

# The Moderating Role of Interorganizational Information Systems in Maximizing the Operational Performance of Dyadic Business Relationships: a Conceptual Model

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**Abstract**—The objective of this study is twofold: first, to examine how the structure of a buyer-supplier relationship impacts the operational performance of the supplier involved in the dyadic relationship and second, to test the moderating impact of interorganizational information systems (IOS) usage (assessed through the dimensions of volume, diversity and depth) on the relationship between the structure of a buyer-supplier relationship and the operational performance of the supplier involved in the dyadic relationship. To do so, the marketing and IOS literatures are reviewed to propose a model and seven research hypotheses. Then, the methodology we intend to use to test our conceptual framework is explained. Lastly, the anticipated theoretical contributions and practical implications of the study are discussed.

**Keywords**—dyadic business relationship structure; inter-organizational information systems; operational performance.

## I. INTRODUCTION

Within the field of marketing, the structure of dyadic business relationships and its impact on the performance of each partnering firms is a key concern for practitioners and academics alike [1][2]. The structure of a dyadic business relationship can be defined as the patterned or regularized aspects of exchange between two business counterparts [3]. To date, most studies on this specific concern have focused on the political impact (i.e., cooperation, satisfaction, trust and commitment) while neglecting the economic impact (i.e., cost, speed, quality and reliability) of dyadic business relationship structures [4]. Among the few researchers that have empirically investigated the economic impact of the structure of buyer-supplier relationships, Bonner and Calantone [5] have shown that certain structures provide economic value to buyers. To date, however, no study has yet to investigate whether certain dyadic business relationships structures also provide economic value to suppliers. To partially address this gap in the marketing literature, the first objective of this study is to complement Bonner and Calantone [5] pioneering work by examining how the structure of a buyer-supplier relationship impacts the

operational performance of the supplier involved in the dyadic relationship.

Within the field of information systems (IS), numerous authors have demonstrated that interorganizational information systems (IOS) – defined as computer networks that support information exchanges across organizational boundaries [6] – can add economic value to business relationships. For example, Saeed et al. [7] demonstrated that IOS can provide either sourcing leverage or process efficiency, depending on IOS functionalities used. In addition, other IS researchers have discussed the possible symbiosis between IOS usage and the structure of business relationships [2][6][8][9][10]. For example, Malone et al. [9] relied on the transaction cost paradigm in their prediction that the evolution of computer-aided buying and selling would disrupt conventional marketing and distribution patterns. According to these authors, by reducing coordination costs, IOS would increase organizations' reliance on markets rather than hierarchies. A couple of years later, Clemons et al. [8] refuted Malone et al.'s [9] theory by demonstrating that the transaction economies of scale, learning curve effects, and other factors related to IOS use favor a move toward long-term relationships with a smaller set of suppliers (i.e., the “move to the middle” hypothesis). Yet, while conceptually very convincing, no study has empirically validated these propositions. To partially address this gap in the IS literature, the second objective of this study is to complement previous IOS studies by testing the moderating impact IOS usage on the relationship between the structure of a buyer-supplier relationship and the operational performance of the supplier involved in the dyadic relationship.

The rest of this article is organized as follows. First, in Section 2, the literatures on the structure of business relationships and IOS usage are reviewed. Based on these theoretical underpinnings we then present our research model and related hypotheses in Section 3. This is followed, in Section 4, by a discussion of the methodology that will be used to validate our research model. Lastly, Section 5 concludes the article by presenting the anticipated theoretical

contributions and practical implications of the study, as well as its limits and future research avenues.

## II. THEORETICAL BACKGROUND

Taking into account the objective of this study, this section reviews the literatures on the structure of business relationships and IOS usage to propose a sound theoretical background.

### A. Structure of a Business Relationship

Traditionally, conceptualizations of the structure of a business relationship have been anchored on two different approaches: an economic approach and a behavioral approach [10]. By applying microeconomic theory and industrial organization analysis, the economic approach is essentially “efficiency” oriented, focusing on costs, functional differentiation and channel design [10]. Williamson [11] is a key contributor to this approach. He asserted that firms organize their exchanges in order to minimize transaction costs and that the ensuing transaction forms may vary according to the degree to which exchange partners maintain decision-making autonomy. Discrete transactions are located at one extreme while highly centralized hierarchical transactions are at the other. Hybrid transactions, such as joint ventures and alliances, are located in between. His pioneering work was among many studies that rely on microeconomic factors to explain the structure of business relationships. On the other hand, the behavioral approach, which is anchored in social psychology and organization theory, is essentially “socially” oriented, and focuses on power and conflict phenomena [10]. Macneil [12] is a key contributor to this approach. Based on a set of contracting norms, he defined the concept of relational exchange on a continuum ranging from discrete to relational. Subsequently, Kaufmann and Stern [13] made an initial attempt to comprehensively operationalize contracting norms, which led the way to more empirical investigations to assess the structure of business relationships according to such norms.

More recently, several authors have combined the economic and behavioral approaches to examine the structure of business relationships, its antecedents and its outcomes [1][10][14][15]. These authors argue that both approaches should be used simultaneously, as interaction effects between economic and behavioral elements may influence the outcome of the exchange [14]. Stern and Reve [10] were the first to adopt this combined approach to study the structure of business relationships. Later on, Boyle et al. [1] proposed a framework anchored on both economic and behavioral elements to demonstrate that communication strategies, captured through communication frequency and content, differ significantly from one channel configuration to the next.

Out of the numerous studies that used the economic approach, the behavioral approach or a combination of the two, three dominant paradigms have emerged to characterize the structure of business relationships: transaction cost, relational marketing and political economy [16]. Of these three paradigms only the latter (political economy) integrates

aspects from both the economic and behavioral approaches, making it the most suitable to study the complex business relationship structures present in today’s economy [1][14]. Accordingly, numerous authors have adopted the Political Economy Paradigm (PEP) to study business relationships [1][10][14]. Amongst these authors, it is certainly Robicheaux and Coleman [16] who have proposed the most comprehensive framework to characterize and assess the structure of business relationships. Within their framework, the structure of a business relationship is assessed along two continuous axes: decision-making structure and operational integration. The former represents the degree to which the decision-making structure is clannish or bureaucratic (i.e., the polity structure), while the latter represents the degree to which the exchange relationship within a channel dyad is discrete or integrated (i.e., the economy structure). Four measures, namely centralization, formalization, participation and shared paradigm, are proposed to assess the decision-making structure (polity) while the level of operational integration (economy) can be captured through four other variables: joint actions, assistances, monitoring and information exchange. To complement their major contribution to the field, Robicheaux and Coleman [16] also proposed sets of antecedents and outcomes related to the structure of business relationships.

### B. Conceptualization of IOS usage

Early studies on IOS usage, such as Venkatraman and Zaheer’s [17] empirical work, relied on a single dichotomous variable to assess IOS usage. However, the appropriateness of such a measure was rapidly challenged since the issue from a management’s perspective is typically not one of use or non-use, but rather one of how and how much use [18]. To address this issue, researchers rapidly arrived to the conclusion that they needed continuous (rather than dichotomous) variables to assess IOS usage.

Later, two distinct approaches were adopted to develop continuous IOS use variables. The first relied on unidimensional measures to assess IOS usage. Among the numerous authors promoting this approach, we note Wang et al. [19], who conceptualized IOS usage along the dimension of virtual integration, defined as the extent to which trading partners use IT to support the processes related to collaborative operation execution and collaborative process planning and control. The second approach relied on multidimensional measures to assess IOS usage. Authors who favored this approach include Keen [20], who proposed a framework describing the usage of IOS along two dimensions: reach and range. According to this author, reach determines the locations that the system can access and to which it can link, while range is defined as the kind of information that can be seamlessly and automatically shared across the system and services.

More recently, some researchers have combined IT implementation models [21] and the diffusion of innovation theory [22] to propose unidimensional measures to assess IOS usage at different phases of the technology assimilation process. For example, Zhu et al. [23] used a

three-stage approach to assess firms' e-business assimilation. The first stage, e-business initiation, was measured by an aggregated index capturing whether the firm had used the Internet for each of the seven value chain activities proposed. The second stage, e-business adoption, was assessed by aggregating the seven adoption items. Finally, e-business routinization was measured by the extent of organizational use of e-business to support value chain activities.

To conclude this section, it is important to note that most of the conceptualizations of IOS use proposed to date, whether unidimensional or multidimensional, were inspired by Massetti and Zmud's [24] approach to EDI measurement, which comprised four facets: (1) volume, which assesses the extent to which a firm's document exchanges are handled through EDI connections; (2) diversity, which captures the extent to which different types of documents are handled through EDI connections; (3) breadth, which assesses the extent to which a firm has developed EDI connections with each of its trading partners; and (4) depth, which captures the extent to which a firm's business processes are intertwined with those of its trading partners through EDI connections. Depending on the context of the research, one or more dimensions of this scheme have been used to assess firms' usage of different types of IOS, including EDI [25], SCM systems [26] and IOS in general [27].

### III. CONCEPTUAL FRAMEWORK

Taking into account that this research focuses on the economic aspects of dyadic business relationships, we build on the theoretical background presented above to propose a research model that first considers the direct impact of the structure of a buyer-supplier relationship on the operational performance of the supplier involved in the dyadic relationship (Figure 1). Operational integration, which is one of the two axes proposed by Robicheaux and Coleman to assess the structure of a business relationship, represents the degree to which an exchange relationship within a business dyad is discrete or integrated [16]. In a discrete relationship, the exchange pursues self-interest vigorously without any consideration of future exchange [28], whereas in an integrated relationship, the distinct and interdependent organizational components of the partners involved in the channel dyad constitute a unified whole [29]. The four variables proposed by Robicheaux and Coleman [16], namely joint actions, assistances, monitoring and information exchange, are used to measure the level of operational integration between the partners (i.e., buyer and supplier) involved in a dyadic relationship. Joint actions capture the extent to which the partners are involved in each other's operations [30]. The assistance assesses the position taken by the supplier toward assisting the buyer [31]. Monitoring captures the ex-ante and ex post control or supervisory actions taken by the buyer over the supplier [32]. Finally, information exchange assesses the bilateral expectation that the partners will proactively provide information to each other [33].

A multidimensional view is also adopted to test the moderating effect of three IOS usage variables, namely volume, diversity and depth, on the relationship between the

predictor and criterion variables. The fourth facet from Massetti and Zmud's [24] conceptualization of IOS usage, breadth, is not considered, as this research focuses on dyadic relationships. Volume of IOS usage assesses the extent to which the supplier's activities with the buyer are supported by IOS use. Diversity of IOS usage assesses the number of e-business functionalities adopted by the supplier to support its activities with the buyer [34]. Depth of IOS usage assesses the extent to which the supplier's processes are intertwined with those of its buyer through IOS use [30].

#### A. *The Impact of the Structure of a Buyer-Supplier Relationship on Operational Performance of the Supplier Involved in the Dyadic Relationship*

Several studies have highlighted or demonstrated the positive impact that an integrated exchange relationship can have on the operational performance of the partners involved. Indeed, integration between supply chain partners can improve manufacturing productivity [35], generate economies of scale and scope [11], reduce shipment discrepancy levels [36] and speed up product development, delivery and payment [29]. Furthermore, operational integration between partners, as assessed through assistances, monitoring, information exchange, continuity expectations and flexibility, decreases purchasing costs [30].

In regards to the particular facets of operational integration proposed by Robicheaux and Coleman [16], numerous researchers have demonstrated that joint actions between a buyer and a seller can improve the performance of the parties involved [36]. For example, Cannon et al. [36] confirmed the importance of joint actions to improve relationship performance under both low and high levels of environmental uncertainty. Based on this premise, we posit our first hypothesis (H1): *Joint actions between the partners involved in a dyadic relationship will positively impact the operational performance of the supplier involved in the relationship.*

Several authors have demonstrated that when a seller/buyer offers assistance to a buyer/seller, the buyer/seller is likely to interpret such actions as a manifestation of commitment by its business counterpart, which may be the basis of trust [5][37]. And, given that trust and commitment have been found to directly and indirectly influence exchange performance or organizational performance [38], it is likely that supplier's assistance to the buyer will positively impact the supplier's operational performance. Based on this premise, we posit our second hypothesis (H2): *Supplier's assistance to the buyer will positively impact the supplier's operational performance.*

The buyer's monitoring of the performance of the supplier is also an important means of assessing the health of a relationship. Indeed, in addition to showing that buyer's monitoring of the supplier positively impacts the buyer's performance [39], the literature also shows that buyer's monitoring of the supplier also positively impact the supplier's performance by enticing him to improve its activities and processes [40]. Based on this premise, we posit our third hypothesis (H3): *Buyer's monitoring of the supplier*

will positively influence the supplier’s economic performance.

Finally, past marketing and supply chain management studies have shown that effective interorganizational information sharing can enhance the performance of a supply relationship [41][42]. For example, as stated by Paulraj et al. [41, p. 49], when “buyers and suppliers share important information relating to materials procurement and product design issues, they are more likely to (1) improve the quality of their products, (2) reduce customer response time, (3) reduce the costs of protecting against opportunistic behavior, and (4) increase cost savings through greater product design and operational efficiencies”. Based on this premise, we posit our fourth hypothesis (H4): *Information exchange between the partners involved in a dyadic relationship will positively impact the operational performance of the supplier involved in the relationship.*

**B. The Moderating Impact of IOS Usage**

Various mechanisms facilitating the operational integration among supply chain partners have been identified in the management literature [42]. As noted by Barki and Pinsonneault [29], these mechanisms include standardizing work, standardizing output, standardizing skills and knowledge, standardizing norms, direct supervision, planning, and mutual adjustment. It has also been demonstrated that the introduction and usage of an IOS eases the implementation of these mechanisms, which, in turn, facilitates the operational integration between supply chain partners [26].

In regards to the particular facets of IOS usage proposed by Massetti and Zmud’s [24], various authors have demonstrated that unless IOS volume reaches a sufficient level, it is unlikely that the reengineering of associated business processes will provide significant benefits [24]. Indeed, a high volume of IOS usage will allow a firm to fully exploit the key mechanisms facilitating operational integration that were initially implemented through the adoption of the IOS. Based on this premise, we posit our fifth hypothesis (H5): *The impact of (a) joint actions between the partners, (b) supplier’s assistance to the buyer, (c) buyer’s monitoring of the supplier and (d) information exchange between the supplier on the supplier’s operational performance will be greater when the volume of IOS usage is high than when the volume of IOS usage is low.*

Also, the greater the variety or diversity of documents exchanged through IOS, the more automated and standardized the document’s generation, transmission and reception processes become [24]. By automating and standardizing document exchange, IOS diversity also optimizes other mechanisms that facilitate operational integration such as mutual adjustments and planning [27]. Thus, high diversity of IOS usage will allow a firm to implement a wide range of mechanisms facilitating operational integration. Based on this premise, we posit our sixth hypothesis (H6): *The impact of (a) joint actions between the partners, (b) supplier’s assistance to the buyer, (c) buyer’s monitoring of the supplier and (d) information exchange between the supplier on the supplier’s operational performance will be greater when the diversity of IOS usage is high than when the diversity of IOS usage is low.*

Lastly, establishing integrated IOS links (or greater depth) through the redesign of business processes and the establishment of unique information exchange routines increases procedural specificity between the partners involved [7]. Furthermore, IOS depth automates and shortens the time required to exchange information [25], which in turn may allow for the implementation of other mechanisms that facilitate operational integration such as direct supervision planning and mutual adjustment. Thus, greater depth of IOS usage will allow a firm to implement a wide range of mechanisms facilitating operational integration. Based on this premise, we posit our seventh hypothesis (H7): *The impact of (a) joint actions between the partners, (b) supplier’s assistance to the buyer, (c) buyer’s monitoring of the supplier and (d) information exchange between the supplier on the supplier’s operational performance will be greater when the depth of IOS usage is high than when the depth of IOS usage is low.*

**IV. METHODOLOGY**

As our research is still in progress, this Section explains the methodological framework we have devised, but not yet used, to test our research model. More precisely, we present our unit of analysis as well as our intended research setting, data collection procedures, survey instrument and data analyses procedures.

**A. Research Setting**

This study explores the structure of business relationships from the perspective of the supplier. Hence, the unit of analysis of this research is the supplier’s relationship with a particular buyer. The up-to-date list of manufacturing firms from the greater Montréal area maintained by a local government agency (CRIQ) will constitute this study’s sample frame. In addition, the sample frame will be limited to manufacturing firms active in four industrial sectors: (1) machinery manufacturing (NAICS 333); (2) computer and electronic product manufacturing (NAICS 334); (3) electrical equipment, appliance and component manufacturing (NAICS 335); and (4) transportation equipment manufacturing (NAICS 336). Two reasons justified this choice. First, the adoption level of IOS in these four sectors is among the highest (Forester Research 2011).

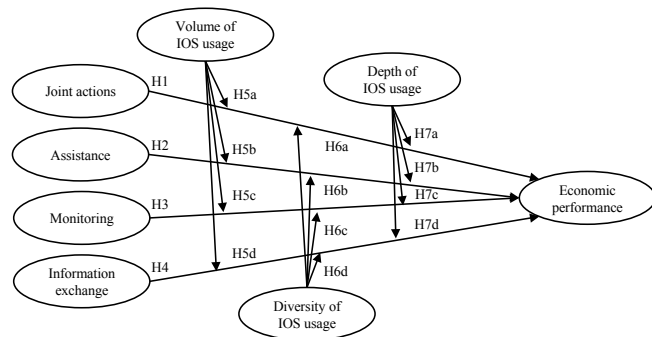


Figure 1. Research Model.

Second, previous studies have demonstrated the validity of these sectors in the study of business relationships [15][30].

### B. Data Collection

Data will be collected by the mean of an online survey. We will follow the key informant approach and collect data from one sales professional at each supplier because specialists in this boundary role are most likely to be knowledgeable about study constructs [35]. Prior to answering the online survey, respondents will be asked to focus on an important buyer relationship for a major product manufactured by their company. To maximize this study's response rate, the diffusion of the survey will be based on four key elements: (1) a respondent-friendly questionnaire; (2) a five-contact strategy (in the form of five different e-mails to be sent to sales professionals); (3) a personalized correspondence; and (4) two incentives (i.e., a tailored benchmark report and a chance to win an electronic gift card of a 500\$ value on Amazon). To ensure the anonymity of our respondents all collected data will be anonymized.

### C. Survey Instrument

The survey instrument will comprise measures adapted from the literature. Measures tied to the structure of the dyadic business relationship (Joint actions [43], Assistance [38], Monitoring [32], and Information exchange [33]) will be adapted from marketing studies while those related to IOS usage (volume of IOS usage [34], diversity of IOS usage [44] and depth of IOS usage [24]) will be adapted from IS studies. In addition, the measure to assess the operational (or economic) performance of the supplier will be adapted from the work of [26]. All measures are available upon request to the authors.

### D. Data Analyses

The analysis of our data comprises four steps: (1) assessing the unidimensionality and convergent validity of the constructs; (2) assessing the internal consistency of the constructs; (3) assessing the discriminant validity of the constructs; and (4) testing our research hypotheses via a hierarchical regression model. For the last step, consistent with standard practice for analyzing models with interaction effects [45], variables will be entered in blocks in the hierarchical regression model. First, we will include the variables of joint actions, assistances, monitoring and information exchange into the model and assess their impact on operational performance. Then, we will enter the IOS usage variables into the model and assess their impact on operational performance. Finally, we will enter the interaction variables into the model and assess their impact on economic performance.

## V. CONCLUSION

The objective of this study was twofold. First, to examine how the structure of a buyer-supplier relationship impacts the operational performance of the supplier involved in the dyadic relationship. Second, to test the moderating impact of IOS usage on the relationship between the structure of a buyer-supplier relationship and the operational performance

of the supplier involved in the dyadic relationship. Accordingly, this research is likely to yield important theoretical contributions and practical implications despite certain limitations.

### A. Theoretical Contributions

This study should make two important theoretical contributions to the marketing and IS literatures. First, this research will be the first to empirically test a key sub-set of Robicheaux and Coleman's [16] framework to characterize and assess the structure of business relationships. Second, this study will link past findings from marketing and IOS studies and show that IOS can help maximize the economic value of supplier involved in buyer-supplier business relationships.

### B. Practical Implications

From a practical standpoint, the present research anticipated results should allow managers to identify the key marketing activities (i.e., joint actions, assistance, monitoring and information exchange) that foster economic value in dyadic business relationships. Also, this study should help managers maximize the economic value they derive from their dyadic business relationships by revealing the key role that IOS play in this context.

### C. Limits and Future Research Avenues

There are two main limitations to this study. First, the research model will be tested with data collected from a small sample, which evidently limits the scope and generalizability of our results. To alleviate this issue, future researches could test our research model with manufacturing firms pertaining to other industries and/or localized in other regions of the world. Second, we did not investigate the impact of IOS ownership in the context of dyadic business relationships. Future research should focus on this important variable since several studies have shown that benefits tied to IOS usage are often skewed in favor of the IOS owner [7].

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