

The Influences of Innovation on Make-or-buy Decision Under the Dynamic Environment*

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Abstract—The decision-making of make-or-buy is the critical issue so that firms are often faced in the process of production and operation, which consequently decides the future strategic development. The study of make-or-buy decisions has a profound impact on the boundary between market and the firm. The most famous research is transaction cost economics (TCE) in terms of the make-or-buy interpretation, which is advocated by Williamson, a Nobel Prize winner. Therefore the argument about vertical integration was put forward by many scholars. Based on the analysis framework of Williamson's heuristic model in the make-or-buy decision, by relaxing the assumptions of the original decision model, this study tries to analyze make-or-buy decision-making process in the continuously dynamic rather than static environment. From the perspective of technological innovation, the study explores the actual innovative process in business organizations in value chain under the dynamic environment in firms and provides theoretical guidance for realizing the effective governance of the enterprise.

Keywords—*heuristic mode; innovation; make-or-buy; value chain*

I. INTRODUCTION

In the traditional neoclassical economics, since Coase put forward the pioneering theory that the firm is the substitution of the market [1], the new institutional economics is on the rise. In the 1970s Williamson [2] formed an important branch of the transaction cost economics (TCE), which explores the asset specificity in the transactions to differentiate the costs. Thus, the critical Make-or-buy decision or the vertical integration faced with the managers is in the conceptual framework of any firms' strategy management, consequently influence the optimization process of an organization. Further, the boundary between firm and market has caught the attention of many scholars since proposed [3][4][5][6].

However, the original model and the theory are on the relatively static premise. In fact, the enterprise is in an ever-

changing, complex and dynamic environment, especially in the contemporary era of big data bearing the features of extremely easy access to and use of resources. Williamson's model of Make-or-buy theory in comparative static conditions becomes susceptible, and then will the theory be widely used in practice [7]? If not, the issue whether the enterprise can continuously improve the competences of technical innovation under the stimulus of innovation factors is under question. Under the current conditions of production in order to achieve cost savings, the management tries to make the production cost less than the transaction costs, eventually achieves the vertical integration of the enterprise.

From the existing literature, previous studies of transaction costs were under the relatively static environment and ignored the innovation factors within the reality of dynamic changes. Based on this, this paper is to broaden Williamson's make-or-buy paradigm from the analysis of innovation for production or outsourcing decision-making.

II. LITERATURE REVIEW

Williamson named "new institutional economics", also known as the economist who rediscovered Coase's contributions. Coase (1937) discussed the nature of firms in market economy and the boundary between firm and market, and added the transaction cost as variance in the process of corporate governance. Williamson (1975, 1979, 1985), in accordance with the thinking pattern of Coase, discussed the existence of enterprise, with the introduction of asset specificity, uncertainty of trading and transaction frequency. Among these three dimensions in the influences of the transaction costs, asset specificity is an important variable in the governance structure, further the heuristic model is constructed to interpret vertical integration in the make-or-buy decision.

A. Heuristic Model

Transaction Cost Economics (TCE) takes trade or transaction as the basic unit of analysis so that economic activities in the organization to a large extent can be understood as the transaction cost saving. In Williamson's theoretical model there are three kinds of governance model: the market, mixed long-term contract, firm and bureaucracy

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[8]. The differences of three governance modes lie in asset specificity on both sides of the transaction [9]. The thought

can simply be represented as shown in "Fig. 1":

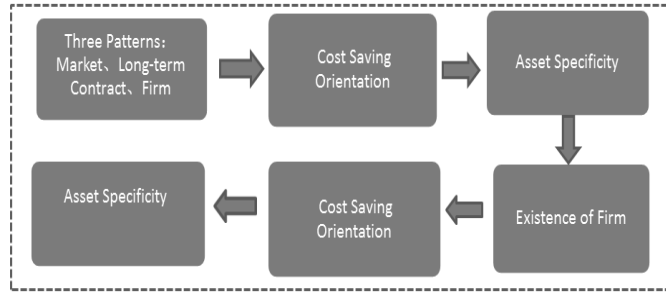


Fig. 1. Williamson's heuristic model connotation.

Vertical integration, or, in the simpler terms, "make-or-buy" decision problem is a paradigm. In the *Asset Specificity and Economic organizations* (1985), the cost of a unified framework is used to evaluate the choice of organizational form, with discussion of the optimization problem of enterprises and market organization of production cost and transaction cost differences. At the same time, the two costs represented by Asset Specificity function, and constructed the heuristic model (see "Fig. 2"), thus giving firm or the market of choice problem, i.e. the "make-or-buy" decision orientation.

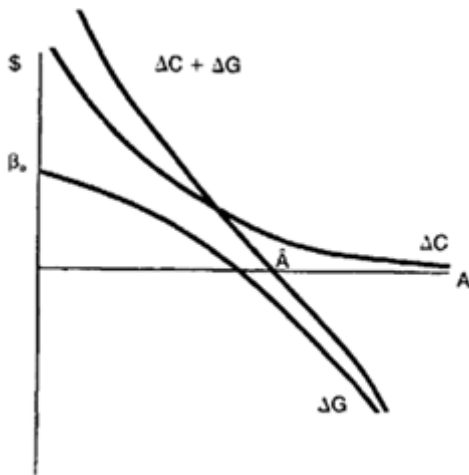


Fig. 2. The heuristic model.

B. Insights from the Heuristic Model

Williamson, first consider the choice of the internal organization and market organization cost of governance (ΔG), that impact on enterprise incentive and bureaucracy are relatively independent of the condition of asset specificity. Then, Williamson considered the cost of enterprise production or outsourcing. ΔC said under the condition of relatively static, enterprise independent production of a product rather than to buy the products in the market both the difference between the costs of production, namely, the make-or-buy. Finally, Williamson, compares the market organization the sum of the cost of production and enterprise production and management, enterprise's total cost difference and the total cost of the vertical integrated market organization, namely the $\Delta C + \Delta G$. Support

the following conclusions: (1) if the asset specificity to achieve the optimal minimum, market organization is minimum cost model, purchasing more beneficial from the market; (2) if the asset specificity is larger, the internal organization is minimum cost model, enterprise production better; (3) the value of the asset specificity, near A^{\wedge} no one model is significant (that is, it doesn't matter which model).

In conclusion, Williamson, from the angle of cost, discusses the boundary of enterprise and market, at the same time explained the enterprise the formation mechanism of the make-or-buy decision. Williamson, however, is under the condition of the premise of relatively static, assuming enterprise production cost and market transaction cost is equal to the heuristic model was established, however, in fact, the enterprise is in a continuous, dynamic, constantly changing environment, the enterprise production cost and market transaction cost is usually not consistent, therefore, Williamson's heuristic model may be more suitable for technology interdependence, strong continuity, innovation enterprise production process of low frequency, and can't explain the dynamic environment of Make-or-buy issue. Therefore, the enterprise can through independent innovation make up the difference between production cost and transaction cost, satisfy the Williamson's original hypothesis, the production cost and transaction cost are equal, so as to realize the enterprise internal economic production, or by maintaining a saving orientation, achieve vertical integration conditions? We will discuss further.

III. INNOVATION FROM THE PERSPECTIVE OF MAKE-OR-BUY DECISION

Under the dynamic environment, managers face a tricky problem of making reasonable production or outsourcing decisions, which fully reflects in the value chain activity of each link. In the external environment and competition under the double pressures of globalization, due to the limited resources endowment restrict, companies often unable to all the technology has its own, make-or-buy highlights the importance of the decision making process. Michael e. Porter pointed out that in the competition there are three correct competition strategies: total cost leading strategy (overall cost leadership), differentiation strategy (differentiation) and the target concentration strategy (focus) [10]; in order to remain in the fierce price competition profit increased, it is necessary to strengthen the control of cost advantage. From

this study make-or-buy of the whole process of decision-making, combining with the enterprise organization environment, using Porter's Value Chain theory [11], value chain inspection of enterprises in the main activities in

production and outsourcing cost, in order to make more efficient production or outsourcing decisions. Make-or-buy decision model in the value chain as shown in "Fig. 3" and "Table II":

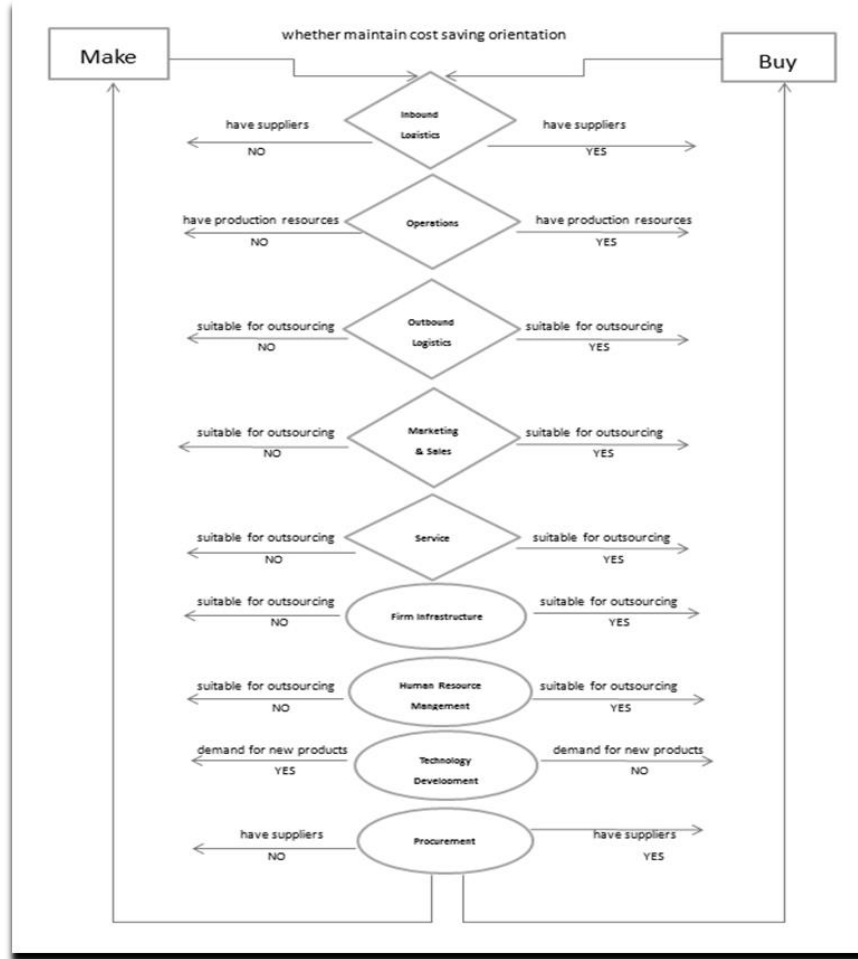


Fig. 3. The make-or-buy decision model on the value chain of strategic choice (Source: according to the literature).

TABLE I. MAKE-OR-BUY DECISION MODEL IN THE VALUE CHAIN COST INTENSITY CONTRAST

Value Activities		Make	Buy
Primary Activities	Inbound Logistics	++	++
	Operations	+++	+
	Outbound Logistics	0	+
	Marketing & Sales	0	+
	Service	0	+
Support Activities	Firm Infrastructure	0	+
	Human Resource Management	0	+
	Technology Development	+++	+
	Procurement	++	++

^a. Note: +++ very strong ++ strong, + weak, 0 none. Source: according to the literature.

"Fig. 3" shows that logistics, the production of the important parts in the value chain, to Make-or-buy decision making and the influence factors of enterprise independent innovation result is more, such as whether or not there are plenty of external suppliers, whether to have corresponding capacity resources can take advantage of the conditions and limits the outsourcing decision of enterprise independent

innovation. Usually, on the premise of enough resource suppliers, production capacity, the probability of enterprise will make independent innovation activities. In auxiliary activities, research and development, purchasing link to make-or-buy need to fully consider, whether the market is the precondition of research and development activities have a demand for new products. In the production of, shipping logistics, sales and after-sales service of these basic activities and auxiliary infrastructure, human resources management activities, can choose outsourcing or production and operation of independent innovation. Thus, Make-or-buy decision in every activity in the reaction strength is different, as shown in "Fig. 3".

IV. HEURISTIC MODEL INTEGRATED WITH INNOVATION

According to Potter's classical theory of value chain, we will analyze each link in the value chain in Make-or-buy decision to build a full range of Make-or-buy decision framework model. Studies suggest that overall, the make-or-buy decision bases on whether to maintain cost saving

orientation. With the Williamson to save the cost of production and puts forward the connotation of the asset specificity. Enterprise is the main reason of the existence because of asset specificity, it is the existence of asset specificity, will largely affect the enterprise on the choice of governance in the process of production or outsourcing decisions. As the uniqueness of all kinds of products and services more and more big, vertical integration and vertical integration become the inevitable requirement of enterprise survival development (Williamson, 1985). In order to make the make-or-buy gradually tends to zero, the difference

between the cost to achieve the purpose of saving the transaction cost, the enterprise needs to consider from the Angle of innovation in a dynamic environment of the make-or-buy decision making problems, explore how to make up for the outsourcing cost for independent innovation. Therefore, based on Williamson's model, we further integrate the heuristic model integrated with the effects of the innovation model, for the modern enterprises Make-or-buy decision provides the theoretical framework and innovation strategy (see "Fig. 4").

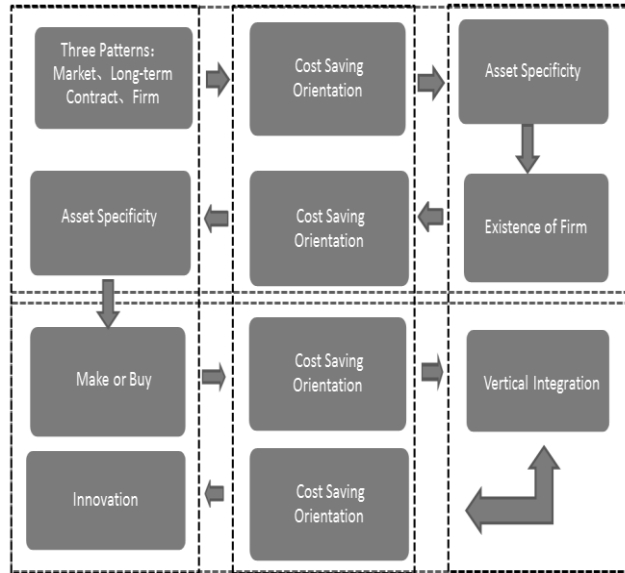


Fig. 4. The heuristic model integrated with innovation factors.

V. COMPREHENSIVE ANALYSIS OF THE INNOVATION IN THE MAKE-OR-BUY DECISION

It is worth noting that the Make-or-buy decision is a process in a systematic manner, of which all the factors affecting the activities are interrelated, affecting the final business decisions. Scholars at home and abroad based on the theory of multiple angle of view, from the multi-

dimensional and multi-level to influence the interpretation of factors in the Make-or-buy decision, they conclude the size of small or large companies, knowledge in to consideration in innovation strategy, knowledge specificity, communication among the companies, market-oriented innovation in competition, governance and contact risk affect technical level and so on, as shown in "Table II".

TABLE II. COMPREHENSIVE ANALYSIS OF FACTORS IN MAKE-OR-BUY DECISION

Theory/Factors	Authors	Conclusion
Size Risk and cost Transaction Cost Theory	R. Veugelers [12] Li [13] Pisano [14]	Small companies have single-aimed innovation strategy Large companies take acquiring internal and external knowledge into consideration in innovation strategy
Appropriateness of Knowledge Resources-based view Real option theory	Leiblein, M. J.[15] Wang [16] Xie [17]	Knowledge specificity and organizational resistance to changes can be negative for outsourcing decision
Absorptive competence Complementarities internal and external R&D Protection of intellectual property	Spithoven [18] V. Van de Vrande [19]	R&D intensity, formal and informal network relation influence and Make-or-buy decision
Open innovative process Dynamic competence view R&D intensity	M.G. Jacobides [20] Liu [21] Lin [22]	Small-and medium-sized companies tend to take open market-oriented innovation in competition; Culture and organization affect the interaction between firm and market
Transaction relation theory Knowledge-based view Human resources	Bai [23] Wieland, A [24] S.M. Mudambi [25]	Communication and cooperation among companies influence the flexibility of boundary of the companies
Company governance Risk of contract Value chain	Walker G [26] Hou [27] H. Odagiri [28]	Governance and contact risk affect technical level

VI. CONCLUSION

Companies have always been in a continuous dynamic business environment. Based on Williamson's classical heuristic model and discussions on the question of "make-or-buy" paradigm, we find that the original model hypothesis on "make-or-buy" strategic decision is in relatively static environment, and assuming that the cost of producing or that of outsourcing is the same, it does not comply with the actual business process. In the continuous dynamic environment, the cost of independent production or outsourcing is not consistent. Under the condition of flexible supposition, we fully consider that the role of independent innovation plays an important part in saving the cost of production. From the angle of innovation, the study discusses the Make-or-buy decision in every link of the value chain in dynamic environment. Then we further construct the heuristic model integrated with the innovation factors to illustrate the relationship among technical competence, learning ability, and knowledge base in the make-or-buy decision. In this paper, through literature analysis, the authors put forward some reasonable decision-making factors in the process like whether there are plenty of external suppliers, corresponding capacity resources, and suitable outsourcing conditions which all are important impacts on the make-or-buy decision to make more effective decisions.

Producing or outsourcing has its own advantages. In the fierce competitive environment, "make" by fully using their own resources for differentiating production capacity, for the long-term development of enterprises to provide a steady stream of innovation power. At the same time, production can also avoid the risk of "ripped off" market, the purpose of saving the transaction cost [29]. Whereas the outsourcing decision could share risks, release resources, reduce development costs [30], increase the flexibility of selection of product, to prevent the outdated technology, improve capital utilization rate of return, etc. In a dynamic environment, the enterprise should be based on their overall strategy, production resources, technology and knowledge base has been laid for the market demand conditions, such as accurate and effective to conform to the enterprise development strategy of Make-or-buy decision, improve the enterprise independent innovation ability to cope with market risk.

In conclusion, this study analyzes in a dynamic environment, rather than in the traditional institutional static context to explore the modern Make-or-buy decision problem, and integrates the innovation factors to Williamson's heuristic model. The authors join the innovation in the connotation of the original model dimension, with in-depth consideration of independent innovation in the make-or-buy decision, and construct the heuristic model, by providing a theoretical framework for corporate governance and corporate innovation. Future orientations for the related study are as follows. First, as a result of the limitation of samples and data acquisition, this article only builds the function with innovation factors in the make-or-buy decision in the conceptual model. Second, in the modern market environment, the endowment of each

enterprise's own resources conditions are not identical, facing the different complex and changeable internal and external environment. Therefore, in this paper, the process in the make-or-buy analysis is not comprehensive, future research should be comprehensive investigation, makes more detailed industry-specific researches.

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