RELATIONSHIP BETWEEN INTRA-FIRM LOGISTICS INTEGRATION AND TRANSACTION COSTS: AN EMPIRICAL STUDY OF INTERNATIONAL MULTIMODAL TRANSPORT COMPANIES IN VIETNAM

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Abstract:

Whilst there is theoretical support for the view that there is a negative relationship between intra-firm logistics integration and transaction costs, this has been largely untested in an empirical sense at least. This study remedies this by reporting results from an empirical investigation of the International Multimodal Transport Industry in Vietnam. Extant literature on inter-departmental integration and transaction costs are briefly reviewed. Conceptualized hypotheses are then tested mainly using the Structural Equation Modeling (SEM) technique. Results from this study imply several mechanisms for reducing transaction costs and thus potentially guiding improvements in firm efficiency and performance. The paper also toucheson areas for future research.

Keywords: *Logistics, intra-firm logistics integration, transaction costs, international multimodal transport companies, structural equation modelling.*

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1. INTRODUCTION

Traditionally, activities that are associated with the movement and storage of goods and services into, through and out of firms were treated separately. They have historically been treated as isolated performance areas. For example, transportation has been considered separately from inventory or inbound logistics or outbound logistics (Ross, 2003, Bowersox, 1969). Some have considered this approach to be unduly restrictive insomuch as it fails to capture the benefits obtainable from integrated control (Bowersox, 1969). By way of contrast, the logistics discipline emphasizes the total system of material and service flows and storage rather than focusing on functions, departments, or institutions which may be involved in the process (Kast and Rosenzweig, 1992). Ideally, all related functions are holistically managed for the optimal flow and storage of goods and services and this is advanced as the appropriate scale of analysis. Integration is a process which facilitates systems' components to behave in a unified way, to rapidly and adequately respond, adjust, or adapt to the demands of other components for the benefit of the system as a whole (Kast and Rosenzweig, 1992, Barki and Pinsonneault, 2005). Integration

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thus plays a major role in logistics analysis. Accordingly, the process and outcomes from integration is a critical component likely to impact upon firm efficiency, effectiveness and performance (Chow et al., 1995).

Hitherto empirical studies on logistics integration borrow from a range of theoretical conceptualizations and cover interdepartmental and supply chain contexts (for instance, see Daugherty et al. (1996), Gustin et al. (1995), Murphy and Poist (1996), Fawcett and Clinton (1997) and Bowersox et al. (1999)). However, significant gaps remain. Firstly, most studies have ignored the integration of logistics activities where there is no logistics department per se. Secondly, the hypothetical negative relationship between logistics integration and associated transaction costs, as defined in Williamson's Transaction Cost Economics (TCE), to the authors' knowledge, has never been empirically tested. Lastly, there is an overt bias in the existing empirical studies towards Western-developed nations and manufacturing activities (Luo et al., 2001). Thus, the extent to which the findings from some of this work can be generalized remains problematic.

This research focuses on empirically investigating the relationship between within-firm integration of logistics activities (LI) and the firms' transaction costs (TC). The analysis is conducted in the context of international multimodal transport (IMT) firms (i.e. a service industry) in Vietnam. The justification for focusing on IMT resides in the fact that most studies in the area of transport have focused on transport issues independently (that is, with no connection to overarching logistics principles) or have treated transport as an element of a manufacturing firm's logistics systems (Stock, 2001). The extent to which logistics principles are actually applied by a transport company, as a service provider, thus provides an interesting nuance.

The paper itself is divided into five additional sections. The second section briefly discusses the theoretical background to the TCE literature and different types of organizational integration. The research hypotheses and conceptual model are then developed as part of this section. The research methods and results of hypotheses testing are presented in Section 3 and 4, respectively. Section 5 is used to consider the managerial implications, the limitations of the work and identify future research directions. Some brief concluding remarks are then presented in Section 6.

2. BACKGROUND

2.1. Transaction Cost Economics and Williamson

Specialization and the division of labor have long been argued to bring benefits (Wallis and Douglass, 1986). According to Eigen-Zucchi (2001), for example, these processes spur productivity, which in turn generates better economic performance. The presence of specialization and division of labor brings about the necessity for exchange or transfers of resources, goods and services among specialized units (Eigen-Zucchi, 2001). These so-called 'transactions' can take place either in the market place or within organizations. One of the major implications of this approach is that transactions usually involve a cost of some form or another (Wallis and Douglass, 1986). Two types of transaction costs have been distinguished in Williamson's TCE literature: ex ante and ex post. The first includes the costs of drafting, negotiating, and safeguarding an agreement. Safeguards can take several forms,

for example, common ownership and credible commitments (Williamson, 1985). Ex post costs of contracting, on the other hand, are divided into four groups, comprising (1) the mal-adaption costs incurred when transactions drift out of alignment, (2) the haggling costs incurred if bilateral efforts are made to correct ex post misalignment, (3) the setup and running costs associated with the governance structures (often not the courts) to which disputes are referred, and (4) the bonding costs of effecting secure commitments (Williamson, 1985).

Given the criticism of Williamson's TCE that theoretical development has not been accompanied by successful measurement of transaction costs (Hobbs, 1996, Hobbs, 1997), another useful and operational approach to classifying Williamson's transaction costs has been proposed by Hobbs (1996) and Hobbs (1997). Here transaction costs are divided into three main classes: information costs, negotiation costs and monitoring or enforcement costs. Information costs include costs in the search for information about products, prices, inputs and buyer or sellers. Negotiation costs arise from the physical act of the transaction, such as negotiating and writing contracts (costs in terms of managerial expertise, the hiring of lawyers, etc.), or paying for the services of an intermediary to the transaction (such as an auctioneer or a broker). Monitoring costs arise after an exchange has been negotiated. This may involve monitoring the quality of goods from a supplier or monitoring the behavior of supplier or buyer to ensure that all the pre-agreed terms of the transaction are met. Also included are the costs of legally enforcing a broken contract, should the need arise. It should be noted that the relaxation of neoclassical assumption of perfect and costless information gives rise to all three types of transaction costs (Hobbs, 1996).

Underlying Williamson's TCE are two behavioral assumptions (i.e. bounded rationality and opportunism) and two others regarding the nature of transactions (i.e. asset specificity and frequency). Bounded rationality refers to human behavior that is "intendedly rational, but only limitedly so" (Simon, 1961, p.xxiv). In other words, although people may intend to make a rational decision, their capacity to evaluate accurately all possible decision alternatives is physically limited (Williamson, 1979). "Bounded rationality poses a problem only in situations of complexity or uncertainty where the ability of people to make a fully rational decision is likely to be impeded" (Hobbs, 1996, p.17).

Opportunism is defined as "self-interest seeking with guile. This includes but is scarcely limited to more blatant forms, such as lying, stealing, and cheating" (Williamson, 1985, p.47). Put differently, it recognizes that businesses and individuals within businesses will sometimes seek to exploit a situation to their own advantage. This does not imply all those involved in transactions act opportunistically all of the time, rather, it recognizes that the risk of opportunism is often present. This risk is greater when there exists a small numbers bargaining problem (Simon, 1961). For example, "the fewer the number of alternative suppliers available to the buyer, the more likely it is that an existing supplier will act opportunistically to alter the terms of the business relationship to their own advantage, such as by demanding a higher price than that previously agreed" (Hobbs, 1996, p.17).

Asset specificity refers to the degree to which "an asset cannot be redeployed to alternative uses and by alternative users without sacrifice of productive value" (Williamson, 1991, p.218). "Asset specificity arises when one partner to an exchange has invested resources specific to that exchange which have little or no value in an alternative use" (Hobbs, 1996, p.17). Asset specificity can take several forms, for example, site-asset specificity, physical-asset specificity, human-asset specificity and dedicated-asset specificity (Afuah, 2001). In the presence of specific assets, significant transaction costs can incur because the party who has made investment in specific assets is locked into a monopoly-like relationship (Kulkarni and Heriot, 1999).

Frequency refers to how often a particular transaction is undertaken. Increased frequency of a transaction is argued more likely to be associated with the internalization of economic activities (Williamson, 1985).

Treating transaction costs as friction, Williamson brings the above four behavioral assumptions together under the so-called "discriminating alignment hypothesis". According to this hypothesis, the parties to a transaction will, in a comparative way, match a transaction (which varies in frequency, asset specificity and consequently transaction costs) with a governance structure (which vary in terms of their ability to manage opportunism and bounded rationality) so that the costs of transacting are minimized. Put simply, given certain attributes of an exchange, firms are inclined to choose a mechanism of managing that transaction (i.e., market, intermediate arrangements or vertically integrated firms) which results in the lowest overall level of transaction costs. Theoretically, the decision on the appropriate governance mechanism is premised on comparing transaction costs of an exchange in different contexts.

Williamson's discriminating alignment hypothesis provides a useful tool for analyzing organizational integration. The first aspect of the application of Williamson's discriminating alignment hypothesis in this context is relatively straightforward: Vertical integration takes effect to minimize transaction costs in particular contexts. However, vertical integration is only one among various forms of inter-firm integration (Ellram, 1995). Basically, firms' early efforts to cooperate in this case result in full-ownership integration (i.e. vertical integration). Nevertheless, this form of inter-firm integration is proving increasingly problematic and often lacks the flexibility to respond to current business practices. Subsequently, other forms of integration have emerged in the form of strategic alliances, long-term supplier relationships, customers contracts and shared processes, for instance (Ellram, 1995, Stonebraker and Afifi, 2004). This range of non-ownership forms of inter-firm integration continues to fit within the category of 'hybrids' described by Williamson and are thus theoretically consistent with the notion of transaction costs minimizing arrangements.

Whilst the internal management of transactions is argued to benefit from low ex post search cost, low cost of drafting employment contract, and adapting uncertainty (Mathiesen, 2007), potential transaction costs due to the bounded rationality and opportunism persist. Specifically, internal management of diversified activities continues to incur cost in the form of administrating, monitoring, processing information and training

employees. The diversity of activities might also lead to costs from shirking and political efforts, the loss of competitive checks and the time taken to discover inefficiency (Mathiesen, 2007). Specific measures have therefore been developed to minimize transaction costs within a firm including organizational integrating mechanisms (e.g. mutual work adjustment, direct work supervision and standardization), rewards (e.g. salary, promotion possibilities, status, and bonuses) and sanctions (e.g. fire, loose status, reduced salary, loss of prospect for promotion, degradation and court sanctions) (Mathiesen, 2007). Viewed through the Williamson lens within-firm integration can also be viewed as a natural response to the firms' endeavors to minimize transaction costs.

2.2. Dimensions of Inter-departmental Integration

Different levels of integration have been widely discussed in the organizational literature, including inter-departmental or inter-functional integration, inter-firm integration and inter-organizational functional integration. Inter-departmental integration is "the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment" (Lawrence and Lorsch, 1986, p. 11), or "how effectively organizational members can receive and interpret messages sent by other members or the environment, and to respond in an appropriate manner" (Grant as cited in Barki and Pinsonneault, 2005, p. 167).

What differentiates inter-departmental and inter-firm integration is the matter of full ownership. Departments within a firm are under the same leadership. As a result, tight control and formal authority can be of use, even when there is a lack of esprit de corps, goodwill, and/or mutual necessity among departments (Min, 2001a). Inter-firm integration, also called supply chain integration, includes all supply chain associations outside those occurring under common ownership (Stonebraker and Afifi, 2004). Put differently, this amounts to "*... an ongoing relationship between two organizations which involves a commitment over an extended time period, and a mutual sharing of the risks and rewards of the relationship*" (Ellram, 1995, p.41).

An additional variant of integration arises when inter-departmental integration is extended to include supply chain partners. Larson describes this as inter-organizational functional integration (Larson, 1994). More specifically, inter-organizational functional integration occurs when one department of one firm coordinates with one or more departments of other firms.

Integration of logistics activities within a firm, the focus of the research at hand, is arguably a manifestation of inter-departmental integration. Various dimensions for assessing the extent of this form of integration have been characterized throughout the literature and include communication, collaboration, formal structures, and formal authority. Each of these is discussed briefly below.

Firstly, it is suggested that successful inter-departmental integration is primarily achieved through the encouragement of information sharing activities among departments (Dougherty, 1992). It is believed that the frequent exchange of information helps reduce misconceptions and misunderstandings between departments (Stank et al., 1999).

Verbal and documented information can be exchanged formally through routine meetings, faxes, planned teleconferencing, conference calls, memoranda, and the transmission of standard documentation (Stank et al., 1999, Kahn and Mentzer, 1996). Informal information sharing is promoted by casual encounters, say around water coolers and coffee machines (Robbins and Barnwell, 2002) or by mutual adjustments, where "people informally interact with one another to coordinate" (Min, 2001b , p. 376). Embedded in the communication dimension are also various applications of information technology in order to improve the quality of interaction among departments (Jonscher as cited in Beretta, 2004, Power, 2005). However, one reservation of this component has been made by Kahn and Mentzer (1996) who suggest that too much formal communication might impede an effective inter-departmental relationship by burdening personnel with meetings, documentation efforts and information overload.

Collaboration, as one mechanism for firms to achieve interdepartmental integration, comprises deliberate programs to build esprit de corps between departments (Kahn and Mentzer, 1996) and voluntary processes (e.g., departments working together, sharing resources, and seeking to achieve collective goals) (Stank et al., 1999). Esprit de corps among departments can be achieved by linking the mission assigned to each unit to the value generation strategy of the firm (Beretta, 2004) and encouraging the adoption of a process view, whereby individual members within departments understand their roles in each value-added process (Beretta, 2004). This establishes a shared vision and common goals across departments (Kahn and Mentzer, 1996). As long as departments trust one another and are willing to work together, firms can utilize various voluntary coordinating programs such as unstructured, largely informal inter-departmental teamwork (Stank et al., 1999), coordination by mutual adjustment (Glouberman and Mintzberg, 2001) and sharing resources (Kahn and Mentzer, 1996). One important note about this dimension is that voluntary processes cannot happen without the prior existence of esprit de corps among departments. As a result, the existence of voluntary processes can itself be used as a proxy for the presence of esprit de corps among departments.

Underlying the argument for the necessity for collaboration is the assumption that the relationships among departments are innately competitive (Kahn and Mentzer, 1996), i.e. each of two parties has an interest in an issue such that any gain for either is at the expense of the other. However, according to Lawrence and Lorsch (1986), this is not always the case. Departments might not conflict with one another regarding basic goals. Rather, extant differences might be the result of structural segmentation and specialization. The resolution process as a result does not require efforts to establish common goals among departments. Therefore, whether collaboration is necessary is determined by whether conflicts among departments arise over basic goals or not (Lawrence and Lorsch, 1986). Nevertheless, the presence of collaborative processes would prima facie support greater degrees of integration.

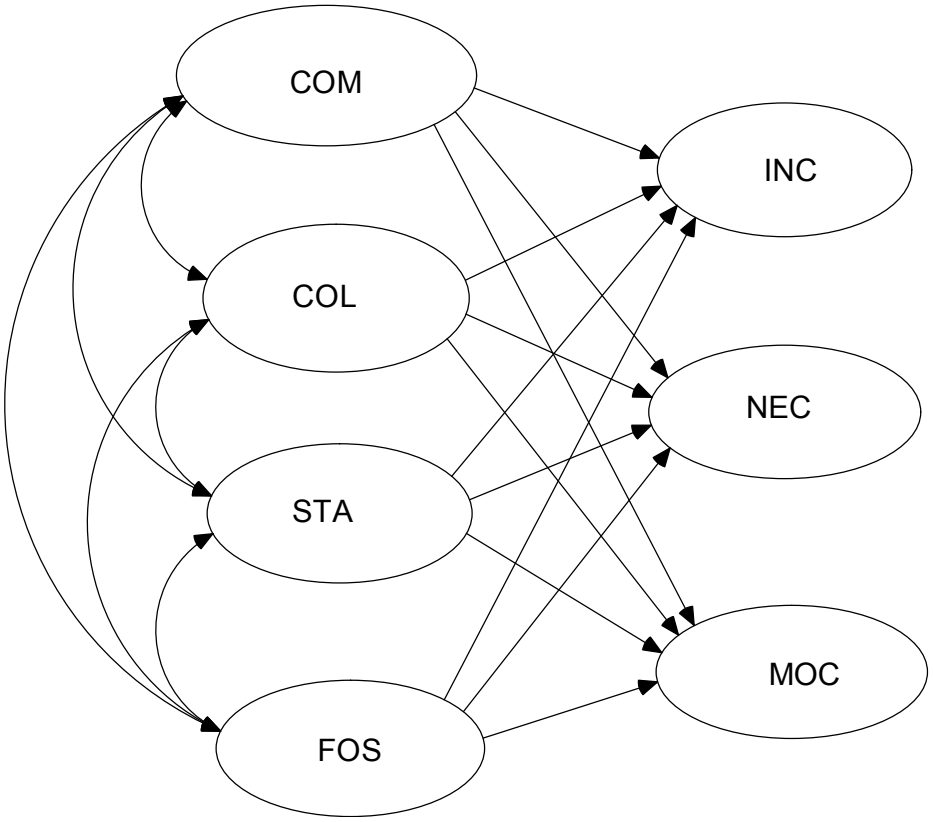
Formal authority involves giving responsibility for conflict resolution and integration to certain individuals or departments or

using a formal decision making hierarchy. Individuals who have formal authority for achieving integration are called integrators and can be competent representatives of the basic functional departments, managers at appropriate levels within the firm (Lawrence and Lorsch, 1986), or an integrating sp1Inter-departmental integration is popularly conceptualized as a multidimensional process. However, there is no general consensus about the relative weight of each dimension. For example, Kahn and Mentzer (199?) describe inter-departmental integration as comprising primarily communication and collaboration (Kahn and Mentzer, 1996); Lawrence and Lorsch (1986) and Glouberman and Mintzberg (2001) mainly focus on formal authority and standardization mechanisms. By way of contrast, Min combines all these mechanisms equally in his implementation framework of inter-departmental integration (Min, 2001b). Consequently, the application of this concept varies greatly from researcher to researcher.

2.3. Research Hypotheses and Conceptual Model

The third application of Williamson's discriminating alignment hypothesis to organizational integration effectively conceptualizes the relationship between integration of logistics activities within a firm and its association with transaction costs: *The higher intra-firm logistics integration, the lower the associated transaction costs*. However, any research that involves multi-dimensional concepts, like L and TC, would be much more informative if investigated at a component level (Cunningham, 2008).

FIGURE 1. Theoretical Structural Model for Relationships among LI and TC Components



Thus, in this study, LI and TC components, rather than summative measures of LI and TC as integrated constructs, are deliberately scrutinized.

For the purpose of relating LI and TC components, the useful classification of TC into three components - information cost (INC), negotiation costs (NEC), and monitoring cost (MOC) by Hobbs (1996) was initially employed. The four major dimensions of inter-departmental integration: Communication (COM), collaboration (COL), standardization (STA) and formal structures (FOS) were originally selected as components of LI, primarily on the grounds of the conceptual work summarized earlier.

Theoretically, these three components of TC (INC, NEC, and MOC) impact on total TC. Similarly, the higher the levels of COM, COL, STA and FOS, the higher will be aggregate LI. Moreover, there is a theoretically negative correlation between the two global constructs (LI and TC) and potential interaction effects between the components of each. These theoretical relationships are depicted in Figure 1. We hypothesize that: *The higher the perceived components of LI, the lower will be components of perceived TC and vice versa.*

3. RESEARCH METHODS

This section briefly describes the development of measures and the sample design. It is also used to provide a synoptic overview of the analytical procedures.

3.1. Development of Measures

Initial indicators of constructs in this study were derived from two main sources: (1) Previous related studies and (2) underlying theoretical treatments. The LI construct borrowed questions from previous related studies but also involved the development of new items based on the theoretical dimensions of inter-departmental integration. As far as TC constructs were concerned, no previous studies on measuring TC costs have been undertaken in the context of logistics processes, let alone in Vietnam. Consequently, all of the items in this study were developed or modified from existing definitions of the components of TC.

A set of questions was developed and then tested for content validity and reliability. The final list of questions is presented in the Appendix. For LI and TC items, respondents were asked to indicate agreement based on a five-point Likert scale where 1 = Strongly disagree; 2 = Somewhat disagree; 3 = Neither disagree nor agree; 4 = Somewhat agree and 5 = Strongly agree.

3.2. Sample Design

A sample frame transport companies in three major cities in Vietnam (Hanoi, Haiphong and Ho Chi Minh City) was established. The rationale for including firms from these three sites is that IMT is an international service, and firms that are located in large cities with international border-gates will be more likely to be involved in IMT services.

Senior managers were targeted in this study in order to ensure reasonable reliability of perceived evaluation. The pilot test resulted in 50 responses from the 157 companies contacted. In the mail survey stage (i.e., the survey proper), questionnaires were sent to 701 transport companies (original sample minus the number of companies contacted in the pilot test). In this context, significant effort was made to encourage firms to respond. First, firms were contacted by phone to establish their preparedness to participate. Second,

a survey was mailed to those expressing a willingness to complete the questionnaire. Third, personalized correspondence and return mail was supplied. Fourth, follow-up phone calls were employed to encourage response. The outcome was a total response of 102. Of the surveys returned, 67 were received two weeks after initial distribution with the remaining 35 being retrieved after follow-up phone calls. Together, the pilot and survey studies resulted in a total of 152 responses from a sample frame of 709, representing a response rate of 26%.

An analysis of non-response bias was conducted. The mean scores of two random variables (LI31 and TC1) were compared for responses obtained before follow-up phone calls (i.e. early responses) and responses received after follow-up phone calls (i.e. late responses). No significant difference (at $p<0.5$) in means was revealed, and thus, we cautiously contended that non-response bias is unlikely to be a major constraint in this instance.

3.3. Analytical Techniques

As previously discussed, the empirical measurement of LI and TC constructs has been largely underdeveloped. Consequently, exploratory factor analysis (EFA), an approach that does not set *a priori* constraints on the estimation of factors or the numbers of factors to be extracted (Hair et al., 2006), was used to explore the dimensionality of LI and TC.

The Structural Equation Modeling (SEM) technique was subsequently employed to test the relationships between LI and TC components. The justification for this choice was two-fold. Firstly, this study involved latent variables and SEM is the only viable technique that allows for the incorporation of latent constructs in the analysis and for the correction for measurement error in the estimation process itself (Hair et al., 2006). Secondly, this study was designed to test multiple relationships among LI and TC components. SEM offers the most efficient estimations of a series of separate but interdependent, multiple regression equations simultaneously. Accordingly, it is possible to define a model to explain the entire set of relationships with SEM rather than separately testing single relationships between dependent and independent variables (Hair et al., 2006).

Due to the limited sample size of 152, a single indicator latent variable model which uses average scores of LI and TC components as scale indicators (as known as item parcelling technique) was developed for the purpose of increasing the ratio of sample size to parameters to be estimated. As a result of that, the ratio reached 6.08:1, higher than the minimum cutoff of 5:1 as stipulated by Kline (2005) and was arguably acceptable (Cunningham, 2008).While arguably being less informative than a model that incorporating all measured variables, this model still accounts for measurement errors inherent in the constructs under consideration (Cunningham, 2008).

4. RESULTS

4.1. Exploratory Factor Analysis

Four dimensions of LI and three of TC were extracted using principal component analysis, Oblimin rotation method and a cutoff of 0.45 for significant factor loadings. Results show that items did not converge into their theoretically designated concepts. As illustrated in Table 1 below, the extracted components of LI are represented by combinations of indicators of multiple theoretical scales (values in bold). For instance, they are COM, COL and STA scales for Component 1. This situation also holds true for TC factors (see Table 2).

TABLE 1. Factor Loadings for LI Construct Items

	Component			
	1	**2**	**3**	**4**
	.756	-.036	-.175	-.026
COL2	**.700**	.014	.172	.106
STA1	**.665**	.105	-.062	-.198
COM3	**.605**	-.143	.127	-.199
COL3	**.589**	-.204	.303	-.098
STA2	**.562**	.106	.149	.073
COM6	**.526**	.276	.002	-.239
COM1	**.526**	-.041	.188	.202
COL5	.414	.030	.087	-.173
FOS1	.238	.133	.207	-.002
STA4	.250	**.727**	-.236	.354
COM9	.030	**.638**	.032	-.022
COL9	-.126	**.606**	.083	-.062
STA5	-.150	**.547**	.314	-.056
COL8	-.025	**.525**	.040	-.357
COL7	-.041	**.513**	.134	-.035
COL6	.214	.351	-.064	-.191
FOS4	-.109	.092	**.710**	.150
FOS2	.137	-.109	**.568**	.102
STA3	.109	.211	**.543**	.002
COM4	.084	-.045	**.532**	-.308
FOS3	.134	-.124	**.504**	-.288
COM7	.245	.116	**.494**	-.002
COL4	.073	.063	**.489**	-.274
COM5	.342	.016	.418	-.081
COM2	.016	.082	.342	.015
COL10	.206	-.116	-.128	**-.792**
COM10	.114	.112	-.033	**-.733**
COL11	.231	.301	-.063	**-.576**
COM11	-.189	.048	.164	**-.522**
COM8	.381	.176	-.048	**-.459**

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
Factor loadings above 0.45 were considered significant.

TABLE 2. Factor Loadings for TC Construct Items

	Component		
	1	**2**	**3**
NEC6	**.729**	-.051	-.092
NEC5	**.644**	-.247	.129
MOC1	**.635**	-.107	.074
NEC1	**.620**	-.018	.198
INC3	-.084	**-.803**	.147
MOC2	.108	**-.790**	-.032
NEC2	.042	**-.787**	-.033
INC1	.078	**-.707**	-.103
INC2	.128	**-.686**	-.103
MOC5	-.432	**-.496**	.371
INC4	-.073	.177	**.746**
NEC4	-.029	-.135	**.740**
MOC4	.154	-.116	**.624**
MOC3	.301	.081	**.529**
INC5	.403	.101	.419
NEC3	.327	-.059	.384

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
Factor loadings above 0.45 were considered significant.

TABLE 3. LI Scales

Factor	Content
Strategic Goals Communication (SGC)	Functional units understand the firms' strategic goals and their role in achieving them
Managerial Support (MS)	Support that flows from standardization of processes and the resultant response of the various units within the organization to internal requests
Multi-functional Projects (MP)	Utilization of work-related projects purposely designed to include more than one functional unit
Conflict Resolution (CR)	Functional units' willingness to discuss and resolve problems when they arise

TABLE 4. TC Scales

Factor	Content
Negotiation Costs (NG)	Trust between functional units and responsiveness to negotiating new and existing orders
Information costs (IC)	Time that functional units spent sorting through information, and effort expended tracking internal orders
Staff Availability Costs (SAC)	Staff members available to source, interpret and track information and/or available to undertake negotiations as required

Names were given to newly extracted constructs based on the highest loading variables on each of the component (Hair et al., 2006, Pallant, 2005), as illustrated in Tables 3 and 4 below

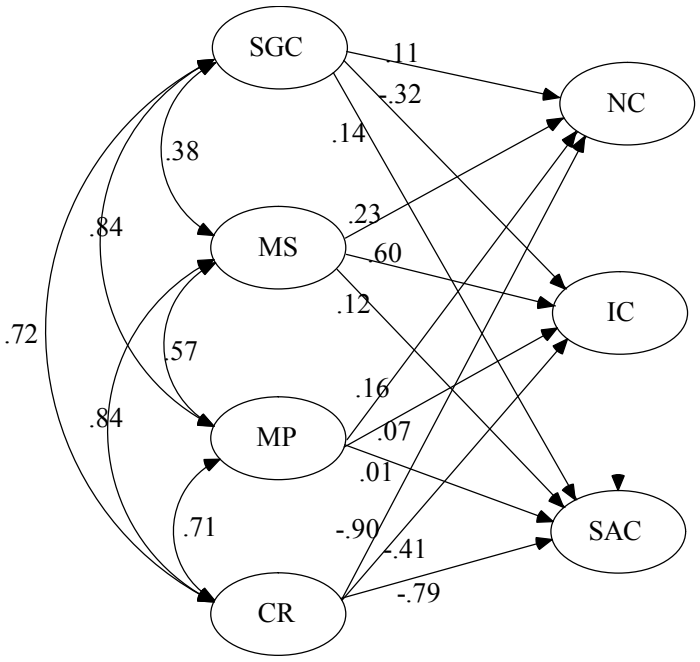
4.2. Hypothesis Tests

Results of hypothesis tests are shown in Table 5 and its visual portrayal appears as Figure 2, below. Evidence suggests that a Bolllen-Stine bootstrapping was insignificant at p = 0.06. Notwithstanding the weak fit implied by two among five conventional model fit indices - RMSEA higher than the anticipated 0.08 and TLI lower than 0.95 - it is worth noting that Karl Joreskog, the highly acclaimed founder of SEM contends that the chi-square (represented by the Bollen-Stine bootstrap p value in this case due to the data's modest departure from multivariate normality) should be regarded as the paramount measure of fit (Cunningham, 2008). On these grounds, the model fit was contended to be adequate overall.

Relationships among LI and TC components were assessed by reviewing the significance, magnitude, and direction of each parameter coefficient. Four relationships: MS-IC, CR-NC, CR-IC and CR-SAC were statistically significant (values in bold). While CR was negatively related to three TC factors (i.e. IC, NC and SAC), the relationship between MS and IC was positive.

TABLE 5. Overall Model Statistics and Construct Relationships

	SGC	MS	MP	CR
NC	0.11	0.23	0.16	**-0.90**
IC	-0.32	**0.60**	0.07	**-0.41**
SAC	0.14	0.12	0.01	**-0.79**
Bollen-Stine bootstrap	p = .060			
SRMR	0.032			
RMSEA	0.157			
GFI	0.971			
TLI	0.710			
CFI	0.959			



SRMR = 0.0323

RMSEA = 0.15

GFI = 0.971

TLI = 0.710

FIGURE 2. Standardized Parameter Estimates for Relationships between LI and TC Components

5. IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

This exploratory research attempted to test the relationship between logistics integration and transaction costs. Results showed that Strategic Goal Communication and Multi-functional Projects had no statistically discernable impact on any of the dimensions of Transaction Costs. Managerial Support also showed no significant capacity to limit Negotiation Costs and Staff Availability Costs while unexpectedly increasing Information Costs. Overwhelmingly, the most influential relationships evident in the model are those between Conflict Resolution and the various dimensions of transaction costs. More specifically, the data support the view that Conflict Resolution plays a role in reducing all variants of transaction costs in international multimodal transport firms in Vietnam. It is not feasible to address all possible components in the space offered but several observations are worth noting.

Plausible explanations for these results could be inferred by referring to the nature of Vietnam's international multimodal transport industry and the observations drawn from case analyses by Nguyen et al. (2008). For instance, as discussed by Nguyen et al. (2008), a staff member involved in service delivery in international multimodal transport companies frequently possesses the flexibility to make commitments regarding contract conditions as well as their performance. Standardization adds an element of certainty to these processes and this may assist those operating in this environment. However, standardization might also act as a constraint on flexibility in some circumstances. For example, an urgent order from an important customer might be delayed due to standardized procedures. This might be one reason for the unanticipated relationships

between Managerial Support and the various transaction cost components in this instance.

Nguyen et al. (2008) also noted that coopetition - a phenomenon where two firms cooperate in some business activities while simultaneously competing with one another (Luo, 2005) - was commonly found in the operations of international multimodal transport firms in Vietnam (Nguyen et al., 2008). In such a setting having clear guidance on the mechanisms for reducing conflict would appear critical to containing information costs, negotiation costs and the costs associated with having staff to monitor and respond to calls for additional negotiation. It is also worth noting that Vietnam is very much a country in transition. There are strong incentives to increase market access and the modification of economic and social norms often creates an environment where transactions can be costly. In such a setting clear guidelines for resolving disputes become paramount, which underlies the important role of Conflict Resolution in transaction cost reduction.

The overall significance of this study has several perspectives. Firstly, it highlights the strategic role of logistics integration insomuch as logistics integration can contribute to the firms' efficiency via reduced transaction costs. Put differently, these results provide some justification for focusing on the integration of logistics activities within firms since, prima facie, those firms with greater investments in logistics integration would appear to enjoy a competitive advantage over their rivals.

Secondly, from a transaction cost perspective, this analysis provides useful empirical evidence in an area that has hitherto been widely neglected. The analysis here provides another piece of evidence that sheds light on the theorized relationship between organizational activities and transaction costs.

At a practical level, these results suggest that some firms respond to high transaction costs by embarking on the integration journey. Operationally, they would appear well-advised to focus on resolving conflicts among departments as a firs step in this process, at least in settings similar to those encountered in this study. Moreover and as we noted earlier in this paper, investments in activities to build esprit de corps may yield relatively little if there is minimal conflict over goal definition in the first case. In that context a heavy focus on clear mechanisms for conflict resolution offers more scope.

Notwithstanding these observations, it would be reckless to conclude that three logistics integration components: Strategic Goal Communication, Multi-functional Projects and Managerial Support are obsolete in all settings, particularly given several high correlations among logistics integration components. For instance, correlations between Strategic Goal Communication - Conflict Resolution, Strategic Goal Communication - Multi-functional Projects, Multi-functional Projects - Conflict Resolution, Managerial Support - Multi-functional Projects and Managerial Support - Conflict Resolution were 0.72, 0.71, 0.71, 0.57 and 0.56 respectively. Such high correlations raise a question about the extent to which the impact of logistics integration components can be considered discretely in any setting. Put differently, whilst the results support the view that the greatest gains on transaction costs can be made by focusing most energies on improving Conflict Resolution, it is not possible to rule out the underlying

influence of Strategic Goal Communication, Multi-functional Projects and Managerial Support. This question remains unresolved and warrants further research.

In addition, the limited sample size has acted as a restraint in several ways. Firstly, a more comprehensive SEM model capable of incorporating all observable variables could not be developed. Rather, a less informative model - a single indicator latent variable model in which logistics integration and transaction cost components were measured by their average scores - was used for testing relationships among logistics integration and transaction cost components. Secondly, it would be ideal if logistics integration and transaction cost measurements are confirmed on a separate sample after the EFA. However, due to the limited sample size, this test was not possible. Consequently, future research which offers greater scrutiny to these areas is desirable.

6. CONCLUDING REMARKS

The results of this study validate, in large part, the hypothesized relationship between logistics integration and transaction cost. At a practical level, they point to several ways in which firms might transaction costs, particularly by focusing on solving conflicts among logistics functional units. Like many other studies, this research is not free from limitations. Consequently, directions for further research have been identified and include the development of more informative SEM models and greater attention to the overall influence of Strategic Goal Communication, Multi-functional Projects and Managerial Support.❑

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APPENDIX

Questionnaire Items

Communication (COM)	
COM1:	Technologies (like phone, email, fax) are easily available to communicate between functional units
COM2:	Technologies (like phone, email, fax) are freely available to communicate between functional units
COM3:	The information that passes between functional units is accurate
COM4:	The information that passes between functional units is timely
COM5:	The information that passes between functional units is formatted appropriately
COM6:	Functional units effectively share operational information
COM7:	There are current and appropriate systems that integrate information
COM8:	Information can be easily shared amongst functional units
COM9:	My firm actively utilizes industry standards for data exchange (e.g. Electronic Data Interchange - EDI)
COM10:	Functional units openly communicate to each other about emerging problems
COM11:	Technologies are available to allow people to communicate off-site
Collaboration (COL)	
COL1:	Functional units clearly understand the firm's strategic goals
COL2:	Functional units understand their role in achieving the firm's strategic goals
COL3:	Functional units cooperate
COL4:	Functional units actively plan together
COL5:	Functional units share a vision of the firm
COL6:	Functional units willingly share resources to achieve a common vision
COL7:	My firm has a system of incentives which involves the sharing of benefits and risks between functional units for any cooperative efforts
COL8:	My firm provides opportunities for members of functional units to interact socially
COL9:	My firm has a job-switching program which provides opportunities for personnel to rotate jobs
COL10:	Functional units collaborate to resolve problems when they arise
COL11:	Successes are widely shared regardless of the operational unit involved
Standardization (STA)	
STA1:	The routines within functional units are well established
STA2:	The routines within functional units are understood by all
STA3:	There is training and education available to help employees develop an understanding of the firm's standards

STA4:	It is a general expectation that functional units will be responsive to the requirements of other units within the firm
STA5:	There are standardized processes in place to resolve conflict between functional units
Formal Structures (FOS)	
FOS1:	Functional units extensively utilize cross-functional work teams for managing day-to-day operations
FOS2:	A task force, comprising members from different functional units, is used to implement new projects or mission
FOS3:	Members of each functional unit can work effectively off-site, if necessary
FOS4:	My firm employs people whose role includes integrating the various functional units
Information Costs (INC)	
INC1:	It is costly to gather information to allow the functional unit to do its job
INC2:	It takes a lot of effort to translate the information from one functional unit into a form useful for another
INC3:	Functional units spend a lot of time sorting through information
INC4:	Each functional unit has staff who spend time sourcing, interpreting and acting on internal information
INC5:	Each functional unit has resources solely devoted to sorting out and understanding information
Negotiation Costs (NEC)	
NEC1:	It is easy to come to an agreement among functional units on orders from one another
NEC2:	Confirming orders takes a long time
NEC3:	Modifications to orders are easily negotiated
NEC4:	Functional units are accessible to negotiate new and existing orders
NEC5:	Functional units are responsive to negotiating new and existing orders
NEC6:	Functional units trust each other which makes negotiating easy
Monitoring Costs (MOC)	
MOC1:	It is easy to follow up orders with other functional units
MOC2:	Tracking orders being processed by other functional units is difficult
MOC3:	It is easy to raise problem with functional units when delivery of orders proves unsatisfactory
MOC4:	Conflicts are easily resolved amongst functional units regarding delivery of orders
MOC5:	The relationship among functional units has been negatively influenced by internal conflicts