

Research Article

Vertical Linkage and Firm's Performance in Supporting Industries in Vietnam

Nham Phong Tuan¹, Takahashi Yoshi²

1. Lecturer in Faculty of Business Administration, Vietnam Commercial University, Vietnam

2. Associate Professor in Graduate School for International Development and Cooperation, Hiroshima University, Japan.

tuandhtm@gmail.com

ABSTRACT

This paper focuses on analyzing relationship between vertical linkages through subcontracting arrangement and firm's performance in supporting industries in Vietnam. Specifically, we based our research on the theoretical foundations of subcontracting linkages and previous empirical researches to set up three sub-hypotheses about this relationship. These sub-hypotheses are examined by multiple regression analysis methodology on a data sample of 89 firms belonging to supporting industries. The results indicate that subcontracting engaged firms do not differ significantly from market-oriented firms for financial performance. However, among those firms engaged in subcontracting, the firms receiving subcontract more intensively are able to achieve better performance, but intensity of subcontract offering activity has insignificant impact on the performance of a firm. Moreover, subcontractors that have a lesser number of contractors are better for their performance, but contractors that have more subcontractors show a better performance. Like all other researches, this study has some limitations. The biggest constraint may be the small size of the sample and the limited location of the research. In spite of these limitations, this research has considerable implications for academics as well as practitioners. For academics, this study provides one more evidence to the existing literature. For practitioners, this paper implies that subcontractors should improve the intensity of their subcontracting activities. They should also focus on a limited number of contractors. However, the contractors should have many subcontractors to carefully save their supplying sources. Finally, the most valuable contribution of this study may be that it is the first empirical study about this matter in supporting industries in Vietnam as our best understanding.

Keywords: Vertical linkage, subcontracting, performance, supporting industries, Vietnam.

1. Introduction

The Vietnamese economy has increasingly developed, since Vietnam's economic reform program—officially called the “*doi moi*”—was launched in 1986. One of the driving forces of this development is an increased role of the industrial sector, which has been making a great

contribution in creating employment and raising income (Berry, 2002; Rand, Tarp, Dzung, & Vinh, 2002). However, under globalization with fiercer competition, both foreign and local firms, especially manufacturing enterprises in the case of Vietnam, need to improve their international competitiveness (Ohno, 2007). Given this need, developing supporting industries that provide parts, components and other inputs to assemblers through good business linkages has long been considered effective and is also suitable for the business strategies of foreign manufacturing enterprises, especially assemblers, in Vietnam. At the same time, one of the goals of developing supporting industries is also to promote Small and medium-sized enterprises (SMEs), who are enterprises with less than 300 employees according to definition of Government decree No 99/2001/CP-ND (2001). The manufacturing SMEs are the most important sector for the industrialization and modernization's strategy of the Vietnamese economy. However, the linkage between firms via stable and long-term subcontracts in Vietnam is still somehow weak (CIEM, 2004). This limits the development of the supporting industries themselves as well as business opportunities for foreign-invested enterprises, specifically assemblers, because it is costly and time-consuming for them to find good local suppliers (Ohno, 2007).

In Vietnam's case, although some researches about subcontracting at the macro level exist, there is still a lack of empirical research about specific matters at the firm level, especially underlying tests about the impact of linkages through subcontracting between firms in supporting industries on their performance. In this context, conducting firm-level studies about the business linkage through subcontracting arrangements is essential to propose practical actions for the development of the supporting industries in Vietnam.

Based on our literature review of the theoretical foundations of linkages and the need for more empirical evidences for academics and the community of entrepreneurs, especially in the case of Vietnam, the purpose of this study is to examine the relationships between the linkages through subcontracting arrangement and the performance of firms belonging to supporting industries.

This paper is organized as follows: the next section briefly reviews previous researches about the theoretical foundation of linkage and subcontracting and argues to develop hypotheses. Following that, the third section presents the data and sample as well as variables and their measurement. In the fourth section, analyses and results are reported. The fifth section presents a discussion of the findings while limitations of the study along with directions for future studies are presented in sixth section.

2. Literature Review and Hypothesis Development

Linkage is defined as a connected sequence of investment decisions occurring in the process of industrialization (Hirschman, 1977; Mazzola & Bruni, 2000). According to Hirschman (1977), there are three types of linkages, which include the production linkage in which the link-connecting firms provide inputs to other firms (backward linkage) or use the product of another firm as input located nearby (forward linkage), the consumption linkage that refers to the expansion of investment opportunities for local entrepreneurs due to the increase in demand for final goods and the fiscal linkage which accrues to government in the form of royalties, taxes and dividends.

Among these linkages, the production linkage (also known as vertical linkage) show the most considerable advantages in the process of development and industrialization since they create a market for intermediate goods and thus generate perceivable profit opportunities by new local

investors as well as improving competence of existing firms (Hirschman, 1977; Mazzola & Bruni, 2000; UNCTAD, 2000). Similarly, under supporting industries that provide parts, components and other inputs to assemblers, this type of linkage between enterprises may improve business capacity, mobilize external resources, and enhance the operation efficiency and competitiveness (CIEM, 2004).

On the basis of different economic conditions, there are some tools representing the vertical linkage such as subcontracting arrangements, capital contribution, and share acquisition (CIEM, 2004). Compared with competitive spot bidding and vertical integration (Kimura, 2002), the most considered form in theory, practice as well as legal framework is the subcontracting arrangement between an enterprise and the other enterprise(s) (Kumar & Subrahmanya, 2007; UNCTAD, 2000).

Subcontracting refers to the purchase of a part or component of a product or process from a different firm (Kimura, 2002). Specifically, subcontracting means long term transactions with specific companies, in which the firm offering another independent enterprise the subcontract requests to undertake the production or carry out the processing of a material, component, part or subassembly for it according to specifications or plans provided by the firm offering the subcontract (Holmes, 1986, p.84; Taymaz & Kiliçaslan, 2005, p.634).

In Vietnamese mechanical, electric and electronic industries as similar as those of other countries, in such a relationship, larger firms are often the ordering party (also known as the contractor) who are responsible for the production, sub-assembly of inputs or assembly of the final product, and smaller firms (mostly SMEs) are often the subcontractors who are in charge of the production of parts, components or subassembly based on the agreement on standards, quality, design and time (CIEM, 2004). CIEM (2004) also reported in their empirical research that for large enterprises, the value of products and services supplied with subcontracts is equal to 38% of the total revenue. For SMEs, about 65% of their revenue is from their subcontracts with large enterprises. Especially, about 31% of the SMEs revealed that 100% of their revenue was from their supply of products and services to large enterprises via subcontracts.

The explanation of the popularity of the subcontracting relationship in obtaining parts and components from upstream over other linkage forms (in some conditions) including vertical integration and competitive spot bidding must be supported by theoretical foundations. According to Kimura (2002), there are four theoretical approaches of subcontracting, including transaction cost, game theory, economics of information and network approach. The transaction cost and the network approach imply that the choice of subcontracting over vertical integration is when the upstream production requires specialized technology or uses particular productive factors such as specialized machines. Instead of purchasing parts or components in the spot market, subcontracting may be chosen when parts and components are customized and had better be supplied from upstream firms with long-term relationship. Moreover, the stability and path-dependent nature of subcontracting under the game approach, and the logic of saving monitoring costs of the information approach suggest that subcontracting is chosen instead of buying in the spot market.

However, the choice of subcontracting relationship based on those theoretical foundations seems to be mostly from perspectives of large firms or contractors. For SME's perspectives in supporting industry, especially in developing countries, they can have three choices: (1) compete and become final product manufacturers; (2) become replacement equipment manufacturers (REM); (3) become subcontractors in supply chain of assemblers. The first choice seems to be quite difficult for such resource-constrained SMEs (Kumar & Subrahmanya, 2007; Subrahmanya,

2004; Wynarczyk & Watson, 2005). The second one can be the best possibility for such resource-constrained SMEs at the beginning of industry development, where do not require highly invested resource. Nonetheless, in the long run, under a growing market with high desire of survival and growth from SMEs as well as increasing need of having local suppliers from assemblers, several REMs will become subcontractors for assemblers, probably absolute subcontractors or just partly engaged. The reasons for subcontracting relationship with contractors (large firms, assemblers) can be that it provides SMEs better scope for accessing resources such as technology, finance, marketing and human resources to compete in the global market and then exhibit better economic performance; economies of scale (Kumar & Subrahmanya, 2007; UNCTAD, 2001). It is also important channel for the transfer of knowledge, technologies and managerial skills to SMEs (UNCTAD, 2000). Hence, the third choice may be the best one for lots of REMs in the long term, and even for other related firms.

With regard to previous empirical evidences at the establishment level, many researches in both developed and developing countries, and from both contractor and subcontractor's perspective show role of subcontracting linkages for development in several aspects of enterprises. For developed countries, several studies obtained the results that subcontracting had positive impacts on firm's performance from contractor's perspective (Girma & Gorg, 2004; Marsall, McIvor, & Lamming, 2007), and from subcontractor's perspective (Deardorff & Djankov, 2000; Mazzola & Bruni, 2000; Wynarczyk & Watson, 2005; Yasuda, 2005). For developing countries, fewer researches have been implemented. For instance, from subcontractor's perspective, Burki and Terrell (1998) examined the efficiency of SMEs in Gujiranwala, Pakistan, and indicated that firms engaging in production subcontracting were more efficient. Hayashi (2002) also reported that vertical linkage as a form of subcontracting has increased productivity of SMEs in Indonesia. Ivarsson and Alvstam (2004) showed that the technological assistance by contractors in subcontracting relationship improved the productivity and flexibility of subcontractors in the case of Volvo trucks and their domestic suppliers in India. Among these above studies, some (Girma & Gorg, 2004; Hayashi, 2002; Marsall et al., 2007; Wynarczyk & Watson, 2005) used sample of only subcontracting engaged firms. In this case, a firm's performance was compared with others under outsourcing or subcontracting intensity. However, some others (Burki & Terrell, 1998; Deardorff & Djankov, 2000; Mazzola & Bruni, 2000; Yasuda, 2005) utilized sample of both subcontracting engaged firms and non-subcontracting firms. In this sense, firms with subcontracting were compared with others without subcontracting in terms of performance. In addition, another case (Ivarsson & Alvstam, 2004) compare firm productivity before and after subcontracting engagement.

On the basis of the theoretical foundation as well as some empirical evidence from both contractor and subcontractor's perspective showed above, it can be come up with a overall hypothesis in this paper that linkage through subcontracting arrangement has a significant impact on firm's performance in Vietnam's supporting industries. However, the overall hypothesis will be separated into sub-hypotheses due to feature of supporting industries in Vietnam and authors' rational desire of underlying analysis of subcontracting effects for firm's performance.

Firstly, supporting industries in Vietnam not only consist of firms working as subcontractor, and firms using and working as subcontractor at the same time (see detail in parts of supporting industries definition and initial descriptives) but also of some other market-oriented firms, including replacement equipment manufacturers (REM) for after market, which are not really related to subcontracting activities but rather to production for direct sales on the market. Thus, it is expected to test the first sub-hypothesis that there is a significant difference between

subcontracting engaged firms and market-oriented firms in terms of performance, in which the former outperform the latter.

Sub-hypothesis H1: Engagement in subcontracting activities has a significantly positive impact on performance.

The comparison between firms with and firms without subcontracting activities of the first sub-hypothesis can be similar to the previous empirical studies such as Deardorff & Djankov (2000), Mazzola & Bruni (2000), Yasuda (2005) and Burki & Terrell (1998). Nonetheless, the comparison in supporting industries which consist of firms sharing common characteristics seems to be more appropriate than that in a broad scope (SMEs or all firms in a location) as the above previous studies.

Then, similar to the previous researches by Girma & Gorg (2004), Marsall, McIvor et al. (2007), Wynczyk & Watson (2005), Hayashi (2002) using sample of only subcontracting engaged firms, this paper will also emphasize on only kind of the subcontracting engaged firms to investigate hypotheses about effects of the subcontracting arrangement for the performance of the firms. However, not only are deep or wide effects, but both deep and wide ones are also expected to be tested in this paper. The deep effect (known as the second sub-hypothesis in this paper) can be considered as subcontracting intensity that was used in these above studies while the wide effect can be regarded as number of subcontractor or contractor a firm has. The wide effect is explained in part of the third sub-hypothesis. This investigation of effects can provide more empirical evidence to the theoretical fundamentals of linkage through subcontracting and thus to be the first empirical study of subcontracting relationship in the case of Vietnam's supporting industries.

From the arguments, the second sub-hypothesis that indicates the deep effect can be proposed. Following previous studies by Kimura (2002) and Taymaz & Kiliçaslan (2005)(2005), this sub-hypothesis is expressed into two statements according to the position of firms in their relationship such as subcontract receiving firms and subcontract offering firms.

Sub-hypothesis H2a: Intensity of subcontract receiving activity has a positive and significant impact on the performance of a firm.

Sub-hypothesis H2b: Intensity of subcontract offering activity has a positive and significant impact on the performance of a firm.

The third sub-hypothesis is related to the wide effect of subcontracting arrangement for the performance of the firms. The wide effect can be understood as influence of number of subcontractor or contractor on the firm's performance. From the perspective of subcontractors, Dyer (1996) suggested that a relationship with specific contractor(s) will enable subcontractors to invest in asset-specificity, minimize transaction costs, thus accumulating their skills, and improving technology ability. Mazzola & Bruni (2000) found out that the existence of specific relationships has a significant positive impact on performance. Yasuda (2005) pointed out that subcontracting to only one company is significantly and positively related to a firm's survivability. On the contrary, Nobeoka, Dyer & Madhok (2002) argued that more number of customers led to superior performance primarily because of learning opportunities of knowledge in the context of automobile industry in Japan. They considered the knowledge including relation-specific and re-deployable one. They also admitted that a specific interaction between a supplier and an assembler can enhance performance of the supplier through relation-specific

knowledge, but the suppliers can acquire more re-deployable knowledge if they can engage in close interactions with multiple customers. As can be seen, the above empirical studies showed contradictive results. It may be explained by the difference of objects, economic environment and development stage of industry. In Vietnam's case, the supporting industries are still at early stage. They have a lot of constraints about every aspect and cannot be compared with Japan's case with high development of the industry, for example, where one contractor has many primary subcontractors, which in turn depend on little more secondary subcontractors, which in turn depend on much more tertiary subcontractors (Lazerson, 1990). Perhaps, the first step in the development of the supporting industries in Vietnam is to establish a really close relationship between a subcontractor and a contractor to primarily learn the relation-specific knowledge rather than multiple contractors without ties. Moreover, from the conclusion by Nobeoka et al.(2002), it can be said that whatever the knowledge is and how many assemblers a supplier has, the close interactions between the supplier and assembler should exist. In short, in the early stage of supporting industries development, a subcontractor should achieve relation-specific knowledge by the close relationship with specific contractor(s). A higher stage of the industry development with re-deployable knowledge cannot be realized without a sufficient relation-specific one. On the basis of the empirical evidence and the argument above, a significantly negative correlation between number of contractors and performance is hypothesized in Vietnam's case.

Sub-hypothesis H3a: Number of contractors a subcontractor has is significantly and negatively related to performance.

From the point of view of contractors, multiple subcontractors are beneficial to assemblers in the Japanese automobile industry (Nobeoka et al., 2002). It is also a common pattern from many countries in the world, where a contractor usually has many subcontractors. The existence of this pattern might prove an implication about the relationship between the number of subcontractors and performance. Vietnam's empirical evidence also indicates that contractors are mainly state-owned enterprises (SOEs) and foreign-invested enterprises, in which the number of these contractors represents only a small proportion of total enterprises in the economy (CIEM, 2004). Moreover, Nobeoka (2006, p: 289) also illustrated a U-shape relationship between sum of purchasing and relational cost and number of subcontractors a contractor has. In terms of performance, the relationship between performance and number of subcontractors becomes a U-inverted shape, suggesting that performance of a contractor increase along with number of subcontractors until a turning point where performance goes down regardless of more number of subcontractors. The turning point implies the maximum number of subcontractors while performance still rises. This turning point is different from case to case. In Vietnam's early stage of the industry development currently, while most contractors have a high demand of subcontractors, the turning point for reducing number of subcontractors has not been reached. In short, it can be hypothesized about the relationship between number of subcontractors and performance in Vietnam's supporting industries.

Sub-hypothesis H3b: Number of subcontractors a contractor has is significantly and positively related to performance.

3. Methodology

Prior to taking further steps, it is necessary to carefully discuss the definition of supporting industries. According to Thuy (2006), this term has been used for at least two decades. It originated in Japan in the mid-1980s, and has been popular in Asia ever since. The supporting industries and other related concepts such as subcontracting, ancillary industries and part and component industries are defined as industries that manufacture inputs for finished products.

In Vietnam's case, the term supporting industries began to be used at the beginning of year 2000, and it can be defined as a group of industrial activities which supply intermediate inputs (i.e., parts, components) and part of capital goods (tools to produce these parts and components) for assembly-type or processing industries (Thuy, 2006). In this paper, the analysis is limited to supporting industries such as mechanical, electric and electronic industries for assembly-type industries. Moreover, market-oriented firms consisting of mostly REM are included in the supporting industries due to their significance in future development of the supporting industries.

Overall, definition and scope of supporting industries used in this paper can be illustrated in Figure 1. In this Figure, supporting industries consist of firms belonging to Tier 1, 2 and 3 and REM, in which Tier 1, 2 and 3 are structured and specialized in producing their parts and components to supply to assembler of final products. Relationship among Tiers and between Tier and assembler is subcontracting arrangement while REM is outside that structure to provide directly to consumer market.

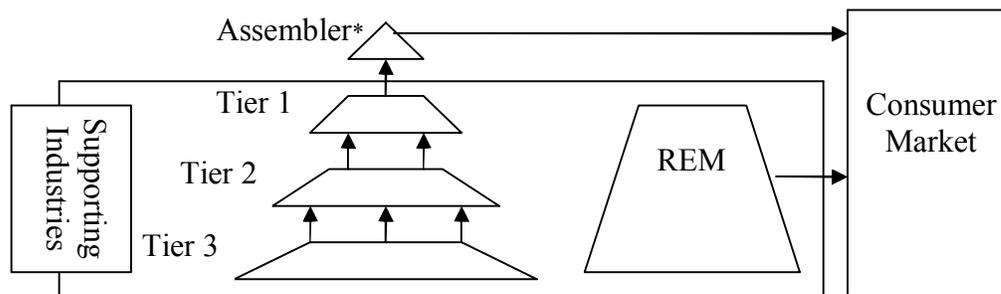


Figure 1: Industry Structure and Supporting Industries

Note: * play role of contractors only; Tier 1 and 2 can be contractor and subcontractor at the same time; Tier 3 is subcontractor only

Source: Outlined by authors

3.1. Data and Sample

To test our proposed hypotheses, a representative sample of 250 manufacturing firms in Hanoi city, which belong to supporting industries (mechanical, electric and electronic (EE)), was obtained from the Vietnam Business Directory, which is the largest business directory in Vietnam. This directory is regularly updated and can be directly searched through the internet. It is also organized by an agency of the Vietnam Chamber of Commerce and Industry (VCCI) which is the national organization representing the enterprise community and associations

nationwide. In order to ensure the reliability of respondents and also to encourage participation, this research was implemented under the VCCI name.

Two sources were utilized as methods of gaining data for this research. Firstly, a survey was conducted during August and September 2008 in Hanoi city. A structured questionnaire was administered to the directors of the 250 firms. It was followed by telephone calls to ensure participation and the return of the questionnaires. The questionnaire was constructed to obtain information on the subcontracting arrangement. The close-ended questions were employed to elicit specific responses. The survey targeted the heads of the firms, as they have the most comprehensive knowledge of their organization and strategies.

Secondly, due to the awareness of the difficulty of obtaining financial data of performance indicators in questionnaire survey, the authors collected them from General Statistic Bureau (GSO) which archives this type of data from many firms nationwide.

Out of the 250 questionnaires sent out, 118 were returned. Among the 118, 102 were valid. Based on these 102 firms, the financial data of 89 firms is gained from the GSO. Thus, 89 firms are the analysis sample for this paper, accounting for 35.6 percent of the true response rate. Considering the general response rate of researches and the actual situation in Vietnam, such a response rate is acceptable.

3.2. Research Variables

3.2.1. Subcontracting Engagement

This variable is measured by dummy one which is coded 1 if firms involved in subcontracting activities, otherwise 0.

3.2.2. Deep and Wide Effects of Subcontracting Activities

In order to observe the deep effects of subcontracting activities, the measurement of subcontracting intensity is utilized. For subcontract receiving activity, respondents are asked about the percentage of the subcontracted products in total sales on average three years 2005-2007. For subcontract offering activity, respondents are asked about the percentage of the outsourced products in total sales on average three years 2005-2007. For measuring the wide effects of subcontracting activities, respondents are asked about the number of subcontractors if those firms offer subcontract and the number of contractors if those firms receive subcontract.

3.2.3. Performance:

There are many types of performance measures for all kinds of firms. Each study uses a different measure, based on its purpose, perspective and theoretical background. However, these studies can be grouped into two regularly used types in organizational research: financial performance and non-financial performance (Chong, 2008; Newbert, 2008). Due to the availability of financial performance from GSO, this paper uses two objective financial performance indicators such as return on sales (ROS) and return on fixed assets (ROFA). They are measurements of operational efficiency calculated by a fiscal year's net profit divided by total sales expressed as percentage (ROS), and a fiscal year's net profit divided by fixed assets (ROFA) (Brealey, Myers, & Allen, 2006, p:790). These indicators have often been utilized in many empirical studies (Davidsson, Achtenhagen, & Naldi, 2006; Storey, 2002). Both of these indicators are measured on average values in three years 2005-2007.

3.2.4. Control Variables:

As in many previous empirical studies (Chandler & Hanks, 1994; Newbert, 2008; Wang & Ang, 2004), this paper controls some variables that may affect performance, including firm size (total number of employees), firm age (measured from established year up to the year 2007), legal status (limited liability companies = 1, the others = 0).

4. Analyses and Results

4.1. Initial Descriptives

Based on the data sample of authors, this section provides some characteristics of firms following all variables used in this study. Table 1 shows the characteristics of firms by subcontracting pattern. Due to the research controlled for only supporting industries, three groups are related to subcontracting activities. Group 1 working as subcontractor and not using subcontractor(s) has 16 firms. Group 2 working as a subcontractor and using subcontractor(s) has 21 firms. There are 52 firms that are not related to subcontracting activities. These firms sell their products directly to markets and most of them seem to be those manufacturing replacement equipments (REM) for markets. Among these firms, some companies are totally REM since their establishment; others are large SOEs that reserve a part of their production for the market of replacement equipments. Some of large SOEs have begun to shift away from vertically integrated production structure of the past and start to specialize in the products or processes in which they have competitiveness (Ichikawa, 2005). In this process, they are more likely to have experience as REM initially before becoming original equipment manufacturers (OEM) for assemblers.

Among two subcontracting groups, group 2 includes firms that are larger and more established than group 1. The remaining indicators of group 2 are higher than that of group 1.

Table 1: Characteristics of firms in terms of subcontracting pattern

	Group 1	Group 2	Group 3
Working as a subcontractor	<i>Yes</i>	<i>Yes</i>	<i>No</i>
Using subcontractor(s)	<i>No</i>	<i>Yes</i>	<i>No</i>
Firm size	184.312	749.333	505
Firm age	7.375	19.095	9.462
Legal status	0.75	0.19	0.558
Subcontracted product share (%)	45.625	53.333	0
Outsourced product share (%)	0	24.762	0
Number of contractors	7.813	10.619	0
Number of subcontractors	0	7.524	0
Return on sales (ROS)	-0.01	0.019	0.005
Return on fixed assets (ROFA)	-0.007	0.045	0.015
Observations	16	21	52

Source: based on author's questionnaire survey and secondary data from GSO

4.2. Determinants for Performance

The multiple regression analysis is used as the main quantitative analysis method in this paper. To be confident with results from this method, assumptions of general linear regression model should be tested. By checking the variance inflation factor (VIF) for these variables with the highest coefficient of less than 4, which is still below the VIF of 10 (Kennedy, 1992, p. 183), it can be said that there are no serious problems with multicollinearity that would violate assumptions for the general linear model.

Table 2 shows results of regression analysis. It can be seen that there are two analyzing steps. The first step uses the total data sample of 89 firms to test the sub-hypothesis *H1*. In this step, dependent variables are regressed against three control variables (LogFS, LogFA and Legal Status) and one independent variable subcontracting engagement (dummy variable). The purpose of this step is to test whether the subcontracting engaged firms (37 firms) outperform significantly the market-oriented firms (52 firms). As a result by checking insignificant level of *p*-value of this dummy variable, it can be said that there is no significant evidence for superiority of subcontracting engaged firms over market-oriented firms in terms of performance. Hence, sub-hypothesis *H1* is rejected.

The second step is to test underlying subcontracting activities on the subcontracting related firms (37 firms). An analysis on this sample will test sub-hypotheses *H2a,b* and *H3a,b*. As can be seen in the second step of Table 2, the subcontracted product share is a significantly positive factor for both financial indicators ROS and ROFA. Thus, sub-hypothesis *H2a* is supported.

For the intensity of subcontract offering activity, the outsourced product share shows an insignificant level of *p*-value, suggesting that sub-hypothesis *H2b* is rejected.

In terms of examining sub-hypotheses *H3a* and *H3b*, results indicate that the number of contractors is significantly and negatively related to performance and that the number of subcontractors is significantly and positively associated to performance. The findings let us to conclude that both *H3a* and *H3b* are supported.

Table 2: Determinants for Performance

	Step 1		Step 2	
	ROS	ROFA	ROS	ROFA
LogFS	-0.014 (-0.117)	-0.009 (-0.072)	-0.081** (-0.498)	-0.096*** (-0.571)
LogFA	0.0001 (0.0007)	-0.007 (-0.036)	-0.018 (-0.066)	-0.001 (-0.005)
Legal Status	-0.029 (-0.197)	-0.052*** (-0.332)	-0.057* (-0.278)	-0.086** (-0.402)
Subcontracting engagement	0.004 (0.028)	0.006 (0.036)		
Subcontracted product share (%)			0.002*** (0.569)	0.002*** (0.536)
Outsourced product share (%)			0.001 (0.103)	0.001 (0.129)
Number of contractors			-0.003** (-0.452)	-0.003*** (-0.507)
Number of subcontractors			0.008** (0.586)	0.008** (0.574)
Constant	0.047	0.067*	0.123*	0.174**

	(0.630)	(0.858)	(1.185)	(1.619)
Observations	89	89	37	37
R-squared	0.03	0.09	0.50	0.59
Adj-R square	-0.02	0.04	0.38	0.49
F-statistics	0.60	2.01	4.21	5.89

Normalized beta coefficients in parentheses

* $p < .1$; ** $p < .05$; *** $p < .01$

5. Discussion and Conclusion

This paper has focused on examining the relationships between the linkage through subcontracting arrangement and the performance of firms belonging to supporting industries in Vietnam. Based on the theoretical foundation and some empirical evidence of subcontracting linkage as well as the actual condition in Vietnam, three sub-hypotheses were raised to test the above mentioned relationships. As can be seen from the results of our regression analyses, sub-hypotheses *H2a* and *H3a,b* are supported, but sub-hypotheses *H1* and *H2b* are rejected.

As sub-hypothesis *H1* is rejected, it means that the subcontracting engaged firms do not outperform significantly the market-oriented firms. It may be explained by the fact that effects of the subcontracting linkage are not really clear for Vietnamese enterprises at this time; and there is lack of closeness and stability of the subcontracting linkage among firms in Vietnam (CIEM, 2004). In other words, the formation of subcontracting linkages in Vietnam has not been professional and highly specialized.

For sub-hypotheses *H2a* and *H2b*, the results mean that the more firms receive subcontract, the better performance these firms achieve, but it is not the case of subcontract offering firms. It confirms the important role of subcontracting linkage for subcontractors in Vietnam's case. This result is similar to the findings of CIEM (2004) that the participation in the subcontracting linkage is more important in production and business for SMEs (often subcontractors) than for large enterprises (often contractors).

In regard to sub-hypotheses *H3a* and *H3b*, our findings prove that subcontractors that depend on a lesser number of contractors are better for their performance. However, contractors that have more subcontractors show a better performance. Although the situation of concentrating on one or two contractors would make the subcontractor depending too much on contractor (s), it may reveal a reality in Vietnam that specialization in production with specific contractors enables subcontractors to accumulate the necessary skills in the early stage of their development. At the same time, contractors may avoid risk when using many subcontractors rather than relying on a limited number of subcontractors.

These findings may be of interest to academics and practitioners for several reasons. For academics, this study provides one more evidence to the existing literature. Specifically, as both sub-hypotheses *H3a,b* are supported, obviously the dependence among contractors and subcontractors is one of main factors for their performance. For practitioners, this paper implies that subcontractors should improve the intensity of their subcontracting activities. They should also focus on a limited number of contractors. However, the contractors should have many subcontractors to carefully save their supplying sources.

6. Limitations and Directions for Future Studies

Although this study may provide several useful contributions, like all other researches, it has some limitations. The biggest constraint may be the size of the sample and the targeted location of the research. The sample size is relatively small and not distributed equally and sufficiently among specific industries, plus the research only focuses on certain areas of the country. Regarding these, one should be careful before making any generalization from this study.

Ultimately, further studies should be implemented. If any researcher wishes to replicate this study, they should be firstly aware of these limitations. In addition, perhaps, one major question is raised from this study; it is what factors affect behavior of offering and receiving subcontract in Vietnam's case. Thus, we would strongly suggest trying to answer this question in further studies.

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