The Strategic Value of Interorganization Information Systems: A Resource Dependency Perspective

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Abstract—**Over the past three decades, numerous studies have shown that the adoption of interorganizational systems (IOS) has enabled organizations to obtain a competitive advantage. Yet, recent information systems (IS) resource-centered studies now question the strategic value of IOS, arguing that they have become easily imitable necessities. However, these studies are mainly efficiency oriented and do not assess the effectiveness impacts of IOS. Hence, the objective of this paper is to bring clarity on the strategic value of IOS by demonstrating that IOS can indeed be used to achieve organizational effectiveness. To do so, we anchor our work on the resource dependency theory (RDT), which explicitly posits effectiveness as the main driver of organizational performance. Accordingly, the literatures on business relationships, organizational performance, RDT and IOS are examined to propose a research model, its related hypotheses, and methodological aspects regarding its empirical validation. Finally, the proposed model's anticipated contributions are discussed.**

Keywords-dyadic business relationship; dependence; effectiveness; resource dependency theory; interorganizational information systems.

I. INTRODUCTION

To stay competitive in today's uncertain dynamic environment, organizations are increasingly relying on their partners to accomplish complex tasks that are impossible to achieve independently [1][2]. This new dynamic, where organizations are outsourcing their activities in which they are less competent [3], is modifying the links bounding a firm to its business counterparts [4] and creating a state of greater interdependence between social actors present in the environment [5]. This new dynamic is also translating in the emergence of new interorganizational forms such as virtual enterprises and integrated supply chains [6][7], to harness benefits from closer and stronger partnerships [8], which, in turn, have put to the forefront the use of interorganizational information systems (IOS). IOS are computer networks that support information exchange across organizational boundaries [9]. They have been extensively adopted and relied upon by organizations to obtain a competitive advantage over their competitors. Abnormal rents derived from such systems are assumed to stem from their ability to allow information to flow quickly and transparently across multiple interorganizational boundaries making it visible to all supply chain partners and in turn improving the performance of business relationships [10]. Despite these stated benefits, recent findings from information systems (IS) resource-centered studies now question the strategic value of IOS, arguing that they have become easily imitable necessities [11][12][13][14].

The proliferation of new interorganizational forms has also changed organizational practices in regards to performance assessment by shifting the locus of organizational performance from efficiency to effectiveness considerations. Indeed, organizations forced to transact with one another to complete their activities are no longer the sole master of their destiny and are thus subject to external influence and demands when making strategic decisions. Effectiveness, defined as the organization ability to satisfy the demands of those in its environment from whom it requires support for its continued existence [5], is thus becoming a critical measure of organizational performance. Furthermore, the shift from efficiency to effectiveness considerations has exacerbated the recent questioning of IOS strategic value. Indeed, findings from IS studies suggest that incentive to adopt an IOS are only efficiency bounded (i.e., reduction of transaction cost, increase productivity) [15][16]. Thereby, using such resources would be of little value in an effectiveness prized context and further validates the recent questioning of their strategic value.

Despite these criticisms on the strategic value of IOS, we must emphasize that resource-centered studies in the IS field are for the most part efficiency oriented and do not assess the effectiveness impacts of IOS [17]. Such a state suggests that much is still to learn in this area and that discarding the strategic value of IOS based on an half complete picture would be mistaken. The present paper is in line with this consideration and aims to bring clarity on the strategic value of IOS by demonstrating that IOS can be used to achieve organizational effectiveness. To do so, we anchor our work on the resource dependency theory (RDT), which is the only resource-based theory (e.g., resource based view theory, relational view theory, knowledge based view theory) that explicitly takes into consideration the interdependencies

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between social actors and posits effectiveness as the main driver of organizational performance and competitive advantage. More precisely, the underlying premise of this paper is that an organization may shift the nature (i.e., structure) of its business relationship with a trading partner from an arm's length to an integrated stance [18][19][20][21] by using an IOS, which in turn will enable the organization to be effective (i.e., to satisfy the demands of its partner from whom it requires support for its continued existence).

The rest of the paper is organized as follows. First, in Section 2, we illustrate the key differences between efficiency and effectiveness measures of operational performance. Then, in Section 3, we rely on the tenets of RDT to identify how an organization may change the nature of its business relationship with a partner from an arm's length to integrated stance to achieve organizational effectiveness. Next, based on these theoretical underpinnings we present our research model and its related hypothesis in Section 4. This is followed, in Section 5, by a discussion of the research methodology that will be used to validate our research model. Lastly, Section 6 concludes the paper by presenting the anticipated theoretical and practical contributions of the study as well as its limits and future research avenues.

II. LITTERATURE REVIEW

A. Organizational Performance: Efficiency vs. Effectiveness

Efficiency and effectiveness are clear distinguishable domains of organizational performance [22]. Efficiency is an internal standard of organizational performance [5] that refers to an input-output ratio or comparison [22]. In turn, effectiveness is externally oriented [5] and refers to an absolute level of either input acquisition or outcome attainment [22]. Effectiveness measures of performance imply a valued evaluation, usually based on how well the organization is meeting the needs or satisfying the criteria of evaluators [5]. As such, in a context like today's competitive environment, where interdependencies between social actors play a critical role, effectiveness measures are more suitable to assess organizational performance than efficiency measures due to their external focus. In the particular case of this study, evaluators consist of the external partners upon which an organization depends.

B. Resource Dependency Theory

Resource dependency theory posits that organizations are defined at the activity level, making activities under the control of an organization its core and purpose [5]. To complete their activities, organizations are assumed to rely on resources present in their environment. Resources can include anything perceived as valuable by an organization; from materials to access to markets [23]. The reliance on these resources poses the problem of their procurement, which is exacerbated by the fact that no organization is believed to be self-contained or to have the total control over it's required operational components or resources [5]. Therefore, differences in firm resource endowments exist and persist over time and define the structure of an organization's environment. In turn, environmental characteristics or patterns of resource endowments create interdependencies between organizations for resource procurement and forces them to transact with one another [23].

Exchanges between partners caused by the environmental structure are not all balanced. In fact, in dyadic settings, asymmetry due to the unequal importance of the exchange for each organization may be present [23]. Asymmetry in a relationship is determined by the respective dependence level of each party upon the other [24]. According to [5], three factors must be weighted to assess an organization's level of dependence towards another. First, the importance of the resource exchanged for the organization (i.e., the extent to which the organization requires the resource for continued operations and survival). Second, the extent to which the organization from which the resource will be acquired has discretion over the resource allocation and usage. Third, the extent to which there are few alternatives or other organizations from which the resource can be obtained. Hence, an organization for which the resource exchanged is highly important, and that has limited discretion over the resource and few alternatives from which it can obtain the resource is considered to be dependent upon its exchange partner.

In turn, asymmetry or different levels of dependence in an exchange will confer to the less needy partner a certain power over its more dependent counterpart exposing the later to the influence and the demands of the former [24]. Hence, an organization's level of dependence upon a partner measures the potency of its partner. In other words, it measures how much the dependent organization must take into account its partner's demands, and also how likely the dependent organization will consider its partner's demands in its decision making process [5].

To deal with a partner's demands and ensure its survival (i.e., to be effective), an organization can take three types of actions [5]. As noted by [25, p. 88], "The first alternative is to comply with such influence. The second response is to evade these demands. The last alternative is to alter external demands by modifying its relationships with external actors". RDT focuses mainly on this last alternative. More precisely, RDT posits that an organization will aim to shift the nature (i.e., structure) of its relationship with a significant partner from an arm's length to an integrated stance. In doing so, an organization will increase its external partner's stakes in the relationship, which in turn will alleviate power asymmetries and secure access to critical resources. Two types of strategies can be used to achieve this aim [25]: (1) ownership alteration strategies such as vertical integration, horizontal integration and diversification that involve the acquisition of the needed external resource and, thus, eliminate interdependencies [5]; and (2) quasi-hierarchical strategies that do not involve a change in ownership, but rather the creation of quasi hierarchical relations (e.g., joint ventures, interlocking boards of directors, associations, cartels and the formation of social norms) to more formally govern interfirm relationships [23].

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III. CONCEPTUAL FRAMEWORK

Based on the theoretical background presented above, the premise of this paper is that IOS usage may be used by an organization to implement a quasi-hierarchical strategy in its attempt to increase its partner's stake in the relationship, alleviate power asymmetries and secure access to the critical resources it requires for its continued existence. This Section exposes the three hypotheses tied to our research model shown in Figure 1.

A. Hypothesis #1

According to the tenets of RDT, to be effective, a dependent organization should develop a close interorganizational relationship – a particular type of quasi-hierarchical strategy – with its business counterpart in order to balance the asymmetrically dependent relationship and make it more symmetrical and interdependent [5]. Finding stemming from the field of marketing, which has a well established tradition of examining organizational dependence in business relationships, support this assertion. Indeed, several authors have demonstrated that the dependence of one party upon another entices the former to integrate its activities with the later [26][27][28]. For example, to ensure that it continues to have access to the resources provided by its less needy partner, a dependent organization is more likely to have a long-term orientation and significantly invest in its relationship with its partner [26][27][29]. Such investments often take the form of bounding behaviours, which include adding value to goods exchanged and developing specialized procedures in ordering, shipping and servicing [30]. Conceptually one can think of such investments involving people, products and procedures as creating exit barriers in the business relationship [27], which would create switching costs for the less needy organization if it decided to change trading partner.

These bounding behaviors also include relationship-specific IOS usage. For example, a dependent supplier may use an IOS to facilitate timely and accurate information sharing, which should add value to the exchange relationship by reducing redundant workload for their customer [31]. It is important to note that these offsetting investments in dyadic relationships are themselves transaction-specific assets since their value would be greatly diminished if one of the partners was to switch and decide to exchange with a source different than the original partner. Thus, IOS usage may be seen as a particular type of quasi-hierarchical strategy that balances asymmetrically dependent relationship. Based on the arguments mentioned above the following hypothesis is formulated:

Hypothesis #1: The greater the organization's level of dependence upon the trading partner, the greater its level of IOS usage with that trading partner.

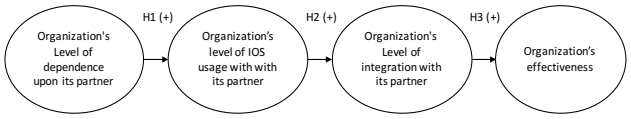

Figure 1. Research Model.

B. Hypothesis #2

Various mechanisms facilitating the integration between trading partners have been identified in the organization theory literature [32]. As noted by [33, p. 171), these mechanisms include "standardizing work (i.e., common and clearly specified procedures and tasks), standardizing output (i.e., clearly specified results or output of work), standardizing skills and knowledge (i.e., standardized training and expertise), standardizing norms (i.e., establishment of common values, beliefs, and expectations), direct supervision (i.e., someone not directly doing the work, but being responsible for coordinating the activities), planning (i.e., establishment of schedules governing activities of different units), and mutual adjustment (i.e., people or units adapting to each other during their work processes)". In turn, numerous studies in the IS field have demonstrated that IOS usage allow for the implementation and/or optimization of these mechanism facilitating integration between partners [34]. Indeed, IOS are recognized to enhance the formalization, the content and the amount of information exchanged between business partners [21]. More precisely, by requiring standard protocols for data communication, IOS usage introduces the need for the establishment of a formal agreement between the trading partners, which in turn fosters the standardization of work and certain outputs. Furthermore, by formalizing communication processes and procedures as well as by providing a superior capacity for data transmission, IOS usage also enhances the speed, the accuracy and completeness of interorganizational communication [35], which in turn optimizes several other mechanisms facilitating partner's integration. For example, by allowing the information to flow effectively across organizational boundaries [36][37], IOS usage enables a manufacturer to promptly react to unexpected events caused by their suppliers/customers as well as to advise them of changes in planning, which fosters rapid mutual adjustment between partners [38][39][40]. Improvements in interorganizational communication derived from IOS usage also increase speed of feedback and error correction between supply chain partners [40] thereby facilitating the supervision of activities across organizational boundaries. In addition, sharing information through IOS gives integrated partner's accurate and precise information on future material requirements [39], and thus improves their planning and scheduling [41][42]. Based on these previous arguments, the following hypothesis is formulated:

Hypothesis #2: The greater the organization's level of IOS usage with the trading partner, the greater its level of integration with that partner.

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C. Hypothesis #3

The positive relationship between an organization's pursuit of a quasi-hierarchical strategy and its effectiveness has been demonstrated in several studies. For example, [43] demonstrated that, by integrating its activities with those of its trading partner, an organization can be more innovative and be more prone to develop new business opportunities. In addition, [44] also revealed that, by integrating its activities with those of its trading partner, an organization can be more effective. Based on these previous arguments, the following hypothesis is formulated:

Hypothesis #3: The greater the organization's level of integration with the trading partner, the greater its effectiveness.

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 intended research setting, data collection procedures, survey instrument and data analyses procedures.

A. Research Settting

An important part of the research design was to identify an industry where: (1) new interorganizational forms established to harness the benefits of closer and stronger partnerships exist, (2) effectiveness is a valued measure of organizational performance, and (3) the level of IOS adoption is high. One example of such industry came to our attention: the aerospace industry. Indeed, recent studies have shown that organizations from this industry are increasingly developing integrated supply chains and strong business partnerships to fulfill market demands [45]. As such, effectiveness is highly valued in this industry [45]. Lastly, recent studies have also shown that the adoption level of IOS by firms in this industry is amongst the highest [46]. Accordingly, the unit of analysis of this study is the business relationship between a manufacturer pertaining to the aerospace industry and one of its customers.

B. Data Collection

Data will be collected by means of a field survey. Conceptually, a researcher can decide to study a business relationship through the perspective of the supplier, the customer or both parties [47]. In the present research, the perspective of the manufacturer (i.e., the supplier) will be adopted. 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 [48]. These sales professional will be identified from a Canadian governmental database, which lists all the manufacturers pertaining to the Canadian aerospace industry. They will be asked to focus on a specific customer relationship for the sale of a specific component/resource when answering the survey. Lastly, to ensure the anonymity of our respondents all collected data will be anonymized.

C. Survey Instrument

The survey instrument will include measures specifically developed for the purpose of this study as well as measures drawn and/or adapted from the literature. Existing scales for the manufacturer's level of dependence upon its customer were deemed inappropriate as they do not account for the three dimensions identified by [5]. Also, measures of organizational effectiveness are non existent. Thus, we will develop appropriate scales for each of these constructs by following the three-stage approach proposed by [49].

Scales for the remaining constructs (those related to the manufacturer's level of IOS usage with its customer, and the manufacturer's level of integration with its customer) will adapted from the literature. More precisely, the manufacturer's level of IOS usage with its customer will comprise three dimensions, namely volume, diversity and depth and will be measured with scales adapted from [50]. The manufacturer's level of integration with its customer will include four dimensions, namely joint actions, assistances, monitoring and information exchange [51] and will be measured using scales adapted from [52] (joint actions), [53] (assistance), [54] (monitoring), and [55] (information exchange).

D. Data Analyses

Structural equation modeling (SEM) will be used to analyze this study's data. One important particularity of this approach is that it allows for the simultaneous evaluation of both the quality of the measurement and the construct interrelationships [34]. In addition, the use of SEM will allow us to test both the direct and indirect effects of dependent constructs on organizational effectiveness as well as to assess if the process of IT value creation is sequential as implied by our model.

A two-phase analytical procedure will be employed. In the first phase, a confirmatory factor model (i.e., the measurement model) will be used to measure the fit between the theorized model and observed variables, whereas in the second phase, results of the measurement model will be used to create a path-analytic model to investigate the relationships hypothesized in this study [56].

V. CONCLUSION

The objective of this project is to bring clarity on the strategic value of IOS by demonstrating that IOS can be used to achieve organizational effectiveness. To do so, a research model anchored on RDT is proposed. Results tied to the empirical testing of this model should prompt important theoretical and practical contributions as well as future research avenues despite certain limits.

A. Theoretical Contribution

First, by measuring organizational effectiveness rather than organizational efficiency, the present study will broaden our understanding IOS impacts and consequently our understanding of their strategic value. Second, this study will complement previous IS resource-centered research by providing insights on how to use a particular IS strategic resources, namely IOS. Traditionally, IS resource-centered

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research have been concerned with identifying strategic resources rather than explaining how they should be used. Such predisposition and lack of guidelines to turn valuable IS resources into competitive advantages may lie on the extensive reliance on the resource-based-view perspective, which doesn't cover this critical aspect. As such, the present study, anchored on RDT, significantly departs from previous research endeavors by being one of the few to both identify and define how a particular IS strategic resource, the IOS, can be used to alleviate dependence asymmetries in business relationships.

B. Practical Contributions

From a practical stance, anticipated findings should help organizations to better manage their portfolio of interorganizational relationships by identifying: (1) key organizational partners, (2) how to alleviate the influence of these partners through interorganizational integration and (3) the critical role of IOS in this integrating process. As such, managers will be able to effectively cope with partner demands, and hence ensure the survival of their organization.

C. Limits and Future Research Avenues

The theoretical and methodological contents presented above suggest a few limits and related future research avenues. First, our study sample is specific to manufacturers involved in a customer relationship for the sale of an important component/resource. To address this limit, future research should be undertaken in order to replicate our research efforts in different settings with different types of resources. For example, it could be interesting to replicate our research efforts within the context of manufacturer-supplier relationships where the manufacturer aims to acquire an IT resource in exchange of a monetary compensation. Second, the present study does not take into consideration the different types of IOS used to support the manufacture-customer relationship (e.g., dyadic, multilateral). Future research initiatives could thus be undertaken to extend the present work by investigating whether or not the use of different types of IOS may lead to different findings. For example, it would be interesting to see if the dependence between two business partners can influence the choice of a particular type of IOS. Third, our research considers only the perspective of the manufacturer. To address this limit, we recommend that future research on dyadic relationships should investigate the viewpoint of both partners in the business relationship. Such an endeavor would generate more accurate findings by, amongst other things, assessing interdependence between the partners, which better reflects the reality of business relationships than only capturing the level of dependence of a single partner towards the other.

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