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Driving Forces of Outsourcing New Product Development and Its Implications

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Abstract: This paper addresses how firms make decision of outsourcing knowledge-intensive activities such as new products development (NPD). Through the employment of transaction cost economics, resource based theory and knowledge based theories, a conceptual decision model is presented, and key factors which influence the decision making process are proposed and compared to the arguments generated from empirical studies. In the empirical studies, the comparison between medium-sized firm and large firm indicates that a stronger influence of transaction costs economics can be detected in large firm; a longer time collaboration relationship is preferable for both firms in R&D projects. In addition, lack of internal resources is another reason for the decision of outsourcing NPD.

Key words: Outsourcing, new product development, transaction cost economics, resource based theory, knowledge based theory

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Abstract

This paper addresses how firms make decision of outsourcing knowledge-intensive activities such as new products development (NPD). Through the employment of transaction cost economics, resource based theory and knowledge based theories, a conceptual decision model is presented, and key factors which influence the decision making process are proposed and compared to the arguments generated from empirical studies. In the empirical studies, the comparison between medium-sized firm and large firm indicates that a stronger influence of transaction costs economics can be detected in large firm; a longer time collaboration relationship is preferable for both firms in R&D projects. In addition, lack of internal resources is another reason for the decision of outsourcing NPD.

Key Words: outsourcing; new product development; transaction cost economics; resource based theory; knowledge based theory

1. Introduction

Along with the technological improvement, industrial competitions in the field of new product development are becoming more severe than thirty years ago. The market for NPD can be found at everywhere around the world, from appliances to new type of resin for engineering, from how to fry chips to electronic chip, from hardware to software and e-commerce products. Different industries all require innovations and new products development. In order to get more share in the market, firms are continuously introduce new products and technologies to compete with others. According to the official website of Lenovo, the firm set up a special department for patents management since 2000 and applied for nearly 480 patents in three years, invention patents took up 50% of these patents application; The patents application rate of Huawei Technology company, which is the famous Chinese technological company, is 100% growth per every year and 1000 patents applications in year 2008. Thus we can see it is crucial for firms to build new product development and achieve strategic flexibility. Successfully developing a new way for new products became the most strategic challenge for firm's survival in the market. Outsourcing of NPD can be one of the appropriate ways meets the challenge. For example, IBM, Accenture, Electronic Data Systems, Computer Science Corp. and HP all recently signed global sourcing contracts exceeding \$1 billion in value; growing foreign companies, such as TCS, Infosys and Wipro, are rising in the top 10 supplier ranks (12 July 2006 in The Wall Street Journal; 28 December 2007 in Business Wire).

Why do the firm need to outsourcing NPD?

The shortening of product life cycle forces firms to put large investments in R&D projects. The increasing statistical data indicates that the new emerged products and technologies in these thirty years exceed the total number of products and technologies in the last 2000 years. The innovation in technology and the changing requirement form the market both led to the shortening of product life cycle. According to the report by Wei (2006), the product life cycle has been reduced to 25%

of the original lifespan in the last 50 years¹. The lifespan for new product is not 5-10 years any more, and it needs to be updated time to time in order to take up the market share.

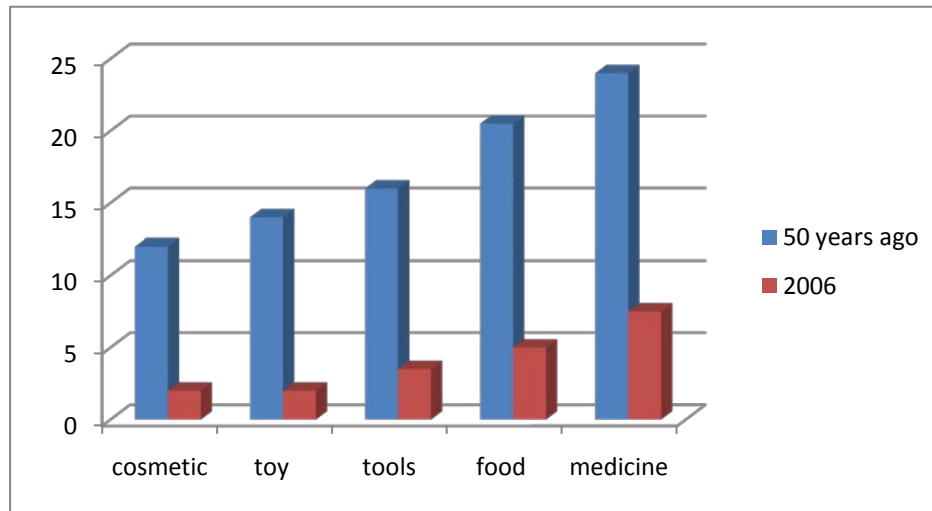


Figure 1-1 shortening of product life cycle in 50 years
Source: Wei Fang, 2006

While the firms realize the increasing importance of NPD and the gradually shortening of the product life cycle, the large investment in R&D does not mean significant output and benefit. Instead, the real situation is most of the new products failed in their NPD process before they get into the market place with a failure rate between 30%-40%. Radio Corporation of America has suffered the loss of 575 million dollars on TV game development. Ford lost 25 million dollars on the promotion of new type of car-Edsel in the end of 1950s. And the birth of Concorde was given by the enormous R&D investment of UK and France that can never be covered by profits it has made.

Although there are more than 25,000 new products entering into the market every year, however only less than 10% of these products will probably survive in the market after three years. To make matter worse, the failure of these products not only cannot be profitable, on the contrary, can even lead the firms to a financial dilemma as these new products always cost a lot of R&D investment in the earlier stage.

¹ Wei Fang, 2006, "A study on Critical Success Factors of Enterprise New Product Development Projects,"

According to the report by Product Development and Management Association (PDMA)², the success rate of new product entering into the market is only 59%. However, the success rate is differing according to the different definition of “industry”, “new product” and “failure”. So the number cannot account for all the problems, it depends on firm’s own capabilities. However, the data above does not include the NPD projects that have been stopped at the early stage. One of the researches indicated that: generally speaking, every seven new products ideas, only 4 of them could be developed, 1.5 among these 4 enters into the market and only one product gets the success. (Figure 1-2)³

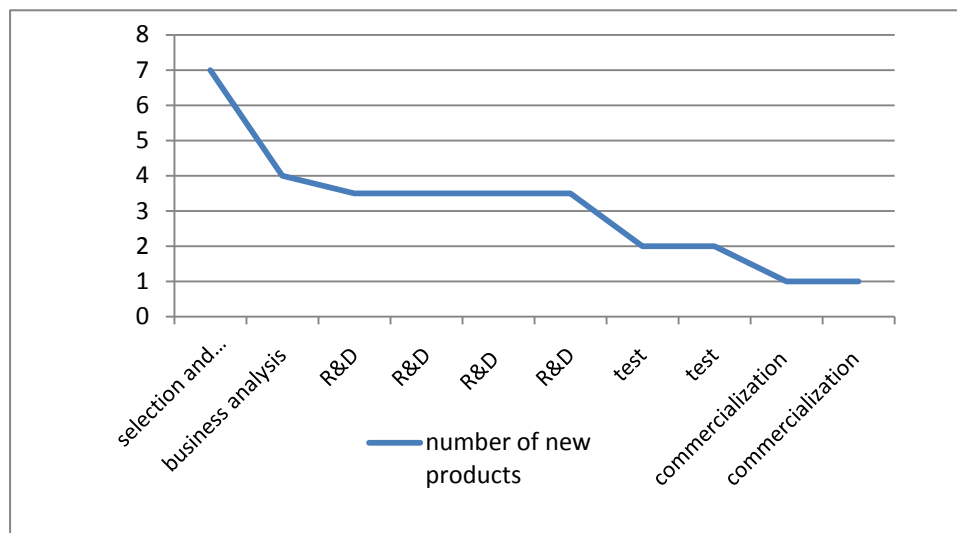


Figure 1-2 decline curves of NPD projects

Source: Allen Booz and Hamilton, 1982

Accordingly, the aim of this paper is to:

- 1) Find out the driving factors for outsourcing NPD.
- 2) Through the employment of theories, to introduce a decision framework of outsourcing NPD and find out what are the most important factors when choosing outsourcing partners?
- 3) Through the case study, this paper tries to compare the differences between the theoretical arguments with empirical arguments, and form the general hypothesis for how to make the decision of outsourcing NPD.

² A. Griffin, 1997, “Drives of NPD Success: The 1997 PDMA Report,” Product Development & Management Association.

³ Allen Booz and Hamilton, 1982, “New Product Management for the 1980s,” New York

Since the motives for outsourcing have moved from cost reduction and time saving to access to resource and knowledge, the NPD process to be outsourced has become a most important field to be studied. Product life cycle are becoming shorter compared to 30years ago. In order to survive and keep up with the high growth rate, firms increasingly seek for new ways of developing new product and obtain the knowledge and resource by outsourcing and forming network with outside partners. It is clear that cost, knowledge and core competence are main factors that influence the decision to outsource NPD. Thus the theoretical foundation in this article will be transaction cost theory, knowledge based theory and resource based theory. Transaction cost theory focus on the three aspects of transaction to explain the decision to outsourcing, as well as investigate the governance structure of these relationship; knowledge based theory and resource based theory are based on analysis of firm's capability. A decision framework will be generated based on these theories and applied to argue the decisions of outsourcing NPD in two Chinese manufacturing firms. It is compared to see whether the theory formed decision framework could benefit firms' governance decisions of their NPD.

Therefore, this paper is organized as follows. A definition of outsourcing NPD will be presented in the next section. Section 3 reviews the theoretical background and introduces a decision framework for outsourcing NPD. Empirical findings will be generated from a case study of two Chinese manufacturing firms in sector 4. The finally sector gives a general conclusion of the finding and refers to the remaining problems in further research.

2. Definition of “Outsourcing of NPD”

2.1 Phrases toward Outsourcing

The word “outsourcing” refers to “the transfer of the production of goods or service that had been internally to an external party”⁴ Thus, it means the transferring of production activities and also the transferring of the responsibilities for a particular activity to the third party. “Outsourcing” is also related with the phases “Make or buy”, which indicates that the decision to outsourcing is a decision process of whether to produce the product in-house or purchase it from an external supplier. Concerning this decision, Bergen (1977) stated that “it is preferable to make (produce in-house) items which are profitable or which require, by reason of security performance, a degree of control otherwise unobtainable”⁵ in his paper in order to define a general decision framework for managers on which kinds of activities can be outsourced to the outsider suppliers. Another term should be mentioned when we discuss about “outsourcing” is the phase “sub-contracting”. It is the word more generally used in construction industry where outsourcing firm transfer part of production to the specialized subcontracting firm. While part of the production has transferred to the subcontractors, it is accompanied by the diffusion of some technological know-how and expertise knowledge. Thus on one hand, outsourcing firm can focus on its core competitiveness and reallocate the internal resource to its best use; on the other hand, the outsourcing of production can lead to a shift of knowledge distribution, sometimes the outsourcing firm will face the risk of information leaks and the increasing dependency on suppliers. Meanwhile, the choice of suppliers could be essential, whether the supplier has the ability to develop new product and help the outsourcing firm from reducing its R&D spending is a necessary factor. It also has very important impact on outsourcing firm’s further development.

⁴ Van Weele A, 2005, “Purchasing and Supply Chains,” John Wiley & Sons Inc, New York.

⁵ S. A. Bergen, 1977, “The make or buy decision,” R&D Management

But the outsourcing of new product development does not only indicate the long-term contracts with outside suppliers, but also a breakthrough for innovation to strengthen firm's core technology. All the firms should evaluate the value of their activities and make classification. That requires the firm to recognize what is the main value he can provide to the customers. Core technology is not equal to core competence, for example, Dell's core competence is supply chain management, and engineering requirements could be the core techniques but cannot be the core competence. So Dell is acting as a manager of computer manufacturing process. The main value Dell provides is an effective network between various components suppliers and the ability of assembling the computer and delivering it to the customers as soon as possible. Therefore, a strategic outsourcing could be the outsourcing of almost any stage and activity of the product development process. Such as Sony, it focus on the core competence which is electromechanical miniaturization design, meanwhile maintain its essential competencies demanded by customers (e.g., rapid response) or required to defend the core(e.g., specialized CD production skills). Except these, other activities such as product and process design, parts and subassembly manufacture, logistic, precompetitive research and basic research, from the early stage of new product research to the later stage of distribution, transportation and post-sale, have almost been outsourced to the outside suppliers.⁶

2.2 A narrow definition of outsourcing NPD

According to Van Weele (2005), he defined outsourcing as “the transfer of the production of goods or services that had been performed internally to an external party”⁷. It contains three parts of this definition: it could be the functions or activities that out of the organizations; whatever it is the activities or the whole function that was previously carried out internally; such kind of transfer is guaranteed by contractual agreement time schedule.

⁶ James Brian Quinn, 2000, “ Outsourcing Innovation: The New Engine of Growth,” p. 8

⁷ Van Weele, 2005, “Purchasing and Supply Chain Management,” Thomson, London

Outsourcing of NPD refers to the transfer of the development of new product, namely all or the innovative part of the NPD process to an external supplier through a long-term contract. (Jonas Rundquist, 2007) Scholars always define R&D outsourcing from different aspects: from the view of resource-based theory, outsourcing of NPD could be considered as one of organizational modes- mergers and acquisitions to obtain the external knowledge to complement firm's own R&D program. Namely concerning a firm's capacity will based on their own internal research and development efforts, firm should focus on its core competence and integrate the outside resource in order to gain competitive advantages⁸. (Matthew and Rodriguez, 2006), On the other hand, Vittorio and Raffaella (1998) viewed outsourcing of R&D as "one of the organizational modes can be adopted to access external source of technology."⁹ Namely the collaboration based on R&D contract: a company agrees to fund cost of R&D at a research institute or university or small innovative firm, for a definite technology. Moreover, the definition based on the basic outsourcing view refers to the firms give the R&D activities to R&D intensive industries In order to acquire technological improvement and innovations. (Chesbrough, Henry, 2003)¹⁰

Hence, the outsourcing of NPD refers to the outsourcing firm transfer the development of new products (goods or service), namely all or the innovative part of the NPD process, to the outside suppliers who are more professional or (and) efficient according to a contract with these external partners. The NPD process is the business process for developing new hardware, software and service products for the firm. It includes all activities from development of the idea or concept for the product, the development of the product and its processes, and the launch of product into production and into the market place. The outside suppliers includes universities, research institutes, competitors in the same industries and industry associations such

⁸ Matthew Higgins and Daniel Rodriguez, 2006, "The outsourcing of R&D through acquisitions in the pharmaceutical industry,"

⁹ Vittorio Chiesa and Raffaella Manzini, 1998, "Organizing for technological collaborations: a managerial perspective," R&D Management

¹⁰ Chesbrough, Henry, 2003, "The logic of Open Innovation: MANAGING INTELLECTUAL PROPERTY," California Management Review

kind of resources outside of the firm that can provide technological support and higher innovativeness.

2.3 Literature reviews of outsourcing NPD

According to Quinn (2000), the key reasons to outsource new product development (NPD) are to access to the resource and special competence and to share the R&D risk with suppliers. A typical example of outsourcing NPD is strategic outsourcing decision in Cisco System. During the first half of 1990s, the company developed long time contract relationship with a few manufacturers in order to maintain its 100% growth rate. Meanwhile it was accompanied by the opening of its network and system in order to joint equipment development. The number of partners was gradually increasing since that and provided “most of Cisco’s components, hardware and manufacturing innovation”¹¹ till today. Moreover, main service providers among them have joint Cisco in the Cisco Hosting Applications Initiative (CHAI) for technological innovations and improvement. It requires high quality of expertise and deeper knowledge base to develop new technology and optimize CHAI, managing the NPD process is also complexity and costly. So the joint of these suppliers can benefit Cisco with the useful resource and technique know-how, they are also the partners to share the risk of failure in research.

Many studies about outsourcing NPD were generated from different fields. Ahmed¹² (1999) reviewed the issue of outsourcing intangible from a theoretical as well as an operational point of view; he focused on the cost-related issue of outsourcing intangible activities, considered the theory of transaction cost and how to evaluate implicit knowledge to emphasized that cost assessment and intangible accounting are two main issues in the process of outsourcing NPD. Luca, Francesca and Enrico¹³

¹¹ James Brian Quinn, 2000, “ Outsourcing Innovation: The New Engine of Growth,” Sloan Management Review,p.2

¹² Ahmed Bounfour, 1999, “Is Outsourcing of Intangibles A Real Source of Competitive Advantage?” Universite de Marne La Vallee.

¹³ Luca Lambertini, Francesca Lotti and Enrico SantaRelli, 2004, “Infra-industry Spillovers and R&D Cooperation: Theory and Evidence,” Econ. Innov. New Techn., 2004, Vol. 13(4), June, pp. 311-328

(2004) conducted an investigation in infra-industry, accounted for the possibility that firms control R&D spillovers based on Cournot-Nash and Cournot-Stackelberg behavior, and finally suggested that the cost-saving effect is significant large and associated with joint venture while the firms' innovative activities mainly depended on own R&D. Thus, two articles above both shed light on the significant relationship between cost saving effects and R&D activities as the scale of R&D investment is one of most necessary factors that should be taken into consideration while the firm intend to outsource its activities. Meanwhile, cooperation in R&D increases the transmission of knowledge, thereby enhancing big knowledge spillovers. Dependence on partners for R&D activity and various form of collaborating on a global scale may put the issue of Intellectual property in jeopardy. How much intellectual property the firm really owns is becoming a hot issue to be discussed. Kirsimarja, Pia and Risto¹⁴ (2004) have put trust, Intellectual property and contracts together and discussed their roles in interfirm collaboration. The article indicated that in asymmetric R&D collaboration especially small outsourcing firm with large global suppliers, contracts are not enough for a successful collaboration. The increasing mutual understanding and learning through the contracting process would help to construct trust; this is another dimension that should be taken into consideration. So there should be a balance between contracts and trust in order to guarantee a successful R&D collaboration. Consider the aspect of R&D intensity, to solve the problem of whether it discourages outsourcing or is compatible with it; Michael¹⁵ (2005) applied large-scale empirical data to demonstrate this relationship in Dutch manufacturing sector. There is a shift priority away from in-house innovations towards developing a more flexible, wider, and large joint research capacity. Firms in R&D intensive industries have gradually started to rely on partnership relations with outside suppliers.

¹⁴ Kirsimarja Blomqvist, Pia Hurmelinna, Risto Seppanen, 2004, "Playing the collaboration game right-balancing trust and contracting,"

¹⁵ Michael J. Mol, 2005, "Does being R&D intensive still discourage outsourcing? Evidence from Dutch manufacturing," research policy.

3. Analytical framework

The issue of outsourcing has been studied from economic aspect which focus on the transactions, human behaviors and how to governance the transactions to strategic perspective which focus on firm's resource acquisition and capability. In addition, more focus has been put on intangible resource such as technical know-how and marketing experience. Williamson (1991) emphasized that additional contextual concerns have been created by the fast changing markets (e.g., technology intensive markets). Consistent with this argument, outsourcing decision makers must face multiple costs and problems. Such as information asymmetry leads to governance difficulties and mismatch of the functions, sunk costs generated from organizational changes and earlier technologies (Heide & Weiss, 1995; Vivek, 2003). The long term outsourcing of NPD may leads to the loss of knowledge-based capabilities, gradually dependent on external resources and the leakage of technical know-how to rivals through the NPD suppliers (Williamson, 1991). Based on the arguments above, this paper focus on TCE and resource based theories with an additional emphasize on knowledge based theory to analyze the interrelationship between outsourcing decision with transaction costs, internal resources and capabilities and NPD activities.

3.1 Transaction cost economics

Governance has become more important in outsourcing decision as because the choice of governance structures (which are the organizational frameworks within which the integrity of a contractual relation is decided¹⁶) could result in different outcomes. In order to get the most profitable results with minimal risks and costs, economic agents should measure the costs and risk of different decision. However, the results tend to be different due to decision makers' bound rationality and opportunism. These are based on a self-interest-seeking assumption that "economic agents are

¹⁶ O. E. Williamson, 1985, "The economic institutions of capitalism," the free press, p. 41

permitted to disclose information in a selective and distorted manner”¹⁷ and constrained by their limited memories and cognitive capability (David A., 2009). However, Williamson did not mean that all the people will be opportunists, some of them may be, but we cannot judge it. TCE approaches this filed by trying to find the best governance structures to match different transactions with lowest costs.

Commons in 1934 used transaction as the basic unit to analyze the economic behaviors. While Ronald Coase (1937) followed it and set out his transaction cost theory of the firm in 1937, making firm as an organization to avoid some of the transaction costs of using the price mechanism. In his article, transactions in the market may generate costs of discovering relevant prices, negotiating and performing a separate contract for each exchange transaction. As Coase indicated, firms are the alternative forms of organization compared to market for managing the very same transactions. Whether a firm produces the resource for its own use or purchases the activities from the market (outside suppliers), it largely depends on the total costs, which are made up of both production costs and the transaction costs. Production costs are defined as the costs of running the perfect market machine, transaction costs are the costs incurred by market failure, such as information asymmetry and friction. Thus the economic agents in the firm should identify the attributions of production costs and transaction costs on one hand and the costs of alternative governance structures on the other hand (Williamson, 1985). The decision of outsourcing is considered as the choice among an external provider (Market), an in-house production (hierarchy) and alliance (hybrid). Outsourcing can reduce the production costs for activities as there is no investment for equipment and personnel, however it will increase the transaction costs such as the costs of obtaining accurate market information, negotiating and concluding separate contracts (Coase, 1937).

¹⁷ O. E. Williamson, 1996, “The mechanisms of governance,” Oxford University Press, p. 56

3.1.1 Three dimensions of transaction

In order to identify the costs of different governance structures, Williamson (1985) summarized that those transaction costs were generated from three dimensions: (1) asset specificity, (2) the frequency of the exchange, and (3) the degree and type of uncertainty, in which asset specificity is the most important dimension influencing transactions.

- **Asset specificity**

Asset specificity refers to the degree which an asset can be redeployed to alternative uses, namely the durable investments that are devoted into the specific transactions, the possibility for alternative uses of the assets in the transaction without sacrifice of productive value (Williamson, 1996). There are at least four types of specific assets have been defined: (1) physical asset specificity, for example, special components that are designed to fit a machine; (2) human asset specificity, it is generated during people's learning-by-doing process; (3) site specificity, such as a train station is constructed in order to facilitate the transportation between cities; (4) dedicated assets, which are the specific investment in purpose by suppliers to fulfill customer's requirements. In the outsourcing of NPD, asset specificity refers to whether the knowledge created in the transaction can be redeployed to alternative uses. Asset specificity not only arise the problem of complex ex ante incentive responses, but also influence ex post governance structure responses. Contractual safeguards and organizational changes would be required in support of transactions which highly involve in specific assets.

- **Uncertainty**

It is interesting to analyze the problem of transaction cost economics as economic agents will adapt different governance structure to response to disturbance. Because of opportunism and bounded rationality, it is hard to predict the future outcomes and disturbances for transactions, the longer time-span of the transactions and relationship, the more uncertainty will be involved in transactions.

Generally speaking, uncertainty can be classified as behavioral uncertainty and

environmental uncertainty. Behavioral uncertainty was developed based on the two assumptions as I indicated above, in which contractual uncertainty is of special importance to understand this points. Because of information asymmetry, you can never get the same kinds of technology and knowledge as well as your partner; because of opportunism, people may disclose information in a selective manner, or interrupt the long-term relationship by no reasons. Lack of communication, the disagreement between two parties of transaction may hinder the relationship. On the other hand, environmental uncertainty can be the result of economic trends or unpredictable market, the changes in the circumstances may cause the behavioral uncertainty such as the emergence of third party, the spot profits in market attracts one party in the contract breaking the relationship.

On spot markets where transaction occurs, you do not need to consider the uncertainty factors as the contractual relationship would be stopped as soon as the transaction finished. However, when there is a long time relationship formed in the contract, environmental uncertainty should be taken into consideration, it will increase the costs of governance. As well as the transaction costs induced by high degree of technological uncertainty, it will increase monitor and control costs as high level of control structure will decrease the risks.

- Frequency

Considering the issue of outsourcing, it refers to the times of one party to use outsourcing in general with its partner. In order to build a relationship, the transaction costs such as searching partners, information, and constructing legal contracts will increase in the initial phase. If there is no cooperation experiences between both parties, the costs of negotiating, communicating, monitoring the process and controlling the output can generated more faster. However, if outsourcing firm or outsourcing supplier in the relationship is familiar with the technology and market, the high frequency of transaction may decrease the transaction costs because of scale of economies.

Although those three factors are all important for judging the transaction costs, asset specificity is regarded as the most necessary point. According to Williamson

(1981), high degree of asset specificity will probably lead to a hierarchical governance structure whenever consider the uncertainty and frequency factors or not. Many studies agreed with this view and explained that the specific assets are costly and hard to redeploy into alternative uses, thus it would be better to use hierarchical governance (Shelanski and Klein, 1995).

3.1.2 Outsourcing Objective from a Transaction Cost Economics perspective

The most significant point for transaction cost theory is how to choose the governance structures in order to conduct the transactions with the lowest costs. Thus different types of costs generated from transaction should be identified, the table below has shown the source and nature of the most common forms of transaction costs. As we can see from the table, transaction costs are mainly generated in the form of direct costs and opportunity costs (Aric Rindfleisch & Jan. Heide, 1997) and directly influenced by asset specificity, environmental uncertainty and behavioral uncertainty.

	Asset Specificity	Environmental Uncertainty	Behavioral Uncertainty
A. Source of Transaction Costs			
Nature of Governance Problem	Safeguarding	Adaption	Performance Evaluation
B. Type of Transaction Costs			
Direct Costs	Costs of crafting safeguards	Communication, negotiation, and coordination costs	1 . Screening and selection costs (ex ante) 2 . Measurement costs (ex post)
Opportunity Costs	Failure to invest in productive assets	adaptation; Failure to adapt	1 . Failure to identify appropriate partners (ex ante) 2 . Productivity losses through effort adjustments (ex post)

Figure 3-1 source and types of transaction costs

Source: Aric Rindfleisch & Jan. Heide, 1997

From the Figure above, it has shown that high levels of asset specificity will cause a safeguard problem; the costs of safeguarding contractual agreement will be increased by the opportunistic behaviors of contractual partners. Without safeguards, decision makers may suffer a great loss from partners' opportunistic behaviors or the direct loss from failure to invest in specific assets. Evidences could be found in a study by Dutta and John (1995), with the conclusion that a monopoly supplier is more likely to engage in price hikes than to share the market with other suppliers. When facing the risk of lock-in due to specific investments, firms are more likely to produce the products internally instead of externally outsourced (Masten, Meehan, and Snyder 1989, 1991). Because the higher levels of specific investments, the higher costs of safeguarding would be generated to maintain the exchange relationship between buyers and sellers. For example, the manufacture suppliers may increase the direct costs to maintain its long term relationship with their downstream customers.

Environmental uncertainty causes the problem of adaptation. Transaction costs induced by environmental uncertainty include the costs of communicating with the suppliers, negotiating on the contract, or coordinating activities according to the new environment. For example, while firms enter into a new market which they are not familiar with, they need to search for the information and negotiate with the new partners. If the partners fail to adapt with the firm, it involves an additional opportunity costs to the firm.

Behavioral uncertainty causes the problem of performance evaluation. To the extent that decision makers are limited by their bounded rationality to evaluate their partner's performance, hence transaction costs generated from this aspect include the costs of screening and identifying its partners and the opportunities costs resulting from fail to find the most appropriate partners. Anderson (1985) examined the full

TCA model from four dimensions (asset specificity, environmental uncertainty, behavioral uncertainty and find that the strongest side effect was produced by behavioral uncertainty. This result strongly supports a positive relationship between behavioral uncertainty and firm's higher level of vertical integration. Meanwhile, firm also try to reduce the costs of behavioral uncertainty by hybrid governance mechanism. Although it is hard to measure human's behavioral uncertainty and test it, it has been broadly supported by empirical analysis that firms try to reduce the costs of behavioral uncertainty through both vertical integration and hybrid governance structures (Aric Rindfleisch & Jan. Heide, 1997).

3.2 Resource-based Theory

Resourced-based theorists consider the firm as a collection of assets and resources, in which some resources could be employed in creating sustained competitive advantages (Barney, 1991). The general idea of this theory is through the implementation of strategies, firms could obtain sustained competitive advantages, thus to increase the utilization of firms' internal resources and capability, avoid internal weakness and reduce the external risks. Outsourcing NPD from this point of view is considered as a strategic decision for firm to obtain the desired NPD resources in order to strengthen firm's sustained competitive advantages.

3.2.1 Assumptions

In order to build a theoretical model to analyze resource-based theories, two simple assumptions should be identified to help focus the analysis of firm's attribution to its competitive position.1), it assumed that the resources firms owned within an industry are heterogeneous; 2), those resources are not perfectly mobile thus it is difficult for competitors to obtain. According to Barney (1991), resources which have the potential to create competitive advantages should meet four criteria: valuable, rare, imperfectly imitable, and cannot be substituted. The resource is valuable refers to it can be used to find opportunities and/ or protect firms from threats; Meanwhile, it should not be

possessed by large number of firms and competitors. If a valuable resource is possessed by many firms in the same industry, each firm implements it in the same way to perform strategies; thereby no firm will get a competitive advantage from this strategy. Considered those two points, it is easy for a valuable and organizational rare resource to be a source for competitive advantage, however, it should be noticed the problems with which competitors can replicate it or substitute it with other similar resources (Ronan, 2009). Thus it implies the resource which intends to be a source of competitive advantage should be unique to a firm. As concluding above, whether a firm could obtain its competitive position, it depends on its ability to exploit opportunities, defend threats regarding resources.

3.2.2 The main contents of RBT

According to Grants (1991), firm is considered as a pool of resources and capability. He developed a general framework from a resourced-based view for firm's strategy formulation: 1) identify and classify the firm's resources, emphasize firm's advantages and weaknesses compared to rivals; 2) focus on firm's internally capabilities and identify its complexity, reorganize the resources in a more effective utilization; 3) "appraise the rent-generating potential of resources and capabilities"¹⁸ in terms of the potential for resources to develop as a source of competitive advantage; 4) choose a strategy with appropriate governance structure for better utilization of internal resources, capabilities and external opportunities; 5) identify the gaps between internal resources and outside complementary resources, do the investments in augmenting and upgrading the firm's competitive advantages in order to fill the resources gaps. As he emphasized in the final part of his article, the external acquisition of complementary resources are strategically important both for the exploitation of firm's internal resources and further development of firm's competitive advantages.

¹⁸ Robert, M. Grant., 1991, "The resourced-based theory of competitive advantage: implications for strategy formulation", *California Management Review*; 33, (3), pp. 114-135, p2

As summarized above, it should be defined that firm resources includes all assets, capabilities, productions, personnel, information and knowledge, etc. Thus there are three categories of firm resources: physical capital resources (Williamson, 1975), which includes firm's physical resources and equipment, location, etc.; human capital resources (Becker, 1964), which includes firm's personnel, experiences, communication networks and relationship; the third kinds of resources are organizational capital resources (Tomer, 1987), which includes firm's governance structures, reputations, controlling and coordinating system, as well as the network between a firm with its environment. However, not all the resources can be sources of competitive advantages for a firm. Some of them are irrelevant for firm's organizational development, some of them can reduce the effectiveness and efficiency of firm's organization process; some of them may prevent the firm from implementing strategies. Thus the firm should recognize and category its resources, employing the specific resources to strengthen its sustained competitive advantages.

3.2.3 Outsourcing objective from a resource based view

Hence, the resource-based theories judge a firm's decision to outsourcing NPD as a way to fill the gap between firm's own resources and required NPD resources. The lack of NPD resources can be supplemented by two paths. The first path is directly purchasing the NPD resources from outside suppliers, namely outsourcing the NPD process to outside expertise; the other way is reorganizing internal resources such as the investment in economic resource in the purpose of creating internal human resources. For example, through the investment in laboratories and R&D equipments, human capital could be accumulated, as well as the increasing in R&D outputs. In addition, it can also explain why different governance structures have been applied to various contracts within a firm. By using resource-based theories, firm boundaries can be viewed as a comparison between firm's internal capabilities and competitors' capability. Thus outsourcing decision is influenced by a firm's ability to organize resources and sustain a competitive position in the market. While a firm does not have

the capability or resources to organize the activity internally, strategic outsourcing can be a good choice. Meanwhile, if the similar resources hold by external providers can develop the activity at a lower cost with higher productivity, there is no competitive advantage for the outsourcing firm to keep the activity in house, thus activity to be outsourced can gain the necessary resources and complementary capabilities from outside suppliers on one hand, and reallocate firm's internal resources on the other hand (Ronan, 2009).

However, firms not only need to make the decisions, but also they need to decide which parts of the activity can be outsourced and which parts cannot. As I mentioned above, a firm's resources should confirm with four criteria in order to become critical resources for a firm's competitive capability. Thus the critical issue a firm should concern about is how to maintain the uniqueness of its resources and keep its products away from replicating by competitors. Following with the assumptions that resources are immobility and non-substitutability, the main guidance for firm's decision making is to prevent resources from competitors and keep the resources and its products in control, hence "the more valuable and uniqueness the resources are, the more preferable an in-house decision will be"¹⁹. On the other hand, if the resources of which the firm needs to develop the product can be found on the market, it will not be a competitive advantage for the firm to keep the product development in house, as critical resources are no longer uniqueness but available for purchasing on the market. Meanwhile it can also be a valuable resource to gain as it may be uniqueness for the industry or firm may get the geographic advantage on it, therefore it is still relatively unique. In this case, the decision of outsourcing the activities is made in the purpose of gaining valuable resources and supporting firm's strategies formulation.

As a summary, the main purpose for outsourcing NPD from this view is considered the decision of outsourcing as a method to fill the gap between firm's own resources

¹⁹ Jonas R., 2009, "Outsourcing and knowledge integration in new product development" Lulea University of Technology, doctoral thesis, p. 430

and required NPD resources. Following with the theories above, the first thing is to identify the internal resources in a firm, and whether it is the resources that can be developed into a competitive advantage. Then there are two paths to follow with after classifying the resources with a number of criteria: valuable to a firm, rarity, imitable and organization. If the internal resources in a firm are sufficient and valuable with a potential to be developed into a competitive advantage, it would be better to govern the activity internally in order to keep the strategic advantage; on the other hand, if the firm do not have the capacity to reorganize the internal resources, keep the activity in-house production or they lack of necessary resources which are available in the market with a lot of suppliers. Hierarchy governance would not be a good idea as there is no competitive advantage for manufactures to keep the activity in-house. Purchasing the resources directly from the market will benefit the firm with the resources they need. As a lot of suppliers on the market will provide the same service or resources which are easy to imitate or substitute, the competition mechanism will decrease the price for the service or resources.

3.3 Knowledge-based theory

A knowledge-based theory contributes to the explanation of a firm's emergence with emphases on the role of knowledge. In fact, it is not a formal theory; it is more like ideas about the existence of the firm from knowledge-based perspective to explain relevant economic behaviors (Grants, 1997). In terms of outsourcing NPD, knowledge-based theories define the nature of knowledge and its role in outsourcing process, providing suggestions with which kinds of knowledge would be more appropriate for outsourcing. While transaction cost economies focus on the efficiency of transaction and how to conduct the transaction with a lower cost, resource-based theories pay attention to how to reorganize the internal resources and capability to fill the gap between resources, knowledge-based theories emphasize the role of knowledge plays in an organization and the capability of a firm to create and apply the knowledge (Grant, 1997; Nonaka, 1994).

3.3.1 Assumptions

Some scholars viewed transaction cost economics (TCE) and knowledge-based theories as contradictory. However, in this paper, knowledge-based theories are more like complementary theories to TCE. TCE emphasize that the firm is generated in order to lower the costs of market transactions, but it addressed little about the administrative process within the firm or the actual role of the firm. Knowledge-based theories approach this field by offering an insight into the processes of knowledge input which is converted into product and service (Grant, 1997). There are some assumptions related with those knowledge-based theories consider of the nature of knowledge and its implications.

1, According to Edvinsson and Malone (1997), there are two kinds of knowledge, as different kinds of knowledge vary in their transferability. One is explicit knowledge, which can be articulated and easily expressed in words between individuals. It can be shared in the form of data, product specifications, manuals, and basic principles etc. Hence, the explicit knowledge can be transferred formally and systematically in individuals' communications and organizations. The other kind of knowledge is tacit knowledge, which is highly personal and hard to formalize. As it is manifest only in its application, in addition, it is existed in individual's action, as well as in the motive and inspiration the individual embraces, thus experiences, technical know-how, intuition and subjective insights are summarized to this kind of knowledge. Those skills and intuition are not visible and difficult to share with others, thus tacit knowledge is difficult and costly to transfer from one individual to another.

2, "Knowledge is subject to economies of scale and scope," as Grant indicated, which means the initial generation of knowledge is more costly than subsequent reproduction. Thus a knowledge-intensive industry could benefit from increasing return from the economies of scale in knowledge. However, the extent of economies of scale varies according to the different types of knowledge. Explicit knowledge would be much easier to conduct economies of scale as this kind of knowledge is more transferable and articulated. On the other hand, tacit knowledge is difficult to

conduct economies of scale as it refers to individual's experience, know-how and intuition, which is hard to transfer and replicate.

3, Individuals need to specialize in knowledge creation (Simon, 1991), knowledge is created by individuals, thus the implementation and production of knowledge need individuals to be familiar with in order to apply the knowledge in production more efficient. Especially in the process of knowledge outsourcing, firm transfers the knowledge-intensive business process to specialized domain expertise. While partner create and provide various information and techniques, outsourcing firm should familiar with those relevant domains to get better understanding of the knowledge generation process and apply it in the further development.

3.3.2 Outsourcing objective from knowledge based perspective

Viewing the outsourcing of NPD from this point, it involves knowledge generation process of new product in an outsourcing and firm's capacity to integrate the knowledge with the outsourcing suppliers. Hence, a firm's competitive advantages vary according to the firm's specialized knowledge and its capability and efficiency of knowledge integration. Grants (1997) emphasized the mechanism of knowledge integration and highlighted that specialization was the key point for integrating many types of knowledge and increasing the efficiency in knowledge integration. Thus a common understanding of the outsourcing subject exists among outsourcing firms and its suppliers is important, it will make the knowledge integration in new product more easily and costless. Meanwhile, each type of knowledge plays different roles in knowledge integration. For example, explicit knowledge such as language, literacy and basic statistic, which can be easily transferred to common knowledge, are likely to be fast integrated among individuals; however, tacit knowledge which exists in individual's experience and practice, is hard to articulate. So it would be better to conduct this kind of knowledge internally to get a better common understanding through close proximity.

As a summary, knowledge is the main factor to consider before deciding whether product development should be kept in-house or outsourced to outside suppliers. Zhao and Calantone (2003) have defined four kinds of risks in outsourcing NPD, one of which indicates the risk of losing core competence from a knowledge perspective. One of the characteristic of tacit knowledge is that it is not available for all firms, thus it would be a good way to obtain knowledge from outside suppliers through collaboration. Getting the knowledge from partners will help the firm reallocate its internal resources on one hand and reduce innovation costs on the other hand. However, while the outsourcing knowledge is very closely related with the core competence of a firm, the frequent interactions between the firm and its partners will lead to the firm's increasing dependency on its partners' resources. Therefore, it is necessary to build processes to support the integration of tacit knowledge (Jonas, p. 38) in order to avoid the potential cost of dependency. Or as Munsch (2004, p. 27) stated: "When your core competency is dependent on people who are not your employees, the culture must support partnerships from which both sides' benefits." Zhao and Calantone in 2003 conducted an empirical test on a wide range of manufacturing and service industries and found the results that "tacit knowledge could be obtained from partner firms through their close and frequent interactions," In addition, the transfer of tacit knowledge contributes a lot for firms' development of new product and innovation capability. Meanwhile, they emphasized the contribution of firms' collaborative experience on the tacit knowledge transfer. The similar things have also been discussed by Quinn in 2000, who indicated that not only the tacit knowledge is important to be the basis of further competitive advantage, but also the knowledge about how to collaborate is an essential ability.

In the decision of outsourcing NPD, knowledge always plays an important role in determining the decision as it is the outsourcings object to be analyzed in the whole decision process. Outsourcing NPD can be considered as the outsourcing of specialist knowledge, or the firm tries to purchase the resources- knowledge from the market to support its strategic development. Thus in the decision model, it is critical to identify

whether it is explicit knowledge or tacit knowledge to be outsourced, whether the knowledge generated is easily transferable and benefits the knowledge integration.

4. Driving factors of outsourcing NPD and its conceptual model

4.1 Factors driving the need to outsource NPD

Although the discussion has treated Transaction Cost Economics and Resource Based View as different theories to explain the outsourcing decision. However, there is a number of literatures consider them as complementary theories. To some extent, specific assets share some common points with firm's distinctive capabilities- they are both not easy to imitate or replicate, and get the potential to support firm's competitive strategy. Andersson and Fransson (2006) identified five analysis areas for outsourcing decision and regarded them as continuum between Transactions cost and Resource-based theory (see figure 4-1).

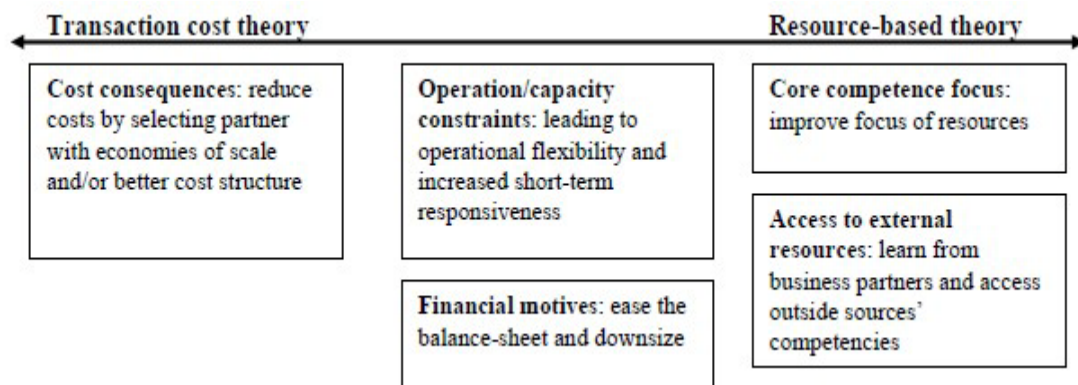


Figure 4-1 five theoretical driving forces for outsourcing

Source: Adersson and Fransson, 2006

From the figure above, it shows that TCE focuses mainly on governance skills, providing a theoretical analysis to compare different governance mechanism (hierarchy, hybrid and market) in the outsourcing decision, whilst the RBV pays attention to production skills – through resources analysis and inter-organizational collaboration to access to complementary resources -- in improving competitive advantages.

Based on the theoretical foundation of outsourcing NPD, it is believed that the decision of outsourcing NPD can benefit the firms a lot if done properly. The motives for outsourcing were gradually moved from the monetary factors to strategic purpose. For financially driving aspect, it is common for a firm to establish a long term relationship with an outside supplier so as to reduce the supplier's costs through learning curve and economies of scale, convert fixed costs in variable costs (Leif Enarsson, 2008) and secure a stable relationship between the vendor and clients. After all, the purpose here is to transfer part or the whole production process of the activity to other places where it could be done at lower cost. For strategically driving aspect, it places the firm's core competency and capacity on the top status. It pays attention to organize the resources, expertise and knowledge outside the firm into better use in order to improve the efficiency and effectiveness of production. Moreover, outsourcing could not only benefit the process of production, but also make the organization refocus on its own resources and contribute to the competitive advantages of the firm(Power, Desouza and Bonifazi, 2006)²⁰ such kind of strategic outsourcing often involves relationship between the firm itself and multiple suppliers.

For example, Dell Computers is a well planner in outsource NPD. It does not keep the research and production of hardware internally; instead it takes the order from customer and arranges the fulfillment process based on its vast network of suppliers and manufacturers. Dell's core competency is information system and supply chain management system. Realized that it cannot update the technology and knowledge in time for every component in the hardware, thus it decided to outsource research and development of new product to specialized partners. On one hand, it was easier for Dell to access to the latest knowledge and technology; on the other hand, it obtained more time for managing the activities and ensuring each supplier is benefited from improved knowledge and insights, as these contributed a lot to its competitive

²⁰ M. J. Power, K.C. Desouza and C. Bonifazi, 2006, "The outsourcing handbook, how to implement a successful outsourcing process," London, Kogan Page

advantages.

In addition, strategic transferring the NPD process to outside suppliers could also for marketing reason. When a firm wants to explore new products and enter an uncertain market, outsourcing the NPD maybe a good way for the firm to use its partner's specialized technology, reputation in the market and distribution network. Therefore, focus on firm's core competency, cost saving, access to knowledge and new market are the main factors that influencing firm's decision to outsource NPD. Those possible advantages are listed in the following part if the firm involves in the outsource activities.

4.1.1. Focus on core competency

When utilizing the concept of outsourcing, it not only means the transfer of all or part of the activities, but also the transfer of decision right (Power, Desouza and Bonifazi, 2006). Those activities cannot deliver high value to its customer, however they are important for firm's competitive advantages, thus by transferring the activities, suppliers take the responsibility to utilize the outside resources and achieve project goals. On the contrary, it allows the firm to get more time on managing and rethink of its restructure. Meanwhile, limited resources can be put in better use and contribute to the core functions in the firm.

4.1.2. Access to resources and knowledge

To obtain the competitive advantage, it is important for a firm to realize that how to access to outside resources and knowledge. Being self-sufficient and trying to keep all the resource produced in house is not a wise decision for firm's further development. As opportunity costs are large and resources will be under-utilized in this case. Moreover, specialized knowledge and resources provided by outside suppliers may be of higher quality than the firm's self-sufficiency. Therefore, to access to specialized knowledge is pointed out in many articles as an important advantage in outsourcing

(such as Brusino, Prencipe and Pavitt, 2001; Quinn, Hillmer, 1995). For example, the British Broadcasting Corporation (BBC) established an outsourcing relationship with Siemens Business Services Ltd in 2004 to reconstruct its information technology department. In this case, BBC sold its wholly-owned BBC Technology Holding Ltd to Siemens under a US \$3.7 billion's contract. On the contrary, Siemens will provide with BBC a specialist operating, updating and maintaining the IT infrastructure to help it to be the leader in desktop news content delivery (Power, Desouza and Bonifazi, 2006). While IT area is often not BBC's core competence, however, it is required in all areas of operation in a modern firm, as firm rely to a specialized knowledge and system controlling to form its daily operation. A good infrastructure and network will increase the efficiency of firm's operation but is costly to create and maintain it. Hence, rather than make the knowledge by themselves, firm inclines to purchase the knowledge and resources from outside suppliers. On the other hand, access to knowledge and technology can make the firm "coordinate loosely coupled networks of suppliers of equipment, components, and specialized knowledge and maintain a capability for system integration"²¹. Dell computers' outsourcing case stated above is a good example to illustrate this point.

4.1.3. Monetary factors

One of the main factors for involving in outsourcing is the cost savings, especially over a long time span, which is generated from many ways. Henri L.F. de Groot(1998) suggests that "declining transaction cost is a crucial factor in explaining the observed increase in outsourcing"²². Through the model developed in the paper, author came to the conclusion that the motives for firms to engage in outsourcing are: transaction cost, exploitation of economies of scale, savings on wage and benefit payments, and strategic consideration, in which saving the transaction cost plays the most important role (Yushan Xu, 2009). First, it is always assumed that purchasing from an outside

²¹ S. Brusoni, A. Prencipe, K. Pavitt, 2001, "Knowledge specialization, organizational coupling, and the boundaries of the firm: why do firms know more than they make," *Administrative Science Quarterly*, p. 1

²² Henri L.F. de Groot, 1998, "Macroeconomic Consequence of Outsourcing"

supplier is cheaper than in-house production as there are no fixed costs but only variable costs on the outsourcing part. In-house production requires all the resources to be kept in house and the firm needs to maintain the facilities and continuously update the technology. Those costs are existed along with the firm's production no matter whether the resource is used or not. Then, firm saves its cost by exploitation of economies of scale. Grossman, Helpman & Szeidl (2005) analyze the determinants based on economies of scale, state that it costs a lot for a single manufacturer to produce all the components of a complicated product, so they are outsourcing some parts of the product to outside providers in order to reduce the cost.²³ While an outside supplier involves in the outsourcing, because of learning curve, "the more similar parts a company can produce, the more cost saving can be realized"²⁴. Outside suppliers are supposed to focus on a small number of business thus they can increase the effect of learning curve through the utilizing economies of scale. In addition, outsourcing firm does not need to pay for the fixed costs; instead transaction cost only occurs when firm purchases the resource from suppliers or access to it. Hence the cost saving effect is significant from those aspects.

But, even if the outside supplier can provide the goods or service as the same quality with a lower price, there are still many other factors to be considered. Firstly, making a decision and setting up project for outsourcing is costly and takes time to see the benefits (Figure 4-2). From the Figure, it is clear that in the beginning phase, in-house production is cheaper than outsourcing the activity to outside suppliers. As the transaction costs such as the costs of selecting the partner, communication, negotiation, and the coordination costs are relatively high. In addition, outsourcing means the governance structure and firm's boundary changes. Hence there are probably some sunk costs generated from firm internally and added into the total costs before the outsourcing activity. Thus the decision of outsourcing could be costly and takes time to see the benefits. Hence, this means that outsourcing part of the activity

²³ Grossman, Helpman & Szeidl, 2005, "Complementarities between Outsourcing and Foreign Sourcing".

²⁴ Leif Enarsson, 2008, "Outsourcing and strategic outsourcing: from strategic models to practical experience," Gothenburg: AS

in the firm can only help a firm reduce the cost when the project lasts for a long time span. On the other hand, because of learning curve, supplier can reduce the cost through economies of scale. In addition, outsourcing can help the firm with providing

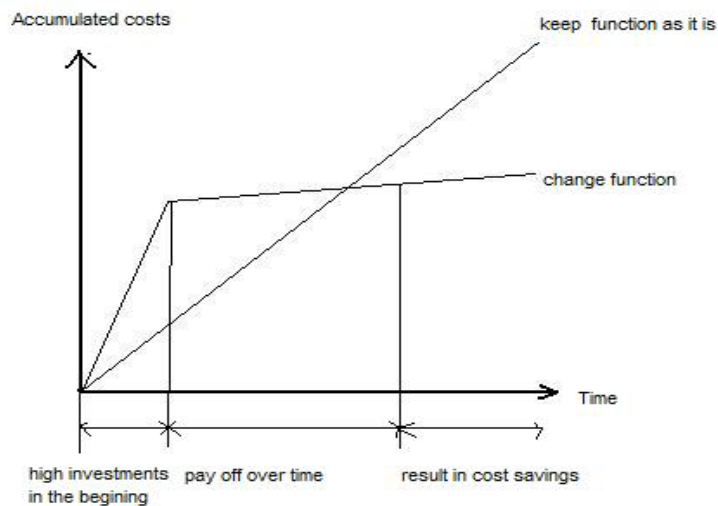


Figure 4-2 Costs of an outsourcing project

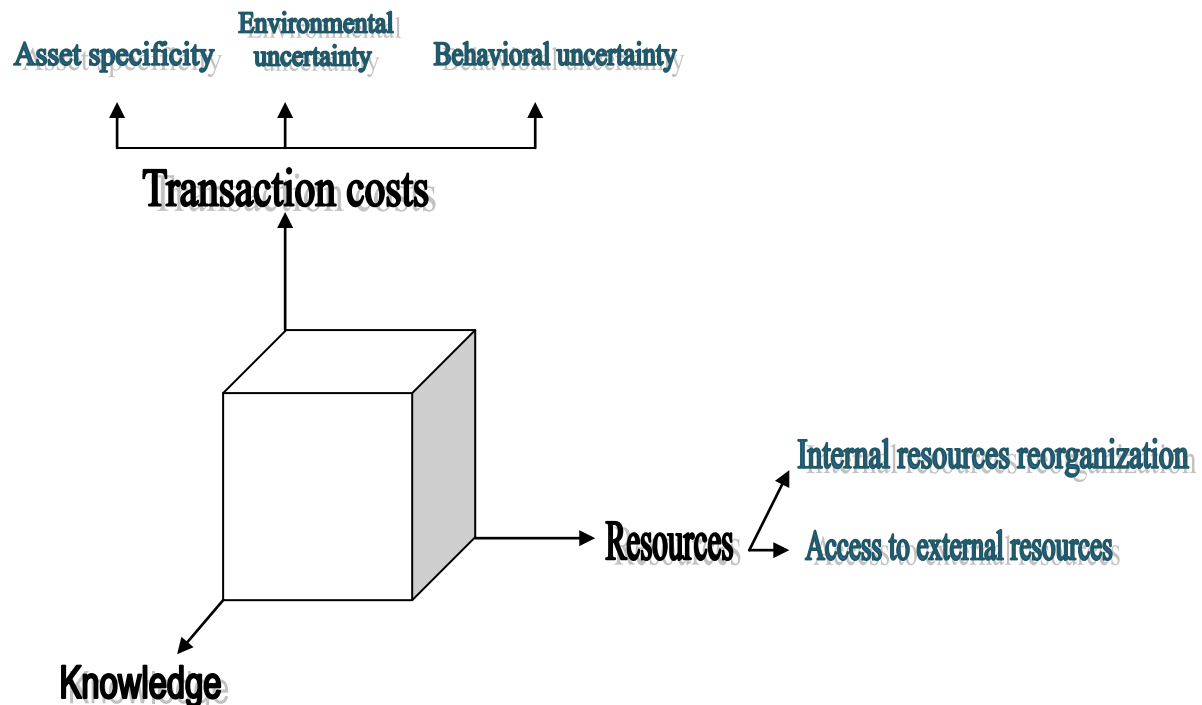
Resource: Bragg, 1998

short-term profits. As firm sells its in-house production activity to the outside suppliers in order to get cash infusion or debt financing, this would benefit the firm a lot in the short term, especially when the firm found itself in financial dilemma (Bragg, 1998).

4.2 The decision model

As indicated above, a conceptual model for outsourcing NPD is introduced at here, the variables included in the model as a summary of those three theoretical perspectives. (Fig. 4-3)

The model presented here indicates how to make a decision of outsourcing NPD from three theoretical perspectives. The details from those three perspectives have provided comparative and complementary arguments for how to make decision of outsourcing NPD. With the analysis of theoretical part in the present graph, this paper summarizes those arguments in the following part:



Tacit or explicit knowledge

Figure 4-3 A general decision model for outsourcing of NPD

- 1) Higher levels of specific investment, higher costs of safeguarding (contractual costs and control costs).
- 2) High uncertainty of environment increases the costs of communicating with the suppliers, negotiating on the contract, or coordinating activities.
- 3) Long term relationship reduces partner's behavioral uncertainty, thus to decrease the ex ante costs such as screening and selection costs.
- 4) Former outsourcing experience reduces the ex post measurement costs such as monitoring and control costs.
- 5) Core competence focus: outsourcing the non-core activity in order to improve focus of resources.
- 6) Lack of internal resources and outsourcing the activity in order to get access to external resources.
- 7) Outsourcing objective presents less strategic importance as resources to be

outsourced are easy to imitate or substitute.

- 8) Knowledge to be outsourced are almost explicit knowledge and easy to build the process for knowledge integration.

Argument (1) – (4) are generated from transaction cost theory, arguments (5) – (7) are generated from resource-based theory and the last argument comes from knowledge-based theory. These arguments will be compared with the arguments generated from empirical analysis of two cases firm of outsourcing NPD in the following section. For example, if argument (2) “High uncertainty of environment increases the costs of communicating with the suppliers, negotiating on the contract, or coordinating activities” can be identified consistent with the facts in both cases firm, thus we can say that transaction costs theory from this view has a value to explain how to make the decision of outsourcing NPD. However, if this argument is found explicitly in one case but implicitly in the other case, it indicates that this argument may be not fully represented the inter-linkages between outsourcing NPD with transaction costs theory, or there are may be other probable factors influencing the decision making process.

5. Research Method

5.1 Case study

Case study is an ideal method in exploratory and descriptive research. Rather than collecting data and following the rigid test in order to check the significant for some variables, case study is based on in-depth investigation of a single event to explore causation in order to find underlying principles (Robert, Yin, 2009). As in this paper which focuses on: 1) developing a descriptive theory with model introduction, 2) documenting the specific phenomenon and exploring its boundaries, and 3) integrating multiple resources and doing the comparison between cases (Eisenhardt, 1989). Through the case study, researchers can approach the inter-relationship between matters and observe the social process which cannot be reached by a

quantitative analysis.

Criticism always indicated that the application of case study was not so wide in real life. However Yin (1984) refuted this argument by comparing the analytic generalization and statistical generalization and emphasized that “In analytic generalization, previously developed theory is used as a template against which to compare the empirical results of the case study”²⁵.

In addition, the resources of case study have been summarized by Yin (1994) into six categories: documentation, archival records, interview, directly observation, participant observation and physical artifacts. Documentation is one of the most necessary resources for case study, as it always exists prior to case study by a long time span. It can be study report, letters or anything that attributes to database. Thus it is stable for repeated review and analyses. However, the documentation always includes authors’ bias and the report may reflect author’s personal perspective; sometimes the documentation is difficult to achieve because of secrecy reason. The same weaknesses can be found in archival records such as maps, charts and personal records. So privacy may inhibit access to precious records. But archival records are more precise and quantitative than documentation. Unlike those two resources, interviews is a more directly and targeted way to focus on case study topics, author can obtain a profound insight into the case and finally perceive causal inferences through the face-to-face interview or questionnaire survey. At the same time, the study may also be biased by poor question design, interviewee’s bias or interviewee’s reflexivity- they states what the interviewer wants to hear thus the results cannot exactly reflect the real situation. On the other hand, direct observation may be a good way to reflect the reality as investigators makes a site visit to gather the data; researchers can analyze the case contextual and cover event context. However, it is time consuming to conduct a long time observation and observers may selectively observe the cases so some of the facts may be neglected, so the reliability is the main

²⁵ Yin, R., 1984, “Case study research, design and methods”(1st ed.) Beverly Hills, CA: Sage Publishing

problem to be concerned.

According to the facts above, each research method has its own merit and drawbacks when it is been used in a case study. However this is not a real problem, multiple applications of resources can make the resources complemented to each other, which makes the conclusion of case study more reliable.

5.2 Data collection

For reason of confidentiality, the mentioned firm in this paper are referred to Firm A and Firm B. Firms to be selected in the purpose of analyzing outsourcing NPD have to meet some criteria. First, the firm should be manufacturing firm with its product line, which means the firms possess the knowledge of how to manufacture, design and organize the internal resources to market certain products or service effectively. It also indicates that the selected firm has its own financial department to raise the money, sales department to open the market and expertise to develop the new products. Without its product line, firm has different purpose for outsourcing NPD compared to the firm who already has its own range of products. In this paper, the unit of analysis is the firm's NPD program, firm A and B are both manufacturing firms in auto industry. Second, the firms should be the same size for analysis. In this paper, Firm A is medium-sized firm (employee over 5,000) and Firm B is large-sized firms (employee number over 10,000). Three, this paper chooses the cases firm from the same industry, to find the common points of outsourcing determinants in both firms. Concluding above, the firms are briefly summarized in Figure5-1

Figure 5-1 General information of firms in the study

Firm	No. of emp	Turnover(hundred million, RMB)	Industry
Firm A	7,000	140	Auto industry
Firm B	124,000	918	Auto industry

The firms selected for the research are both very famous firms which located in China Firm B which was founded since 1969 have affected the development of Chinese auto industry for nearly 40 year , Firm A is more young and innovative automobile firm in

Chinese auto industry. They are both collaborated with local research center, universities and have a wide communication network with media thus it is easy to get information from newspaper, interviews from TV program. Meanwhile, they are both listed in the stock market; therefore the information and details about firm's financial problem and recent projects are easy to be obtained. Multiple methods were used to collect the data. Documentation includes study reports from earlier researchers; Archival records-secondary data which includes service records, survey data and the information from official website. Interviews from TV program and journals, participant observation (views from workers in this firm, not a manager).

The main part of the analysis is qualitative interpretations to quantify the data. One purpose of the analysis is if arguments given by theoretical model were confirmed with the arguments presented by empirical study.

5.3 Data analysis

When analyzing the data, some findings were presented in Figure 5-1. The main purpose of this paper is to present the decision framework of outsourcing NPD and identify the most important determinants for firm's outsourcing decision which refers to whether to outsource NPD or keep the NPD in-house production. Compared with the theoretical arguments in Section 4, some findings generated from empirical study are consistent with the theoretical arguments; however other findings show some different relationship between theory and practice.

According to the empirical findings in the case study, some differences would be found between Firm A and Firm B. For example, in the argument (3), it was strongly presented in case study that Firm A inclines to form long time relationship with its partners. Some evidences were found in the previous study of Firm A which says that: "The qualified suppliers are assessed by their productivity and quality and then classified into A, B, C classes. Till the end of year 2007, 466 core components

suppliers and non-core components suppliers have been assessed by Firm A, in which B class suppliers increased from 37% to 65%; C class suppliers decreased from 56% to 30%.”²⁶ Hence in the figure below, Firm A was identified to have long term relationship with its partners.

Arguments summarized in the theoretical framework in Section 4. In the decision of outsourcing NPD, those arguments are....	Firm A	Firm B
(1) Higher levels of specific investment, higher costs of safeguarding (contractual costs and control costs).		○
(2) High uncertainty of environment increases the costs of communicating with the suppliers, negotiating on the contract, or coordinating activities.		
(3) Long term relationship reduces partner’s behavioral uncertainty, thus to decrease the ex ante costs such as screening and selection costs.	○	○
(4) Former outsourcing experience reduces the ex post measurement costs such as monitoring and control costs.	○	
(5) Core competence focus: outsourcing the non-core activity in order to improve focus of resources.	×	○
(6) Lack of internal resources and outsourcing the activity in order to get access to external resources.	○	○
(7) Outsourcing objective presents less strategic importance as resources to be outsourced are easy to imitate or substitute.	×	
(8) Knowledge to be outsourced are almost explicit knowledge and easy to build the process for knowledge integration.		×

○	Strongly presented in the empirical study
×	Arguments are not fully confirmed with the empirical study
blank	Weak identified with the empirical study

Figure 5-2 Comparison of theoretical and empirical study

The first finding is that, compared to Firm A, Firm B is much easier to be influenced by transaction costs factors such as assets specificity and behavioral uncertainty. The

²⁶ Bei Wu, Jin Chen, and Zengyuan Wu, 2009, “The mode, characteristics and process of firm’s R&D outsourcing,” R&D Management, Vol. 21 No. 2, p. 61

specificity of the project technology following Griffith (2009) was defined as specific resources if they are licensed technologies or the innovative products developed by specialist suppliers. In the case study of Firm B, it takes a long time for Firm B to protocol the contract. The more complexity of the contract (more employee and technical products included in the contracts), the longer time it will take to protocol and perform the contract. Meanwhile, the findings of this study show that Firm B is trying to minimize its transaction costs through vertical integration, which is confirmed with Williamson's (1985) argument. Firm B is engaged in different parts of production, from the inputs used in the production of its products to the distribution centers. It controls subsidiary companies such as tire companies, metal company to provide the regular components resources for its production, and also retailers to distribute its final products. Those suppliers who play the role in supporting automobile production are not always belongs to Firm B, some of them are often contractors with long-time, bilateral exchange relationship. In order to reduce the safeguarding costs and environmental uncertainty, Firm B adapted a hybrid governance mechanism with the suppliers makes the components but the Firm B owns the tools and technologies.

5.3.1. Sunk Costs

In addition, it shows clearly in the cases comparison that Firm B is more hesitating than Firm A in making the decision of outsourcing NPD. Considering Firm B is a large organization than Firm A, sunk costs generated from decision making process should be taken into consideration. While the firm make the decision to outsource its NPD activities to outside suppliers, it "involves a switch from internal production to external procurement." Hence, sunk costs may be generated from this aspect which refers to the abandonment of costly sunk specific assets, the costs of reorganizing personnel network and internal resources. "If the managers are unable to ignore these sunk costs, they may engage in outsourcing to a lesser extent than would be

normatively appropriate.”²⁷ Namely, the outsourcing decision will negatively affected by potential sunk costs. Meanwhile, in a large organization, it means more behavioral uncertainty either from outside suppliers or employees in the organization. People who “faces the decision for any given circumstance is limited by the decisions one has made in the past even though the past circumstances may no longer be relevant.”²⁸ It is attributed to the reason that decision makers would be afraid of the changes brought by outsourcing such as the potential risk of organizational failure, ineffective organizing, as well as the abandonment of costly sunk specific assets. Hence it is easy for a large organization to follow the previous decision path with no obvious changes.

5.3.2. Longer time relationship

The third argument indicates a longer time contractual relationship is preferable by both firm. Consistent with the percepts of TCE, which argues for a long-time relationship, especially in the way of vertical integration, as a protective mechanism to minimize technological leakage and lower transaction costs. The findings of this study show that Firm A strives to minimize the transaction costs and risks by maintaining a former multilateral relationship with suppliers. There is a quality administration department in Firm A to network the components suppliers, classify the suppliers and assess the components which are provided by suppliers. The selection of the suppliers includes several steps: firstly, all the suppliers should be approved by TS16949 and ISO2000 and evaluated by standard indicators such as price, after sale service, contribution and so on. The suppliers who have passed the first assessment will be considered as “potential suppliers” to provide components at a limited quantity. Then the potential suppliers with high quality and stable service will receive a promotion as “qualified suppliers” to have longer time collaboration contract with Firm A. Among those “qualified suppliers”, a classification system still works to evaluate the quality of the products every year. The suppliers who marked as class A

²⁷ Filip Roodhooft, Luk Warlop, 1999, “On the role of sunk costs and asset specificity in outsourcing decisions: a research note,” *Accounting, Organizations and Society* 24 (1999), pp. 363-369, p. 364

²⁸ Arrow, Kenneth J., 1963, “Social Choice and Individual Values”. Yale University Press, New Haven, 2nd ed. p. 119-120

presents as the suppliers with the highest quality products and service, thus a long time partner is chosen in this way. It also confirmed with argument 4 which implies former outsourcing experience reduces the ex post measurement costs such as monitoring and control costs. Meanwhile, the chosen of former collaboration partner can also lower the relation building costs. However, it also presents in the case study that firm A does not want to reduce the costs of monitoring and administrating so much as the administration system is an effective way to control the suppliers and minimize the risks of behavioral uncertainty.

5.3.3. Outsourcing of core activities

Outsourcing the non-core activity to improve focus of resources has been detected in both cases. However, this argument is not completely confirmed with the empirical findings in firm A. Not only the non-core activities, but also the critical and core activities have been partly outsourced to suppliers in firm A. All the activities in the manufacturing process have been divided into several parts which refer to core components, important components and non-core components. According to the different functions of automobile, all the components for production have been classified to different sub-systems to be outsourced; even the production of engines has been outsourced to certain suppliers.

Thus this is contrary to one of the important arguments in TCE that the complex activity should be kept in-house production. The outsourcing of core activities may leads to the problem of information leakage and the loss of core competencies. However, not only the core activities have been outsourced, in both cases, the most frequent outsourced activities are the early stage of products development and even the most innovative and technological activities in the production. It is always the collaboration between the firm with research institutes, local universities and the local knowledge-based firms. This was significantly the case in firm A, where the basic research on new type of automobile engine was outsourced to its subsidiary research

institute (where firm A owns part of it), and further development of electronic system (GPS, CCS and conditioner system) was outsourced to the local university. At the same time, another finding is that the firm is inclining to choose the outsourcing partners situated close to the firm if the local institute has the capability to make the research.

Compared to firm A, the outsourcing activities in Firm B were shown its coherency to the resource based theory. It has the ability to perform almost R&D projects by its own research center as it has relatively more financial assistants and strong research team with expertise in different fields. Hence, the core activities of firm B have been maintained in the research centre. On the other hand, Firm B conducts a lot of R&D collaboration projects with local research institutes and foreign famous auto companies. The administration of the R&D projects was always under a hybrid governance structure, where the foreign auto firms provided with technologies and equipments, Firm B involved in the production and market processes. Sometimes it is also the collaboration between firm B with other manufacturers in the auto industry in search of advanced technologies and complementary technologies. Hence the property rights were owned by both firms.

Meanwhile, both firms in the case study show that the motive for outsourcing NPD is confirmed with argument (6) - Lack of internal resources and outsourcing the activity in order to get access to external resources. Outsourcing of NPD activities in firm A and firm B are both due to lack of internal resources. The need for specialist knowledge forces the firms to collaborate with outside suppliers, through the mutual learning and knowledge integration, firms can access to complementary knowledge and advanced knowledge in a short time compared to its individually research development. Hence, outsourcing of NPD could be a good way to strengthen firm's core competencies and strategic development.

5.3.4. Highly supplier involvement

Last two arguments indicate the character of outsourcing NPD. One suggests that the resources or knowledge to be outsourced are less strategic important and easy to imitate or substitute. However, this is not the case for Firm A. Because not only the less strategic important resources in firm A have been outsourced to suppliers, but also the strategic important resources such as the basic research and early development of the products have been externalized in order to access to advanced knowledge and specialists. It involves a large number of suppliers in both the early development stage and mature stage. This is contrary to our theorized arguments that high complexity or high technological uncertainty activities should be kept in house. According to TCE, lower supplier involvement in the NPD process will decrease the risks of information leakage and external resource dependence. The development of unique resources and activities are obtained for firm's further strategies, in order to maintain the competitive advantage, unique technologies and resources should be kept in house and away from replicating by competitors.

Although higher suppliers involvement runs the risk of information leakage and loss of core competencies, outsourcing activities in firm A maintain three characters to reduce the risk: First, the components to be outsourced are indeed the resources which is easy to imitate or substitute. They are also relatively independent components when it has been outsourced to different suppliers. So it is difficult for single supplier or competitors to replicate almost components needed for core activities. Second, modularity production occurs in both firms. It allows the production of components geographically dispersed through adherence to common standards. In addition, it reduces "the risks of technology know-how leakage because knowledge of suppliers is module specific"²⁹ (Sanchez, 1999; Griffith, 2009). Third, greater supplier involvement can be detected in the outsourcing process, especially in strategic

²⁹ D. A. Griffith, N. Harmancioglu, C. Droge, 2009, "Governance decisions for the offshore outsourcing of new product development in technology intensive markets," *Journal of World Business* 44, 217-224. P. 219

important project. Although higher degree of supplier involvement imply higher risks of technology leakage and behavioral uncertainty, the close relationship between buyer and suppliers can form a potential protection mechanism for technology know-how. As entities in this network share information with each other, the institutional norms generated from communication, mutual learning and collaboration can provide a protective mechanism for multilateral relationship (Heide and John, 1992; Chee and Sakun, 2008).

The last argument tries to ensure the efficiency of knowledge integration in outsourcing NPD process. However, this cannot be detected in the case study. The tacit knowledge cannot be clearly presented in the contract as it is hard to articulate individual's experience and technical know-how. But it actually occurs and transfers between buyer and suppliers during the outsourcing process. Hence, outsourcing such kind of knowledge and regular the contract for tacit knowledge integration is still a problem that remains to be solved.

6. Summary of Findings

The results in Section 5 indicate that the theoretical model was supported by the case study on both firms with different emphasis.

- (1) Compared to medium-sized firm, large firm is much easier to be influenced by transaction costs factors. Especially when the NPD projects need to be outsourced have higher degree of asset specificity. Or the sunk costs generated during the decision making process would be large if the decision making firm is a large organization with complex governance structure.
- (2) Firms prefer long-time relationship with their partners as it will reduce the ex ante costs of screening and selection, as well as the ex post costs such as monitoring

and controlling costs.

- (3) From the resource-based view, the core activities should be internalized and considered as the potential resources for core competencies. However, contrary to resource-based theory, not only the non-core activities have been outsourced, core activities are also partly outsourced for strategic purpose. In the case of Firm A, internal resources have been reorganized and classified; partly outsource to different outsourcing partners. On the other hand, suppliers are also been assessed by the firm in order to develop a longer time contractual relationship.
- (4) It has been highly confirmed that outsourcing of NPD in both medium-sized firm and large firm are due to lack of internal resources. Through learning from partners during outsourcing and collaboration, firm can access to the external resources. On one hand, it eases the internal resources and financial burden for internal R&D projects; on the other hand, it reduces the time for the development of complementary knowledge. Firm can purchase the complementary knowledge they need directly from market instead of building specialist knowledge by themselves.
- (5) The efficiency of knowledge integration plays a critical role in the outsourcing process. As outsourcing NPD does not mean the giving up of internal research and development of new products. However, it emphasizes firm's ability to enhance knowledge integration effectiveness and integrate the outside knowledge with its internal resources to strengthen its competitive advantages.

The theories are all contributed to the decision framework of outsourcing NPD,. On one hand, resourced-based theories play a more important role in influencing the decision process; on the other hand, a stronger influence was found from transaction costs theories on large sized firm. However, those findings are the results of qualitative analysis. They can only be considered as the hypothesis for further quantitative analysis and test, not the finally conclusions for how to make the decision of outsourcing.

7. Conclusions

The comparison of cases above indicates the trend of outsourcing in NPD, from in house production to build new products development capabilities and achieve strategic objectives by outsourcing. Outsourcing allows firm to reduce costs by selecting partner with economies of scale/ or better costs structure, leading to administrative flexibility and create environments for inter-firm learning. Meanwhile, it lets the firm to concentrates on its limited resources, through reallocate the resources and mutual learning from its outsourcing partners, firm can maintain its core competencies and strengthen its competitive advantages. Outsourcing NPD provides the avenues for firm to access to the external resources and capabilities that are costly and not easy to be developed internally. The outsourcing of NPD does not mean the application of external R&D instead of internal R&D. But it indicates the R&D department moving from routine administration towards a more strategic relationship with partners (Zhao & Calantone, 2003). It should be identified the importance of increasing the efficiency of knowledge integration, through external resources and inter-firm learning, external resources and knowledge can be developed as the complementary knowledge for firm's strategic development, firm's internal R&D capability can never be substituted by external R&D resources.

7.1 Contribution to theory

This paper presents the decision framework for outsourcing NPD, with the combination of three theories: transaction costs theory, resource-based theory and knowledge-based theories. The case studies of outsourcing NPD give an insightful attempt to apply theories to outsourcing NPD. Through the comparison between two firms' decision framework, it illustrates the more influencing factors for outsourcing decision while considering the firms with different size. On the other hand, through studying the cases of outsourcing NPD in two firms, it cannot be neglected the facts that core activities in one of the firm have been partly outsourced which is contrary to

resource-based theory. Hence, whether the decision of outsourcing core activities is good or not, still need further research and complementary explanations.

7.2 Strengths and weakness

This study provides a number of new insights into outsourcing of NPD processes: first, with the comparison of different sized firms, this paper tries to explain the decisions made by large organization are different from medium-sized firm from the aspect of sunk costs. It emphasized that the complex governance structures in large organizations will prevent the decisions of outsourcing. In addition, the decision process is always accompanied by path dependence, thus it is not easy for large organization to change its previous decisions and make a breakthrough. The sunk costs generated from those aspects were heavily influencing the decision making process, especially in large organization. Second, to access to external resources is one of the main driving forces for outsourcing decision. It is important for medium-sized firm to strengthen its core competencies by the utilization of its internal resources and obtaining the external resources. Hence core activities can be strategically outsourced to its partners in order to fill the resources gap. Third, previous studies always emphasized the collaboration between cross national MNCs will make the knowledge integration more effectiveness (Jonas2007). But the case studies show that firms try to increase the efficiency of knowledge integration by collaboration with both cross-nationally firms and local research institutes.

While the combination of three theories gives us a preliminary guidance of how to make the decision of outsourcing NPD, some limitations are also detected during the studies. First, the explanations of firm's decision are limited by the theories. For example, core activities were partly outsourced to suppliers in Firm A's decision, which is contrary to resource-based view that core activities should be kept in house in order to maintain firm's core competencies. As a contradictory explanation for TCE, Heide and John (1992) suggested that highly supplier involvement in the outsourcing

of core activities provide a protective mechanism for core technology and information sharing. Second, the problem about how to measure the transaction costs. Transaction cost involves the measurements of environmental uncertainty and behavioral uncertainty. A large proportion of the study is determined by NPD managers' personal behaviors, thus uncertainty made up the large part of the decision making processes which is immeasurable. Third, unreliable arguments generated in the case study. The main purpose of this study is to find out the driving forces for outsourcing NPD and form reliable hypothesis for further researches in this field. However, only two firms were presented in case study and compared to the theoretical arguments. Whether it is the representative for almost outsourcing firms or the typical case, the results tends to be different. Thus, it is recommended to including more firms in the case study to get a more reliable result.

7.3 Implications for managers

As the main part of this paper is trying to find a decision model for NPD managers to make the right decision of outsourcing, thus the results of this study offers some guidelines for managers to make the decision considering different situations.

Before make the decision of outsourcing NPD, firm should identify and assess its internal resources, capability to organize the resources and classify the activities all included in the firm. The classification and reorganization of resources may help the firm to find out the valuable resources in the firm in order to focus on its core activities with limited resources. On the other hand, it is a good way for firm to realize its advantages and weaknesses compared to rivals. In order to filling the resources gaps between internal and external resources, firm should choose appropriate governance structure for better utilization of internal resources and detect external opportunities.

Different governance structures may be applied to different situations. If it is core

activities with the most valuable resources and advanced technology, vertical integration or strategic alliance would be good choices. While vertical integration may help the large organizations to reduce the costs of behavioral uncertainty and the risks of information leakage, strategic alliance may help the firm to find the most appropriate partners to perform the R&D projects with high degree of assets specificity together. The long term multilateral relationship reduces the risks of environmental uncertainty and solves the problem of large investments in specific assets. It also implies a potential protective mechanism was generated through information sharing and mutual learning. If it is the non-core activities, or the less important resources that have already existed in the market with lots of suppliers, those NPD projects can be governed by market relationship as purchasing the resources directly from suppliers on the market reduces the costs of develop complementary resources and speeds up the introduction of innovative products.

Reference:

1. Arrow, Kenneth J., 1963, "Social Choice and Individual Values". Yale University Press, New Haven, 2nd ed. p. 119-120
2. Allen Booz and Hamilton, 1982, " New Product Management for the 1980s," New York
3. Anderson, Erin, 1985, "The Salesperson as Outside Agent or Employee: A Transaction Cost Analysis," *Marketing Science*, 4 (summer), 234-54.
4. Aric Rindfleisch & Jan. Heide, 1997, "Transaction cost analysis: past, present, and future applications," *The Journal of Marketing*, Vol. 61, No. 4, pp. 30-54
5. Ahmed Bounfour, 1999, "Is Outsourcing of Intangibles A Real Source of Competitive Advantage?" *Universite de Marne La Vallee*.
6. Andersson, D., Fransson, D & Rehme, J., 2006, "Driving forces for outsourcing: A study of wood product manufacturing firms", *Linkoping University*
7. Barney, J. B. 1991, "Firm resources and sustained competitive advantages", *Texas A&M University, Journal of Management*, Vol. 17, No. 1, 99-120
8. Becker, G.S., 1964, "Human capital", *New York, Columbia*
9. Bei Wu, Jin Chen, and Zengyuan Wu, 2009, "The mode, characteristics and process of firm's R&D outsourcing," *R&D Management*, Vol. 21 No. 2, p. 61
10. Bragg, S.M. (1998), *Outsourcing*, Wiley, Hoboken, NJ
11. S. Brusoni, A. Prencipe, K. Pavitt, 2001, "Knowledge specialization, organizational coupling, and the boundaries of the firm: why do firms know more than they make," *Administrative Science Quarterly*, Vol. 46, No. 4, 597-621
12. S. A. Bergen, 1977, "The make or buy decision," *R&D Management*
13. Chesbrough, Henry, 2003, "The logic of Open Innovation: MANAGING INTELLECTUAL PROPERTY," *California Management Review*
14. Chee Yew Wong^a and Sakun Boon-itt, 2008, "The influence of institutional norms and environmental uncertainty on supply chain integration in the Thai automotive industry," *International Journal of Production Economics*, Volume 115, Issue 2, October 2008, Pages 400-410
15. Coase, Ronald H. 1937. "The Nature of the Firm", *Economic N. S.* 386-405 [chapter 2 of this volume].
16. Dutta, Shantanu and George John (1995), "Combining Lab Experiments and Industry Data in Transaction Cost Analysis: The Case of Competitions s a Safeguard," *J journal of Law, Economics, and Organization*, I (1), pp. 87-111
17. David, A., & Nukhet, H., & Cornelia, D., 2009, "Governance decision for the offshore outsourcing of new product development in technology intensive markets," *Journal of World Business* 44, 217-224
18. Eisenhardt, K., 1989, "Building theories from case study research," *Academy of management review*, 14, 532-550
19. Filip Roodhooft, Luk Warlop, 1999, "On the role of sunk costs and asset specificity in outsourcing decisions: a research note," *Accounting, Organizations and Society* 24 (1999), pp. 363-369
20. Griffin, A., 1997, "Drives of NPD Success: The 1997 PDMA Report," *Product Development& Management Association*.

21. Grant, R. M., 1997, "The knowledge-based view of the firm", In C. W. Choo & N. Bontis (Eds.), *The Strategic Management of Intellectual Capital and Organizational Knowledge*: 133-148. Oxford: Oxford University Press
22. Grossman, Helpman & Szeidl, 2005, "Complementarities between Outsourcing and Foreign Sourcing".
23. D. A. Griffith, N. Harmancioglu, C. Droge, 2009, "Governance decisions for the offshore outsourcing of new product development in technology intensive markets," *Journal of World Business* 44, pp 217-224
24. Heide, J. B., & John, G., 1992, "Do norms matter in marketing relationships?" *Journal of Marketing*, 56(2): 32-44.
25. Heide, J. B., & Weiss, A. M., 1995, "Vendor consideration and switching behavior for buyers in high-technology markets," *Journal of Marketing*, 59(3): 30-43.
26. Henri L.F. de Groot, 1998, "Macroeconomic Consequence of Outsourcing," VU. University Amsterdam - Department of Spatial Economics
27. James Brian Quinn, Frederick G. Hillmer, 1995, "Strategic outsourcing," *The McKinsey Quarterly*, No. 1
28. Jonas Rundquist, 2007, "Knowledge integration efficiency in distributed product development projects," *International Journal of Product Development*.
29. Jonas R., 2009, "Outsourcing and knowledge integration in new product development" Lulea University of Technology, doctoral thesis
30. James Brian Quinn, 2000, "Outsourcing Innovation: The New Engine of Growth," *Sloan Management Review*
31. Kirsi marja Blomqvist, Pia Hurmelinna, Risto Seppanen, 2004, "Playing the collaboration game right-balancing trust and contracting,"
32. Leif Edvinsson and Michael S. Malone, 1997, "Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower", New York: Harper Business, pp 10-15
33. Luca Lambertini, Francesca Lotti and Enrico SantaRelli, 2004, "Infra-industry Spillovers and R&D Cooperation: Theory and Evidence," *Econ. Innov. New Techn.*, 2004, Vol. 13(4), June, pp. 311-328
34. Leif Enarsson, 2008, "Outsourcing and strategic outsourcing: from strategic models to practical experience," Gothenburg: AS
35. Masten, Scott E., James W. Meehan, Jr., and Edward A. Snyder, 1989, "Vertical Integration in the U.S. Auto Industry: A Note on the Influence of Transaction Specific Assets," *Journal of Economic Behavior and Organization*, 12 (October), 265-73.
36. Masten, Scott E., James W. Meehan, Jr., and Edward A. Snyder, 1991, "The costs of organization," *Journal of Law, Economics and Organization*, 7 (Spring), 1-25.
37. Matthew Higgins and Daniel Rodriguez, 2006, "The outsourcing of R&D through acquisitions in the pharmaceutical industry," *Journal of Financial Economics*
38. Munsch, Kenneth, 2004, "Outsourcing design and innovation", *Research-Technology Management*, Volume 47, Number 1, 1 January 2004 , pp. 27-30(4)
39. Michael J. Mol, 2005, "Does being R&D intensive still discourage outsourcing? Evidence from Dutch manufacturing," research policy.
40. Notaka, I., 1994, "A dynamic theory of organizational knowledge creation",

- Organization Science, 5: 14-37
41. Organization Science 2: 125-134
 42. Robert, M. Grant., 1991, "The resourced-based theory of competitive advantage: implications for strategy formulation", *California Management Review*; 33, (3), pp. 114-135
 43. Ronan M., 2009, "How the transaction cost and resource-based theories of the firm inform outsourcing evaluation", *Journal of operations management*, 45-63
 44. Simon, H.A., 1991, "Bounded rationality and organizational learning",
 45. Shelanski, H., Klein, P.G., 1995, "Empirical research in transaction cost economics: a review and assessment," *Journal of Law, Economics, and Organization* 11, 335-361
 46. Sanchez, R., 1999, "Modular architectures in the marketing process", *Journal of Marketing*, 63(Special Issue): 92-111.
 47. S. Tamer Cavusgil, Roger J. Calantone, Yushan Zhao, 2003, "Tacit knowledge transfer and firm innovation capability", *Journal of Business & Industrial Marketing*
 48. Tomer, J.F., 1987, "Organizational capital: the path to higher productivity and well-being", New York: Praeger
 49. Van Weele A, 2005, "Purchasing and Supply Chains," John Wiley & Sons Inc, New York.
 50. Vittorio Chiesa and Raffaella Manzini, 1998, "Organizing for technological collaborations: a managerial perspective," *R&D Management*
 51. Vivek, G. 2003, "Impact of uncertainty and sunk costs on firm survival and industry dynamics," *Georgia Institute of Technology*, ISSN Nr. 0722-6748
 52. Williamson, O.E., 1975, "Markets and Hierarchies", New York, Free Press
 53. Williamson, O. E., 1981, "The modern corporation: origins, evolution, attributes", *Journal of economic literature* 19, 1537- 1568
 54. Williamson, Oliver E., 1985, "The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting," New York: The Free Press
 55. Williamson, O. E., 1991, "Comparative economic organization: The analysis of discrete structural alternatives," *Administrative Science Quarterly*, 36(2): 269-296.
 56. Williamson, O. E. 1996, "The mechanisms of governance," Oxford University Press
 57. Wei Fang, 2006, "A study on Critical Success Factors of Enterprise New Product Development Projects,"
 58. Yin, R., 1984, "Case study research, design and methods" (1st Ed.) Beverly Hills, CA: Sage Publishing
 59. Yin, R., 1994, "Case study research: Design and methods," (2nd ed.), Thousand Oaks, CA: Sage Publishing
 60. Yushan Zhao, R. J. Calatone, 2003, "The trend toward outsourcing in new product development: case studies in six firms," *International Journal of Innovation and Management*, Vol. 7, No. 1, pp. 51-66