

Logistics Outsourcing, Contract Complexity and Performance of Australian Exporters

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Abstract

Most research on outsourcing of logistics services ignore the inter-relationship between logistics outsourcing and outsourcing contractual arrangements that govern performance. This is challenging since it is how these contracts are structured together with the nature of logistics functions outsourced that may determine how firms will improve their business performance. The purpose of this research, therefore, is to fill this gap by proposing and testing the moderating effect of contractual complexity on the relationship between logistics outsourcing and performance. A key contribution of this study is the development of a conceptual model that integrates the tenets of transaction cost theory, resource-based theory and contractual complexity theory for analysing the indicated moderating effect on performance including financial effectiveness and strategic logistical capabilities.

We adopted a survey-based approach to evaluate the different elements that link the nature of logistics services outsourced and contract arrangements. These elements were characterised as transaction; process or relationship-related. Using a sample drawn from the Australian Exporters Database, the findings of this study, using simple mediation regression analysis (Barron and Kenny, 1986), suggest that contracts have an indirect influence on performance, and that contract clauses should be differentiated according to the nature of logistics functions outsourced and performance objectives.

Introduction

In line with the increase in industry competition and in end-customers' demand for better service quality, more firms are adopting the strategy of 'co-operating to compete' in the interests of minimising costs and maximising service quality and hence performance (Min et al. 2005; Holweg et al. 2005; Lambert et al. 2004). Among different forms of strategic collaboration, logistics outsourcing, the provision of logistics services through third-party logistic services provider, is part of an ongoing trend toward outsourcing logistics activities by manufacturers, distributors and retailers (Cho et al. 2007).

There exists an extensive literature, spanning multiple disciplines, focusing on logistics outsourcing. Researchers have explored, for example, types of logistics functions outsourced: how outsourcing partners are chosen; what types of outsourcing partnership are entered into; outsourcing and long-term contract; and whether outsourcing creates value for shareholders. Often overlooked, however, are contractual complexity and influences of the underlying contracts on outsourcing relationships, which in turn, influences the performance of user of logistics provider. Transaction Cost Economics scholars generally define "contractual complexity" as the increased number of contractual safeguards written into contracts in order to mitigate potential exchange hazards (Carter and Hodgson, 2006). Contractual complexities may therefore be a key moderator of the fundamental relationship between outsourcing and performance (Zeynep and Higgins, 2007). Contract complexity dictates the allocation of control rights, it is how these control rights are allocated that determines how a firm will benefit from a strategic partnership (e.g. Adegbesan and Ricart, 2005; Elfenbein and Lerner, 2003).

The purpose of this research, therefore, is to fill this gap by proposing and testing the moderating effect of contractual complexity on the relationship between logistics outsourcing and performance. A key contribution of this study is the development of a conceptual model that integrates the tenets of transaction cost theory, resource-based theory and contractual complexity theory. The paper proceeds as follows: the next section develops the conceptual framework and research hypothesis. The research methodology to test this foundation is then presented, followed by the study results and finally conclusions and implications for future research.

Conceptual Model and Development of Research Question

This research involves three measurement constructs: logistics outsourcing, contract complexity, and firm performance. The first two constructs are regarded as a form of firm strategic conduct. A general assumption of this research is that the strategic influence of logistics outsourcing on firm performance is moderated by contractual complexity. Figure 1 is an illustrative conceptual model of the relationships of these constructs and establishes the framework for the entire study. The relationships between logistics outsourcing and performance; and between logistics outsourcing and contract complexity are discussed in turn as follows.

Logistics outsourcing and performance

Individual firm have unique bundles of resources, competencies and capabilities that form the basis for competitive advantage but no firm holds all of these attributes to compete effectively (e.g. Barney, 1996). Moreover, myriad costs are also associated with various firm transactions (for example, the cost of additional monitoring of the trading partner to mitigate the potential for opportunistic behaviour, legal costs of establishing a contract and other related costs).

Acknowledgement

This research was made possible through the sponsorship of the University of Tasmania's Institutional Research Grant Scheme in 2008. We are particularly indebted to Ms Tam Lynch from the University of Tasmania for designing the web-based survey questionnaire for this study.

Resource-dependence theory (e.g. Pfeffer and Salancik, 1978; Kedia and Lahiri, 2007) posits that strategic alliance, such as logistics outsourcing, is therefore a means by which firms pool their resources and capabilities. Transaction cost economics on the other hand postulates that firms seek the sourcing arrangement that minimizes these costs (Kingsley et al., 2010; Gonzalez-Diaz et al., 2000; Williamson, 1991; Williamson and Ouchi, 1981).

By outsourcing their logistics services, firms are able to benefit by leveraging the third-party's expertise in high-end skill base, cumulative domain expertise, and industry-specific knowledge that result in integrated, innovative solutions (Kedia and Lahiri, 2007). For example, Kingsley et al. (2010), Knemeyer et al. (2003), and Lieb and Randall (1999) pointed out that firms are able to reduce cost and increase customer service by outsourcing their logistics functions. Cho et al. (2007) also found that outsourcing contributes to increase a firm's logistics capability, which allow it to conceive of and implement strategies that improve efficiency and effectiveness (Barney, 1996). The relationships between levels of outsourcing, performance and supply chain characteristics are however complex and are not straightforward. For example, Hsiao et al. (2010) found that outsourcing different logistics activities results in differences in logistics service performance. Based on the industrial network approach, Gadde and Hulthen (2009) highlighted the importance of the relationship between the buyer and the provider of logistics services to the success and beneficial outcome of logistics outsourcing.

Logistics outsourcing and contract complexity

While there are benefits from logistics outsourcing, because markets have advantages over internal production, it may be undesirable because outsourcing is subject to the risk from exchange hazards. In general, the three types of exchange hazards are defined as asset specificity, measurement difficulty, and uncertainty (Williamson, 1981, 1985, 1991).

In the context of offshore logistics outsourcing, the associated risks can be further categorized into market volatility risks, risks of incomplete information, inability to measure performance and other risks specific to offshore relationships (Ellram et al., 2008). For example, transactions that are supported by specific assets and are commonly associated with uncertainty implies high transaction costs (Williamson 1981). The essence of asset specificity, therefore, is that lock-in effects occur, which potentially lead to hold-up problems (Williamson 1981). Broadly, exchange hazards occur because logistics providers may be opportunistic in their behavior meaning they might resort to cheating, distortion of information, shirking of responsibility or other forms of dishonest behavior (Williamson, 1985, 1991; Hansen and Higgins, 2007; Kingsley et al., 2010).

Exchange hazards necessitate the need for contractual complexity (Williamson, 1991). Through contract complexity, service users can better monitor the performance of the service providers and ensure that they provide them with the critical resources and innovative solutions to deal with the uncertainties and thus boost their performance. Jensen and Stonecash (2004) showed that transaction-related uncertainty can be mitigated by designing a contract that allocates uncertainties to the logistics service providers in an efficient manner while providing appropriate incentives for performance. McIvor (2008) has further recommended that, apart from employing a sufficiently tight contract in the outsourcing arrangements, contractual safeguards, incentives for improvement as well as collaborative practices to deal with unforeseen process changes must be developed.

In order to mitigate exchange hazards, when a firm decides to outsource provision of a service, it must determine ex ante how risk should be allocated between the parties involved. It is widely accepted that regardless of how appropriate a strategic decision may be, successful outcomes are unlikely when implementation is poor (Grover et al. 1996). An important determinant of project success, therefore, involves the design of the contract. Users should attempt to design a contract that allocates risk to the provider in an efficient manner, whilst providing appropriate incentives for performance (Jensen and Stonecash, 2004). The essence of exchange hazards thus prompted the need to investigate the moderating effect of contract complexity on the influence of outsourcing on performance.

Research Methods

This section presents the development of construct measurements, the sample design, and the procedures used to analyze the data.

Development of construct measures

The relevant constructs were operationalised with a mix of original and adapted measurements derived from the conceptual definition of each construct, the relevant literature and face-to-face interviews with logistics executives.

Logistics outsourcing

Previous studies (e.g. Hsiao et al., 2010; Rahman, 2009; Sohal et al. 2002; Logan, 2000) have commonly used type of logistics services (e.g. transportation, packaging, freight bill auditing and payment, freight consolidation and distribution, product marketing, product returns, and fleet management) for analysing logistics outsourcing practices. In contrast to these studies, we measured logistics outsourcing by classifying various individual logistics functions outsourced based on their nature using Williamson's asset-specificity and transaction uncertainty concepts.

To reflect the logistics services faced by manufacturing companies, asset-specificity was further divided into human asset-specificity and physical asset-specificity. Accordingly, transaction uncertainty was further classified into individual logistics function (e.g. in-bound transportation) and uncertainty associated with overall distribution process-related uncertainty. Table 1 presents the relevant description of each dimension. This construct represents the first set of instruments in the survey. Respondents were asked to indicate their perceptions on each dimension based on a five-point likert scale where 1=extremely low; 2=low; 3=moderate; 4=high; and 5=extremely high.

Contractual complexity

A contract is a series of clauses linking combinations of various possible elementary events to prescriptions of behaviour (Barthelemy and Quelin, 2006). The notion of contractual complexity has been studied in the literature (e.g. Hansen and Higgins, 2007; Reuer and Arino, 2007; Robinson and Stuart, 2007). However, these studies differ widely in their approach and definition of complexity. For example, some use broad

measures such as contract length or number of provisions (Robinson and Stuart, 2007), and others focus on inclusion or exclusion of specific provisions (Barthelemy and Quelin, 2006).

In general, there are various types of contract clauses that outsourcing firms rely upon to protect themselves against the uncertainties associated with logistics outsourcing. Legal and economic literature suggests that control clauses (Halvey and Medly, 1996), incentive clauses (Klein and Leffler, 1981), price clauses (Joskow, 1987, 1988), and flexibility clauses are five main types of clauses that are paramount in outsourcing contracts. For the purpose of our study, we measured contractual complexity using control, incentive, and relational clauses (Golicic and Mentzer, 2006), as shown in Table 2. This construct represents the second set of instruments for the survey. Respondents were asked to indicate their perceptions on each dimension using the same approach as described in the first set.

Performance

Firm performance varies according to various elements of the organization, including strategy, structure, environment, organizational learning, and resource (Cho et al. 2007). Accordingly, different measurements have been adopted by different researchers for measuring performance. Jiang and Qureshi (2006) and Kotabe and Mol (2009) measured performance as operational performance, which include cost efficiency, profitability and productivity. Morash et al. (1996) classified their measurement based on demand-oriented capabilities (i.e. delivery reliability, responsiveness to target market, and post-sale customer service) and supply-oriented capabilities (i.e. geographical coverage and reduction in total distribution cost).

For the purpose of our study, we divided the performance construct into two dimensions, namely strategic logistics capabilities (Cho et al. 2007; Morash et al. 1996) and financial effectiveness (Jiang and Qureshi, 2006; Kotabe and Mol, 2009). The details of each dimension are presented in Table 3. This construct forms the third set of instruments for the survey. Similar procedure was applied to solicit individual perception on this construct.

Sampling and survey procedures

Data for this study were obtained from a survey of Australian exporters in manufacturing products (i.e. Food and kindred products, Textile mill products, Printing related products, and Electronic except computer equipments). The survey questionnaire was initially pre-tested by ten logistics executives and three academics for readability and ambiguity (Dillman 2000). Minor changes were made to selected questionnaire items based on comments received from the pre-test. With respect to our survey sample, a total of 1500 firms were initially selected from 'The Business Who's Who' database (Dun and Bradstreet, 2007). Because the information provided by the database was incomplete, more research efforts were later undertaken to update or complete the contact details (such as email address, telephone number and/or contact person) and other description of these companies wherever necessary.

Literature reviews reveal that the ability of firms in assessing performance due to outsourcing is related to outsourcing experience. According to Golicic and Mentzer (2006), reliability improves as years increases (i.e. at least one year or more). A total of 500 companies met this criterion and they were maintained for the survey. An email survey was carried out between April and October in 2008. The revised survey questionnaire was emailed to each of the selected companies. In the following second and third weeks, follow up emails and phone calls were made to urge the companies to response. The survey resulted in 76 responses, representing a response rate of 15.2%. The response rate is considered to be reasonable given that the response rates in similar studies ranged between 12% and 22% (e.g. Rahman, 2009; Sohal et al. 2002; Lieb and Bentz, 2003; Peter et al. 1998).

Modelling approach

As described earlier, contract complexity is assumed to function as a mediating variable (M). This implies that M is regarded as the generative mechanism through which the focal independent variable (X) is able to influence the dependent variable (Y) of interest. Thus the nature of the mediated relationship is such that the X influences M, which, in turn, influences Y (Baron and Kenny, 1986). In our study, this refers to the nature of logistics services outsourced (i.e. X) is believed to influence contract complexity, which, in turn, influences firm performance (i.e. Y). Also critical is the prerequisite assumption that a significant association between the X and Y exists before testing for a mediated effect.

There are several ways in which moderation may be modelled. Although systems of equations linking X to Y through multiple mediators are possible to specify (MacKinnon, 2000), we focus on models in which only a single mediator is posited. Preacher et al. (2007) term this three-variable system simple mediation. Simple mediation is illustrated in the path diagram in Figure 2.

There are a variety of strategies to calculate the indirect effect and test it for significance (MacKinnon et al. 2002). The most popular of these strategies are the causal steps strategy, distribution of the product strategies, bootstrapping strategies, and various products of coefficients strategies. Our study utilized a more direct approach to testing mediation by directly testing the significance of a_1b_1 (Sobel, 1982). The coefficients a_1 and b_1 , and standard errors of a_1 (S_{a_1}) and b_1 (S_{b_1}) respectively, are obtained from estimating the following two regression models using standard least-squares regression routines (Preacher et al. 2007).

$$\text{Model 1: } M = a_0 + a_1X + \varepsilon$$

$$\text{Model 2: } Y = b_0 + c'X + b_1M + \varepsilon$$

In order to conduct the test, $S_{a_1b_1}$ is divided by (i.e. $\sqrt{b^2S_{a_1}^2 + a^2S_{b_1}^2}$) and the ratio is treated as a Z-test (e.g. larger than 1.96 in absolute value is significant at the .05 confidence level).

Results

Table 4 presents merely the results of models with significant indirect effect between 0.25% and 10% confidence level. The key findings are summarised as follows:

First, the level of complexity in contract agreements (CC1), is found significant in moderating the effect of the level of distribution related skills or experience required to support the outsourced functions (LF1); the level of dedicated equipment and/or infrastructure required to support the outsourced transaction (LF3); and the potential in sharing transaction-related uncertainties with service providers (LF5). The significant indirect effects were observed on improvements in the level of delivery reliability (P1), net annual profit (P8), reduction in total distribution cost (P6), and sales growth (P7). These findings are consistent with Joskow (1987, 1988), Oxley, (1997) and Ellram et al. (2008) that more contractual safeguards are needed as the risk of opportunistic behaviour increase due to one or more exchange hazards related to asset-specificity and transaction uncertainty.

Second, penalties for delays or delivery damage (CC5) is significant in moderating the effects of the level of dedicated equipment and/or infrastructure required to support the outsourced transaction (LF3); individual transaction process-related uncertainty (LF4); and overall distribution process-related uncertainties (LF6) on improvements in firm's customer service (P2), geographical coverage (P5), sales growth (P7), and reduction in total distribution-related uncertainties (P17). These findings reinforced the importance of having penalty clause when transactions are supported by asset-specificity or involved transaction uncertainty (Williamson, 1981).

Third, communication and liaison (CC6)) is significant in moderating the effect of the potential in sharing transaction-related uncertainties with service providers (LF5) and overall distribution process-related uncertainties (LF6) on firm's improvement in reduction in total distribution cost (P6), net annual profit (P8) and reduction in total distribution-related uncertainties (P17). These findings demonstrate the importance of personal interactions and relationship building in strategic partnerships (e.g. Asanuma, 1989). The finding on the effect of contract complexity on reduction in distribution cost is consistent with Jensen and Stonecash (2004). Similar reasoning applies to the contract clause of having intention for continuing partnership (CC7), which is reflected through its significant moderating effect on the potential in sharing transaction-related uncertainties with service providers (LF5) and on improvement in responsiveness to customer demand (P3). These observations further suggest that outsourcing partnership requires the nourishment of relational relationships (e.g. Golicic et al. 2002; Golicic and Mentzer, 2006; Gadde and Hulthen, 2009).

Conclusion and Future Research Directions

The purpose of this paper was to propose and test a model of the moderating effect of contractual complexity on logistics outsourcing, which in turn affect a firm's performance. In general, our empirical analysis supports this hypothesis and a number of important findings emerge that have theoretical and managerial implications as described below.

First, a significant contribution of this study is the empirical test of theoretical assumptions in the extant literature on contract complexity in logistics outsourcing and firm performance. Contract complexity is shown to have a significant indirect impact on performance on a number of measures (i.e. distribution reliability/cost, profit, sales growth) through moderating the support function related skills/experience, infrastructure and the sharing of transaction-related uncertainties. This finding underscores the important role contract complexity plays in outsourcing practices and potential indirect performance benefits. Therefore, it is important for best practice exporters to focus on contract clauses; and that they should be designed to take into account the difference not only with the nature of logistics functions outsourced, but also with the variation in performance objectives.

Second, this research also suggests that the moderating effect of contract complexity on performance varies according to not only the nature of logistics functions outsourced but also to different dimensions of performance objective. Therefore, this highlights the importance of having outsourcing contracts with specific clauses for meeting specific performance objectives. As Adegbesan and Higgins (2007) point out, it is how the underlying control rights are allocated in a contract that determines how a firm will benefit.

Third, there are two important methodological issues for future research. First, perception of performance should also be assessed from the service provider perspective. Data collection on both sides of the dyad relationship would alleviate concern about biased performance assessments by exporters and constructs targeted at either exporters or providers would enable comparisons. Second, alternative measures of contractual complexity that capture the intention of having continuous partnership; penalty; and communications clauses should be further developed. This will provide further insights to exporters on how to manage their inter-organisational relationship in a fruitful manner.

Finally, our goal with this research has been to disclose another layer in logistics outsourcing research by analysing underlying contractual complexity to demonstrate their indirect influence on performance. By doing so, we believe we have successfully linked the contractual complexity literature with transaction cost and resourced-based literatures. Our next research challenge will be to extend the developed framework to address the question of how multiple outsourcing networks and their associated contractual agreements, which in essence is another form of contractual complexity, affects performance within these networks.

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Figure 1: Conceptual model and hypothesized relationships

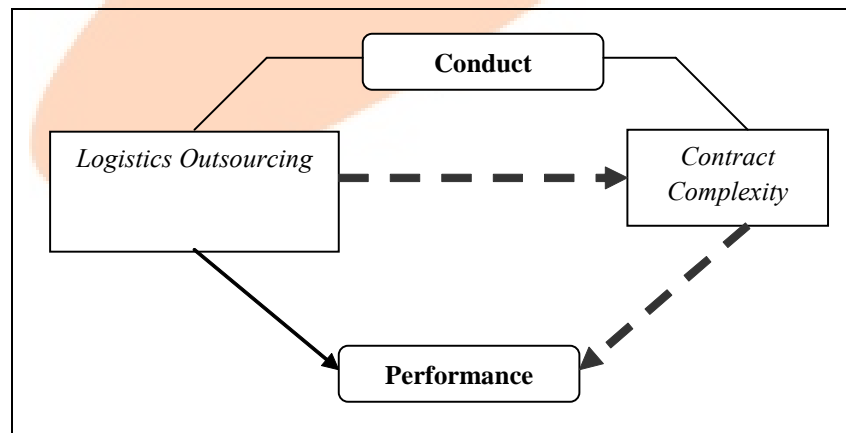
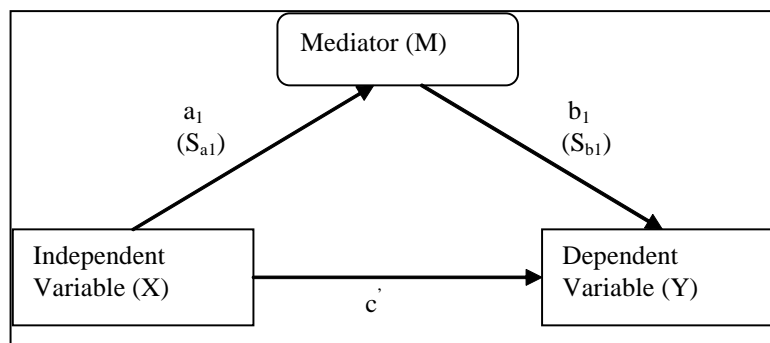


Figure 2: Path diagram of simple mediation



(Source: <http://www.people.ku.edu/~preacher/sobel/sobel.htm>)

Table 1: Description of questionnaire construct 1

Nature of Logistics Functions Outsourced (LF)	Classification	Dimension (Code)
	Human asset-specificity	The level of distribution-related skills or experience required to support the outsourced functions (LF1).
		The level of country-specific knowledge required to support the outsourced functions (LF2).
	Physical asset-specificity	The level of dedicated equipment and/or infrastructure required to support the outsourced transaction (LF3).
	Transaction uncertainty	The level of distribution process-related uncertainty associated with individual logistics (LF4).
		The potential in sharing transaction -related uncertainties with service providers (LF5).
		The overall distribution process-related uncertainties (LF6).

Table 2: Description of questionnaire construct 2

Contractual Complexity (CC)	Classification	Dimension (Code)
	Control clause	The level of complexity in contract agreements (CC1).
	Relational clauses	The level of involvement associated with the management of contract such as coordinating and monitoring (CC2).
		The extent of communication and liaison with service providers (CC6).
		The level of importance placed on having continuous outsourcing relationship with service providers (CC7).
	Incentive clauses	The importance placed on incentive for good performance (CC4).
		The importance of imposing penalty for delay or damage (CC5).

Table 3: Description of questionnaire construct 3

Performance (P)	Classification	Dimension (Code)
	Strategic Logistics Capabilities	Improvement in the level of delivery reliability (P1).
		Improvement in customer service (P2).
		Improvement in the level of responsiveness to customer demand (P3).
		Improvement in geographical coverage (P5).
		Increase in sales growth (P7).
		Reduction in total distribution-related uncertainties (P17).
	Financial Effectiveness	Reduction in total distribution costs relative to performance goals (P6).
		Improvement in net annual profits relative to performance goal (P8).

Table 4: Selected empirical results of the moderating effects of contract complexity

Model	Independent	Dependent	Mediator	Indirect effect of X on Y (i.e. a_1b_1)	Standard deviation of indirect effect	Z-Statistics
1	LF1	P1	CC1*	0.0611	0.0466	1.3112
2	LF3	P1	CC1*	0.0432	0.0323	1.3375
3	LF5	P1	CC1*	0.0527	0.0372	1.4167
4	LF1	P6	CC1***	0.1365	0.0616	2.2159
5	LF3	P6	CC1*	0.0483	0.0348	1.3879
6	LF5	P6	CC1*	0.0555	0.0387	1.4341
7	LF1	P7	CC1*	0.0856	0.0529	1.6181
8	LF3	P7	CC1*	0.0387	0.0301	1.2857
9	LF5	P7	CC1*	0.0449	0.0337	1.3323
10	LF1	P8	CC1*	0.0676	0.0480	1.4083
11	LF3	P8	CC1*	0.0500	0.0356	1.4045
12	LF5	P8	CC1*	0.0398	0.0307	1.2964
13	LF3	P2	CC5***	0.1506	0.0655	2.2992
14	LF4	P2	CC5***	0.1493	0.0642	2.3255
15	LF6	P2	CC5**	0.1272	0.0727	1.7497
16	LF3	P5	CC5*	0.0771	0.0533	1.4465
17	LF4	P5	CC5**	0.0941	0.0534	1.7622
18	LF6	P5	CC5***	0.1548	0.0704	2.1989
19	LF4	P7	CC5***	0.1251	0.0602	2.0781
20	LF4	P17	CC5**	0.0927	0.0534	1.7360
21	LF5	P17	CC6*	0.0444	0.0324	1.3704
22	LF6	P17	CC6*	0.0577	0.0395	1.4608
23	LF5	P6	CC6*	0.0457	0.0325	1.4062
24	LF6	P6	CC6**	0.0778	0.0450	1.7289
25	LF6	P8	CC6*	0.0669	0.0426	1.5704
26	LF5	P3	CC7*	0.0406	0.0312	1.3013

Notes:

*** Significant at $\alpha = 0.01$ (1.9600).** Significant at $\alpha = 0.05$ (1.6449).* Significant at $\alpha = 0.10$ (1.2816).