Int. J. Production Economics 129 (2011) 23–31

Contents lists available at ScienceDirect

Int. J. Production Economics

journal homepage: www.elsevier.com/locate/ijpe

Outsourcing versus joint venture from vendor's perspective

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ARTICLE INFO

Article history:
Received 29 January 2009
Accepted 13 August 2010
Available online 19 August 2010

Keywords:
Outsourcing
Joint venture
Net present value
Real options

ABSTRACT

Even though many studies have discussed outsourcing contracts from the client's perspective, little research has been done from the vendor's perspective. In this paper, we consider a vendor's outsourcing contract decision-making process, during which the market price and the vendor's operation cost are uncertain. This paper develops real option models to investigate whether a vendor firm should sign an outsourcing contract from its client or establish a joint venture with this client. Our results show that, while the feasibility of an outsourcing contract to the vendor increases with a higher contract price offered by the client, the feasibility of a joint venture depends on market conditions. We also find that there are loss-by-acceptance regions, in which either an outsourcing or a joint venture contract is currently feasible to start, but a vendor may sustain a loss by accepting such a contract.

1. Introduction

Strategic alliance among different firms has been highlighted in both literature and practice. Cooperating with other firms can attain many benefits, such as ease of market access, cost reduction, operational efficiency, capacity pooling and access to external expertise or technology advantages. According to Hamel et al. (1989), even competitive collaboration between competitors can strengthen both firms against outsiders.

Inter-firm collaboration can be contracted in many different forms, such as joint-venture, outsourcing, product licensing and cooperative research. In this research, we are interested in two strategic alliances: outsourcing and joint venture. In an outsourcing contract, a client externalizes its previous in-house operational or technological activities to a vendor and then purchases the outsourcing service from this vendor. For example, to compete against Japanese companies Matsushita, Sanyo and Sharp in 1980s, GE contracted out the production of microwave ovens to Samsung in South Korea because this Korean vendor could perform the manufacturing operations at a lower cost (Domberger, 1998). To form a joint venture, the client and its vendor(s) proportionally share some of their resources, capabilities and profits. For example, US Steel and two Asian vendors, POSCO and SeAH Steel, established a joint venture with shares of 35%, 35% and 30% in 2008.

Thus far, most research has been mainly focused on the client's side while overlooking the vendor's standpoint (Levina and Ross, 2003; Jiang et al., 2008a). Evaluating the feasibility of a contract is challenging for a vendor, because the vendor's operation cost is not usually constant over the duration of a contract due to fluctuations in the exchange rate, labor wage policy changes and hyperinflation conditions (Austin, 2002; Li and Kouvelis, 1999; Chopra and Sodhi, 2004). In addition, the market price keeps fluctuating over time. Under such an uncertain environment, different alliance strategies may result in different outputs to a vendor. This article develops valuation models incorporating cost and price uncertainties and compares different contracts from the vendor's perspective.

As representative schemes of alliance contracts, fixed-price outsourcing contract and joint-venture contract are compared in this research. In a fixed-price outsourcing contract, the client externalizes its previous in-house activities to the vendor and acquires the relevant output by paying a fixed price. In a joint venture, the client is responsible for paying the vendor a share of the cost as well as requires a share of the revenue. More importantly from the vendor's perspective, in the case of fixed-price outsourcing, a certain amount of revenue is guaranteed from the client. However, after contracting a joint venture, the vendor must be ready to suffer possible losses due to revenue and cost uncertainties.

For these reasons, we first develop valuation models under uncertainties from the vendor's perspective and then compare the two contracts in regards to which one becomes feasible and how the vendor should make a decision. Section 2 provides the literature review. Section 3 establishes the real options related models. Section 4 studies vendor's value under each contract and discusses each contract's feasibility based on an optimal exercise threshold of the contract. Section 5 compares two contracts and explores the main difference in vendor's decision making between the traditional approach, net present value (NPV) method and the real options theory (ROT) approach. Section 6 summarizes this research with managerial implications and suggests further studies.

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doi:10.1016/j.ijpe.2010.08.006

2. Literature review

The majority of research on outsourcing is focused on the client's side, and the vendor's aspect is rarely examined. However, recent studies have discussed how organizational relationships and different contractual structures affect outsourcing outcomes and emphasized the importance of investigating the vendor's concerns (Kern et al., 2002; Levina and Ross, 2003; Jiang et al., 2008b). For example, the case study by Kern et al. (2002) illustrates "the winner's curse" from the vendor's side: in order to win a client's outsourcing contract bid, a vendor may bid at an extremely low price, which may be even lower than the vendor's operation cost that leads to a loss.

Jeffery and Leliveld (2004) report that most vendors are using the traditional NPV approach to evaluate outsourcing contracts. If the NPV is positive, the project is worthwhile and should be pursued; if it is negative, the project should be turned down. For example, Dayanand and Padman (2001) use the standard NPV approach to study the progress payments problem of outsourcing contracts. In recent years, many researchers have criticized that the NPV based decision making can miss the additional value of managerial flexibility, which results from such an option: firms may exercise the investment opportunity or hold the opportunity for some length of time (Brennan and Schwartz, 1985; Dixit, 1989; McGrath, 1997). This option makes the exercise timing an important factor in decision making. For this reason, Dixit and Pindyck (1994) apply the real options theory (ROT) to discuss the optimal exercise timing in a framework of investment irreversibility and uncertainty, and point out the parallels between an investment opportunity and a "call option", which gives an investor the right to acquire an asset of uncertain future value.

The vendor's option to exercise a contract is not obvious (Jiang et al., 2008a). In fact, a contract's exercise timing usually is out of the vendor's control. It is rare that a client would hold a contract to wait for the vendor's optimal time to exercise it. When the vendor signs a contract, the vendor has agreed to exercise it at a given time. From the ROT perspective, however, exercising a contract at the given time enforces the vendor to give up the option to wait (Jiang et al., 2008b). Because losing the option to wait could expose the investor (vendor) under a potential loss of money (Luehrman, 1998; Zhu and Weyant, 2003), it is a commonly agreed principle in financial economics that no exercise should take place unless its net benefits at least compensate for the loss of "value of waiting" (Huchzermeier and Loch, 2001). In order words, NPV larger than zero is not the critical point of investment, but NPV larger than the value of the lost option is (Pindyck, 1991; Trigeorgis, 1993). Since a vendor who has to exercise a contract at a given time is no longer hedged by its option to wait, the vendor must make up this lost option value.

In outsourcing literature, the application of ROT has been booming. For example, Johnstone (2002) treats outsourcing as a call option for the public sector and use the cost of purchasing as the strike price. If the in-house operating cost is higher than the purchasing cost in the open market, this public sector should outsource its former in-house activities. Nembhard et al. (2003) address the same issue: the bottom-line cost (strike price) associated with an outsourcing decision (option). Alvarez and Stenbacka (2007) use the level of market uncertainty as the strike price, in order to decide an organization's production mode—partial or complete outsourcing. In the outsourcing process, there is no doubt that clients play an active role by deciding whether to outsource, when to outsource and how much/many to outsource. Therefore, it is a straight forward study to look at outsourcing as an option of clients. In the current literature of outsourcing, most ROT-related studies treat outsourcing as an option in clients' hand.

Different from the aforementioned studies, our research investigates two different alliance contracts (outsourcing and joint venture) with the consideration of vendor's option to wait. Thus, we develop real option models and reveal when the contract becomes feasible and how the appropriate alliance strategy can be selected.

3. Model settings

We consider a vendor who is facing two possible alliance contracts from a client: an outsourcing contract and a joint venture contract. The vendor's product cost is C_t over the contract duration D. The product is sold by the client to a market at an exogenous market price P_t. Here, C_t and P_t, evolve uncertainties over time as geometric Brownian motions (GBM), the continuous-time formulations of the random walk. This is the standard setting in the real options theory and also a good approximation for uncertainties (Dixit, 1989; Dixit and Pindyck, 1994; Abel and Eberly, 1994; Alvarez and Stenbacka, 2007). Specifically,

$$dC_t = \mu_C C_t\, dt + \sigma_C C_t\, dz_C,$$

$$dP_t = \mu_p P_t\, dt + \sigma_p P_t\, dz_p,$$

where dz_C or dz_P is the increment of standard Wiener process for cost or price; μ_C or μ_P the shift rate of expected future change for cost or price; σ_C or σ_p the uncertainty rate of such a process for cost or price with the correlation, $E[dz_C dz_P] = v dt$.

3.1. Model for an outsourcing contract

We represent the time when the vendor exercises the contract is t_0. Suppose that under the outsourcing contract, the client pays a fixed outsourcing service price P_O to the vendor over the contract duration D, i.e., from the contract starting time t_0 to ending time t_0+D. Such an outsourcing contract's net present value (NPV) to the vendor is

$$\Phi_{t_0} = E\left[\int_{t_0}^{t_0+D} (P_O - C_t) e^{-\rho(t-t_0)}\, dt\right] = P_O \frac{1-e^{-\rho D}}{\rho} - C_{t_0} \frac{1-e^{-(\rho-\mu_C)D}}{\rho-\mu_C}$$

where ρ is the discount rate. Assume $\rho > \mu_C$, $\rho > \mu_P$ for convergence.

Before undertaking a contract, the vendor has the option to exercise this contract or just wait. As a result, the real option value reflects more accurately the value of an exercise opportunity by considering a value of option to wait than the standard NPV does (Benaroch, 2002). The real option value at t_0 can be described by the standard real options expression:

$$F_O(t_0) = \max_{T \geq t_0} [\Phi_T^+ e^{-\rho(T-t_0)}],$$

where $X^+ = \max(X,0)$, reflecting the essence of an option. The vendor hopes to maximize its real option value at t_0 by selecting the optimal exercise time T in the future. By definition, there is no obligation to exercise an option, and the value of option to wait is always non-negative. For example, if the standard NPV is negative at t_0, the NPV method recommends to give up the investment forever, while the ROT method suggests that a firm should not invest at the time t_0 but wait until an optimal time $T \geq t_0$, which may be an 'infinitely wait' implying the optimal time $T = \infty$.

Solving the vendor's maximum real option value $F_O(t_0)$ (see Appendix A), we have the following vendor's value function:

$$F_O(P_O, C_{t_0}) = \begin{cases} P_O \frac{1-e^{-\rho D}}{\rho} - C_{t_0} \frac{1-e^{-(\rho-\mu_C)D}}{\rho-\mu_C}, & C_{t_0} \leq C^* \\ A_1 C_{t_0}^{\beta_{O1}}, & C_{t_0} > C^* \end{cases} \tag{1}$$

where

$$C^* = \frac{\beta_{O1}}{\beta_{O1}-1} \left(P_O \frac{1-e^{-\rho D}}{\rho}\right) \frac{\rho-\mu_C}{1-e^{-(\rho-\mu_C)D}},$$