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Competence Building, Business Configuration, and Economic Performance: An Empirical Investigation*

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Competence Building, Business Configuration, and Economic Performance: An Empirical Investigation

Abstract

Literature of competence-based management has suggested that firm heterogeneity lies in the firm's capabilities in managing both competence building and competence leveraging activities in a synergistic manner. Leveraging the existing competencies to a wider business scope, however, involves different levels of uncertainty and risk with balancing strategic flexibility and organizational efficiency, which makes the realization of synergistic outcomes difficult. To achieve sustainable growth, a firm has to manage the dynamics between competence building efforts and business configurations so that economic returns can be ensured. Despite the critically, the extant literature is scant in exploring such dynamics and its impact of a firm's economic performance. To bridge this knowledge gap, the present research postulates a theory-guided empirical exploration on the interplays among competence building efforts, business configuration, and economic performance. Based on a longitudinal data set containing operating information of electronic hardware manufacturers based in Taiwan, we are able to perform a path analysis on the dynamics among these constructs. Results show that a contract manufacturer's product competence building efforts will positively facilitate its pursuit of wider business scope, and process competence building efforts will negatively influence on contrary, while competence building efforts and business configuration have direct and indirect effect on economic performance. Furthermore, significant interactions among product scope, customer scope, and vertical integration are found in our analysis. Implications of these empirical results and suggestions to future research on this important yet under explored issue are discussed.

Keywords: Competence Building, Business Configuration, Dynamic Capabilities

The issue of creating dynamic capabilities in order to achieve sustainable growth, especially in a hypercompetitive environment, has received a great research attention in strategy field (e.g., Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003; Teece, Pisano, & Shuen, 1997; Zollo & Winter, 2002). The central notion of this literature suggests that to create dynamic capabilities a firm has to "integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece, et al., 1997: 516)". Based on this conceptualization, a firm's dynamic capabilities can be regarded as its management of both competence building and competence leveraging activities along various business configuration dimensions in a synergistic manner (Christensen and Foss, 1997). Economic performance is therefore determined by the extent to which the existing competence can be efficiently leveraged to horizontal or vertical configuration such as different product scopes, customer scopes or vertical integrations, as well as the extent to which new competence can be effectively generated through the existing resource configuration.

However, endogenous growth theory (e.g., Penrose, 1959) highlighted that competence leveraging and competence building efforts are difficult to achieve a balance (p. 70) as there are uncertainty and risk associated with each resource utilization initiative (p. 58). It is the existence of embedded uncertainty and risk that requires the firm's managerial capabilities to cope with and therefore becomes the limit to growth. Specifically speaking, for an initiative that leverages the existing competence to different business scopes, it may face an issue that how wide the construction of horizontal configuration the existing competence can be leveraged, whereas how close the integration of vertical configuration shall be involved. On the other hand, by choosing a certain configuration change, a firm may have to build new competence to "balance" the scope of leveraging. In other words, the interplay between competence building and the scope of business configuration served becomes a critical managerial issue. Despite the critically, the extant literature of competence-based management is scant in discussing such a dynamics and its performance impact, which in turn motivates our research endeavor.

To narrow this knowledge gap, the present study undertook an empirical investigation on how a firm's competence building efforts will affect the structure of business configuration, which in turn leads to differential economic performance. To start the empirical investigation, we propose a path analytic framework encompassing these key constructs, i.e., *competence building*, *business configuration*, and *economic performance*, and suggest a series of testable hypotheses by closely following the theoretical logic of competence-based management. We choose the a broadly defined electronic hardware industry located in Taiwan as our empirical context, under which a longitudinal data pertaining to a large group of publicly listed electronics contract manufacturers over the year of 1997-2002 is collected.

This empirical context provides us a satisfactory setting for assessing the dynamics between competence building and business configurations. As highly vertically de-integrated (Bettis, Bradley, and Hamel, 1992; Yoffie, 1997), electronic hardware industry reveals a rich context of both rapid technological change and inter-firm specialization. For Taiwanese contract manufacturers participated in this industry field, they have to not only ensure constant upgrading capabilities in providing post-architecture design and time-to-cost manufacturing services, but also manage adequate leveraging of its specialization across product and customer scopes in order to enhance its competitiveness (Curry and Kenny, 1999; Sturgeon and Lee, forthcoming). Given such a hyper competitive environment and Taiwan being the global leading supply base for electronic hardware products, examining the strategic logic of resource utilization and configuration as well as performance linkages adopted by electronic contract manufacturers would provide insights for the applicability of the extant theory of competence management.

The present paper proceeds as follow. First, we provide a brief sketch and review on the theoretical background of our core research issue. Next, we will briefly explain the empirical context we have chosen, under which a conceptual framework and a series of testable hypotheses are postulated. Detailed explanations on key methodological issues, including sample selection, data

sources, measurements, analytic model are presented. Analytic results and implications sections are followed with concluding remarks at the end.

Review of Theoretical Background

From Resource to Dynamic Capabilities

Inspired by Penrose's work on the link between resources and firm growth (Penrose, 1959), the resource-based view of the firm (RBV) has been widely adopted by strategy researchers as a working framework to explain firm heterogeneity and the sustainability of competitive advantages (Amit & Schoemaker, 1993; Barney, 1986; Dierickx & Cool, 1989; Mahoney & Pandian, 1992; Peterraf, 1993; Rumelt, 1984; Wernerfelt, 1984). Commonly grounded on the premise that a firm can be regarded as a bundle of productive resources (Penrose, 1959: 24; Wernerfelt, 1994), researchers have suggested that the possession of unique resources (Barney, 1991), capabilities (Amit and Shoemaker, 1993), or core competencies (Prahalad and Hamel, 1990) as the basis for implementing value-creating strategies that are difficult to imitate and constitute the dominant course of heterogeneity and hence superior economic performance. Resources of this sort are very likely rooted in firm-specific routines (Nelson and Winter, 1982), are knowledge-based (Conner and Prahalad, 1996; Grant, 1996), and are involved the coordinated deployment of assets and capabilities (Sanchez, et al., 1996) within the interconnected activity system of the firm (Porter, 1996). Later, the development of the concept of dynamic capability (Teece et al., 1997) further extends the RBV from a static argument of resource position to a dynamic viewpoint.

From the dynamic capability perspective, a firm's extant resource configuration is regarded as an evolutionary outcome of its past experience and actions of resource accumulation. The competitive advantage of a firm hence hinges upon its capabilities to 'integrate, build and reconfigure internal and external competencies to address rapidly changing environments' (Teece, et al., 1997: 516). In their recent review on the nature of dynamic capability, Eisenhardt and Martin (2000) advance that dynamic capabilities can be functionally defined by strategic and organizational routines and can also

be used to either enhance existing or build new resource configurations in the pursuit of competitive advantages (p. 1106). Based on these insights, it becomes clear that a firm's dynamic capabilities and eventual resource configurations can be analyzed by capturing how the firm manages its competence building and competence leveraging activities (Christensen and Foss, 1997; Collis and Montgomery, 1997; Hamel and Prahalad, 1993; Penrose, 1959; Sanchez and Thomas, 1996).

Competence-based Management

Competence building refers to the *qualitative* changes of a firm's resource configurations and can be achieved by either developing internally or acquiring externally (Sanchez, et al., 1996). As Penrose emphasized, expansion through upgrading existing resource profiles can be realized by acquiring physically describable resources from the market, accumulating knowledge through using existing physical resources, or gaining from reciprocal exchanges with the external world (1959, pp. 78-79). The effectiveness of such qualitative changes is contingent upon not only a firm's entrepreneurial efforts and organizational learning capabilities but also on the ways in which a firm generates dynamic complementarities between value activities (Christensen and Foss, 1997, pp. 289).

Specifically, competence building presents firm's ability to supply innovative product with smooth process. Further, it consists of the ability to develop new products so called product competence, and the ability to upgrade conversion process so called process competence. Moreover, to build these competencies, firms need to make capital investment which will be deployed to research and development, and be used for upgrading manufacturing facilities and equipments (Maritan, 2001).

In addition to building competence, a firm has to establish ways for leveraging existing stocks of assets and capabilities (Hamel and Prahalad, 1993) in order to remain competitive and achieve continuous growth. Formally put, competence leveraging refers to a firm's efforts in applying its existing competence, created from previous upgrading actions, to current or new market opportunities in ways that require *quantitative* changes in the firm's assets or capabilities (Sanchez, et al., 1996: 8).

Penrose regarded competence leveraging as the "balance of processes" in the utilization of resources (1959, p. 68). Indeed, opportunities for leveraging competence are attributable to the existence of resource indivisibility, or simply the realization of economies of scope or static synergy (Teece, 1982; Christensen and Foss, 1997).

Competence building and competence leveraging are by no means independent of each other. In searching for sustainable growth, a firm, on one hand, exerts explorative efforts in creating new resources aimed at building the foundation for specialization that leads to further exploitative initiatives through expanding the utilization of existing specialization (Christensen and Foss, 1997; March, 1991). On the other hand, the process of leveraging from the existing resource portfolio may accompany learning opportunities for further resource renewal. Hence, the optimal growth becomes "a matter of finding the optimal trade-off between exploiting resources in present uses and using them for developing new resources" (Christensen and Foss, 1997, p. 294). Penrose (1959) referred to this interaction as the jig-saw puzzle of resource management and suggested that a virtuous cycle "in which specialization leads to higher common multiplies, higher multiplies to greater specialization" (p. 73) leads firms in their pursuit of growth.

Embedded Uncertainty and Risk during Reconfiguration

Perceiving firm as a repository of productive resources, Penrose (1959) portrays that a firm's growth will be driven by the entrepreneur's heterogeneous initiative of utilizing excess resources in productive opportunities that are beyond the existing firm boundary (p. 32). She especially highlighted that the realization of endogenous growth critically depends upon the firm's cognitive judgment of the opportunities (i.e., entrepreneurial versatility) as well as willingness (i.e., entrepreneurial ambition) and managerial capabilities to exploit them (Penrose, 1959, p. 35-42). Of great influence on a firm's judgment on productive opportunities is the uncertainty and risk associated with the firm's boundary expansion decisions. It is the existence of the embedded uncertainty and risk of resource utilization that will require managerial efforts to cope with before it becomes a limit to growth (Ghoshal, Mahn, and Moran., 2000; Penrose, 1959). In other words, the processes of

resource reconfiguration involve certain uncertainty and risk, which can greatly influence decisions concerning the boundaries of the firm (Sanchez, 2000), and requires the development of managerial coping skills (Penrose, 1959, p. 58) and applying flexibility (Volberda, 1996) for growth demands.

Hypotheses Development in Empirical Context

So far, we have elucidated that the essence of sustainable competitive advantages can be understood as a firm's abilities in managing value creation processes involving both leveraging existing and building new competencies (Christensen and Foss, 1997, Collis and Montgomery, 1995, 1998) in a synergistic manner, the realization of which processes involves different degrees of uncertainty and risk that require managerial efforts with flexibility or efficiency to adjust. Based on this conceptualization, we will commence empirical processes to investigate how a firm's competence building efforts will affect the extent of leveraging across product and customer configurations, hence shaping its economic performance. Before introducing a working framework for empirical testing, we will briefly elaborate the industry context to facilitate subsequent conversation.

Industry Context

As mentioned earlier, we choose Taiwanese electronic contract manufacturers of a broadly defined electronic hardware industry as the context of empirical exploration. The emergence of this industry sector can be attributed to the rising global outsourcing activities. In response to increasing competitive pressure in the early 80s, the outsourcing of components, parts or even entire systems for manufacturing by reliable, low-cost Asian suppliers has become part of the competitive strategies used by Western firms in industries ranging from consumer electronics, computers, automobiles, textiles, and industrial machines (Bettis, et al., 1992; Kotabe, 1990; Lei and Slocum, 1992; Ohmae, 1989; Quinn, 1992). Such international cooperative relationships, based on inter-firm specialization, enhance both the outsourcing firm's operating flexibility and competitive position. Intensively adopting industrial outsourcing is even more crucial to a firm's global competitiveness in horizontally configured industries (Yoffie, 1997: 17), where fast technological progress and increasing scale

economies lead to a greater degree of specialization in each stage of the value chain, as evidenced by the evolution of the global computer industry.

The adoption of global outsourcing practices by branded companies (e.g., Dell, Compaq, and IBM) and increasing commoditization along the disaggregated but specialized industry value chain, however, trigger both severe price competitions and rapid technological and product change in the end market (Curry and Kenny, 1999). Competing in such a high-velocity industry context requires a contract manufacturer to keep up with world-class design, manufacturing, and service capabilities while remaining cost competitive. Even more challenging to a contract manufacturer is the uncertainty of supply relationship. Unlike the long-term or quasi-integrated supply relationships found between suppliers and assemblers in the automobile industry (e.g., Dyer, 2000; Hemmert, 1999), the buyer-supply relationships in the computer industry are more likely to be recurrent, using Hemmart's (1999: 493) typologies of vertical industrial relations. In other words, whereas the continuity of supply contract may be high, the costs of switching suppliers are low and the buyer tends to unilaterally define the content of transactions. Depending upon the supplier's capability levels and bargaining power, some supply linkages can be regard as interdependent ones, where buyer's switching costs are relatively high and a bilateral governance mode exists (Lee and Chen, 2000). However, it is common for major brand computer companies to establish parallel sourcing policies across different types and levels of products (Dedrick and Kraener, 1998: 149). All these constitute formidable managerial challenges to contract manufacturers and require these firms to develop a certain kind of dynamic capability in order to survive and be successful.

Along the theoretical framework illustrated earlier and considering the nature of competition in this industry context, we submit an analytic framework encompassing three building blocks; they are *competence building efforts*, *business configurations*, and *economic performance*, respectively. The proposed relation basically follows the theoretical notion that dynamic capabilities leading to superior performance is a function of a firm's abilities in building firm-specific value-creating routines and

leveraging them into key business dimensions. We will then discuss each building block within the empirical context and postulate a series of testable hypotheses for further empirical operations.

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Competence Building and Business Configurations

The link between competence building and business configuration has been clearly pinpointed by the literature of competence-based management (e.g., Foss, 1996; Sanchez, Heene, and Thomas, 1996) and dynamic capabilities (e.g., Teece, et al., 1997). A firm has to build competence through investing in firm-specific assets while to leverage the existing assets to different business scopes. The effectiveness of competence leveraging critically depends upon the extent and types of scope choice. Within the context of electronics contract manufacturing, we could identify three business scope choices for competence leveraging. First of all, companies could choose to leverage the existing competence to different product categories. For example, a notebook computer manufacturer could leverage its hardware system design and assembly manufacturing competence to design and manufacture personal digital assistance (PDA). Both products require miniaturization design and large-scale assembly capabilities so that synergistic value creation could achieve. As such, the extent of product scopes, be it diversified or concentrated, becomes a critical parameter of business configuration to observe.

Second, for contractual supply business, different degrees of customer concentration reflect the extent of the manufacturer's reliance upon a certain numbers of branded buyers. It's too reliable with the limited customers to increase bargaining power for suppliers, and influence the profitability. Thus, a contract manufacturer could choose the extent of contractual customer scope, be it diversified or concentrated, becomes a critical parameter of business configuration to observe. Third, in the context of electronics contract manufacturing, price and quality advantage are only serving basic

requirements for competition, whereas quick response through vertical integration become a vital point for value creation. Hence, the extent that a contract manufacturer engages in vertical integration is another parameter of business configuration to observe.

Together, a firm's business configuration encompasses both horizontal and vertical dimensions: the horizontal dimension indicates the scope of products and customers in which the focal firm serves, while the vertical dimension refers to the scope of the vertical chain in which the focal firm is involved. Therefore, we have identified three configuration choices including horizontal and vertical dimensions, i.e., *product scope diversity*, *customer scope diversity, and vertical integration*, the extent of which a contract manufacturer has to decide before leveraging its existing competence.

A contract manufacturer will invest in product competence to constantly bring in new kinds of assets and capabilities. With product competence, the firm could qualitatively improve the effectiveness in product design and development activities to create diversified products and innovation. Consequently, the firm could carry out design proliferation based on product modularization capabilities in the contract manufacturing context (Baldwin and Clark, 1997; Scanchez, 1996). By utilization of product modularization capabilities, a contract manufacturer can meet buyers' differential needs in product features while incurring minimal incremental costs, a kind of value-adding manufacturing service or vertical integration that becomes a source of competitive advantage. Besides, as we mentioned earlier, these decisions, however, face different degree of uncertainty and risk, which makes trade-off considerations necessary. With over concentrations in product or customer scope, firms face the lock-in risk and hold-up uncertainty due to high level of specialization in certain products and much reliance to certain customers. Therefore, by developing new products and further attracting new customer to broaden horizontal business configuration with leveraging product competence, firms reduce the lock-in risk or hold-up uncertainty, increase strategic flexibility from diversified scope, and coordinate the flexible efforts into vertical integration (Richardson, 1996). Therefore, we could establish the following hypothesis:

Hypothesis 1: The level of product competence building efforts will be positively associated with a diversified product scope.

Hypothesis 2: The level of product competence building efforts will be positively associated with a diversified customer scope.

Hypothesis 3: The level of product competence building efforts will be positively associated with the effectiveness of a vertical integration.

Furthermore, a contract manufacturer will also invest in process competence to constantly bring in new kinds of assets and capabilities. Process competence refers to those capabilities that are related to improving a supplier's manufacturing efficiency. Investments of this sort competence could include expanding capacity, further reduction in production costs with concentrated business scope. Hence, it would generate conflicts in the choice of business configurations from process and product competence building. Although an expanded business scope configuration may be beneficial from the standpoint of product competence leveraging, there are some drawbacks of diversifications respect to specialization. First, a diversified business scope may exert further uncertainties for decreasing efficiency due to further investments in co-specialized, complementary assets, heterogeneous pace of technological changes, the requirement for a high variety of output, or differential learning paths between products and customers. In addition, characterized by a high degree of inter-firm specialization and division of labor, the returns to diversification would be lower than competence specialization. Hence, for improving the efficiency, firms devote to enhance the capacity through the process competence building. In other words, the inefficiency uncertainties due to high business scope variety and vertical configurations may limit the existing process competence on one hand, and, on the other hand, firms execute the process competence building efforts for concentrated reconfiguration, which is unfavorable for vertical integration. Therefore, we could establish the following hypothesis:

Hypothesis 4: The level of process competence building efforts will be negatively associated with a diversified product scope.

Hypothesis 5: The level of process competence building efforts will be negatively associated with a diversified customer scope.

Hypothesis 6: The level of process competence building efforts will be negatively associated with the effectiveness of vertical integration.

Interactions among Dimensions of Business Configuration

To highlight the interactive nature between business configurations, Penrose (1959: 73) referred to these activities as the jigsaw puzzle of resource management and suggested that a virtuous cycle in which specialization leads to higher common multiples, higher multiplies to greater specialization leads firms in their pursuit of growth. The optimal growth becomes a matter of finding the optimal trade-off between configuration changes. Hence, on the one hand, constant competence building will change the business configurations over time, and, on the other hand, the elements and constructs of the configurations will also interact with each other in order to pursue the best fitness and balance for growth.

Product scope diversity versus customer scope diversity. Since OEM customers will chose the optimal suppliers based on the criteria such as capacities, manufacturing abilities, innovation, etc. (Dyer, 1996; Liu, Ding, & Lall, 2000), and promise their qualified suppliers the outsource activities for future, manufacturers have to develop and build the product competencies, and then reconfigure the diversified productive activities for the requirements of contractual customers. Nonetheless, a risk will reveal by concerning the problem of high variety of demand from higher diversification of product scope, if the manufacturer cannot or will not expand the customer base. Additionally, since the firm distributes its diversified products in the market, the manufacturer's competence of design, development and manufacturing may be revealed to prospective buyers who are searching for a qualified value-adding contract manufacturer (Lee *et al.*, 2005). In other word, wide product scope may signal the manufacturer's product related capabilities, which may bring in new subcontracting

business and broaden the customer base, and will diversify the contractual customer scope to reduce the uncertainty from high variety and demands.

Hypothesis 7: The degree of product scope diversity will be positively associated with the degree of customer scope diversity.

Customer scope diversity versus vertical integration. As mentioned early, a wider customer scope reduces the risk of the potential hold-up, but increase the uncertainty due to high demand for diversity and integrative effectiveness. Since, vertical scope presents the integrative effectiveness of the strategic flexibility among wider business scope, and firms can adopt the vertical integration to decrease the uncertainty from diversity. Despite of integrating vertical configuration for displaying the flexibility, a firm can further enhance the advantage and gain the profit from the vertical extension of contractual businesses, on the other hand. Because by working closely with multiple customers, analyzing each customer's needs and providing various products and services, firms are able to extend the service scope beyond manufacturing activities by integrating the value creation process into vertical scope.

Hypothesis 8: The degree of customer scope diversity will be positively associated with the effectiveness of vertical integration.

Vertical integration versus product scope diversity. The development of vertical scope integrates the strategic flexibility among wider business scope into value creation. In other words, vertical configuration will push strategic flexibility, generating from the strategic initiatives such as diversification or the creation of new products, ahead. Moreover, for close vertical integration, firms have to go along the task of product diversity. Therefore, we could establish the following hypothesis:

Hypothesis 9: The effectiveness of vertical integration will be positively associated with the degree of product scope diversity.

Business Configurations and Economic Performance

Business configurations perform the basic functional activities of the firm with assuming the

capabilities and competencies improvement for better performance (Grant, 1991; Stalk et al., 1992; Amit & Shoemaker, 1993; Treacy & Wiersema; 1993; Hayes & Pisano, 1994). And, these configurations sequentially generate product, process and service output with a value greater than the input. Simply put, better economic performance results from economies of scale (Porter, 1996) and scope (Cottrell & Nault, 2004) yielded by product and business configurations.

Product scope diversity versus economic performance. Product scope diversity presents the breadth of product mix. However, the more diversified the product mix, the more difficult to achieve economies of scale for each product. Following the concept of economies of scale, firms cannot sustain the cost advantage in the competitive market by producing various products with small capacity to the customers. In other words, firms cannot leverage the inherent resources and capabilities for achieve higher efficiency except to mass production for scale economies. By the same token, characterized by a high degree of inter-firm specialization and division of labor, the returns to specialization would be higher than the diversification. Therefore, we could establish the following hypothesis:

Hypothesis 10: The degree of product scope diversity will be negatively associated with the focal manufacturer's economic performance.

Customer scope diversity versus economic performance. Great concentration on contractual customer scope shows that a firm highly focuses on developing and dealing with the limited customers. While a firm gets close to the major buyers under concentrated customer configuration, a firm will profoundly depend on the limited partners. However overly depending on several customers, and merely providing manufacturing capacity based on its capabilities of operational efficiency (Frazier et al., 1988; Heide & John, 1990; Nishiguchi, 1994), a firm may decrease its operating margin and performance. Contrary to concentration on several limited customers, a wider customer scope could not only decrease the risk of hold-up from incremental flexibility, but also enhance the bargaining power to raise the operating margin for better economic returns. Therefore, we could

establish the following hypothesis:

Hypothesis 11: The degree of customer scope diversity will be positively associated with the focal manufacturer's economic performance.

Vertical integration versus economic performance. To enhance its performance, a capable contract manufacturer will extend its service scope beyond manufacturing activities into its vertical configuration. Through leveraging existing competence to stretch the vertical business scope, a manufacturer will likely to generate significant synergies in strategic flexibility, scope economies, and signaling for superior competence, thus yielding greater profitability. The higher profit margin obtained from a vertical integration will be able elevate the overall profitability level of the manufacturer compared with those firms concentrating full capacity on subcontracting service. Furthermore, through develop vertical configuration, firms have more learning opportunities from frequent contact with diversified customers, and can develop more attractive products and imperative services to them and, thus, increase profitability. Therefore, we could establish the following hypothesis:

Hypothesis 12: The level of engagement of vertical integration will be positively associated with the focal manufacturer's economic performance.

Competence Building and Economic Performance

A contract manufacturer will invest in product and process competence to constantly bring in new kinds of assets and capabilities. As mentioned, product competence refers to those capabilities that are related to qualitatively improving a supplier's effectiveness in product design and development activities. Whereas the supplier is mainly responsible for managing the post-architecture designs or product development leading toward better manufacturing performance, on of the key product competencies is to be able to carry out design proliferation based on product modularization capabilities (Baldwin and Clark, 1997; Scanchez, 1996). With product modularization capabilities, a contract manufacturer can meet buyers' differential needs

in product features while incurring minimal incremental costs, a kind of value-adding manufacturing service that becomes a source of competitive advantage. As far as process competence is concerned, it refers to those capabilities that are related to improving a supplier's manufacturing efficiency. Investments of this sort could include expanding capacity by adding more machines, further reduction in production costs by adopting new process equipments, or migrating manufacturing technology to a new level by adding new sets of assets. As these new resource configurations will enhance the contract manufacturer's ability to provide value-adding services, economic returns should justify the investment. As such, we can establish the following hypotheses:

Hypothesis 13: The investment of the product competence will be positively associated with the focal manufacturer's economic performance.

Hypothesis 14: The investment of the process competence will be positively associated with the focal manufacturer's economic performance.

Methodology

Data Sources and Sample Selection

The sample companies selected for our empirical study were chosen from the publicly offering companies listed in the Electronics and Information Technology (EIT) category in Taiwan Stock Exchange (TSE) and R.O.C Over-the-Counter Securities Exchange (ROSE). As the present empirical investigation require a disclosure of firm-level operating and financial information form the sample companies, our choice of publicly listed companies could ensure not only the availability of the required data over the sampling period from 1997-2002, but also the accuracy and integrity of the required data, especially almost all these sampled companies are audited by globally renowned accounting firms. The financial data from each sampled firm was retrieved from *Taiwan New Economic Journal*, a database containing all the financial information reported to TSE and ROSE. In addition, we drew information from the company's annual reports and official announcements for collecting the sample company's buyer structure.

To avoid confounding effect due to the heterogeneity of industry sectors, we chose those contract manufacturers mainly involving in producing electronic hardware products and excluding software, services, telecommunication, consumer electronics, optoelectronics and channel companies. In addition, we excluded those companies involving in financial crisis during the period of investigation. The final sample set contains 126 manufacturers with completed operation information for six years. As far as sample representation is concerned, the sample set covers all sectors of broadly defined IT industries in Taiwan, including sub-sectors of electronics components (71 companies), computer system products (10 companies), boards (14 companies), semiconductors (10 companies), and peripherals (21 companies).

Variables and Measurements

Based on the conceptual framework shown in Figure 1, we will detail the measurements for respective constructs in the following paragraphs and summarize them in Table1.

Product Competence Building. We adopt *research and development ratio* (RDR) to capture a firm's product competence building efforts. For the research and development ratio, we calculate the amount of a firm's research and development expenditures as a percentage of its total sales revenue, as a proxy to measure the company's product competence building efforts (e.g., Griliches, 1998; Hambrick & MacMillan, 1995; Lee, Chen, & Tang, 2001). The measurement is resource input, to consider the lagged effect of the variable, we used a prior year measurement (*t-1*) to evaluate the construct of competence building efforts made by the sample firm.

Process Competence Building. We adopt *equipment investment ratio* (EIR) to capture a firm's process competence building efforts. For equipment investment ratio, we calculate the sample company's net production equipment cost divided by the total amount of fixed assets during the year of investigation, as a proxy to measure the company's process competence building efforts.

Product Scope Diversity. To evaluate the degree of sales diversification of a contract manufacturer over the range of product items it serves, we set a variable of *product scope diversity* (PDIV), constructed by calculating the numerator which be leaved from one minus the summation of the square of sales percentage of each principal product out of the total revenue. This measure reflects both the extent and distribution of the supplier's product scope.

Customer Scope Diversity. To evaluate the degree of sales dependence of a contract manufacturer on its buyers, we set a variable of *customer scope diversity* (CDIV), constructed by calculating the numerator which be leaved from one minus the summation of the square sales percentage of each principal external customer that share 10% or more of the consolidated revenue of the company. This measure reflects both the extent and distribution of the supplier's external customer scope.

Vertical Integration. We adopt *Value-Added Degree* (VAD), constructed by calculating the amount of deducting the overhead and cost of material from sales revenue and then divided by sales revenue to capture the effectiveness of vertical integration due to the firm's vertical scope development.

Economic Performance. We adopt *returns on invested capital (ROIC)* suggested by Copeland, Koller and Murrin (1995) as the measure to economic performance. The advantages of taking use of ROIC as performance measure in the research are two fold. First, as our conceptual model is developed based on competence-based management, the performance measure shall reflect its economic returns, rather than accounting returns. ROIC does not only consider accounting net income but also take all invested capital of company into performance evaluation. Therefore, it's helpful to evaluate the strategic priority based on the effectiveness. Second, ROIC is positively associated with the level of free cash flow, which leads to the value of the company (Copeland *et al.*, 1995). The implication of ROIC to the value of the company therefore could further extend our inference to the value impact of a firm's dynamic capability.

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Structural Equation Model

To test the hypothesized relationships in our research framework, we employed the structural equation modeling approach (SEM; Arbuckle, 1999; Arbuckle & Wothke, 1999; Byrne, 2001) with the help of AMOS (analysis of moment structure) software. Especially, the SEM is appropriate for analyzing the panel model because it permits complex analysis of synchronous and lagged effects (Choo & Tan, 2004). Besides, Byrne (2001) elaborates SEM as a statistical methodology that takes a confirmatory (i.e., hypothesis-testing) approach to the analysis of a structural theory bearing on some phenomenon. Typically, this theory represents causal processes that generate observations on multiple variables (Bentler, 1988). The term structural equation modeling conveys two important aspects of the procedure: first, that the causal processes under study are represented by a series of structural (i.e., regression) equations, and, second, that these structural relations can be modeled pictorially to enable a clearer conceptualization of the theory under study (Byrne, 2001). Practically, the SEM consists of two parts - the structural model and the measurement model. The structural model specifies the relationship of each construct, and the measurement model considers the adequacy of the measures used for theoretical constructs employed in the study. On the other hand, **AMOS** provides a chi-square value and the indices that assess the fit of path model such as the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the confirmatory fit index（CFI） (Bagozzi & Yi, 1988; Bentler & Bonnet, 1980), and the root mean square error of approximation (RMSEA) (Steiger 1990) for testing the model fit, and also uses path analysis to analyze hypothesized relationships, calculating parameter estimates and standard errors that can be used to test statistical significance.

For defining model fit, non-significance of a chi-square test suggests a good fit, indicating that the covariance matrix of the specified model is not significantly different from the sample covariance matrix. In addition to chi-square test, alternative fit indices, goodness of fit, have been employed (Hu & Bentler, 1995). Because there is no consensus on a single or a set of measures to assess fit (Maruyana 1998), it is a standard practice to report several measures which we will report

goodness-of-fit index (GFI), the confirmatory fit index（CFI）(Bentler & Bonnet 1980), adjusted goodness-of-fit index (AGFI) (Bagozzi & Yi, 1988), and the root mean square error of approximation (RMSEA) (Steiger 1990).

Analytical Results

Table 2 shows summary statistics and correlation among the variables. As evidenced by these statistics, these contract manufacturers reached an average of 10.34% on ROIC, ranging from 43.47% to –34.63% (standard deviation is 8.62%), which reflected a significant degree of firm's heterogeneity with this sample set. These firms averagely invested 2.55% out of their revenue in R&D activities, and 18.10% of incremental equipment expenditure were increased annually. The average sales proportion from major buyers was around 90%, reflecting a high degree of diversity on providing subcontracting services to external buyers. And, the average sales proportion from principal products was around 40%, reflecting a neutral degree of diversity on providing products. Besides, the average value-added level of these manufacturers was over 39%. All variables seem to have a sound distribution between extreme values and our examination of the correlation for all the explanatory are used, thus the occurrence of multicollinarity is unlikely.

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Insert Table 2 About Here

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Path Analysis Results

Working with observed variables, we proceeded to model test directly. The model that was tested examined all of our proposed hypothesized relationships. The various goodness-of-fit indices, as Table 3, are suggested a good fit (Chi-square = 0.475 with P-value = 0.491, GFI = 1, AGFI= 0.996, CFI = 1, RMSEA = 0.000). Firstly, the non-significance of a chi-square test suggests a good fit. And the value higher than 0.90 for GFI and CFI indicate a good fit (Gefen and Straub, 2000), while AGFI values higher than 0.80 suggest a good fit of the hypothesized model with a null model. For RMSEA, the value equaling to zero also indicates perfect fit (Browne & Cudeck, 1993).

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Insert Figure 2 and Table 3 About Here

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With the well research model fit, the path analysis also provided to test all of the study's hypotheses. Table 3 presents the path analysis result and the indices of fit, and Figure 2 reports parameter estimates from the analysis of this model. The results provide support the three hypotheses, H1, H2 and H3, regarding the relation between product competence and business configurations. Supporting Hypothesis 1 (H1: $\beta = 1.171$, $p = 0.000$), product competence building exerts a positive influence on the extent of product scope diversity. With regarding to the argument for the positive effects of product competence building on the diversification of contractual customer, the analytic result confirms Hypothesis 2 (H2: $\beta = 0.434$, $p = 0.011$), and we find out that the results suggest that more input of product competence building are resulting in significantly higher diversity on customer scope. Besides, the results suggest a positive relationship between product competence building and the business vertical configuration as proposed by Hypothesis 3 (H3: $\beta = 1.126$, $p = 0.000$). Overall, with more investment in product competence building, a firm enhances its capabilities and flexibility, and leverages into its business horizontal and vertical reconfigurations.

The results provide partly support the hypotheses regarding the relation between process competence and business configurations. Although depending on the path analytic results, Hypothesis 4 (H4: $\beta = 0.008$, $p = 0.832$) and Hypothesis 5 (H5: $\beta = 0.001$, $p = 0.956$) do not be supported. The results suggest a negative relationship between process competence building and the business vertical configuration as proposed by Hypothesis 6 (H6: $\beta = -0.144$, $p = 0.000$).

For testing the interplay among proposed three business configurations, the path analytic results provide support for our hypotheses – H7, H8 and H9. Firstly, the positive influence of product scope diversity on customer scope diversity does suggest to confirming Hypothesis 7 (H7: $\beta = 0.079$, $p = 0.000$). Secondly, the customer scope diversity has positive influence on the vertical configuration,

confirming Hypothesis 8 (H8: β = 0.221, p = 0.001). Additionally, analyses also found that higher effectiveness of the vertical integration are positively associated with higher level of diversification of product scope, thus supporting Hypothesis 9 (H9: β = 0.143, p = 0.000). In short, such shows the evolution of business configurations changes that will influence each other to adjust sequentially.

With regarding to comprehending the relation between business configuration and focal firm's economic performance, we proposed three hypotheses – H10, H11 and H12. Overall, the results provide partly supports for the research hypotheses, according to which product scope diversity and customer scope diversity have no significant effect on focal firm's economic performance (H10: β = -0.001, p = 0.965; H11: β = -0.040, p = 0.101), while the vertical configuration has directly influence on firm's economic performance (H12: β = 0.054, p = 0.000).

Besides, for testing the relation between the investment of competence building and focal firm's economic performance, we proposed two hypotheses, H13 and H14, which are partly supported. According to the result, the investment of product competence building has no significant effect on focal firm's economic performance (H13: β = -0.034, p = 0.770). But the investment of process competence building has positive and significant effect on firm's economic performance (H14: β = 0.095, p = 0.000).

Discussions

Employing the conceptualization of firm's expansion growth through the delicate investment of competence building and business reconfigurations, the preceding empirical investigation seems to provide both implications for research in dynamic capability perspective and insights for explaining the heterogeneity of manufacturer's performance.

First of all, while theory suggested that competence building and business configurations are vital to the expansion growth of the firm, in the context of Taiwan contractual manufacturers, we find

out that competence building are essential to business configurations. A high level of investments in product competence building efforts, such as the investments of research and development, play an important role with leveraging competences into wider business configurations for horizontal expansion and vertical integration. A series of consistent results, supporting H1, H2 and H3, also clearly shows that such direct influences from product competence building to wider business configuration changes have profound needs on catching strategic flexibility.

Second, firms have to create strategic flexibility to spread the risk through diversified reconfiguration by leveraging the product competence building efforts into diversified and vertical scope, but firms face the problem of reduction of efficiency from over diversification. Hence, by considering the adjustment of excessive diversification, we could indicate that a high level of investments in process competence building efforts, such as new equipment investments, play an key role with leveraging competences into narrow business configurations for pursuing efficiency which will impede the firm's horizontal expansion and vertical integration activities in turn. A consistent and significant result from the proofing H6 could partially inference that negative influences from process competence building efforts on vertical configuration changes, and could point out that counterbalance on strategic flexibility. In short, firms have to make trade-off between strategic flexibility and operating efficiency, while they decide the priority of competence building efforts.

Focusing on the interplay among three business configurations, additionally, the present results from the proof of H7, H8 and H9 show that the product scope diversity has positive influences on customer scope diversity, the customer scope diversity has positive effect on firm's vertical integration, and then the effectiveness of vertical integration has the positive influence on product scope diversity. On the other hand, the empirical results also reveal the intriguing relations between the three business configurations, and one commonality, in pursuit of flexibility. Given anything be equally, under high-level diversity of product scope, firms may create new customers and decrease the dependency to contractual customers, but with diversified customer scope they may increase the

demand for the product deployment. Only by the increment of vertical integration, firms could converge the advantage of flexibility from wider business scope in product and customer into value creation. In other words, a firm has to evolve the configuration changes in pursuit of strategic flexibility, and simultaneously develops the horizontal and vertical configuration to initiate the added value for economic return.

Although the empirical results of the effect of business configuration and competence building on economic performance are not completely supporting the hypotheses (from H10 to H14), we could figure out the discrepancy from the specific intention and major purpose of each dimension. While product competence building efforts intend for strategic flexibility from wide business scope, process competence building efforts intend for operating efficiency. The firms can gain the immediate economic return by improving process efficiency, but need to spend a long time in integrating flexible effectiveness into value creation process. That's to say the major purpose of strategic flexibility from wide business scope is focus on the instant spread of risk and uncertainty stemming from concentrative activities, not on the pursuit of return in short term, yet will appear superior performance through value-added integration in long term. On the contrary, the major purpose of operating efficiency from narrow business scope is focus on the maximization of efficiency for better returns as soon as possible, not on the pursuit of reduction of risk and uncertainty in short term. Although there are not significant evidence for supporting H10, H11 and H13, the strongly significant results of proofing H12 and H14 could verify the point that different competence building efforts will influence the configuration changes into distinct economic outcomes now and future.

In addition to hypothetic discussion, our choice of competence building efforts of the prior year potentially confirms the lagged effect of competence building in the context of contract manufacturing. Similar to the recent research indications (Celly, Spekman, & Kamauff, 1999; Gulati, Khanna, & Nohria, 1994; Lee, Chen, & Tang, 2001), this present evidence also indicates the necessity for a contract manufacturer to constantly invest and upgrade its competence to future business growth.

Conclusions and Future Research

The present paper on the firm's performance link of contract manufacturers in the electronic hardware industry characterized by rapid technological change and time-based competition provides us an opportunity to functionally decompose the essence of dynamic capabilities (Teece et al., 1997; Eisenhardt & Martin, 2000) based on the competence-based management (Collis & Montgomery, 1997; Penrose, 1959; Sanchez et al., 1996). Different from the traditional perspective of OEM suppliers, who is mainly providing manufacturing capacity at competitive cost position, the contract electronic manufacturers in the computer industry globally through making competence investment and business reconfigurations will conduct in an optimal way. Constantly upgrading their competence and building effort proves to be essential for their reconfigurations and vital to their performance.

Depending upon the trade off of business configurations for strategic flexibility or operating efficiency, managing a balanced business scope to pursue superior performance constitutes an important piece of the jigsaw puzzle of dynamic capabilities. Concurring with Penrose's notion (1959) of balanced growth, our research implies that not only by combining efforts of competence building to business reconfigurations but with leveraging existing competence can a contract manufacturer pursue the optimal productive opportunities that its resources can render and create a self-reinforcing cycle for sustainable growth.

The present paper contains several deficiencies due to exploratory nature of the research design and the limitations of some measurements. First of all, our use of research and development ratio (RDR) and equipment investment ratio (EIR) as the key measurement for a contractual manufacturer's effort in building competence may tend to underestimate the difficulty and complexity of a resource renewal process. Future research could consider the other input factors of capability, such as marketing capability, to be more exploratory.

Secondly, the present elaborates that firms expand and stretch the business scope for pursuit of strategic flexibility and reduction of risk. Therefore, future research may include the construct about the dimension of the flexibility or risk for further verifying the inference from current study.

Thirdly, the current research may suffer all limitations associated with single country and single industry analysis. As outsourcing is a dominant mode of operation in many industries, such as shoemaking and clothing, future research can expand our conceptualization to other industries. Watching closely at industry heterogeneity may provide more insights regarding different styles of dynamic capability development within the context of industry supply chains and may render more verification for the logic of business growth presented in this study. Furthermore, future research that applies the logic of present study may prove to be fruitful in identifying both opportunities and limitations for competence building and business reconfigurations, which will provide a significant implication for a firm’s growth strategy.

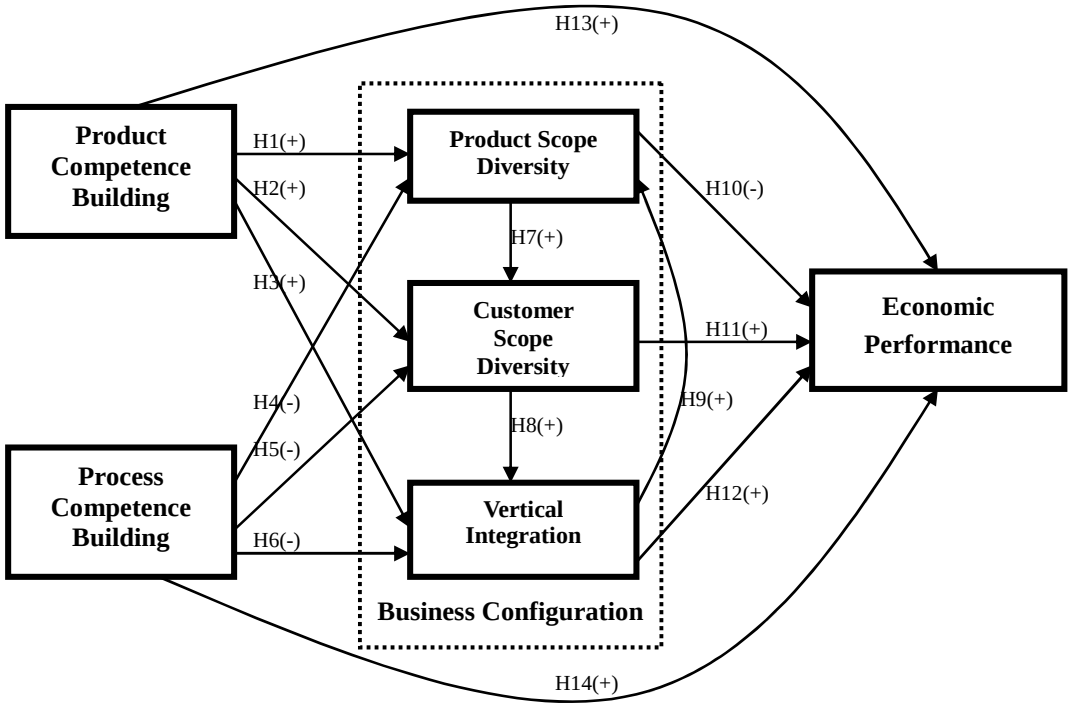

Figure 1: Conceptual Framework

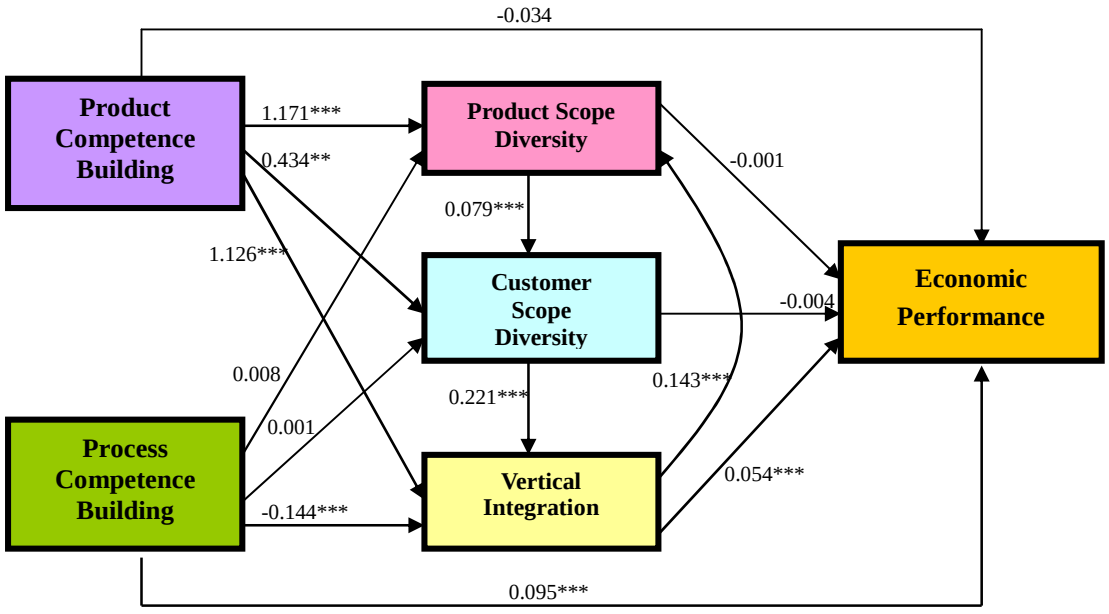

Figure 2: Path Analysis Results [a]

[a] Standardized estimates of the path coefficients are shown.

*p < 0.05，** p <0.01，*** p <0.001

Table 1

Variables and Measurements

Construct	Variable	Description
Competence Building	***Product Competence Building*** $_{i,t}$	**RDR** $_{i,t-1}$ = R&D Expenditure $_{i,t-1}$ / Total Sales Revenue $_{i,t-1}$
	Process Competence Building $_{i,t}$	**EIR** $_{i,t}$ = (Machinery equipment $_{i,t}$ - Machinery equipment $_{i,t-1}$) / Machinery equipment $_{i,t}$×100%
Business Configuration	***Product Scope Diversity*** $_{i,t}$	**PDIV** $_{i,t}$ = 1－∑(P $_{i,t}$ / Total Sales Revenue $_{i,t}$) ^{2} Where as P $_{i,t}$ refers to the announced sales of i product in t year
	Customer Scope Diversity $_{i,t}$	**CDIV** $_{i,t}$ = 1－∑(C $_{i,,t}$ / Total Sales Revenue $_{i,t}$) ^{2} Where as C $_{i,t}$ refers to the announced sales of i customer higher than 10% in t year
	Vertical Integration $_{i,t}$	**VAD** $_{i,t}$ = (Total Sales Revenue $_{i,t}$ – Overhead $_{i,t}$ – Material cost $_{i,t}$)/ Total Sales Revenue $_{i,t}$
Economic Performance	***Returns on Invested Capital*** $_t$	**ROIC** $_{i,t}$ =（Net Profit $_{i,t}$ Before Interest and Tax+ Depreciation $_{i,t}$ - Non-operating Income $_{i,t}$）/（Total Asset $_{i,t}$ - Else Asset $_{i,t}$ – Long Term Investment $_{i,t}$）×100%

Table 2

Correlations Matrix and Descriptive Statistics for Construct [a]

Variable	Mean	Standard Deviation	ROIC	RDR	EIR	VAD	CDIV	PDIV
Returns on invested Capital(ROIC)	0.103	0.086	1.000					
Research and development ratio (RDR)	0.025	0.026	0.009	1.000				
Equipment investment ratio (EIR)	0.181	0.236	0.238**	0.025	1.000			
Value-Added degree (VAD)	0.390	0.229	0.095**	0.140**	- 0.145**	1.000		
Customer scope diversity (CDIV)	0.901	0.126	- 0.038	0.114**	0.003	0.155**	1.000	
Product scope diversity (PDIV)	0.418	0.235	0.009	0.152**	- 0.009	0.174**	0.178**	1.000

[a] Standardized estimates of the coefficients are shown and based on 6 year average (1997-2002).

N = 756 (126 × 6)

*p<0.05；**p<0.01；***p<0.001; all tests are two-tailed.

Table 3

Standardized Regression Coefficients for Path Estimates

Hypothesis	Path Relations	β	S.E.	C.R.	*p*-Value
Hypothesis 1	Product Competence Building → Product Scope Diversity	1.171***	0.319	3.667	0.000
Hypothesis 2	Product Competence Building → Customer Scope Diversity	0.434**	0.172	2.529	0.011
Hypothesis 3	Product Competence Building → Vertical Integration	1.126***	0.308	3.657	0.000
Hypothesis 4	Process Competence Building → Product Scope Diversity	0.008	0.036	0.212	0.832
Hypothesis 5	Process Competence Building → Customer Scope Diversity	0.001	0.019	0.055	0.956
Hypothesis 6	Process Competence Building → Vertical Integration	-0.144***	0.034	- 4.202	0.000
Hypothesis 7	Product Scope Diversity → Customer Scope Diversity	0.079***	0.020	4.038	0.000
Hypothesis 8	Customer Scope Diversity → Vertical Integration	0.221***	0.066	3.350	0.001
Hypothesis 9	Vertical Integration → Product Scope Diversity	0.143***	0.038	3.791	0.000
Hypothesis 10	Product Scope Diversity → Return on Invested Capital	- 0.001	0.013	- 0.044	0.965
Hypothesis 11	Customer Scope Diversity → Return on Invested Capital	- 0.040	0.025	- 1.642	0.101
Hypothesis 12	Vertical Integration → Return on Invested Capital	0.054***	0.014	3.931	0.000
Hypothesis 13	Product Competence Building → Return on Invested Capital	- 0.034	0.117	- 0.292	0.770
Hypothesis 14	Process Competence Building → Return on Invested Capital	0.095***	0.013	7.340	0.000
GFI（Goodness-of-Fit Index）		1.000			
AGFI（Adjusted Goodness-of-Fit Index）		0.996			
CFI（The Confirmatory Fit Index）		1.000			
RMSEA（Root Mean Square Residual）		0.000			
Chi-Square		0.475			
Degree of Freedom		1.000			
p –Value		0.491			

*：C.R. < 1.96；using a significance level of 0.05, critical ratios that exceed 1.96 would be called significant.

1. β：Standardized Coefficient

2. S.E.：Standard Error of β

3. C.R.：Critical Ratio（= β / S.E.）

4. *p*-Value：Statistical Significance of the Test

Reference

Amit, R., & Schoemaker, P. 1993. Strategic assets and organizational rent. ***Strategic Management Journal,*** 14: 33-46.

Arbuckle, J. 1999. ***AMOS 4.0***. Chicago: Small Waters Corporation.

Arbuckle, J., & Wothke, W. 1999. ***AMOS User's Guide.*** Chicago: Small Waters Corporation.

Bagozzi, R. P., & Yi, Y. 1988. On the evaluation of structural equation models. ***Academy of Marketing Science***, 16(1): 74-94.

Baldwin, C. Y. & Clark, K. B. 1997. Managing in an age of modularity. ***Harvard Business Review***, September-October, 84-93.

Barney, J. B. 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***, vol. 8: 39-62. Greenwich, CT: JAI Press.

Bentler, P. M., & Bonnet, D. G. 1980. Significance tests and goodness of fit in the analysis of covariance structures. ***Psychological Bulletin,*** 88(3): 588-606.

Brown, S. L., & Eisenhardt, K. M. 1995. Product development: Past research, present findings, and future development. ***Academy of Management Review***, 20: 343-378.

Browne, M., & Cudeck, R. 1993. Alternative Ways of Assessing Model Fit', in Bollen, K. A. and Long, J. S. (Eds.), ***Testing Structural Equation Models***: 6-162. Newbury Park, CA：Sage.

Celly, K. S., Spekman, R. E., and Kamauff, J. W. 1999. Technology uncertainty, buyer preferences and supplier assurances: An examination of Pacific Rim purchasing arrangements. ***Journal of International Business Studies***, 30(2): 297-316.

Choo, F. & Tan, K. B. A Structural Equation Modeling of CEO Pay-Performance Relationships. ***Journal of American Academy of Business***, 5: 116-124.

Christensen, J. F., & Foss, N. J. 1997. Dynamic corporate coherence and competence-based competition: Theoretical foundations and strategic implications. In: A. Heene & R. Scanchez (Eds), ***Competence-Based Strategy Management.*** New York, NY: Wiley.

Collis, D. J., & Motgomery, C. A. 1997. ***Corporate strategy: Resources and the scope of the firm.*** Chicago, IL: Irwin.

Copeland, T., Koller, T., & Murrin, J. 1995. ***Valuation: Measuring and managing the value of companies***, 2nd ed., New York, NY: John Wiley & Sons, Inc.

Cottrell, T., & Nault, B. R. 2004. Product variety and firm survival in the microcomputer software

industry. ***Strategic Management Journal,*** 25: 1005-1025.

Day, G. D. 2003. Creating a superior customer-relating capability. ***MIT Sloan Management Review,*** 44(3): 77-82.

Dyer, J. H. 1996. Specialized Supplier Networks As A Source Of Competitive Advantage: Evidence From The Auto Industry. ***Strategic Management Journal***, 17: 271-291.

Eisenhardt, K. M. & Martin, J. A. 2000. Dynamic capabilities: what are they. ***Strategic Management Journal***, Special Issue 21: 1105-1121.

Frazier, G. L., Spekman, R. E., & O'Neal, C. R. 1988. Just-in-time exchange relationships in industrial markets. ***Journal of Marketing,*** 52(4): 52-67.

Foss, N. 1996. Introduction: The emerging competence perspective, in N. Foss and C. Knudsen. (Eds.) ***Toward a competence theory of the firm***, London, UK: Routledge.

Gefen, D., & Straub, D. 2000. The relative importance of perceived ease of use in IS adoption: A study of e-commerce adoption. ***Journal of the Association for Information Systems***, 1(8): 1-28.

Grant, R. M. 1991. The resource-based theory of competitive advantage: Implication for strategy. ***California Management Review,*** 22: 114-135.

Gulati, R., Khanna, T., & Nohria, N. 1994. Unilateral commitments and the importance of process in alliances. ***Sloan Management Review***, Spring: 61-69.

Hamel, G., & Prahalad, C. K. 1993. Strategy as stretch and leverage. ***Harvard Business Review,*** 71(2): 75-84.

Hayes, R. H., & Pisano, G. P. 1994. Beyond world class: The new manufacturing strategy. ***Harvard Business Review,*** 72: 77-86.

Heide, J. B., & John, G. 1990. Alliances in industrial purchasing: The determinants of joint action in buyer-supplier relationships. ***Journal of Marketing Research***, 27(1): 24-36.

Helfat, C. E., & Peteraf, M. A. 2003. The dynamic resource-based view: Capability lifecycles. ***Strategic Management Journal***, 24: 997-1010.

Henderson, R. M., & Cockburn, I. 1994. Measuring competence: Exploring firm effects in pharmaceutical research. ***Strategic Management Journal,*** Summer Special Issue, 15: 63-84.

Hu, L. T., & Bentler, P. M. 1995. Evaluating Model Fit. In Hoyle, R. H. (Eds.), ***Structural Equation Modelling: Concepts, Issues, and Applications***. Thousand Oaks, CA: Sage.

Ketchen, D. J., Thomas, J. B., & Snow, C. C. 1993. Organizational configurations and performance: A comparison of theoretical approaches. ***Academy of Management Journal,*** 36(6): 1278-1313.

Kline, P. 1998. ***The New Psychometrics: Science, Psychology, and Measurement***. London: Routledge.

Lee, J. R., & Chen, J. S. 2000. Dynamic synergy creation with multiple business activities: Toward a competence-based growth model for contract manufacturers. In: R. Sanchez & A. Heene (Eds), ***Advances in Applied Business Strategy***, vol. 6A: 209-228. Greenwich, CT: JAI Press.

Lee, J. R., Chen, J. S., & Tang, M. J. 2001. ***Upgrading and Leveraging Competence through Balanced Supply Structure: The Dynamic Capability of Contract Manufacturers in the Global Computer Industry.*** Paper presented at the *Annual Meeting of the Academy of Management*, Washington DC.

Lee, J. R., Chen, J. S., & Tang, M. J. 2005. Exploring the growth strategy of contract electronics manufacturers in Taiwan: A competence-based perspective. In: R. Sanchez & A. Heene (Eds), ***Advances in Applied Business Strategy***, vol. 7: 209-233. Greenwich, CT: JAI Press.

Liu, J., Ding, F. Y. & Lall, V. 2000. Using data envelopment analysis to compare suppliers for supplier selection and performance improvement. ***Supply Chain Management***, 5: 143-150.

Maritan, C. A. 2001. Capital investment as investment in organizational capabilities: An empirical grounded process model. ***Academy of Management Journal***, 44: 513-531.

Maruyana, G. M. 1998. ***Basics of Structural Equation Modeling***. Thousand Oaks, CA: Sage.

McCarthy, I., & Tsinopoulos, C. 2003. Strategies for agility: an evolutionary and configurational approach. ***Integrated Manufacturing Systems,*** 14(2): 103-113.

McGrath, R. G., MacMillan, I. C., & Venkataraman, S.1995. Defining and developing competence: A strategic process paradigm. ***Strategic Management Journal***, 16: 251-275.

Miller, D. 1987. The genesis of configuration. ***Academy of Management Review,*** 12: 686-701.

Miller, D. 1996. Configurations revisited. ***Strategic Management Journal,*** 17: 505-512.

Mintzberg, H. 1990. Strategy formation schools of thought. In J. W. Fredrickson (Eds), ***Perspective on Strategic Management:*** 105-135. London: Harper & Row.

Nishiguchi, T. 1994. ***Strategic industrial sourcing: The Japanese advantage***. New York, NY: Oxford University Press.

Penrose, E. T. 1959. ***The theory of the growth of the firm***. New York, NY: Wiley.

Porter, M. E. 1996. What is strategy. ***Harvard Business Review,*** 74(6): 61-78.

Prahalad, C. K., & Hamel, G. 1990. The core competence of the corporation. ***Harvard Business Review***, 68:79-91

Richardson, J. 1996. Vertical integration and rapid response in fashion apparel. ***Organization Science***, 7(4): 400-412.

Sanchez, R. 1996. Strategic product creation: managing new interactions of technology, markets, and organizations, ***European Management Journal***, 14(2): 121-138.

Sanchez, R., Heene, A., & Thomas, H. 1996. Introduction: Towards the theory and practice of competence-based competition. In: R. Sanchez, A. Heene & H. Thomas (Eds), ***Dynamics of Competence-Based Competition: Theory and Practice in the New Strategic Mangement***: 1-35. Oxford, UK: Pergamon and Elservier Ltd.

Stalk, G., Evans, P., & Shulman, L. E. 1992. Competing on capabilities: The new rule of corporate strategy. ***Harvard Business Review,*** 70: 57-69.

Steiger, J. H. 1990. Structural model evaluation and modification: An interval estimation approach. ***Multivariate Behavioral Research***, 25(2): 173-180.

Sturgeon, T. and Lee, J. R. 2005. "Industry Co-evolution: A Comparison of Taiwan and North America's Electronics Contract Manufacturing in North America and Taiwan," in Suzanne Berger and Richard K. Lester (eds) ***Global Taiwan: Building Competitive Strengths in a New International Economy***, New York, NY: M.E., Sharpe, Inc. forthcoming.

Teece, D., Pisano, G., & Shuen, A. 1997. Dynamic capabilities and strategic management. ***Strategic Management Journal,*** 18(7): 509-533.

Treacy, M., & Wiersema, F. 1993. Customer intimacy and other value disciplines. ***Harvard Business Review,*** 71: 84-93.

Volberda, H.W. 1996. Toward the flexible form: how to remain vital in hypercompetitive environments. ***Organization Science***, 7(4):359-374.

Zollo, M., & Winter, S. G. 2002. Deliberating learning and the evolution of dynamic capabilities. ***Organization Science***, 13(3): 339-351.