Characteristics of IT Outsourcing Contracts

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Abstract

Once the decision to outsource an activity has been made, managers are faced with issues related to the management of the relationship with their service providers. A critical element of relationship management is the contract itself, which defines, more or less completely, the nature of the services to be rendered and of the relationship itself. In this paper, we rely on transaction cost theory to develop a series of propositions on the relationship between the characteristics of the transaction - asset specificity, number of suppliers, measurement problems, uncertainty, and permanent character of the contract - and the level of contract completeness. A survey of 200 firms was conducted to test the propositions.

1. Introduction

Outsourcing of Information Technology services maintains its presence on the top list of managerial issues. During recent years though, management concerns regarding outsourcing have become more complex, shifting from questions such as: "Should we outsource?" to "How should we outsource?" and "How should we manage the client-vendor relationship?". In order to address this question, this paper focuses on the machinery of contracts used to support information technology outsourcing. Transaction cost theory has been widely used to examine the make-or-buy decision: the choice of a particular governance mode to manage a given set of transactions. However, it has seldom been used to shed light on the structure and richness of contracts.

The works of Joskow [9,10]; Crocker and Masten [5]; Crocker and Reynolds [6]; Adler et al. [1] and Saussier [21] are examples of such efforts. We briefly review these contributions in the general theoretical framework of transaction cost theory. We then propose a modelling strategy inspired by Crocker and Reynolds [6] which aims at identifying the drivers of the optimal level of completeness of IT outsourcing contracts. The drivers are largely borrowed from previous work done in transaction cost theory. However, we differ from the preceding literature by our use of an important sample of enterprises from a broad cross-section of industrial sectors, whereas previous studies focused on a particular industrial sector – e.g., the energy sector, or the defence procurement sector.

2. Theoretical Framework

An important strand of research has examined the make-or-buy decision using transaction costs theory. Its foundation was laid by Coase [4] who positioned the market and the firm as alternative mechanisms that could be chosen to conduct a transaction. The theory has been refined and used extensively in the last twenty years. According to transaction costs theory, the decision to use the market or the firm to regulate a transaction depends primarily on three variables [13,24]:

(1) Specificity of the assets required to produce the good
(2) Uncertainty and measurement problems surrounding the transaction
(3) Frequency of the transaction

These considerations constitute deviations from the ideal situation of a perfectly competitive spot market transaction where all goods are available, all information is public knowledge, and all transactions are performed instantly. When transacting is impaired by the presence of conditions (1)-(3), the benefits of using the market are substantially reduced and, beyond a certain threshold, then lead a party to internalize the transaction [13,24].

Empirically, the majority of studies using transaction costs theory focused on the make or buy decision, whether the transaction was conducted in-house or on a market. Most dependent variables were dichotomous, reflecting a yes/no decision toward outsourcing (for example: [2, 12, 14, 18, 19, 22]. Some researchers used the portion of the firm's budget allocated to the internal provision of a given service divided by the overall budget allotted to the service [11,16]. In these studies, the most widely probed independent variables are asset specificity and uncertainty. Frequency was rarely used. These three variables are presented in sequence in the following paragraphs.

Asset specificity has received a lot of attention from researchers [24] whenever the value of an asset is linked to a specific transaction (meaning that its next best use is less valuable than its primary use), it creates a lock-in situation where a party could extract a quasi-rent[1] from the other party involved in the transaction. This motivates the internalization of the transaction. The role of asset specificity has been supported by studies in various fields, for example: auto parts, aerospace, and aluminium [8, 12, 14, 23].

A basic assumption of transaction cost theory is that for a transaction to be conducted on the market, the parties ought to be able to evaluate the elements exchanged, in quantity and quality. If the deliverables cannot be defined *ex ante* with enough precision and clarity, the transaction process is complicated or hampered. Uncertainty may also prevent the establishment of long term contract (a traditional remedy for asset specificity). In these cases, internal governance will be preferred. Empirical studies showed that uncertainty played a key role in the choice of a governance mode [2,12,23] and interacted with asset specificity [15]. Recently, empirical studies also supported the agency proposition that the measurability of the transactions strongly increases the probability of outsourcing decisions by reducing the cost of using market mechanisms [19].

[1]A quasi-rent is the difference between the value of an asset in its best use and the value it takes in its second best use. [18, p. 159].

Finally, organizing a transaction inside a firm implies creating a governance structure, which means incurring important and irreversible costs. If a transaction is known to be unique, the firm will prefer to bear the risk associated with specific assets or uncertainty rather than to invest in order to internalize a single transaction. Internal organization is only efficient for recurrent transactions [24]. Pisano [18] considered the idea of frequency. Companies conducted in-house activities for which they could use the expertise frequently, on a regular basis. They used external suppliers for activities requiring expertise used infrequently.

3. Contracting

A number of studies have focused on the governance institution chosen for a transaction but have not considered the machinery of the governance mode itself. In fact, as Hennart [7] described it, there are differences between the institution itself (market or hierarchy) and the mechanisms used to regulate the transaction. Each institution uses mechanisms associated with the other one. For example, payment can be tied to production for an employee within a firm. Conversely, committees or quasi-managerial supervision can be used in a relationship with a supplier. Contracts, which support the institution of the market, often incorporate behaviour constraints as well as incentives [7]. There is therefore a lack of research on the choice and design of contract mechanisms instead of the institutional choice solely.

In the past, some authors have looked into this problem by empirically examining the contract structure and its link with the transaction costs theory variables. Among those authors, Joskow [9,10] studied the duration of the contracts between coal suppliers and electricity producers in the US. In particular, the results strongly support the transaction cost hypothesis related to the specificity of assets implied in the transaction (physical, site and dedicated asset): contracts are significantly longer when assets are more specific [9]. This result reflects the importance of having a long term relationship with a supplier, when highly specific investments are needed.

Crocker and Masten [5] developed and empirically tested a theoretical model of contract choice (incentives clauses, price provision, and contract length), reflecting

the trade-off between the marginal cost and benefits of contracting. They also measured the distortion in contract terms associated with price regulation in the natural gas market. Their results clearly show that the fear of being locked in a contractual relation (lack of alternative sellers) increases the length of the relationship between client and supplier as well as the use of incentives clauses (take-or-pay obligations). The results also indicate that uncertainty has the reverse effect. Also, price regulation is found to introduce distortions in the contract design, by reducing the contract length and leading to a sub-optimal use of take-or-pay obligations (incentive clauses).

In a more recent study, Crocker and Masten [5] examined contracts between sellers and buyers of natural gas, in order to analyse the use of different price adjustment processes (from the more rigid to the more flexible). Their hypothesis is that the choice of more flexible contracts, which allow price adjustment, is the result of an arbitrage between the advantage of having an open-ended agreement (reduction of contracting costs) and the cost of these flexible contracts (seller opportunism). They also analyse how the decision of having incentives clauses (take-or-pay clauses and longer contracts) influences the flexibility of the contract used. Their results suggest that by reducing the risk of opportunism with incentives clauses (longer contract and increased take-or-pay obligations), firms can choose more flexible price provisions in their contract (provision for re-negotiation, and flexible price adjustment). Firms can therefore more efficiently face uncertain environments.

Crocker and Reynolds [6] studied the impact of transactional characteristics on the design of Air Force engine procurement contracts by the Department of Defence. They developed a measure of contact incompleteness, defined as the facility of adjustment of price provision. For instance, a contract with a "fixed-price incentive with successive adjustments" is considered as very incomplete since the agreement does not constrain the supplier's behaviour against opportunism, while a "firm-fixed price" constrains this type of behaviour by according no negotiations *ex post* and is thus complete. Using and ordered probit model, they found that variables increasing the likelihood of opportunistic behaviour, such has the past experience of the supplier and the availability of alternative suppliers, reduce the incompleteness level. On the other hand, uncertainty variables were found to significantly increase the incompleteness of the contract, since they increase the cost of contracting. This reflects the trade-off between the benefits and the costs of writing a complete contract.

Adler et al. [1] tested a typology of contracts using data from US Defence. They were able to predict the type of contract (fixed-price, incentive, cost-plus) using transaction cost variables. More specifically, they used measures for the specificity of assets, for uncertainty and for contract incompleteness (measured by its complexity, its explicitness and the design additions) to classify contracts into three types, using discriminant analysis. Their results tend to support transaction cost theory, since the transactional and contractual characteristics effectively help classify the contracts in the three categories.

Finally, Saussier [21] used contracts between Electricité de France and its coal carriers to explain contract incompleteness using transaction cost theory variables. They calculate a measure of the incompleteness of contract by classifying contract clauses into six categories, related to the quantities, the penalties, the indexation of price and the renegotiation process. By observing different characteristics of the transaction (equipment used, value of the site, and various dummy events), Saussier [21] estimated an ordered logit model to analyse the impact of the specificity and the uncertainty of transactions on the completeness level of contract observed. The results indicated that firms choose the completeness level of their contract by minimising the transaction costs.

4. Optimal Contracting

Our theoretical model is borrowed from Crocker and Reynolds [6]; and Saussier [21], who described the contractual design decision as a trade-off between the marginal benefits and the marginal costs of contractual completeness. As they did, we posit that when firms decide to outsource some or all of their IT activities, they choose an optimal level of contact completeness in a world fraught with uncertainty. The model developed below exposes the process of minimisation of transaction costs leading to the design of this optimal contract.

According to Perry [17], a contract is incomplete if "it fails to specify performance obligations for the parties in all states of nature, or fails to specify the nature of the performance itself" [17, p. 221]. A criterion to judge the level of completeness of contracts is to evaluate the probability (*p)* that a contingency not expressly covered by the agreement may arise [6]. A contract is thus complete if (1 - *p*) equals to one (i.e., the probability equals to unity), and is very incomplete if it is close to zero.

According to Williamson [24], transaction costs occur on the one hand because the unforeseeable nature of the environment implies some contractual costs of writing and enforcing a complete contract. Thus, given a certain level of uncertainty, the more complete, sophisticated and rich the contract is, the greater are the *contractual costs*. These costs are therefore an increasing function of the uncertainty level of the transaction. On the other hand, transaction costs come from the possible opportunism of the supplier, who can take advantage of the contract incompleteness to reduce his effort *ex ante* or *ex post* (moral hazard and adverse selection problems). In fact, there is always some risk associated with a contract, since many unforeseen events can occur which might lessen the benefits of the outsourcing contract [3].

Transaction and contractual characteristics have a direct impact on contractual risk exposure. Strategic contracting deals with risk management by either reducing the probability of occurrence of an undesirable outcome, or by cutting the losses of such an outcome. Crafting, designing, negotiating and implementing a contract that will minimize the risk exposure of the client for a given level of benefits is an art. Efficient contracts structure the relationship between the client and the supplier in ways that are beneficial to both. The examination of outsourcing contracts reveals that many clients purposively try to manage the risk involved in outsourcing using contractual mechanisms [3].

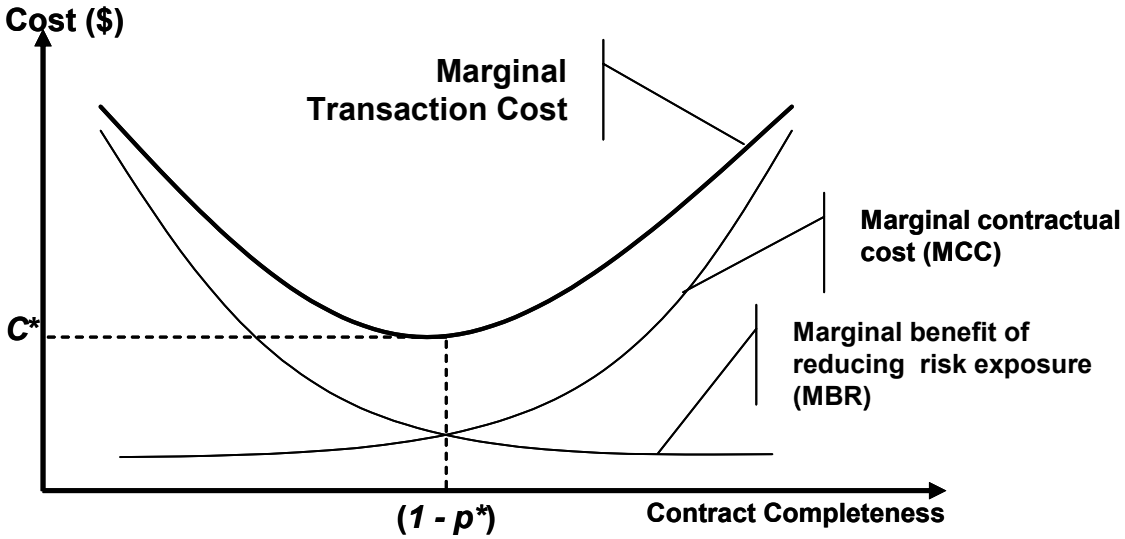

Figure 1. Contract completeness and associated costs

One distinctive feature of IT outsourcing contracts is the fact that the governance modes chosen go from complete outsourcing to complete internalisation, and a mixed governance mode of IT activities. A company can outsource a single activity or sign a permanent contract. In terms of risk analysis, we posit that firms have the ability to change the potential severity of negative consequences, by using an occasional contractual relation. The choice or decision of using a permanent outsourcing contract is thus a function of firms' organisational needs and the expected losses associated with negative consequences.

The expected result is quite intuitive: firms increase their protection against contractual hazards by reducing their contract incompleteness until the marginal cost of risk exposure ($\phi(1-p)$) equals the marginal benefited associated with a reduction in risk exposure ($\varphi(1-p)$). For instance, in order to reduce the probabilities of negative consequences (or sometimes reduce the impact of these events), the parties can include contingencies for different outcomes, arbitration mechanisms, termination conditions, sequential contracting mechanisms, or other contract clauses to reduce their risk exposure. All these clauses are costly to negotiate, to implement, and to manage [24]. Therefore, parties will have to compromise between the level of risk they are supporting and the level of completeness of the contract they accept to aim for. Figure 1 captures this key insight.

There are situations where no contract clause can be agreed upon, for example in situations where uncertainty is extreme, and where the risk exposure associated with such a contract – totally open – would be very high. This example describes a situation where the expected marginal transaction cost is so high that the organisation believes that it can organise internally the transaction (in a simple two-alternative world) more efficiently[2]. In these cases the organisation will revert to internal provision and use employment contract (totally incomplete), thus avoiding the risk associated with outsourcing these activities.

5. Research Propositions

The framework illustrated in Figure 1 allows us to derive the following propositions linking contract structure, completeness, and richness to various transaction characteristics.

Since we do not observe the expected transaction cost, we must assume the transaction cost theory effectiveness hypothesis, i.e., that the observed contract completeness corresponds to the optimal level given the transactional characteristics of the IT activities included in the contract. Thus, we use transaction cost theory as a maintained hypothesis in our empirical work. In Figure 1, this point is reached when the marginal cost of contracting equals the marginal benefit associated with reducing risk exposure. However, this choice of contract completeness would be different if the environment were to become more uncertain. This would result in an increase of contractual costs and a less complete contract. In this research we compare different combinations of transactional characteristics that should result in different completeness levels. The three following propositions concern the explanation of these differences in optimal contract equilibrium.

Proposition 1. An increase of the uncertainty level in the environment shifts the marginal cost of contracting up, and reduces the optimal contractual completeness.

Complexity and volume uncertainty will make contract clauses more difficult to write, simply because these activities will be more complex to describe and more difficult to predict. Following proposition 1, these two variables should thus reduce contract completeness by increasing contractual costs (net negative effect).

On the other hand, highly predictable or easy to measure activities will make complete contracting easier. Lack of uncertainty means that parties will be able to predict what services will be delivered over the duration of the contract. Similarly, increased measurability will mean that more measures and better ones will be included in the contract, in a way that makes the supplier performance will be more observable and verifiable. Therefore, both measurability and lack of uncertainty will lead to more complete contracts, since this will decrease the marginal cost of contracting (net positive effect).

Proposition 2. An increase in the idiosyncratic level of the buyer-supplier relationship shifts up the marginal benefit of reducing exposure, and extends the optimal contractual completeness.

Proposition 2 implies that whereas the more unique the supply relation, the higher the probability of negative consequences. This uniqueness (or the idiosyncratic level) is measured by the specificity of the investments in human and physical assets and by the number of potential alternative suppliers.

[2] This analysis returns to the make-or-buy framework presented before.

Activities for which there is a large number of potential suppliers will be less risky to outsource, simply because an unsatisfactory performance of a supplier does not have to be tolerated. The fact that suppliers know that they can be replaced can be sufficient to motivate them to provide an adequate level of service [20]. Therefore, the easier it is to replace a supplier, the less firms are exposed to contractual risk and the less complete the contract needs to be (net negative effect).

However, high specific investment in human or physical asset increases the risk exposure of the buyer, because these investments increase the uniqueness of the relation. The contract cannot be transferred to another supplier without significant loss of value. The buyer and the supplier are therefore locked in a classical bilateral monopoly relation. This exposes the buyer to the possible opportunism of the supplier, who can for instance renegotiate *ex post* the price and other contract clauses at his advantage. Thus, by increasing the probability of negative consequences, the specificity level of assets increases the optimal contract completeness (net positive effect). In our model, two variables measure the specificity of assets. In the first case, the variable *specificity* evaluates globally the next-best-use value of assets (human and physical) used in the transaction, since high specific investments reduce the value of assets outside the transaction.

Proposition 3. An increase in the permanent character of the outsourcing contract shifts up the marginal benefit of reducing of risk exposure curve, and extends the optimal degree of contractual completeness.

This third proposition is linked to the expected impact of the severity of negative consequences on the level of risk exposure. In order to measure the severity, we used a variable that characterises a contract as either permanent or occasional. An outsourcing contract is defined as permanent if the agreement is characterised by a complete transfer of the activity to the supplier. On the other hand, a contract is considered occasional if it is used as a support for transition (between two system platforms), as a help to resolve internal technical problems, or as a temporary increase of the internal capacity of the firm. Therefore, firms that have a permanent outsourcing contract are potentially exposed to more severe negative consequences since they rely more heavily on the effort of the supplier to perform their IT services. This represents a more important commitment from the firm, which is engaged in the outsourcing relationship for a longer term horizon. Therefore, by having a permanent contractual relation with a supplier, firms need to have a more complete contract (net positive effect).

6. Measures

For this study, the completeness level of IT contracts is broadly defined by its capacity to describe the performance to be reached and to incite the supplier to reach it, and by the establishment of adjustment and conflict resolution procedures. This definition refers to Williamson's "protective safeguards", which implied realignment of incentives efforts, a forum for dispute resolution, and mechanisms to facilitate adaptation and continuity [25, p. 146-147]. The following mechanisms were evaluated for each contract:

- An option for renewal of the contract
- Stipulated cost reductions over time
- Penalties for under-performance
- Contract termination clause for under-performance
- Bonus for outstanding performance
- Detailed performance targets
- Private arbitration
- Gain-sharing provisions between buyer and supplier
- Renegotiation "windows" (pre-specified periods at which buyer and supplier agree to renegotiate some features of the agreement)

Therefore, the level of completeness of the contract was evaluated on a scale ranging from zero (no feature selected) to nine (all features selected).

Respondents were also asked to describe their outsourcing contract. Contracts could include three types of activities: IT management, IT operations, IT maintenance. Appendix 1 describes each group and provides descriptive information about the level of outsourcing observed. For each of the activities listed in the Appendix, apart from the governance mode, respondents were also asked to evaluate on a scale from 1 to 7 the following variables: asset specificity, uncertainty, and measurability. A definition of each

term was provided with the questionnaire. Averages were computed for each category. Since we specifically questioned respondents about outsourced activities in a specific contract, respondents indicated for which groups of activities they were describing the contract's features. Therefore, we were able to match the contract with the appropriate activity descriptions.

7. Survey Methodology

The database used has been collected doing an extensive survey about IT outsourcing decisions of Canadian firms. A questionnaire was mailed to IT senior persons working in 1496 different organizations. No prior contact had been made with the respondents. Of these, 200 returned a completed questionnaire, leading to a response rate of 13.3%. Respondents belonged to a wide variety of industrial sectors, representing the Canadian industrial composition. The most heavily represented sectors were manufacturing and financial sectors.

8. Results

In order to test the model, the following regression was estimated.

$$\text{Completeness of the contract} = \beta_0 + \beta_{1*} \text{measurement problems} + \beta_{2*}\text{uncertainty} + \beta_{3*} \text{asset specificity} + \beta_{4*} \text{Number of suppliers} + \beta_{5*} \text{Permanent character of contract}$$

The regression produced significant results (R-square is 19%). The beta coefficients are shown in Table 1.

Table 1. Regression results

	Unstandardized coefficients		Standardized coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	2.252	.749		3.008	.003
Measurement problems	-0.461	.126	-0.275	-3.666	.000
Uncertainty	-0.343	.156	-0.174	-2.200	.029
Asset specificity	-0.079	.102	-0.063	-0.773	.441
Number of suppliers	-0.191	.120	-0.116	-1.585	.115
Permanent character	1.006	.341	0.219	2.950	.004

Results shown in Table 1 suggest that propositions 1 and 3 are supported. Higher uncertainty and lesser measurability (more measurement problems) lead to less complete contracts. Both coefficients are in the expected direction and significant at the $p<0.05$ level. Also, permanent outsourcing is associated with more complete contracts than temporary outsourcing. Organizations signing temporary contracts do not invest as much effort in increasing the level of completeness of the contract as companies signing permanent arrangements.

Proposition 2 was not supported. Asset specificity does not appear to lead to more complete contracts. The coefficient is not significant. When evaluating the number of suppliers, a proxy for asset specificity which has been widely used in the past, the results are also inconclusive.

9. Discussion and conclusion

The results confirm the general relationship presented in Figure 1. Organizations appear to arbitrate between the costs associated with the level of contract completeness and the risk they accept to bear for the same contract. Therefore, the optimal completeness level is the result of a trade-off between the costs of writing a complete contract and the expected costs associated with the level of risk exposure.

It seems that this is especially true for the uncertainty and measurability variables, which have both a significant impact on the completeness level of contracts. A contract for which activities would be hard to predict or difficult to measure would incite the firms to choose a form of contract that is more incomplete, since the cost of writing a complete agreement is too high. In addition, the permanent character of the relation seems to be an important variable explaining the completeness of contractual relationships. The results clearly show that when a contractual relation is permanent, firms need more complete contracts. This reflects the fact that by entering into a permanent outsourcing relation, firms increase the severity of the possible negative consequences they might face and so their risk exposure. The permanent agreements therefore call for a greater risk protection, which is not the case of occasional ones.

However, asset specificity (or the often associated number of potential suppliers) does not seem to explain very well the completeness of the contract. In the results, neither variables have a significant impact on the level of completeness of the contract.

The results obtained here open avenues for future research. The first would be a refinement of measures. In particular, the measure used here for the level of completeness of contracts did not include many components related to the capacity of the client to describe the performance to be reached. Rather, it mostly included means to incite the supplier to reach performance levels, as well as adjustment and conflict resolution procedures. In addition, the degree of completeness of the contract was obtained by counting the number of features present in a given contract. A more refined measure of contract completeness is called for. A second avenue would be to pursue the exploration of the model by examining the relationship between the variables already present in the model and the degree of success of the outsourcing endeavour. Indeed, firms outsource IT operations in order to obtain benefits, and contract characteristics constitute an important element which should contribute to getting these benefits.

The study of contractual mechanisms in IT outsourcing is still in its early stages. More research in this area would indeed help firms be in a better position to manage their relationship with their suppliers, and in doing so, help them alleviate the negative outcomes often associated with outsourcing.

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Appendix 1 – Activities outsourced

Descriptive Statistics

	N	% outsourced	Std. Deviation
IT Operation Management			
Scheduling of applications	194	0.14	0.35
Control of operations	196	0.13	0.34
IT Operations			
Operation of applications	197	0.17	0.37
Operation of Operating system	199	0.23	0.42
CPU Operation	197	0.23	0.42
Operation of client/server systems	174	0.18	0.38
Operation of telecom. software	181	0.28	0.45
Printer operation	199	0.16	0.37
Maintenance activities			
Operating system maintenance	191	0.75	0.43
Hardware maintenance	191	0.62	0.49
PC maintenance	181	0.43	0.50
Network maintenance	193	0.76	0.43
Telecom line maintenance	190	0.81	0.39

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