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Value Chain Management Based on Open Innovation Strategy

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Abstract Global economy is experiencing a transition from industrial, product-centered to innovation, service-centered. The implementation of open innovation strategy requires us not only to exploit the core competence of the firm, but also to explore the core competence in the future. This paper integrates the views of firm development theory, real option theory and open innovation paradigm into one analytic framework. And then, some implications are provided in brief.

Keywords Value chain management; Open innovation; Economic rent

1 Introduction

Business in the 21th century will not be as the same as in the 20th century. Since network propelled by the internet and information technique are becoming the basis of economic activity and progress, the useful knowledge is becoming widespread across both large organization and small organizations. The costs of technology development are rising and product life cycles are becoming shorter. The combination of rising development costs and shortening market windows reduce the investment returns on the innovation investment. Part 2 give a brief review of firm development theory and give a synthetic structure of firm development model; Part 3 combine firm development model with real option theory; Part 4 extend the firm develop model according to open innovation paradigm, and put forward a value chain management model in an integrated framework; Part 5 is a conclusion.

2 The brief review of firm development theory

Marshall pioneered neo-classic economics by using supply and demand analysis tools to study a perfectly competitive market, firm to some extent is a "black box." Coase (1937) proposed the issue why firms exist. Many scholars tried to explain this phenomenon, there were transaction cost theory, agency theory and property rights theory. Transaction cost theory treat transaction costs as the basic unit of analysis; the existing issue of firms was attributed to their lower transaction costs than the market. Principal-agent theory broke through the Firm's "black box" point

of view; the firm is a contract knot among people in the organization. Property rights theory emphasizes that clear definition of property rights can reduce external issues. These theories nurtured and developed contract theory, Hart introduce the concept of asymmetric information to develop incomplete contract theory.

Bain (1956) put forward the famous "structure - conduct - performance" theory, which was the source of the theory of industrial organization. Porter's Five Forces model is industry analysis of industrial organization, which is also known as the Harvard School. Tirole and Shapiro introduced game theory, which was known as "new industrial organization theory." Arrow proposed information economics, reinforced the value of information, which is overlooked by neo-classical economics.

Chandler's research on the strategy and organization attracted the attention of scholars, while the " Anthony- Ansoff- Andrew paradigm" started a theory of modern strategic management research. Porter's theory of industrial organization analysis dominated in the 1980s. Wernerfelt started to explore the source of corporate competitive advantage, which was known as “a resource based view." A resource based view benefited from Schumpeter (1934) theory of innovation, as well as Penrose (1959) corporate growth theory.

There is also a path of non-mainstream theory of which evolved from the organization ecology theory. Hannam & Freeman (1977) used niche concept from bio-ecology to connect organization with environment. In 1982, Nelson and Winter published "Evolutionary Theory of Economic Change," based on limited rationality assumption they emphasized the importance of routines and path dependence.

In this paper, based on resource based view, combined with analytical methods of industrial organization, in accordance with the evolution point of view to explore the development of firms, we define firm development concepts and theoretical connotation from a perspective of economic rents.

2.1 Gaining rents is the fundamental motivation for value chain management

Firms are the searcher and the user of strategic resources, their goal is to get rents, that is, beyond the normal level of profit (Wernerfelt, 1984; Barney, 1986). The way to obtain rents: Firms sell products or services with a unique attraction for customers; firms sell the same products with lower price compared with competitors; causal relationship between the complexity and ambiguity; firms rely on market forces and strategies behavior for rents. There are two ways to use strategic resources for rents: one is the ability of the firm by taking possession of strategic resources in order to form isolation mechanism to gain rents; the other is the ability of the firm based on strategic resources to make strategic behavior in order to form the structural and behavioral entry barriers to gain rents.

2.2 Firm development model is the guidance of value chain management

Firms are facing uncertainty with limited rationality, and profit-maximization will not be the guidance of firms with the existence of uncertainty. Firm

development is based core competence development under the guidance of dominant logic. Firm development which is based on core competence includes two aspects: value appropriation of existing core competence, value creation from future core competence.

3 A firm development theory from the perspective of real option theory

Real options theory originated from the questioning about the net present value of traditional investment appraisal techniques from academics and practitioners. Myers (1977) first pointed out that when investments are highly uncertain project, the traditional net present value of the theory underestimated the actual investment. Myers suggested that financial option pricing techniques could be applied under uncertainty. Myers believes that an initial investment a company made in face of uncertainty will not only generate cash flow, but also gain a valuable “growth opportunities" for further investment, while the traditional net present value techniques ignore this part of value of growth option. As Kogut & Kulatilaka(1994) pointed, company has developed a mature evaluation tools of short-term performance , if an firm focused on long-term profit-making opportunities, it need make platform investment. Platform investment can be understood as growth option in order to obtain further investment. Kogut & Kulatilaka(1994) thought that the option-pricing techniques could be used to quantify such investments.

The initial investment under uncertainty can be deemed to have purchased a call option, option holder therefore have the right to wait for future growth. In this way, firms can control the lower bound of the risk and manage uncertainty to obtain the upper bound of benefits. If the "growth opportunity" does not appear, the lower bound of the risk of firm is only the initial investment; this part can be regarded as sunk costs, which can be regarded as the option fee. If "growth opportunities" appear, new investment can be considered as the implementation of the option, and exercise price is the amount of business further investment. In this way, corporate have two different assets: First, physical assets, whose market value are independent of firms and investment strategies; Second, real options, real options refers to opportunities to buy physical assets at the right time. Myers clearly pointed out that the value of real options is based on physical assets, like stock option is based on the underlying stock.

Trigeogis(1996) identify seven different real options. These are option to defer investment, option to alter operating scale, option to switch to use, option to abandon, corporate growth options, option to staged investment, multiple interacting options）. Here we can identify two of these options, operating option and growth option. Operating Options allow firms to scale their processes to suit business conditions (Trigeorgis 1996).The Growth option deals with the value of a follow-on investment. If a firm invests in new technology an option for a follow-on investment may be included, i.e. an option to upgrade the machinery or an option to develop new products. The Growth option deals with the value of a follow-on investment. If a firm invests in new technology an option for a follow-on

investment may be included.

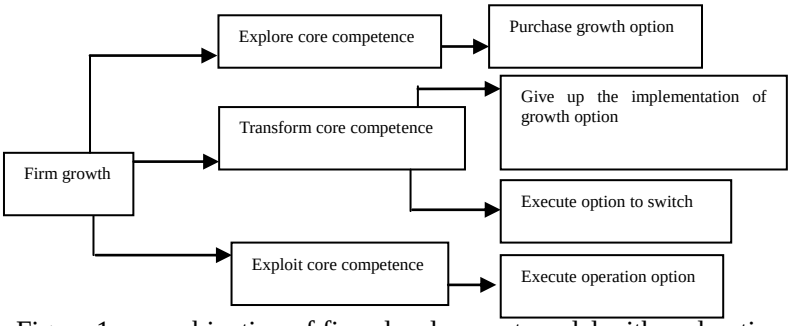


Figure 1: a combination of firm development model with real option theory

We need to combine organization and technology more closely to match the environment. Adaptive topography theory shows the existing allocation of organizational resources and technology resources in the multi-dimensional space.

Once a firm makes investment for searching resources and creating new knowledge, it means a series of real options appear. The search for appropriate resources can be done inside or outside the firm. This paper attempts to imbed real option theory into "a synthetic structure of firm development model ". It is easy for the firms in determined circumstance to make the right decisions, while firms need to carry out necessary exploration tests in front of uncertainty. If the evolution direction of firms is obvious, firms will focus on specific direction; if the evolution direction is inaccurate, firms need to pay the cost of exploration. With real options theory firms can measure the value of flexibility under uncertainty. This paper attempts to apply real option theory analysis to explore potential core competence in an uncertain environment.

While dominant logic is remain stable, firms will use operation options to gain value from managing flexibility that is to exploit the core competence; While the dominant logic is changing, firms will purchase growth options to explore the core competence in the future; if growth options are in line with the direction of the firms, firms will implement the growth option, if the growth option does not achieve the desired performance, firms will abandon the implementation of the Growth Option; when firms find the original dominant logic cannot adapt to the survival environment, firms will implement the option to switch, adjusting the integration modes of technology resources and organizational resources to a new dominant logic and core competence.Figure1 combine real option theory with the firm development model.

Real option theory can help managers to confirm the opportunity sets, identify and assess the value of the core competence. If a firm has a particular competitive advantage, there may be economic rent. Firms need to focus on competitive advantage which based on core competence to gain rents. If competitive advantage is temporary, economic rents will decrease over time. Firms need to make innovation investments to explore the new core competence. As the emerging markets, uncertainty involved in start-up firms is often related to a series of

investment decisions. R&D or pilot investments in emerging markets may not be too attractive, but for a later stage it is possible to reduce operating costs or pre-occupy the market.

4 Firm develop model based on the open innovation paradigm

Based on his study of firms practicing open innovation, Chesbrough concluded that industrial R&D was undergoing a ‘paradigm’ shift from closed to the open model. In contrast to ‘closed model’, Chesbrough argued: ’Open innovation is a paradigm that assumes that firms can and should use external and internal ideas and internal and external paths to market.’(Chesbrough 2003a).

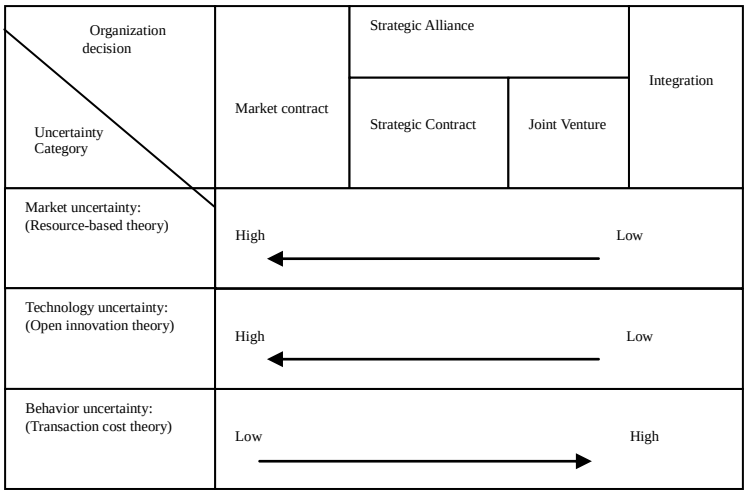
Chesbrough and Schwartz (2007) define open innovation as the "(...) use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively", (Chesbrough and Schwartz,2007: 55). The open innovation paradigm implies co-developmental partnerships, developing a mutual working relationship (versus the traditional defensive business strategy), and using external sources of knowledge. These partnerships might look for the delivery of a new product, technology, or service, to reduce R&D expenses (Chesbrough and Schwartz, 2007), to expand the innovation output and its impact, and even to open new markets which are otherwise inaccessible. Recent studies on innovation have stressed the growing relevance of external sources of knowledge and creativity (Perkmann and Walsh, 2007). These studies have showed that more than trusting their R&D labs, organizations should adopt the open innovation strategy (Chesbrough and Crowther, 2006). This means that innovation can be considered the result of knowledge networks connecting several organizations instead of a function within one organization (Coombs et al. 2003; Powell et al. 1996). In the same line of reasoning, the concept of interactive innovation was established to understand the non-linear, iterative and multi-agent nature of the innovation processes (Kline,1985; Lundvall, 1988;Von Hippel, 1988).

4.1 Open innovation is a strategy concerns both value appropriation and value creation

The firm is not considered to be exclusively aimed towards either value appropriation or value creation. In order to guarantee firm survival, there must be a period of time in which the firm may pursue value appropriation in order to grasp the fruits of its innovations. At the same time, value appropriation cannot alone guarantee the survival of firm in a hypercompetitive environment: there is the need to anticipate and make innovation investment for the value creation from the future. The creation of new rent flows: (a) developing new sets of resources and capabilities; (b) achieving a match between changing environmental conditions and distinctive organizational resources and competences.

4.2 Open innovation is a strategy which is value network driven and service centered

Table 1: An integrated analytical framework of VCM



Although a firm capture its own initiatives may be essential to the survival of the firm and the evolution of the business ecosystem. The nature of the firm is undergoing profound changes. The firm is shifting from a self-centered value creation and capture to one part of value networks. Providing services rather than just selling products contributes will be much more important to the survival and development of firms. The shift from "the value is in the stuff" to "the value is in the service the stuff provides" also may lead to a radical shift in the concept of ownership.

4.3 Value chain management model of an integrated framework

Open innovation paradigm focus on "technology uncertainty", while transaction theory focuses on "behavior uncertainty" and resource-based theory focus on "demand uncertainty". Synthesizing the transaction theory, open innovation theory and resourced-based theory, we can get an integrated analytical structure. These different theoretic perspectives don't conflict; they can be complementary. Table 1 is an integrated analytical structure that explains the relation between organization decision and the categories of uncertainties.

5 Conclusions

Value chain management is the management of economic rents flows through a network of different interests-relevant organizations. Value chain management involves coordination and collaboration throughout the value networks. A firm would better define the structure of the value chain, and then describe the position of the firm within the value network. Value appropriation or value creations are different means to gain economic rents. Value appropriation is based on the core competence in existence, while value creation is base on the searching for new core competence. Open innovation strategy has practically significance in the

hyper-competition and knowledge-based business ecology.

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