.089	0.138	0.138	0.112	0.073	0.086	0.078	0.096
	(0.47)	(0.41)	(0.41)	(0.63)	(0.63)	(0.52)	(0.33)	(0.40)	(0.36)	(0.44)
(Labour productivity)$_i$	0.010	0.010	0.009	0.009	0.010	0.010	0.009	0.009	0.010	0.009
	(1.96)*	(2.00)*	(1.91)+	(1.97)*	(2.07)*	(2.06)*	(1.97)*	(1.92)+	(2.06)*	(1.97)*
(Foreign ownership share)$_i$	1.276	1.438	1.329	1.336	1.278	1.320	1.226	1.279	1.294	1.401
	(2.66)**	(2.96)**	(2.78)**	(2.80)**	(2.67)**	(2.75)**	(2.56)*	(2.67)**	(2.72)**	(2.90)**
(Loan interest rate)$_i$	-0.067	-0.070	-0.073	-0.076	-0.074	-0.070	-0.077	-0.063	-0.063	-0.066
	(1.66)+	(1.71)+	(1.79)+	(1.84)+	(1.82)+	(1.70)+	(1.81)+	(1.58)	(1.60)	(1.59)
(Interest Coverage Ratio)$_i$	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.32)	(0.39)	(0.16)	(0.35)	(0.30)	(0.27)	(0.58)	(0.33)	(0.31)	(0.12)
(Skill intensity)$_i$	-0.018	-0.420	0.051	0.107	0.132	0.041	0.210	0.104	0.058	0.167
	(0.03)	(0.66)	(0.09)	(0.18)	(0.22)	(0.07)	(0.35)	(0.18)	(0.10)	(0.28)
(Distance to port)$_i$	-0.144	-0.095	-0.132	-0.201	-0.189	-0.153	-0.062	-0.157	-0.185	-0.228
	(0.78)	(0.51)	(0.72)	(1.08)	(1.02)	(0.84)	(0.33)	(0.83)	(1.04)	(1.24)

Table 13 continues

Table 13 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Dependent variable: (Dummy variable for the quality of participation in production networks)$_i$									
(Dummy variable for meeting international standard)$_i$	0.210									
	(0.56)									
(Dummy variable for have introduced ICT)$_i$		0.976								
		(2.41)*								
(Dummy variable for have established new divisions)$_i$			-0.168							
			(0.44)							
(Dummy variable for involving in business networks)$_i$				0.457						
				(1.36)						
(Dummy variable for acquiring new machinery)$_i$					0.197					
					(0.58)					
(Dummy variable for improving existing machinery)$_i$						0.036				
						(0.10)				
(Dummy variable for acquiring production knowledge)$_i$							0.908			
							(2.51)*			
(Dummy variable for ability of introducing new products)$_i$								-0.106		
								(0.30)		
(Dummy variable for considering risk in business operation)$_i$									0.078	
									(0.24)	
(Dummy variable for willingness to adopt new business strategy)$_i$										0.646
										(1.94)+

Table 13 Concluded

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Dependent variable: (Dummy variable for the quality of participation in production networks)$_i$									
(Dummy var. for garment sector)$_i$	0.564	0.651	0.505	0.513	0.611	0.563	0.755	0.573	0.581	0.579
	(1.27)	(1.45)	(1.15)	(1.16)	(1.38)	(1.29)	(1.65)+	(1.31)	(1.34)	(1.33)
(Dummy var. for auto parts and components)$_i$	-0.392	-0.302	-0.412	-0.388	-0.273	-0.311	-0.451	-0.355	-0.308	-0.318
	(0.72)	(0.55)	(0.75)	(0.70)	(0.50)	(0.57)	(0.80)	(0.64)	(0.57)	(0.59)
(Dummy var. for electronics, and electronics parts and component)	-0.202	-0.157	-0.184	-0.256	-0.177	-0.148	-0.275	-0.198	-0.150	-0.175
	(0.41)	(0.31)	(0.37)	(0.51)	(0.36)	(0.30)	(0.55)	(0.39)	(0.30)	(0.35)
(Dummy var. for country group)$_i$	-0.373	-0.067	-0.318	-0.401	-0.324	-0.281	-0.437	-0.471	-0.353	-0.333
	(0.78)	(0.13)	(0.67)	(0.83)	(0.69)	(0.60)	(0.88)	(1.00)	(0.78)	(0.72)
Observations	195	195	194	193	195	196	193	193	198	198

Notes:

1. Robust z statistics in parentheses

2. ** significant at 1%;

    * significant at 5%;

    + significant at 10%,

Participating SME with higher size has a chance to improve their position in production network, or to move to higher tiers. The estimated coefficient of size is positive and very statistically significant at 1 percent level. It is worth mentioning that this finding is in contrast with the role of size in determining SME participation in production networks (i.e., the econometric analysis in the previous section). This suggests that SMEs only exploits the source of competitiveness from economies of scale when they have successfully established their operation in production networks; they do not really exploit the economies of scale at the stage when they are about to establish their operation in the networks. This is consistent with the view that competitive struggle among firms is more intensive or severely in production networks, compared to those out of the networks.

Foreign ownership seems to be really important for upgrading the tiers of SMEs, or for moving SMEs to high-quality level of SMEs in production networks. The estimated coefficient of foreign ownership is very large and statistically significant across the specifications. Moreover, the value of the estimated coefficients suggests that the effect of foreign ownership is significant. The estimated coefficients across the specifications suggest that a 10 percentage point increase in foreign ownership share increases the chance of an SME to move to higher tiers in production network by about 12 times, *ceteris paribus*.

Similar to the finding on size, foreign ownership seems to gain significant role only when firms/SMEs are already in production networks. Again, this is sensible given the more intensive firm competition inside the networks, which makes the marginal value of every unit of shared foreign-specific much larger than that outside production networks. However, as the previous analysis shows, foreign ownership still play a crucial role in improving a chance of SMEs to start participate in production networks.

Productivity still matters even SMEs have successfully established their operation in production networks. The estimated coefficients of labor productivity across the specification are positive and statistically significant, mostly at 5 percent level. Thus, higher productivity facilitates SMEs to move up to higher tiers, toward becoming good-quality SMEs in production networks. The finding on productivity is consistent with the finding on foreign ownership. Analytically, this suggests that SMEs, or firms in general in this matter, really tend to mimic the characteristics of strong exporting firms.

The fact that foreign ownership and labor productivity still play their important role indicates a continuously learning process even firms/SMEs have already established their position in networks of production.

Firm's innovation effort determines quality upgrading of SMEs toward the higher tiers. There is, however, rather weak evidence on this, at least when one compares with the finding of these characteristics for the determinants of SME participation in production networks. This is because, unlike this finding, only two out of eight innovation-efforts variables that are positive and statistically important, and these are the dummy variable for have introduced ICT and the dummy variable for acquiring production knowledge. The estimated coefficients of the other variables are very statistically insignificant, indicating that they do not play the role for upgrading to the higher tiers.

The characteristic of firm toward risk does not seem to create a strong impact for upgrading SMEs into a higher tier. While the estimated coefficient of the two variables that represent this characteristic are is positive, there is only one estimated coefficient that is statistically significant, and this is the estimated coefficient of the dummy variable for willingness to adopt new business strategy.

8. Summary and Conclusion

This chapter provides empirical investigation on the participation of SME in production networks. It attempts to reveal the constraints to growth and firm characteristics determinants of SME participation in production networks. It builds on the background and analytical framework presented in the previous chapter in its approaches to the investigation and analysis.

The empirical investigation relies on the results of the ***ERIA Survey on SME Participation in Production Networks***, which was conducted over the period two to three months period at the end 2009 in most of ASEAN countries and China. The ASEAN countries covered are Thailand, Indonesia, Malaysia, Philippines, Vietnam, Cambodia, and Laos PDR.

The survey results on the perception of constraints faced by SMEs reaffirm that most surveyed SMEs are operating under severe constraints internal to them. For all SMEs in the survey, both the detailed and main category ranking of constraints is consistently high on "Functional Barriers" and "Product and Price Barriers". However, the "Informational barriers" seems to be lower for SMEs that are in the production network compared with for the whole sample and those SMEs that are not in the production network. Less than half of SMEs in the surveyed sample have received assistances from NOGs or government. Even though most of SMEs are satisfied with the assistances in "Financing", it still appears to be the most important area of supports underlying the fundamental constraints faced and relevant of supports needed by all SMEs. On top of that for SMEs in general and those that are not in the production network, supports in "Information", "Business linkages and networking", and "Training" are their most wanted supports. However, for SMEs that are in the production network, "Overall improvement in investment climate", "Financing", and "Business linkages and networking" are the top three supports they need.

The conclusion from these perceptions is clearly indicative for a further empirical investigation on the firm characteristics that determine SME participation and performance in production networks. The other part of the study addresses this.

The descriptive and econometric analyses suggest that productivity, foreign ownership, financial characteristics, innovation efforts, and managerial/entrepreneurial attitude are the important firm characteristics that determine SME participation in production networks.

The descriptive analysis finds that SMEs participated in production networks are importantly different than those are not participated. They are larger, younger, and involves more of foreign ownership than those the non-participated ones. Regarding foreign ownership, SMEs may not receive strong flow of information spillovers from their foreign partners. This is because the average of foreign ownership share is less than 51%. Nonetheless, the higher foreign ownership share in the participated group indicates that somehow, SMEs still benefits from their foreign partners for their participation in production networks.

Firm productivity determines the participation of SMEs in production networks. The estimated coefficients of labor productivity from estimations are positive and

statistically very significant. This finding is robust. It supports our hypothesis of positive relationship between productivity and SME participation in production networks. Moreover, it accords to our argument that SMEs who plan to participate in production networks need to prepare themselves by mimicking the characteristics of exporting firms, one of which is high level of productivity. The superiority in productivity is needed given the strict requirement of goods produced by other firms in participated in production networks.

SMEs that actively conduct innovation activities seem to have higher chance to participate in production networks. The innovation efforts here covered those related to the activities made improvement in terms of business strategies and technological capability. This finding is consistent with the idea that firms need to be more productive if they wish to engage in production network activities.

SMEs in production networks are less financially constrained and have better access to financial sector. The latter is indicated in the descriptive analysis by the lower loan interest rate these SMEs, compared to those not participated in the networks. These findings, particularly the former, suggest that SMEs in production networks have better cash-flow due to large, stable, and more certain buying order from other firms in the networks. The findings also support the idea that SMEs in production networks are able to convey more information to the bank which reduces the extent of asymmetric information.

The characteristic of firm toward risk or adoption of new business idea is another important determinant. The estimated coefficients of the two dummy variables that represent this, i.e., consideration on risk in business operation and willingness to adopt new business strategy are all positive and statistically significant. The coefficient further suggests that the impact this characteristic is large. This finding is consistent with the view that SMEs in production networks operate in a tough business environment and faces a constant and continuously survival threat, because SMEs will not have a favourable survival chance if they are reluctant to accept new ideas and not willing to face the risky business in the networks.

Empirical analyses in this chapter also consider the issue of SMEs in moving up tiers in a network of production, from the low- to high-quality Tiers. First, in terms of the constraints to grow, SMEs are different between those that are in lower quality

production network than those in the higher quality one seeing from the top ten and detailed rankings of constraints. For those that are in lower quality of production network, internal constraints are critical to them in contrast to external constraints faced by those that are in higher quality of production network. About 60 % of SMEs in both groups of quality in production network have reported received assistances. Among others, "Financing" continues to be the pressing needs of supports together with "Overall improvement in investment climate" for both groups. However, support in "Information" is more important for that are in lower quality of production network and "Business linkages and networking" for those that are in higher quality of production network.

Meanwhile, the econometric analysis reveals that size, productivity, foreign ownership, and to some extent, financial characteristics, innovation efforts, and managerial attitude, as the important firm characteristics to upgrade the Tier position of SMEs in production networks. The finding on size suggests that SMEs really exploits competitiveness from economies of scale only when they are able to engage in the networks. This behavior is also implied by foreign ownership and productivity.

References

Abonyi, G. (2005) "Integrating SMEs into Global and Regional Value Chains: Implications for Subregional Cooperation in Greater Mekong Subregion." Prepared for UNESCAP, Bangkok.

Aw, Bee Y. and A.R. Hwang (1995) "Productivity and Export Market: A Firm-level Analysis." *Journal of Development Economics*, 47(2), pp.313-32.

Barney, J. (1992) "Integrating Organizational Behavior and Strategy Formulation Research: A Resource-based Analysis." In P. Shrivastava, A. Huff, and J. Dutton (eds.), *Advances in Strategic Management*. Greenwich, CT: JAI Press, pp. 39-62.

Bernanke, B. (1993) "Credit in the Macroeconomy." *Federal Reserve Bank of New York Quarterly Review*, 18(1), pp.50-70.

Bernard, A.B. and J.B. Jensen (1999) "Exceptional Exporter Performance: Cause, Effect, or both?" *Journal of International Economics*, 47(1), pp.1-25.

Bernard, A.B., J.B. Jensen and R.Z. Lawrence (1995) "Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987." *Brookings Papers on Economic Activity, Microeconomics*, 1995, pp.67-119.

Blalock, G. and P. Getler (2004) "Learning from Exporting Revisited in a Less Developed Setting." *Journal of Development Economics*, 75(2), pp. 397-416.

Claessens, S., S. Djankov and L.C. Xu (2000) "Corporate Performance in the East Asian Financial Crisis." *World Bank Research Observer*, 15(1), pp.23-46.

Desai, M., C.F. Foley and K.J. Forbes (2004) "Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Crisis." *NBER Working Paper Series*, No. 10545, Cambridge, MA: NBER.

Diamond, D. (1991) "Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt." *Journal of Political Economy*, 99(4), pp.688-721.

Dierickx, I. and K. Cool (1989) "Asset Stock Accumulation and Sustainability of Competitive Advantage." *Management Science*, 35(12), pp.1504-11.

Geroski, P.A. (1998) "An Applied Econometrician's View of Large Company Performance." *Review of Industrial Organization*, 13(6), pp.271-93.

Gertler, M. and S. Gilchrist (1994) "Monetary Policy, Business Cycles and the Behavior of Small Manufacturing Firms." *Quarterly Journal of Economics*, 109 (2), pp.309-340.

Jovanovic, B. (1982) "Selection and the Evolution of Industry." *Econometrica*, 50 (3), pp.649-70.

Kimura, F. and M. Ando (2005a) "Two-dimensional Fragmentation in East Asia: Conceptual Framework and Empirics." *International Review of Economics and Finance*, 14, pp.317-48.

Kuchiki, A. (2005) "A Flowchart Approach." In A. Kuchiki and M. Tsuji (eds.), *Industrial Cluster in Asia: Analyses of Their Competition and Cooperation*. New York: Palgrave MacMillan, pp.169-199.

Organization for Economic Cooperation and Development (OECD) (2008) "Removing Barriers to SME access to International Markets."

Petersen, M.A. And R.G. Rajan (1994) "The Benefits of Firm-creditor Relationship: Evidence from Small Business Data." *Journal of Finance*, 49(1), pp.3-37.

Rumelt, R.P. (1984) "Towards a Strategic Theory of the Firm." In R.B. Lamb (ed.), *Competitive Strategic Management*. Englewood Cliffs, NJ: Prentice Hall, pp. 556-70.

Sjoholm, F. and S. Takii (2003) "Foreign Networks and Exports: Results from Indonesian Panel Data." *ICSEAD Working Paper Series*, Vol. 2003-33, Kitakyushu: ICSEAD.

Stiglitz, J.E. And A. Weiss (1981) "Credit Rationing in Markets with Imperfect Information." *American Economic Review*, 71 (3), pp.393-410.

Wooldridge, Jeffrey M. (2002) *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Appendix 1. The ERIA Survey on SME Participation in Production Network

All Information is Confidential	**ERIA Survey on SME Participation in Production Networks** (Country Code:……………) (Cambodia: CAM, China: CHN, Indonesia : IND, Malaysia: MLS, Laos: LAO, Philippines : PHL, Thailand: THA, Vietnam: VTN)

General Information

Q1. Name of Company	
Q2. Year of Establishment	
Q3. Type of Business	☐ 1. Garment ☐ 2. Parts, Components, and Automotives (including motorbikes) ☐ 3. Electrical, Electronic, parts and machinery ☐ 4. Other, specify: ………………………………………
Q4. Company size	Number of employees (persons) ☐ 1. 1-5 persons ☐ 3. 50-99 ☐ 5. more than 200 ☐ 2. 6-49 ☐ 4. 100-199
Q5. Company Status	What percentage of your firm is owned by Domestic ………………% Foreign ………………% Nationality………………………… Government State ………………% Joint-Venture ………………% Nationality…………………………

Q6. Company Cost Structure	a) For Fiscal Year 2007 and 2008, please provide the following information about this establishment
	                                                                                                          2007 2008
	                                                             Total sales ………………$ ………………$
	                                                                     Profit ………………% ………………%
	                               Share of Cost of labor in total cost ………………% ………………%
	Share of cost of raw materials/intermediate goods used in total cost ………………% ………………%
	             Share of Cost of electricity, fuel and water in total cost ………………% ………………%
	                      Share of Interest payments (loan) in total cost ………………% ………………%
	                                                                    Others ………………% ………………%
	
	b) For fiscal year 2008, what is the total number and composition of employment in terms of education/training?
	
	                                                                                            % of female
	                               Total ………………persons ………………%
	With Tertiary education ………………% ………………%
	        Vocational Training ………………% ………………%
	        High school or less ………………% ………………%

Q7. Sources of Finance	a) Indicate source of your company finance
	                                                                  For : Total Working Capital Capital Expansion
	                                           Retained earnings ………………………% ………………………%
	                                                              Bank ………………………% ………………………%
	                         Other financial institutions ………………………% ………………………%
	Others (☐government concession/subsidized loan, ☐ suppliers,
	            ☐money lenders, ☐personal saving, and ☐relatives) ………………………% ………………………%
	
	b) What is the average annual cost/rate of interest on borrowing? ………………………%

Q8. Sources of Raw Materials/Intermediate inputs	What percentage of your firm's raw materials/intermediate inputs is sourced from
	a) Are they your ultimate buyers? b)How far are they from your plants?
	    Other local SMEs ………………………% ☐ Yes ☐ No …………Km, …………Hours
	    Local large Firms ………………………% ☐ Yes ☐ No …………Km, …………Hours
	    Other domestic suppliers ………………………% ☐ Yes ☐ No …………Km, …………Hours
	    The rest from imports ………………………% ☐ Yes ☐ No Countries: ………………………

Q9. Sale patterns
(Please refer to the glossary for assistance with any unfamiliar terminology)
 	
For size of firm:
S : Small (with employment: 1 - 49 persons)
M: Medium (with employment : 50 - 199 persons)
L: Large (employment: more than 200 persons)
	a) What is the annual growth rate of your sales? 2007 2008
	                                                                       ………………% ………………%
	
	b) Proportion of products sold:
	            a) Domestic buyers …………………………% 1) Size 2) Distance from your plants
	                    of which: Final Assemblers ………………………% ☐ S ☐ M ☐ L …………Km, ………Hours
	                                          First Tier ………………………% ☐ S ☐ M ☐ L …………Km, ………Hours
	                                      Second Tier ………………………% ☐ S ☐ M ☐ L …………Km, ………Hours
	                          Third Tier and More ………………………% ☐ S ☐ M ☐ L …………Km, ………Hours
	                                  Whole/Retailers ………………………% ☐ S ☐ M ☐ L
	            b) Direct Exports ………………………% Countries: ………………………

Q10. Location of plants	a) Distance from main ports (water/air) ……………Km, …………Hours b) Distance from EPZ or Industrial Park ☐within ☐ Outside……………Km, …………Hours

Q11. Business Capability	a) Human resources development
	            1. Annual expense on staff training in the past 5 years ……………………………US$
	
	b) Has your business made efforts for improving business processes or organizations in the past three years?
	                                                                                                                    Yes No
	            1. met an international standard (ISO or others)? ☐ ☐
	            2. Introduced ICT (information and communication technologies)
	               and reorganized business processes by it? ☐ ☐
	            3. established new divisions or new plants? ☐ ☐
	            4. attended/involved in business associations, cooperation with other firms,
	                                   R&D networks, trade fairs, etc.? ☐ ☐
	c) Has your business operation adopted a new production method in the past three years? Yes No
	            1. Bought new machines or facilities with new functions to operation ☐ ☐
	            2 . Improved existing machines, equipment, or facilities ☐ ☐
	            3. Introduced new know-how on production methods ☐ ☐

118

Q.11 continues…	d) Has your business introduced new products or services to the market in the past three years? ☐ Yes ☐ No
	if YES
	to the existing market or new market? ☐ Existing ☐New
	by using the existing technologies or new technologies for your operation? ☐ Existing ☐New
	the average percentage increase in sales of new products in the past three years?...................%

Q12. Assistance from Government, NGOs, and others

a) Have you received the following assistances?	Yes	No	b) If Yes, are they adequate and/or effective? (1: very................................5: Not at all)
1) **Training** in general business management, entrepreneurship, and particular business skills such as marketing, accounting, and finance;	☐	☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
2) **Counseling and advice**, often on a 'firm by firm' basis, and where particularly effective, as follow-up to training;	☐	☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
3) **Technology development and transfer**, involving the adaptation, design and development of technologies and their dissemination to SMEs;	☐	☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
4) **Market information** including complexity of production networks, buyers, technology, increasingly available through ICT-based facilities, as well through traditional mechanisms such as trade fairs, exhibitions, visits/tours;	☐	☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
5) **Business linkages and networking** involving the development and strengthening of commercial linkages between SMEs and large firms (e.g. subcontracting) and among SMEs (e.g. development of 'enterprise clusters'), business associations;	☐	☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
6) **Financing** aimed at channeling funds to SMEs either directly (e.g. special purpose financial institutions such as 'SME Banks')or indirectly (e.g. through special 'window' of commercial banks, perhaps at preferential rates;	☐	☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
7) **Overall improvement in investment climate** (e.g. political and macroeconomic stability; laws, regulations, and dispute resolutions; reduce corruption and bureaucratic barriers; fair competition, infrastructure etc.); and	☐	☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
8) **Others**, specify………………………………………………	☐	☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Perceptions of Barriers to SME Development

Barriers to SME Development are defined as all those constraints that hinder a firm's ability to initiate, to develop, or to sustain business operations in both domestic and overseas markets.

Q13. Thinking about your overall experience how significant a barrier to expanding your product or service are the following:

(Please refer to the glossary for assistance with any unfamiliar terminology)

INTERNAL BARRIERS - barriers internal to the enterprise associated with organizational resources/capabilities and company approach to business development.
Rank from: 1. Very significant ……………………………. 5. Not significant

INFORMATIONAL BARRIERS
B1. Limited Information to locate/analyze markets/business partners
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B2. Unreliable market data (costs, prices, market shares)
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B3. Inability to indentify and contact potential business partners
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

FUNCTIONAL BARRIERS
B4. Lack of managerial time to identify new business opportunities
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B5. Insufficient quantity of and/or untrained personnel for market expansion
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B6. Lack of production capacity to expand
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B7. Shortage of working capital to finance new business plan
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B8. Difficulty in getting credit from suppliers and financial institutions
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

PRODUCT AND PRICE BARRIERS
B9. Developing new products
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B10. Adapting to demanded product design/style
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B11. Meeting product quality/standards/specifications
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B12. Meeting packaging/labeling requirements
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B13. Offering technical/after-sales service
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B14. Offering competitive prices to customers
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B15. Difficulty in matching competitors' prices
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
B16. Anti-competitive or informal practices
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

119

DISTRIBUTION, LOGISTICS AND PROMOTION BARRIERS

B17. Complexity of production value chain
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B18. Accessing a new production chain
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B19. Establishing and maintaining trust with business partners
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B20. Unavailability of inventories/warehousing facilities
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B21. Excessive transportation/insurance costs
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B22. Participation in promotional activities to target markets/business partners
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

EXTERNAL BARRIERS - barriers stemming from the home and foreign/target/host environment, within which the firm operates.

PROCEDURAL BARRIERS

B23. Unfamiliarity with complexity of procedures/paperwork
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B24. Difficulties in enforcing contracts and resolving disputes
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B25. Lack of home government assistance/incentives
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B26. Unfavourable home rules and regulations
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B27. Unfavorable host/foreign rules and regulations
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

BUSINESS ENVIRONMENT BARRIERS

B28. Poor/deteriorating economic conditions
a) Home Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
b) Foreign Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B29. Inadequacy of basic and IT infrastructure
a) Home Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
b) Foreign Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B30. Political instability
a) Home Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
b) Foreign Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

TAX, TARIFF AND NON-TARIFF BARRIERS

B31. High tax and tariff barriers
a) Home Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
b) Foreign Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B32. Inadequate property rights protection (*e.g.* intellectual property)
a) Home Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
b) Foreign Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements)
a) Home Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
b) Foreign Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B34. High costs of Customs administration, in exporting or importing
a) Home Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
b) Foreign Market
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

OTHER BARRIERS

B35. Perceived risks in your current and new business operations
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B36. Lack of the perceived benefits from joining production networks
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B37. Willingness to adopt new business strategy or ideas
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

B38. Others, please specify…………………………………………………………
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Q14. Selecting from the barriers by main category above, what do you consider to be the most important barriers to the operation of your firm? (please rank 1: highest…….. 8:lowest)

☐ INFORMATIONAL BARRIERS
☐ FUNCTIONAL BARRIERS
☐ PRODUCT AND PRICE BARRIERS
☐ DISTRIBUTION, LOGISTICS AND PROMOTION BARRIERS
☐ PROCEDURAL BARRIERS
☐ BUSINESS ENVIRONMENT BARRIERS
☐ TAX, TARIFF AND NON-TARIFF BARRIERS
☐ OTHER BARRIERS

120

Perceptions of assistance to SMEs	☐
Q15. What sort of assistance would be most effective to you in overcoming the barriers you faced in the conduct of your business (please rank the degree of importance 1: highest to 8:lowest)	☐ *Training* in general business management, entrepreneurship, and particular business skills such as marketing, accounting, and finance; ☐ *Counseling and advice* , often on a 'firm by firm' basis, and where particularly effective, as follow-up to training; ☐ *Technology development and transfer* , involving the adaptation, design and development of technologies and their dissemination to SMEs; ☐ *Information* on market including complexity of production networks, buyers, technology, increasingly available through ICT-based facilities, as well through traditional mechanisms such as trade fairs, exhibitions, visits/tours; ☐ *Business linkages and networking's* involving the development and strengthening of commercial linkages between SMEs and large firms (e.g. subcontracting) and among SMEs (e.g. development of 'enterprise clusters'), business associations; ☐ *Financing* aimed at channeling funds to SMEs either directly (e.g. special purpose financial institutions such as SME Banks') or indirectly (e.g. through special 'window' of commercial banks, perhaps at preferential rates; ☐ *Overall improvement in investment climate* (e.g. political and macroeconomic stability; laws, regulations, and dispute resolutions; reduce corruption and bureaucratic barriers; fair competition, infrastructure etc.); and **Others**, specify……… ……… ………

**Large part of this questionnaire is adapted from OECD (2008) "Removing Barriers to SME Access to International Markets".

THANK YOU VERY MUCH FOR YOUR COOPERATION

121

Notes for Interviewers

Brief points of guidance for the interview:

a) It is the face-to-face type of questionnaire survey;
b) Interviewers should be familiar with all the terminology;
c) Sample size must be at least 100 firms;
d) For Q3 of the questionnaire, the distribution of sample size for each business sector should reflect the share of the sector in the total country's manufacturing output.

Glossary

Production Value Chain: refers to the full range of *value-added activities* required to bring a product from its conception , through design, sourcing raw materials and intermediate inputs, production, marketing, distribution and support to final consumers.

Final Assemblers: are lead firms, original equipment manufacturers (such as Toyota, Sony, Levi, Carrefour…).

First Tier: are normally large-firm wholesalers or global suppliers who are surrounded by lower-tier suppliers.

Second Tier: can be large-firm or SME suppliers of parts, components, and other inputs to the next higher-tier

Third and More Tier: are lower-end in the production networks, value chains, predominantly SMEs doing low-skill, low-value added activities, producing relatively simple outputs, and competing on the basis of low cost, with

Illustration of the tiers of firms:
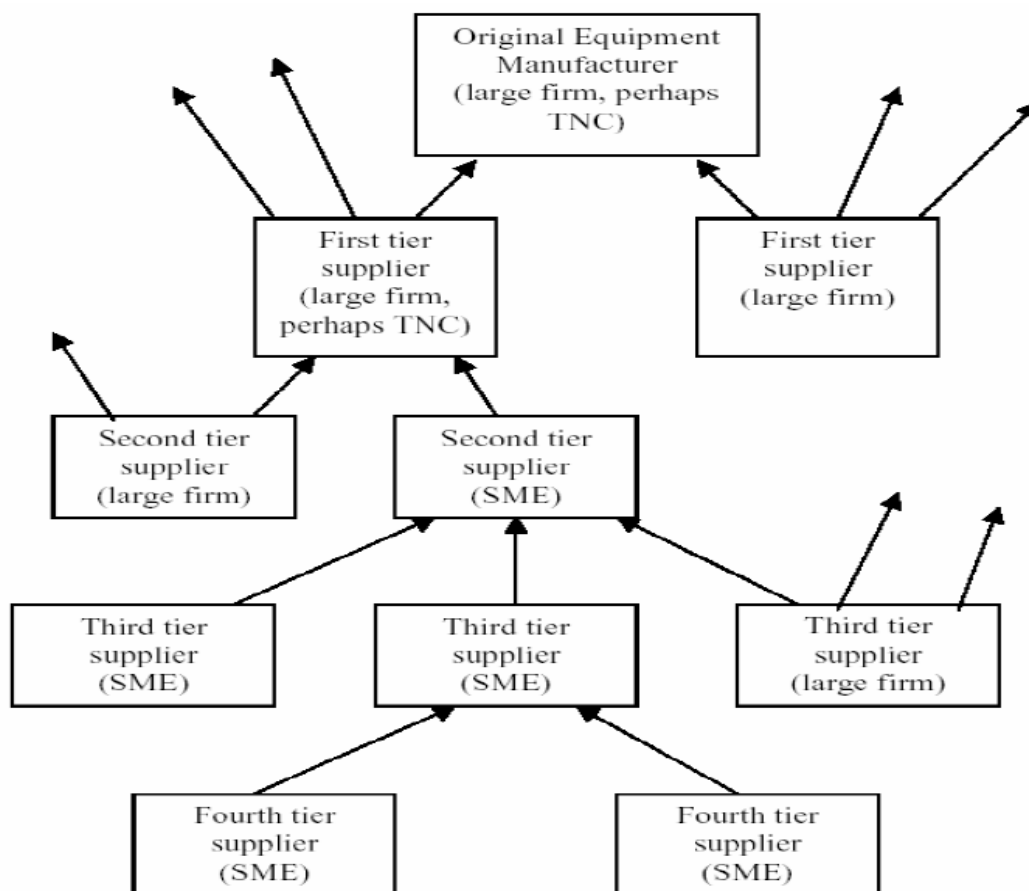
Source: Abonyi (2005)

INTERNAL BARRIERS: Barriers internal to the enterprise associated with organizational resources/capabilities

Informational Barriers: problems in identifying, selecting, and contacting potential markets due to information inefficiencies.

(B1) Limited information to locate/analyze markets/business partners: difficulty in knowing what national and international sources of information is available or required to reduce the level of uncertainty.

(B2) Unreliable market data (costs, prices, market shares): problems associated with the source, quality, and comparability of available information used to attempt to increase understanding of markets (including access to data, ability to retrieve data quickly, and the cost of obtaining data).

(B3) Inability to Identify and contact potential business partners: difficulty in strategically and/or proactively identifying and selecting opportunities in foreign markets (including customers, contacts, business partners and joint ventures).

FUNCTIONAL BARRIERS: inefficiencies of various functions internal to the enterprises such as human resources, production, and finance.

(B4) Lack of managerial time devoted to new business opportunities: inability of managers to devote sufficient time, resources and energy towards selecting, entering and expanding into new markets, designing marketing strategies, and conducting business.

(B5) Insufficient quantity of and/or untrained personnel for market expansion: problems associated with insufficient numbers of personnel to handle the excess work demanded by new operations, in addition to a lack of specialized knowledge and expertise within the company to deal with new business opportunities.

(B6) Lack of production capacity to expand: an inexistence of or inability to generate production to expand business operations.

(B7) Shortage of working capital to finance new business plan: difficulty in allocating and/or justifying adequate expenditure towards researching markets, adapting marketing strategies and/or inability to access financing assistance from governmental agencies, banks and other investors.

(B8) Difficulty in getting credit from suppliers and financial institutions: problems due to lack of trust to receive credit from suppliers, and lack of collateral to access to credit from financial institutions.

PRODUCT AND PRICE BARRIERS: pressures imposed by external forces on adapting the elements of the company's marketing strategy including barriers associated with the company's product, pricing, distribution, logistics, and promotional activities both domestic and overseas.

(B9) Developing new products: inability, difficulty or unwillingness to develop entirely new products to changing specific market needs and wants.

(B10) Adapting demanded product design/style: inability, difficulty or unwillingness to adapt the company's product design or style to the idiosyncrasies of each market (*e.g.* different conditions of use, variations in purchasing power, dissimilar consumer tastes, diverse socio-cultural settings).

(B11) Meeting product quality/standards/specifications: inability, difficulty, or unwillingness to adapt products necessitated by both legal and non-legal differences in quality standards and preferences among markets.

(B12) Meeting packaging/labeling requirements: inability, difficulty or unwillingness to adapt: packaging for requirements such as safety during transportation, storage and handling; and/or labeling for requirements such as different languages, specific information required by the host country (such as expiry dates, types of ingredients and net weight), and symbols, pictures, and colours preferred by foreign markets.

(B13) Offering technical/after-sales service: problems associated with the provision of technical and/or after-sales service including delays and increased costs associated with: geographical distances between the company and its market; setting up servicing operations in strategic locations; maintaining large quantities of spare parts; adjusting the approach to after-sales service for variations in conditions of use, competitive practices, and physical

(B14) Offering competitive prices to customers: inability to offer customers competitive prices because of: higher unit costs due to small production runs; additional costs incurred in modifying product, packaging and/or service; higher administrative, operational and transportation expenses; extra taxes, tariffs, and fees imposed; and higher costs of marketing and distribution.

(B15) Difficulty in matching competitors' prices: lack of price competitiveness due to factors that are controllable (*e.g.* strict adoption of a cost-plus pricing method) and/or uncontrollable (*e.g.* differences among countries' cost structure of production, distribution, and logistics; adoption of dumping practices by competitors; and government policy to subsidies local industry).

(B16) Anti-competition or informal practices: problems due to monopoly or entry-barriers, smuggling and other unfair competitive behavior

(B17) Complexity of production value chain: problems associated with adjusting production methods according to the variations and idiosyncrasies within each production chain (*e.g.* range and quality of services offered, and number of layers of a production chain).

(B18) Accessing production chain: problems associated with gaining access to production chain (including production that is occupied by the competition; the costs of managing the length of the production; or various levels of the system being controlled by a certain producer).

(B19) Establishing and maintaining trust between business partners: difficulties in obtaining and maintaining reliable business partners who meet the: structural (territorial coverage, financial strength, physical facilities), operational (product assortment, logistical arrangements, warehouse facilities), and behavioral (market reputation, relationships with government, co-operative attitude) requirements of the partner and is not already engaged by a

(B20) Unavailability of inventories/warehousing facilities: problems associated with finding/building adequate warehousing including lack of proper installations to safeguard product quality, prohibitive storage fees, outdated warehousing equipment technology, and the need for a multiple warehousing system.

(B21) Excessive transportation/insurance costs: the exacerbation of transportation costs because of large distances to and within markets, poor infrastructural facilities, limited availability of transportation, and delays in product delivery; and/or insurance costs because of the higher risks associated with selling goods.

(B22) Participation in promotional activities to target markets/business partners: problems associated with adjusting promotional activities due to variations in buying motives, consumption patterns, and government regulations including: variations in the composition of the target audience, inappropriate content of the advertising message, unavailability or different use of advertising media, restrictions in the frequency/duration of advertising, and insufficient means to assess advertising effectiveness across markets.

EXTERNAL BARRIERS: Barriers stemming from the home and host environment within which the firm
Procedural Barriers: barriers associated with the operating aspects of transactions with foreign customers.

(B23) Unfamiliarity with complexity of procedures/paperwork: difficulty in understanding and/or managing customs documentation, shipping arrangements, and other procedures.

(B24) Difficulties in enforcing contracts and resolving disputes: problems associated with: enforcing contracts due to poor quality (*e.g.* non-verifiable information, ambiguity, lack of consideration or mutual acceptance, and/or unreasonable breadth of the contract); enforcing contracts because of unclear expectations, misinterpretation, "bad faith" and/or unwillingness of contract partner(s) to uphold the contract; resolving disputes because of nonexistent or unsophisticated dispute resolution mechanisms, time and/or cost of accessing foreign legal systems, lack of knowledge of laws, and conflicts of laws; and/or unwillingness of contract partner(s) to participate in dispute

GOVERMENTAL BARRIERS: Barriers associated with the actions or inaction by the home government in relation to its indigenous companies and exporters.

(B25) Lack of home government assistance/incentives: support and/or encouragement by government agencies to SMEs.

(B26) Unfavourable home rules and regulations: local producers are restricted by controls imposed by the home government including restrictions on exports of either components or final-products to certain hostile countries and/or restrictions on products with national security or foreign policy significance.

(B27) Unfavourable host/foreign rules and regulations: local producers are restricted by controls imposed by the host government including restrictions on exports of either components or final-products to certain hostile countries and/or restrictions on products with national security or foreign policy significance.

BUSINESS ENVIRONMENT BARRIERS: Barriers associated with the economic, political-legal and socio-cultural environment of the market(s) within which the company operates or is planning to operate.

(B28) Poor/deteriorating economic conditions: unpredictable consumer behavior caused by economic effects such as large foreign debts, high inflation rates, and high unemployment levels in markets, which erode their citizens' purchasing power and impacts on their spending habits (*e.g.* seeking more economical products, purchasing goods less often, and carefully selecting what they buy).

(B29) Inadequacy of basic and IT infrastructure: poor roads, ports, and logistic supporting facilities, high utility costs, non-existent or unsophisticated IT infrastructures (*e.g.* hardware, software, security, and broadband) are in place to support the distribution, sale, purchase, marketing, and servicing of products or services over electronic systems such as the Internet and other computer networks.

(B30) Political instability: difficulty in initiating or maintaining operations due to economic (low household incomes, inflationary trends, large foreign debt), societal (crime, theft, disorder, religious fundamentalism, ethnic tension, high degree of corruption), and/or political (authoritarian regime, conflict with neighbours, military

TAX, TARIFF AND NON-TARIFF BARRIERS: Barriers associated with restrictions on importing or exporting, and internationalizing imposed by government policies and regulations in home or foreign markets.

(B31) High tax and tariff barriers: the burden associated with excessive tax applied to imported goods to artificially inflate prices of imports and protect domestic industries from foreign competition.

(B32) Inadequate property rights protection (e.g. intellectual property): difficulties associated with an inadequate legal framework to protect the ownership, use, control, benefit, transferral or sale of both physical and intangible property especially intellectual property (*e.g.* copyrights, patents, trademarks and trade secrets).

(B33) Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements): difficulties associated with meeting high, non-transparent, inconsistent and/or discriminatory country-specific standards for imported goods including: sanitary and phytosanitary requirements; industrial and environmental protection standards; conformity assessment procedures (testing and re-testing, verification, inspection and certification to confirm products fulfill standards); and technical standards (*e.g.* preparation, adoption and application of different standards for specific characteristics of a product such as production, design, functions and

(B34) High costs of Customs administration, in exporting or importing: costs associated with, divergent interpretations of customs valuation rules by different Customs administrations (including the use of arbitrary or fictitious customs values); delay in customs clearance procedures (*e.g.* excessive and/or irrelevant paperwork, congestion at points of entry, delay and cost of cargo clearance); lack of procedures for prompt review; and lack of transparency and/or irregular/illegal practices (*e.g.* unofficial customs procedures, unwritten rules and unpublished changes, unofficial fees to accelerate processing, and the absence of information on customs regulations and

(B35) Perceived risks in your current and new business operations: the willingness to take risks by owners/managers reflecting the attitude towards and assessment of risks.

(B36) Lack of the perceived benefits from joining production networks: reflecting the inability to perceive benefits by owners/managers.

(B37) Willingness to adopt new business strategy or ideas: reflecting how well owners/managers are opened to new initiatives/ideas to improve their business.

Appendix 2. List of Constraints and their Category

INFORMATIONAL BARRIERS

B1. Limited Information to locate/analyze markets/business partners

B2. Unreliable market data (costs, prices, market shares)

B3. Inability to indentify and contact potential business partners

FUNCTIONAL BARRIERS

B4. Lack of managerial time to identify new business opportunities

B5. Insufficient quantity of and/or untrained personnel for market expansion

B6. Lack of production capacity to expand

B7. Shortage of working capital to finance new business plan

B8. Difficulty in getting credit from suppliers and financial institutions

PRODUCT AND PRICE BARRIERS

B9. Developing new products

B10. Adapting to demanded product design/style

B11. Meeting product quality/standards/specifications

B12. Meeting packaging/labeling requirements

B13. Offering technical/after-sales service

B14. Offering competitive prices to customers

B15. Difficulty in matching competitors' prices

B16. Anti-competitive or informal practices

DISTRIBUTION, LOGISTICS AND PROMOTION BARRIERS

B17. Complexity of production value chain

B18. Accessing a new production chain

B19. Establishing and maintaining trust with business partners

B20. Unavailability of inventories/warehousing facilities

B21. Excessive transportation/insurance costs

B22. Participation in promotional activities to target markets/business partners

PROCEDURAL BARRIERS

B23. Unfamiliarity with complexity of procedures/paperwork

B24. Difficulties in enforcing contracts and resolving disputes

B25. Lack of home government assistance/incentives

B26. Unfavorable home rules and regulations

B27. Unfavorable host/foreign rules and regulations

BUSINESS ENVIRONMENT BARRIERS

B28. Poor/deteriorating economic conditions (home)

B28. Poor/deteriorating economic conditions (foreign)

B29. Inadequacy of basic and IT infrastructure (home)

B29. Inadequacy of basic and IT infrastructure (foreign)

B30. Political instability (home)

B30. Political instability (foreign)

TAX, TARIFF AND NON-TARIFF BARRIERS

B31. High tax and tariff barriers (home)

B31. High tax and tariff barriers (foreign)

B32. Inadequate property rights protection (*e.g.* intellectual property)- (home)

B32. Inadequate property rights protection (*e.g.* intellectual property) - (foreign)

B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (home)

B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (foreign)

B34. High costs of Customs administration, in exporting or importing (home)

B34. High costs of Customs administration, in exporting or importing (foreign)

OTHER BARRIERS

B35. Perceived risks in your current and new business operations

B36. Lack of the perceived benefits from joining production networks

B37. Willingness to adopt new business strategy or ideas

Source: OECD (2008)

Appendix 3. Complete Ranking of Perception of Barriers for SMEs – Whole Sample

Barrier	Obs	Mean	S.D.	Rank
B14. Offering competitive prices to customers	796	2.72	1.25	1
B35. Perceived risks in your current and new business operations	796	2.75	1.33	2
B28. Poor/deteriorating economic conditions (home)	741	2.78	1.26	3
B19. Establishing and maintaining trust with business partners	796	2.79	1.27	4
B1. Limited Information to locate/analyze markets/business partners	793	2.79	1.27	5
B31. High tax and tariff barriers (home)	795	2.81	1.24	6
B30. Political instability (home)	796	2.82	1.20	7
B15. Difficulty in matching competitors' prices	794	2.88	1.32	8
B6. Lack of production capacity to expand	794	2.90	1.34	9
B2. Unreliable market data (costs, prices, market shares)	792	2.90	1.33	10
B4. Lack of managerial time to identify new business opportunities	796	2.93	1.28	11
B21. Excessive transportation/insurance costs	791	2.95	1.26	12
B34. High costs of Customs administration, in exporting or importing (home)	795	2.97	1.30	13
B7. Shortage of working capital to finance new business plan	758	3.02	1.29	14
B37. Willingness to adopt new business strategy or ideas	789	3.04	1.27	15
B3. Inability to indentify and contact potential business partners	757	3.04	1.44	16
B9. Developing new products	794	3.06	1.24	17
B32. Inadequate property rights protection (e.g. intellectual property)- (home)	791	3.09	1.24	18
B25. Lack of home government assistance/incentives	780	3.10	2.26	19
B5. Insufficient quantity of and/or untrained personnel for market expansion	791	3.12	1.30	20
B11. Meeting product quality/standards/specifications	793	3.12	1.33	21
B18. Accessing a new production chain	795	3.12	1.29	22
B10. Adapting to demanded product design/style	791	3.13	1.40	23
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (home)	791	3.14	1.27	24
B29. Inadequacy of basic and IT infrastructure (home)	791	3.15	1.25	25
B36. Lack of the perceived benefits from joining production networks	682	3.16	1.38	26
B13. Offering technical/after-sales service	794	3.19	1.27	27
B20. Unavailability of inventories/warehousing facilities	757	3.21	1.42	28
B16. Anti-competitive or informal practices	793	3.21	1.94	29
B30. Political instability (foreign)	758	3.22	1.37	30
B8. Difficulty in getting credit from suppliers and financial institutions	791	3.22	1.25	31
B22. Participation in promotional activities to target markets/business partners	743	3.22	1.22	32
B17. Complexity of production value chain	778	3.27	1.33	33
B26. Unfavorable home rules and regulations	794	3.31	1.88	34
B28. Poor/deteriorating economic conditions (foreign)	778	3.34	1.24	35
B32. Inadequate property rights protection (e.g. intellectual property) - (foreign)	778	3.34	1.30	36
B24. Difficulties in enforcing contracts and resolving disputes	719	3.37	1.52	37
B29. Inadequacy of basic and IT infrastructure (foreign)	704	3.38	1.45	38
B31. High tax and tariff barriers (foreign)	721	3.42	1.48	39
B12. Meeting packaging/labeling requirements	746	3.43	1.45	40

Barrier				
B34. High costs of Customs administration, in exporting or importing (foreign)	715	3.49	1.42	41
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (foreign)	647	3.51	1.50	42
B23. Unfamiliarity with complexity of procedures/paperwork	718	3.51	1.49	43
B27. Unfavorable host/foreign rules and regulations	720	3.53	1.52	44

Appendix 4. Complete Ranking of Perception of Barriers for SMEs in Production Network

Barrier	Obs	Mean	S.D.	Rank
B14. Offering competitive prices to customers	248	2.50	1.20	1
B35. Perceived risks in your current and new business operations	245	2.51	1.19	2
B28. Poor/deteriorating economic conditions (home)	231	2.57	1.20	3
B19. Establishing and maintaining trust with business partners	247	2.57	1.29	4
B1. Limited Information to locate/analyze markets/business partners	247	2.62	1.29	5
B31. High tax and tariff barriers (home)	231	2.64	1.31	6
B30. Political instability (home)	230	2.67	1.48	7
B15. Difficulty in matching competitors' prices	247	2.67	1.23	8
B6. Lack of production capacity to expand	247	2.68	1.30	9
B2. Unreliable market data (costs, prices, market shares)	248	2.69	1.23	10
B4. Lack of managerial time to identify new business opportunities	247	2.70	1.30	11
B21. Excessive transportation/insurance costs	245	2.71	1.30	12
B34. High costs of Customs administration, in exporting or importing (home)	219	2.76	1.37	13
B7. Shortage of working capital to finance new business plan	247	2.77	1.32	14
B37. Willingness to adopt new business strategy or ideas	244	2.78	1.26	15
B3. Inability to indentify and contact potential business partners	247	2.79	1.35	16
B9. Developing new products	247	2.80	1.27	17
B32. Inadequate property rights protection (e.g. intellectual property)- (home)	232	2.81	1.49	18
B25. Lack of home government assistance/incentives	247	2.84	1.32	19
B5. Insufficient quantity of and/or untrained personnel for market expansion	248	2.85	1.27	20
B11. Meeting product quality/standards/specifications	247	2.88	1.33	21
B18. Accessing a new production chain	245	2.89	1.29	22
B10. Adapting to demanded product design/style	247	2.89	1.38	23
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (home)	232	2.93	1.44	24
B29. Inadequacy of basic and IT infrastructure (home)	230	2.93	1.26	25
B36. Lack of the perceived benefits from joining production networks	245	2.94	1.30	26
B13. Offering technical/after-sales service	245	2.95	1.38	27
B20. Unavailability of inventories/warehousing facilities	246	2.96	1.48	28
B16. Anti-competitive or informal practices	245	2.97	1.38	29
B30. Political instability (foreign)	231	2.99	1.59	30
B8. Difficulty in getting credit from suppliers and financial institutions	247	2.99	1.36	31
B22. Participation in promotional activities to target markets/business partners	247	3.00	1.26	32
B17. Complexity of production value chain	247	3.01	1.27	33
B26. Unfavorable home rules and regulations	246	3.03	1.36	34
B28. Poor/deteriorating economic conditions (foreign)	230	3.04	1.49	35
B32. Inadequate property rights protection (e.g. intellectual property) - (foreign)	231	3.05	1.60	36

Barrier			
B24. Difficulties in enforcing contracts and resolving disputes	246	3.05	1.37	37
B29. Inadequacy of basic and IT infrastructure (foreign)	230	3.07	1.47	38
B31. High tax and tariff barriers (foreign)	231	3.09	1.55	39
B12. Meeting packaging/labeling requirements	246	3.10	1.37	40
B34. High costs of Customs administration, in exporting or importing (foreign)	218	3.11	1.53	41
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary	231	3.15	1.60	42
B23. Unfamiliarity with complexity of procedures/paperwork	246	3.20	1.29	43
B27. Unfavorable host/foreign rules and regulations	246	3.24	1.47	44

Appendix 5. Complete Ranking of Perception of Barriers for SMEs Out of Production Network

Barrier	Obs	Mean	S.D.	Rank
B7. Shortage of working capital to finance new business plan	549	2.74	1.34	1
B14. Offering competitive prices to customers	548	2.82	1.26	2
B6. Lack of production capacity to expand	549	2.84	1.25	3
B2. Unreliable market data (costs, prices, market shares)	547	2.87	1.24	4
B1. Limited Information to locate/analyze markets/business partners	546	2.87	1.25	5
B28. Poor/deteriorating economic conditions (home)	510	2.88	1.27	6
B15. Difficulty in matching competitors' prices	549	2.88	1.19	7
B3. Inability to indentify and contact potential business partners	547	2.93	1.30	8
B8. Difficulty in getting credit from suppliers and financial institutions	548	2.96	1.27	9
B5. Insufficient quantity of and/or untrained personnel for market expansion	548	2.97	1.28	10
B4. Lack of managerial time to identify new business opportunities	545	2.99	1.33	11
B19. Establishing and maintaining trust with business partners	547	3.04	1.33	12
B35. Perceived risks in your current and new business operations	546	3.15	1.24	13
B9. Developing new products	547	3.18	1.21	14
B31. High tax and tariff barriers (home)	527	3.18	1.24	15
B21. Excessive transportation/insurance costs	544	3.19	1.23	16
B13. Offering technical/after-sales service	548	3.20	1.30	17
B20. Unavailability of inventories/warehousing facilities	545	3.21	1.36	18
B30. Political instability (home)	527	3.21	1.39	19
B25. Lack of home government assistance/incentives	533	3.22	2.58	20
B11. Meeting product quality/standards/specifications	544	3.22	1.27	21
B22. Participation in promotional activities to target markets/business partners	544	3.22	1.24	22
B10. Adapting to demanded product design/style	548	3.22	1.24	23
B37. Willingness to adopt new business strategy or ideas	547	3.24	1.21	24
B18. Accessing a new production chain	546	3.25	1.25	25
B17. Complexity of production value chain	547	3.27	1.26	26
B16. Anti-competitive or informal practices	548	3.32	2.14	27
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (home)	526	3.34	1.32	28
B36. Lack of the perceived benefits from joining production networks	546	3.34	1.20	29
B34. High costs of Customs administration, in exporting or importing (home)	463	3.35	1.35	30
B29. Inadequacy of basic and IT infrastructure (home)	513	3.35	1.19	31
B32. Inadequate property rights protection (e.g. intellectual property)- (home)	525	3.38	1.36	32

B26. Unfavorable home rules and regulations	532	3.38	1.31	33
B23. Unfamiliarity with complexity of procedures/paperwork	532	3.40	1.21	34
B12. Meeting packaging/labeling requirements	548	3.41	2.06	35
B24. Difficulties in enforcing contracts and resolving disputes	532	3.48	1.24	36
B27. Unfavorable host/foreign rules and regulations	500	3.52	1.43	37
B28. Poor/deteriorating economic conditions (foreign)	474	3.55	1.41	38
B30. Political instability (foreign)	488	3.55	1.45	39
B31. High tax and tariff barriers (foreign)	490	3.58	1.41	40
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (foreign)	487	3.69	1.41	41
B29. Inadequacy of basic and IT infrastructure (foreign)	485	3.69	1.35	42
B34. High costs of Customs administration, in exporting or importing (foreign)	429	3.71	1.44	43
B32. Inadequate property rights protection (e.g. intellectual property) - (foreign)	489	3.75	1.42	44

Appendix 6. Complete Ranking of Perception of Barriers for SMEs in Low Quality Production Network

Barrier	Obs	Mean	S.D.	Rank
B35. Perceived risks in your current and new business operations	152	2.49	1.14	1
B14. Offering competitive prices to customers	154	2.51	1.21	2
B19. Establishing and maintaining trust with business partners	153	2.61	1.25	3
B6. Lack of production capacity to expand	154	2.68	1.31	4
B1. Limited Information to locate/analyze markets/business partners	154	2.68	1.31	5
B28. Poor/deteriorating economic conditions (home)	149	2.70	1.15	6
B15. Difficulty in matching competitors' prices	154	2.71	1.24	7
B21. Excessive transportation/insurance costs	153	2.73	1.28	8
B2. Unreliable market data (costs, prices, market shares)	154	2.73	1.24	9
B4. Lack of managerial time to identify new business opportunities	154	2.75	1.29	10
B31. High tax and tariff barriers (home)	148	2.77	1.27	11
B7. Shortage of working capital to finance new business plan	154	2.79	1.39	12
B34. High costs of Customs administration, in exporting or importing (home)	140	2.80	1.34	13
B3. Inability to indentify and contact potential business partners	154	2.84	1.34	14
B30. Political instability (home)	148	2.86	1.49	15
B37. Willingness to adopt new business strategy or ideas	151	2.92	1.24	16
B32. Inadequate property rights protection (e.g. intellectual property)- (home)	149	2.93	1.46	17
B5. Insufficient quantity of and/or untrained personnel for market expansion	154	2.95	1.22	18
B10. Adapting to demanded product design/style	154	2.96	1.37	19
B9. Developing new products	154	2.97	1.27	20
B18. Accessing a new production chain	152	2.98	1.30	21
B25. Lack of home government assistance/incentives	153	3.00	1.33	22
B11. Meeting product quality/standards/specifications	154	3.01	1.31	23
B36. Lack of the perceived benefits from joining production networks	152	3.02	1.30	24
B13. Offering technical/after-sales service	153	3.03	1.40	25
B20. Unavailability of inventories/warehousing facilities	153	3.05	1.47	26
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (home)	149	3.09	1.40	27
B22. Participation in promotional activities to target markets/business partners	153	3.10	1.27	28
B17. Complexity of production value chain	153	3.10	1.23	29
B30. Political instability (foreign)	149	3.13	1.65	30
B26. Unfavorable home rules and regulations	153	3.14	1.32	31
B29. Inadequacy of basic and IT infrastructure (home)	148	3.15	1.24	32
B28. Poor/deteriorating economic conditions (foreign)	148	3.16	1.52	33
B16. Anti-competitive or informal practices	153	3.16	1.38	34
B24. Difficulties in enforcing contracts and resolving disputes	153	3.17	1.35	35
B29. Inadequacy of basic and IT infrastructure (foreign)	148	3.18	1.52	36
B34. High costs of Customs administration, in exporting or importing (foreign)	139	3.18	1.57	37
B8. Difficulty in getting credit from suppliers and financial institutions	154	3.18	1.35	38
B32. Inadequate property rights protection (e.g. intellectual property) - (foreign)	148	3.24	1.58	39
B23. Unfamiliarity with complexity of procedures/paperwork	153	3.26	1.27	40
B12. Meeting packaging/labeling requirements	153	3.28	1.35	41
B31. High tax and tariff barriers (foreign)	148	3.32	1.56	42
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (foreign)	148	3.33	1.59	43
B27. Unfavorable host/foreign rules and regulations	153	3.43	1.45	44

Appendix 7. Complete Ranking of Perception of Barriers for SMEs in High Quality Production Network

Barrier	Obs	Mean	S.D.	Rank
B30. Political instability (home)	82	2.32	1.41	1
B28. Poor/deteriorating economic conditions (home)	82	2.33	1.25	2
B31. High tax and tariff barriers (home)	83	2.40	1.36	3
B14. Offering competitive prices to customers	94	2.50	1.21	4
B19. Establishing and maintaining trust with business partners	94	2.50	1.34	5
B1. Limited Information to locate/analyze markets/business partners	93	2.51	1.26	6
B9. Developing new products	93	2.52	1.25	7
B29. Inadequacy of basic and IT infrastructure (home)	82	2.54	1.20	8
B35. Perceived risks in your current and new business operations	93	2.55	1.27	9
B37. Willingness to adopt new business strategy or ideas	93	2.55	1.26	10
B25. Lack of home government assistance/incentives	94	2.57	1.27	11
B32. Inadequate property rights protection (e.g. intellectual property)- (home)	83	2.60	1.52	12
B4. Lack of managerial time to identify new business opportunities	93	2.61	1.31	13
B15. Difficulty in matching competitors' prices	93	2.61	1.23	14
B2. Unreliable market data (costs, prices, market shares)	94	2.63	1.23	15
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (home)	83	2.64	1.48	16
B16. Anti-competitive or informal practices	92	2.64	1.31	17
B21. Excessive transportation/insurance costs	92	2.66	1.34	18
B31. High tax and tariff barriers (foreign)	83	2.67	1.45	19
B8. Difficulty in getting credit from suppliers and financial institutions	93	2.68	1.30	20
B11. Meeting product quality/standards/specifications	93	2.68	1.35	21
B34. High costs of Customs administration, in exporting or importing (home)	79	2.68	1.43	22
B5. Insufficient quantity of and/or untrained personnel for market expansion	94	2.69	1.34	23
B3. Inability to indentify and contact potential business partners	93	2.70	1.36	24
B6. Lack of production capacity to expand	93	2.70	1.30	25
B32. Inadequate property rights protection (e.g. intellectual property) - (foreign)	83	2.71	1.60	26
B30. Political instability (foreign)	82	2.73	1.44	27
B7. Shortage of working capital to finance new business plan	93	2.75	1.21	28
B18. Accessing a new production chain	93	2.75	1.26	29
B10. Adapting to demanded product design/style	93	2.78	1.41	30
B12. Meeting packaging/labeling requirements	93	2.80	1.35	31
B20. Unavailability of inventories/warehousing facilities	93	2.81	1.49	32
B36. Lack of the perceived benefits from joining production networks	93	2.81	1.30	33
B13. Offering technical/after-sales service	92	2.82	1.34	34
B28. Poor/deteriorating economic conditions (foreign)	82	2.82	1.42	35
B33. Restrictive health, safety and technical standards (e.g. sanitary and phytosanitary requirements) - (foreign)	83	2.83	1.57	36
B24. Difficulties in enforcing contracts and resolving disputes	93	2.85	1.39	37
B26. Unfavorable home rules and regulations	93	2.85	1.41	38
B17. Complexity of production value chain	94	2.85	1.34	39
B22. Participation in promotional activities to target markets/business partners	94	2.85	1.24	40
B29. Inadequacy of basic and IT infrastructure (foreign)	82	2.87	1.36	41
B27. Unfavorable host/foreign rules and regulations	93	2.94	1.47	42
B34. High costs of Customs administration, in exporting or importing (foreign)	79	2.99	1.45	43
B23. Unfamiliarity with complexity of procedures/paperwork	93	3.09	1.32	44

Appendix 8. Ranked Constraints by Category Faced by SMEs

All Sample					In Production Network					Out Production Network				
Barrier	Obs	Mean	S.D.	Rank	Barrier	Obs	Mean	S.D.	Rank	Barrier	Obs	Mean	S.D.	Rank
Product and Price Barriers	788	2.96	1.71	1	Product and Price Barriers	247	2.95	1.76	1	Product and Price Barriers	541	2.96	1.68	1
Functional Barriers	788	3.76	1.90	2	Functional Barriers	247	3.84	1.92	2	Functional Barriers	541	3.72	1.90	2
Business Environment Barriers	787	3.96	1.94	3	Business Environment Barriers	247	3.91	2.07	3	Business Environment Barriers	540	3.99	1.88	3
Informational Barriers	785	4.27	2.10	4	Distribution, Logistics and Promotion Barriers	247	4.34	1.84	4	Informational Barriers	538	4.04	2.08	4
Distribution, Logistics and Promotion Barriers	785	4.32	1.77	5	Procedural Barriers	247	4.36	2.04	5	Distribution, Logistics and Promotion Barriers	538	4.30	1.74	5
Procedural Barriers	785	4.54	1.90	6	Tax, Tariff and Non-Tariff Barriers	247	4.53	2.26	6	Procedural Barriers	538	4.62	1.83	6
Tax, Tariff and Non-Tariff Barriers	786	4.89	2.17	7	Informational Barriers	247	4.77	2.05	7	Tax, Tariff and Non-Tariff Barriers	539	5.06	2.11	7
Other Barriers	765	7.30	1.64	8	Other Barriers	243	7.30	1.73	8	Other Barriers	522	7.30	1.60	8

Appendix 9. Ranked Constraints by Category Faced by SMEs and Quality in Production Network

Low Quality Production Network					High Quality Production Network				
Barrier	Obs	Mean	S.D.	Rank	Barrier	Obs	Mean	S.D.	Rank
Product and Price Barriers	153	2.90	1.72	1	Product and Price Barriers	94	3.03	1.82	1
Business Environment Barriers	153	3.75	2.00	2	Functional Barriers	94	3.62	1.91	2
Functional Barriers	153	3.98	1.92	3	Business Environment Barriers	94	4.17	2.16	3
Procedural Barriers	153	4.38	2.02	4	Distribution, Logistics and Promotion Barriers	94	4.26	1.68	4
Distribution, Logistics and Promotion Barriers	153	4.40	1.93	5	Procedural Barriers	94	4.33	2.08	5
Tax, Tariff and Non-Tariff Barriers	153	4.46	2.19	6	Tax, Tariff and Non-Tariff Barriers	94	4.65	2.38	6
Informational Barriers	153	4.69	2.12	7	Informational Barriers	94	4.88	1.96	7
Other Barriers	150	7.41	1.56	8	Other Barriers	93	7.13	1.97	8

Appendix 10. Ranked Effectiveness of the Assistance to the Surveyed SMEs

All Sample					In Production Network					Out Production Network				
Assistance	Obs	Mean	S.D.	Rank	Assistance	Obs	Mean	S.D.	Rank	Assistance	Obs	Mean	S.D.	Rank
Financing	175	0.32	0.47	1	Technology development and transfer	75	0.30	0.46	1	Financing	175	0.32	0.47	1
Technology development and transfer	191	0.35	0.48	2	Financing	77	0.31	0.46	2	Technology development and transfer	191	0.35	0.48	2
Counseling and advice	197	0.36	0.48	3	Counseling and advice	89	0.36	0.48	3	Counseling and advice	197	0.36	0.48	3
Overall improvement in investment climate	206	0.38	0.49	4	Overall improvement in investment climate	91	0.37	0.48	4	Overall improvement in investment climate	206	0.38	0.49	4
Business linkages and networking	214	0.39	0.49	5	Training	101	0.41	0.49	5	Business linkages and networking	214	0.39	0.49	5
Training	227	0.41	0.49	6	Business linkages and networking	107	0.43	0.50	6	Training	227	0.41	0.49	6
Information	261	0.48	0.50	7	Information	120	0.48	0.50	7	Information	261	0.48	0.50	7

Appendix 11. Ranked Effectiveness of the Assistance to the Surveyed SMEs by Quality in Production Network

Low Quality Production Network					High Quality Production Network				
Assistance	Obs	Mean	S.D.	Rank	Assistance	Obs	Mean	S.D.	Rank
Financing	86	1.13	1.39	1	Financing	53	1.64	1.53	1
Overall improvement in investment climate	97	1.21	1.42	2	Technology development and transfer	51	1.80	1.71	2
Technology development and transfer	87	1.23	1.56	3	Business linkages and networking	59	1.90	1.55	3
Business linkages and networking	108	1.40	1.56	4	Training	61	1.90	1.46	4
Information	114	1.46	1.51	5	Overall improvement in investment climate	56	1.91	1.64	5
Counseling and advice	88	1.49	1.45	6	Information	62	2.18	1.56	6
Training	91	1.52	1.52	7	Counseling and advice	47	2.28	1.69	7

Appendix 12. Ranked Perception of the Assistance by the Surveyed SMEs

All Sample					In Production Network					Out Production Network				
Assistance	Obs	Mean	S.D.	Rank	Assistance	Obs	Mean	S.D.	Rank	Assistance	Obs	Mean	S.D.	Rank
Financing	175	0.32	0.47	1	Technology development and transfer	75	0.30	0.46	1	Financing	175	0.32	0.47	1
Technology development and transfer	191	0.35	0.48	2	Financing	77	0.31	0.46	2	Technology development and transfer	191	0.35	0.48	2
Counseling and advice	197	0.36	0.48	3	Counseling and advice	89	0.36	0.48	3	Counseling and advice	197	0.36	0.48	3
Overall improvement in investment climate	206	0.38	0.49	4	Overall improvement in investment climate	91	0.37	0.48	4	Overall improvement in investment climate	206	0.38	0.49	4
Business linkages and networking	214	0.39	0.49	5	Training	101	0.41	0.49	5	Business linkages and networking	214	0.39	0.49	5
Training	227	0.41	0.49	6	Business linkages and networking	107	0.43	0.50	6	Training	227	0.41	0.49	6
Information	261	0.48	0.50	7	Information	120	0.48	0.50	7	Information	261	0.48	0.50	7

Appendix 13. Ranked Perception of the Assistance by the Surveyed SMEs and Quality in Production Network

Low Quality Production Network					High Quality Production Network				
Assistance	Obs	Mean	S.D.	Rank	Assistance	Obs	Mean	S.D.	Rank
Overall improvement in investment climate	150	3.45	2.27	1	Overall improvement in investment climate	90	3.73	2.37	1
Financing	150	3.57	2.05	2	Business linkages and networking	90	3.76	1.87	2
Information	150	3.87	1.82	3	Financing	90	3.80	2.28	3
Business linkages and networking	150	3.88	2.00	4	Training	90	3.94	2.09	4
Training	150	4.33	1.95	5	Information	90	4.09	1.86	5
Counseling and advice	150	4.53	1.84	6	Technology development and transfer	90	4.16	1.70	6
Technology development and transfer	150	4.64	1.88	7	Counseling and advice	90	4.69	1.78	7