A Framework for Identifying the Critical Factors Affecting the Decision to Adopt and Use Inter-Organizational Information Systems

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Abstract—The importance of inter-organizational system (IOS) has been increasingly recognized by organizations. However, IOS adoption has proved to be difficult and, at this stage, why this is so is not fully uncovered. In practice, benefits have often remained concentrated, primarily accruing to the dominant party, resulting in low rates of adoption and usage, and often culminating in the failure of the IOS. The main research question is why organizations initiate or join IOS and what factors influence their adoption and use levels. This paper reviews the literature on IOS adoption and proposes a theoretical framework in order to identify the critical factors to capture a complete picture of IOS adoption. With our proposed critical factors, we are able to investigate their relative contributions to IOS adoption decisions. We obtain findings that suggested that there are five groups of factors that significantly affect the adoption and use decision of IOS in the Supply Chain Management (SCM) context: 1) interorganizational context, 2) organizational context, 3) technological context, 4) perceived costs, and 5) perceived benefits.

Keywords—Business-to-Business relationships, buyer-supplier relationships, Critical factors, Interorganizational Information Systems, IOS adoption and use.

I. INTRODUCTION

INTERORGANIZATIONAL Information Systems (IOS) are becoming a competitive necessity due to globalization and the growing importance of business alliances. Since more and more organizations engage in outsourcing and offshoring, either as customers or as suppliers, IOS are essential to coordinate their supply chain. Moreover, technological improvements and enhanced Internet connectivity enable the implementation of a wide variety of IOS, which may provide organizations with substantial benefits [37]. Still, many organizations are disinclined to implement IOS [4, 9]. IOS may provide substantial benefits, however many organizations are reluctant to implement them. Perhaps the most common form of technology to support data exchange between business partners is Electronic Data Interchange (EDI). Currently, many trading partners are turning to Internet-based approaches, including Internet-based data exchange and procurement [10].

In the context of interorganizational systems, research and management issues become more complex compared to intraorganizational settings, as more than one autonomous decision maker is involved [13]. An additional dimension of complexity -- uncertainty and risk -- is added to the situation, as the benefits of investments may no longer depend only on internal contingencies but also on the decisions and the loyalty of business partners.

Many researchers have studied the adoption of business-to-business IOS, but agreement on which factors is more important driving forces of IOS adoption has not been achieved. To assess the verity of this contention, we conducted a review of research in Business to Business (B2B) relationships adoption and use in SCM systems that has been published in IS journals. Despite the interest and volume of research on this topic few theoretical generalizations have emerged. The lack of theorization has been compounded by the fact that the literature has grown in many directions to address various technological and practitioner concerns. Various models, which dealt with IOS implementation, have been developed. However, these models concerned only certain aspects of IOS adoption or use. To address this gap we propose a framework to review this field of research, and provide a means to appreciate the complementarities that run through this research stream.

In the next section, we present the evolution of IOS definitions and highlight the different typologies and related technologies. We then review the past literature to delineate our basic constructs of Inter-organizational relationships, and Inter-organizational systems, and identifying the critical factors of IOS adoption and use. Next, we use these constructs to discuss our research objectives. The proposed theoretical framework will be depicted in the next section. Finally we conclude with a discussion of our work and the scope of further work that can result.

II. THE EVOLUTION OF IOS CONCEPT

IOS refer to the computer and telecommunications infrastructure developed, operated and/or used by two or more firms for the purpose of exchanging information that support a business application or process. These firms can be suppliers and customers in the same value chain, or strategic partners or

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even competitors in the same or related market. The term IOS was officially introduced in the early 1980s. Barrett & Konsynski [2] used the term Inter-Organizational Information Sharing System to refer to "*systems that involve resources shared between two or more organizations*". During this time, IOS was mainly being used by manufacturers, wholesalers, distributors, financial institutions, airline reservations and insurance agencies. Cash and Konsynski [5] were the first to coin the term "*inter-organizational system*" and defined it as an "*automated information systems shared by two or more companies*". This definition is the most commonly used definition of IOS in literature.

The 1990s exhibited another dramatic increase in the number of organizations adopting an IOS. Meanwhile, transaction/operational level IOS turned from a competitive advantage into a strategic necessity. For many industries, using an IOS was a requirement to do business with them. A typical IOS in 1990s can be defined as an "*information system that links one or more firms to their customers or their suppliers, and facilitates the exchange of products and services*" [1].

Research was being done to create an IOS that supported less structured activities that were more process oriented. This evolution would be required to support the multitude of activities that an IOS could potentially perform. According to Kumar and Van Dissel [26], '*an IOS is the information and communication technology that transcends organizational boundaries*'. IOS became more prevalent in the 1990s because of its strategic significance.

In 2000, the growing use of the Internet has affected how organizations conduct their commercial transactions and has led to the development of B2B electronic commerce. Both large and small organizations were able to take advantage of an IOS due to the relatively inexpensive costs to build one. IOS on the web were more flexible and could be designed based on market needs. In the 2000's, IOS can be defined as:

"*A network-based IS that extends beyond traditional enterprise boundaries. With an IOS permitting information access to other organizations, the organizational boundaries are redefined and extended to the extent that a firm's value chain needs to be redesigned*" [19].

According to the literature [23], a typical IOS consists of three parts: content platform, delivery platform, and trading partner base [43]. They characterize the relative openness of an IOS. Using this three-part framework, we analyze the relative openness of three generations of IOS: proprietary systems (e.g. ASAP: Analytical Systems Automated Purchasing system was developed by the American Hospital Supply Corporation (AHSC) in the 1960s), partially open systems (e.g. EDI), and open-standard systems (Internet-based IOS). The purpose of adopting an IOS is to implement computerized communications with trading partners. Toward this end, an IOS adopter needs to have a content platform in place – computerized systems that translate private corporate data into a standardized data format recognizable by the IOS. Then, the standardized data are transported via a delivery

platform – physical networks or the "pipe" used for data transmission. Finally, the data are delivered to targeted partners in the trading partner base.

Usually, an IOS involves two groups of participants: the initiator and a number of (prospective) participants. The initiator bears the major part of investment to set up and maintain the system. In order to make the system successful and compensate for the initial investment, a number of partner firms have to agree to participate and use the system. The IOS can be configured in various ways. They can be set up as one-to-one or dyadic (a typical buyer–seller system), one-to-many (a marketing or purchasing system), or many-to-many (electronic markets), depending on the interaction patterns between the participants. The IOS can also be configured according to the type of dependence existing between the firms joining the network [26]. Pooled interdependency requires a star-like configuration in which data movement is directed toward the central hub. With an IOS using sequential interdependency, nodes are arranged in a straight line, where the output of one node becomes the input of the next. The reciprocal interdependent system necessitates a complex IOS in which participants are interdependent. The existing views of the IOS configuration focus on the physical interconnection of, and/or data flows between, participating firms. The configuration of an IOS, however, can be viewed from a different perspective—in terms of horizontal or vertical electronic linkages between organizations [19]. The linkage between heterogeneous value chains is vertical, whereas the linkage between firms spanning a single industry is horizontal. Thus, the way that an IOS is configured is associated with its purpose or the strategy. For example, organizations are horizontally connected for cooperation between competitors. On the other hand, organizations seek vertical interconnection when it is important to team up with buyers, sellers, or organizations that provide complementary products or resources.

III. GENERAL BACKGROUND

The last decade or so has seen a considerable infusion of IT into supply chain management: electronic data interchange (EDI) networks, various other forms of IOS like extranets, and more recently electronic markets. They enable integration between trading partners through faster, more efficient and more accurate data exchange, thus offering ample benefits for companies [31, 33]. The field of IOS adoption already has a long history. EDI has been used for more than 30 years now to exchange structured data electronically in a standardized format between organizations and is being intensively researched since the mid 1980s. EDI however is an old technology that requires considerable investment that can act as a barrier towards adoption. Chwelos et al. [8] has suggested that knowledge obtained from studying IOS adoption could be extended by studying the adoption of Internet-based IOS that interconnect businesses.

The use of IOS has been found to provide both operational and strategic benefits to a firm [7, 8, 13, 21, 31, 42]. Information technology impacts the strategic options available by providing connectivity for value-added partnerships, electronic negotiations, and enhanced procedures and practices. Benefits of IOS adoption and use include strengthened buyer–seller relationships [15, 41, 42], improve bargaining power over customer/suppliers, shorten lead time, fit products to customer requirements, launching new products and services, support after-sale service or maintenance, enhance sales, facilitation of purchasing transactions, reduce errors and return, cheaper procurement, enable outsourcing of more activities, reduce the organization's inventory levels, improved transportation practices, and the potential for competitive advantage.

Research in Supply Chain Management area views IOS as a facilitator of coordination between supply chain partners. IOS, especially supply chain software, provide the opportunity to move toward an extended enterprise business model. Hill and Scudder [18] contend that using IOS (especially EDI) can facilitate frequent and automatic bidirectional information flows between supply chain partners, thus enhancing degree of coordination between them. In order to gain process efficiencies through collaborative or partnership-like relationships, firms need to expand information flows in the supply chain by instituting IOS that are integrated and facilitate exchange of a comprehensive set of information. There are number of strategic reasons that motivate firms to form interorganizational relationships (IOR). It concerns the question of why firms enter into relationships. Oliver [28] articulates this inquiry as a discovery of the "contingencies…that prompt or motivate organizations to establish IOR". She cites, in her review, six critical "contingencies" that demarcate the various explanations of interorganizational relationships (see table I).

IV. REVIEW OF RELEVANT LITERATURE

The review of literature shows that the approaches used by researchers in examining IOS adoption and use can be segmented into four different streams. First, research that builds on the innovation diffusion approach predominantly focuses on the perceptions regarding attributes of the technology such as complexity, compatibility, and relative advantage in examining diffusion [15]. A second stream expands on this idea by including factors such as top management support, organizational slack, organizational readiness to accept new technology, and IT capability resident in the firm to be important determinants [8]. Studies that fall in the third stream approach the issue from an industry perspective, arguing that environmental uncertainty, industry pressure, competitive pressures, and institutional factors play a significant role [15, 29, 40]. Finally, relational approaches offer another perspective, wherein researchers emphasize the importance of the nature of the relationship between firms and its likely impact on IOS use [15, 17].

TABLE I
MOTIVES FOR INTERORGANIZATIONAL RELATIONSHIPS

Contingerncy	Description
Necessity	IOR are established to meet legal or regulatory requirements.
Asymmetry	IOR are established in response to power or control of another organization.
Reciprocity	IOR are based on cooperation, collaboration and coordination among organizations
Efficiency	IOR are prompted to improve the internal input/output ratio of an organization and internal efficiency.
Stability	IOR formation is an adaptive response to environmental uncertainty (generated by resource scarcity or lack of perfect knowledge).
Legitimacy	IOR are established to appear in agreement with the prevailing norms, rules or expectations of external constituents and/or to improve the image, reputation, prestige.
Asymmetry	IOR are established in response to power or control of another organization.

Although many well-known IOS adoption models (principally EDI) from different perspectives have been introduced and validated by previous studies, none has emerged as a unified model due to the complexity of the issues involved. Teo et al. [40] describe three kinds of institutional influences that affect the adoption of IOSs: mimetic pressures; coercive pressures; and normative pressures. The prevalence of adoption practice in the focal industry and the perceived success of other organizations' adoption cause mimetic pressures on the company that does not adopt. Coercive pressures are defined as formal or informal pressures exerted on organizations by other organizations upon which they are dependent. The shared norm among a group of trading partners increases the likelihood of an individual organization's adoption of the system due to the increased chance of learning its benefits and costs. This is called the phenomenon of normative pressure. Institutional influences of various kinds have been proved to significantly affect the adoption of IOS such as EDI [17, 20]. Some of the recent relevant studies about IOS adoption in SCM context are summarized in the table II.

A large number of previous studies of IOS adoption are cross-sectional, employing a survey method or a case study to assess various factors affecting adoption, including the characteristics of IOS, the organizations, and the external environment. Generally, they make use of factors identified from the organizational innovation adoption literature rooted in the Diffusion of Innovation theory, assess the relevance of these factors to a particular IOS under study, and in some cases, identify additional factors.

TABLE II
LITERATURE REVIEW OF IOS ADOPTION

Study	Adoption factors
Grover and Saeed (2007)	Demand uncertainty of the component Complexity of the component Market fragmentation Market volatility Information sharing environment Firm size
Geri & Ahituv (2007)	Perceived Potential Strategic Benefits Perceived Potential Transactional Benefits Power Position of Initiator Maximal Infeasibility (Economic infeasibility, Organizational infeasibility, Technological infeasibility, Risks, Lack of financial resources)
Yao et al. (2007)	Perceived benefits Top management support Firm size Chain position External and competitive influence
Ratnasingam (2005)	Power (persuasive, coercive) Trust
Saeed and al. (2005)	Process efficiency Source leveraging External integration IOS breadth IOS initiation
Teo et al. (2003)	Mimetic pressures Coercive pressures Normative pressures
Chwelos et al. (2001)	Perceived benefits Organizational readiness (IT sophistication, financial resources, trading partner readiness) External pressure (competitive pressure, initiator's power)
Ramamurthy et al. (1999)	Organizational factors (internal support, EDI's benefits potential, EDI compatibility, resource intensity benefit of EDI) Inter-organizational factors (customer support and competitive pressure)
Hart and Saunders (1997)	Types of power (potential, exercised: persuasion and coercion) Trust between buyer and supplier
Iacovou et al. (1995)	Perceived benefits Organizational readiness External pressure
Premkumar and Ramamurthy (1995)	Competitive pressure Exercised power Top management support

Finnegan and Golden [11] suggest that technical issues were not the main consideration for successfully implementing IOS. They considered the technology to be well advanced and available, and reported the importance of adapting the technology to suit organisational circumstances. While acknowledging the importance of adopting the appropriate technology and standards, they believed that the non-technical issues for which little help was available had a greater impact in determining the success of the IOS implementation. For example, complications arose from the lack of understanding amongst management and staff about interorganizational technology, the business rationale behind it, its benefits, and how to implement it. Finally their study indicates that problems may arise when the IS department is given sole responsibility for implementing these systems.

V. RESEARCH FRAMEWORK

In this article, we develop a new theoretical framework to analyse end explore the set of factors which are critical to the success of the IOS project. This research focuses on the motivations to adopt and use Internet-based IOS in supply chains management. We take into consideration the perspectives of the initiator as well as those of the prospective participants. The framework serves the following objective: to answer the question as what are the factors driving the adoption and/or use of IOS?

Much of the prior research on the performance impact of IT adoption and use examines economic benefits for the individual firm in the supply chain [12, 15, 34, 35, 36, 37, 38, 39, 40]. Other papers look at manufacturers and suppliers, or insurance carriers and agents, but again concentrate on the individual firm's benefits. This paper examines how benefits to other firms (i.e., supply chain partners) may affect technology adoption and use by a focal firm [42].

This study aims to assess the applicability of those factors identified from the literature in explaining the IOS adoption benefits experienced by organizations. We start with identifying various factors affecting IOS benefits from the literature. Identifying the most critical factors affecting the adoption decision would provide managers with a more focused list of factors that need their consideration in adoption decisions relating to IOS. To investigate which factors influence IOS adoption, this study developed a set of propositions by focusing on factors which are dominants in the SCM systems.

Consequently, the present research framework (Fig. 1) includes five groups of factors: interorganizational context, organizational context, and technological context, which influence the perceived costs and benefits, which in turn have a great importance when firms decide to adopt an IOS. Each of these is briefly discussed below.

We used the following propositions to investigate the importance of these factors in the context of Internet-based IOS adoption by manufacturing firms.

P1: Perceived benefits (principally strategic) are positively associated with the adoption of IOS.

P2: Higher levels of perceived costs are negatively associated with the adoption of IOS.

P3A: Perceived competitive pressure is positively associated with IOS adoption.

P3B: A power position of a firm positively affects the IOS adoption.

P3C: The greater the level of trust between firm and his trading partners, the greater the adoption of IOS.

P3D: Higher readiness of trading partners will lead to greater IOS adoption.

P4A: Firms with top management support will positively associated with the adoption of IOS.

P4B: Larger firms will be positively associated with the IOS adoption.

P5: The technological factors (network reliability, scalability, security, and complexity) argue that the more favourable

the perceived characteristics of technology, the more likely the organizations are to adopt the IOS.
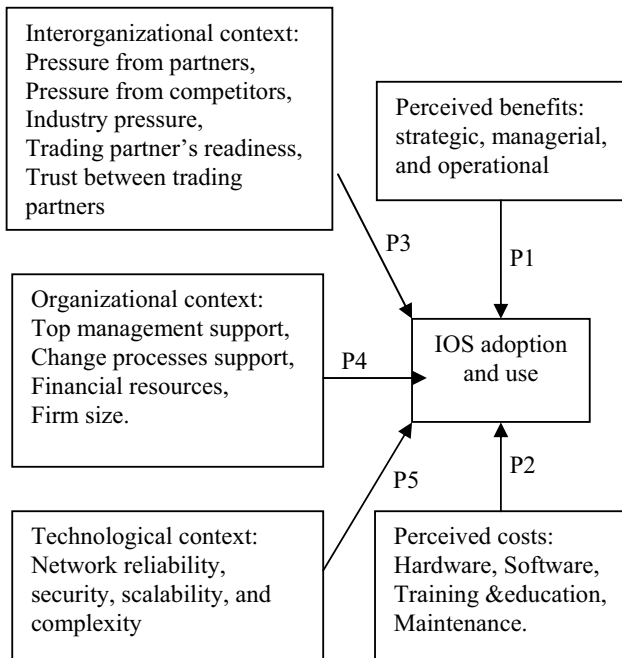

Fig. 1 The research framework for IOS adoption

A. Interorganizational context

It encompasses the pressure from trading partners and pressure from competitors within the same industry segment. It implies that the power structure between business partners is highly correlated with the degree of interdependence and its balance, which is determined by who has the control of key resources. The IOS implementation process requires the institutionalization of agreed-upon standards, business practices, information to be shared, and the invested equipment and human resources. The convincing power and compulsory power could influence an organization's business partners. The convincing power is to use incentive mechanisms (e.g. financial reward) to encourage an organization to implement IOS. Moreover, sometimes joining an IOS is apparently against the best interests of an organization because it improves the bargaining power of its trading partners, or increases the threat of existing and potential competitors [4]. Researchers argue that in many industries, firms have coerced their suppliers to establish electronic links or lose business. By using IOS to establish closely coordinated processes, these firms were able to get visibility into the suppliers' operations and used it as a bargaining tool. For example, in a dyadic relationship, power relation imbalance exists when one of the organizations is more powerful in terms of resources such as facilities, manpower and sales. In such a relation, the powerful party can easily influence the less powerful party to abide by its terms and conditions and force it to adopt the system. When there is a balanced power relationship and one of the parties is unwilling to implement the IOS, the initiating organization may implement the system with the reluctant organizations' rivals. This may put competitive pressure on the unwilling organization and force it to implement the system.

Pressure from competition represents the second factor that is consistent with previous IOS literature. Competitive pressure can affect the adoption of IOS. Moreover, the readiness of trading partners to achieve business with firm and the pressure from industry status both influence the IOS adoption. In the context of interorganizational systems, however, readiness is not solely an organization-level construct. At minimum, adoption of an IOS requires readiness on the part of two trading partners. Thus, we have augmented the readiness construct with a subconstruct labeled trading partner readiness to consider a firm that may be motivated to adopt IOS (i.e., having high perceived benefits) and be ready to adopt (i.e., having available financial resources and IT know-how) but is unable to adopt due to unready trading partners. The trading partner readiness items gauge the willingness and ability of potential partners to adopt IOS. Larger organizations are considered more capable of adopting innovations, and firm size has been found to have significant influence on IOS adoption. Also, large organizations are more likely to have transactions that suit IOS, at least with some of their trading partners. Each industry possesses unique characteristics which may influence the possibilities and the extent of information systems utilization in general and IOS in particular. While in certain industries, like banking or airlines, IOS are considered a strategic necessity, in other industries; their feasibility may be limited for various reasons.

The last factor in this group relates to trust. From a relationship theory perspective, trust is defined as "the firm's belief that another company will perform actions that will result in positive outcomes for the firm, as well as not taking unexpected actions that would result in negative outcomes for the firm" [31]. Interorganizational trust is a party's willingness to be vulnerable to another party based on the belief that the latter party is competent, open, concerned and reliable. Each of these dimensions signifies behaviours that reinforce the expectation regarding a partner's performance. Interorganizational trust has been emphasized to be important for success of interorganizational transactions, partnerships and other types of IOR due to various factors such as the increasing uncertainty and the necessity to develop tight IOR. Several aspects of the relationship appear to contribute to this complexity. First, there is evidence of bi-directionality, trust being seen by some as important for IOS adoption and use, but also being reinforced by the process of IOS adoption and use. Conversely, low trust may discourage IOS adoption and use, or problems with the IOS can adversely affect trust between firm partners. Prior research suggests that a high level of trust between trading parties can curb opportunistic behaviour. Further, mutual commitment, a condition when both trading parties commit resources to the relationship, can also mitigate opportunistic tendencies. Researchers use many different terms interchangeably to refer to trust or some aspects of trust, including cooperation, credibility, openness, benevolence, integrity, predictability, integrity, and competence [35].

B. Organizational context

At the organisational level, support from the senior (top) management is essential to ensure benefits from IOS and should consider it as strategically important. This is because a good understanding of the senior management regarding various types of benefits to be gained from IOS encourages their commitment to IOS. Organisations in which senior management commitment for IOS are high generally allocate sufficient amount of financial and manpower resources to support electronic relationships. Greater benefits from IOS can be achieved when appropriate changes in business processes are introduced in conjunction with IOS. Sometimes, the organization lacks the required resources for IOS implementation. These are not necessarily financial resources, and may include specific expertise or managerial skills. However, in the current business environment, organizations can use outsourcing to complement their internal resources. Therefore, we define lack of resources as a situation where the organization lacks the necessary financial resources for IOS implementation. However, process changes may affect job responsibilities and even organisational structure and hence cannot be initiated without full support from senior management. Furthermore, it is hard to gain IOS benefits when business partners are reluctant to join the IOS network. Hence, management support is strongly needed to persuade business partners to embrace IOS and make necessary changes in the inter-organisational workflow. Furthermore, resistance to change may inhibit the implementation of any new system. Internally, the organizational culture should support cooperation with external entities. Externally, effective use of IOS requires the acceptance and cooperation of potential partnersse one space after periods and colons.

C. Technological context

The technological context related to how the perceived characteristics of existing technologies in an organization influence the IOS adoption. This group of factors includes reliability, security, scalability, and complexity. First, the dimension of network reliability is the most critical technical issue in conducting B2B electronic commerce over the Internet. In fact, bandwidth and reliability are among the main factors affecting Internet communications between trading partners. The fact that the Internet is a network of networks of computers forces many organizations to think twice before adopting Internet-based IOS to communicate with trading partners. Today, business communication requires increased bandwidth to accommodate the transfer of large multimedia files such as video and audio files.

Second, the concerns regarding security are most typically characterized in terms of confidentiality and fraud. By placing strategic data such as financial reports and manufacturing schedules online, companies open themselves to potentially damaging security breaches. Not surprisingly, IOS adoption may hinge on security-related issues since IOS can expose sensitive information for potential hackers to steal, alter, or make the systems malfunction. Furthermore, companies along the supply chain are concerned about information gathered and/or mined by trading partners as well as the intent behind the use of the collected data. Though, the nature of the business data regularly exchanged between our firm and our trading partners requires a secured communication medium.

Third, scalability is an organization's ability to easily modify the systems supporting an IOS environment as business requirements and relationships change (these modifications are typically increases in system size, scope, and/or function). Because of the low initial investment and operational costs, the Internet provides organizations with the capabilities to expand its IOS environment without significant investments or specific technical expertise. Furthermore, current Internet communication speeds are sufficient to handle the data movement necessary for our company to communicate with our trading partner.

Fourth, complexity refers to the ease of adoption of the Internet standards, which allow organizations to contact any other organization anywhere in the world. Most research efforts discussing EDI have indicated that the existence of several communication standards between trading partners is a major obstacle in adopting EDI. Accordingly, Internet-based IOS is thought of as a less complex system and a viable option that provides organizations with one communication standard. Moreover, the Internet's one common communication standard (TCP/IP) would make it easier to communicate with multiple trading partners.

D. Perceived costs

The setup and use of IOS lead to expenses for the initiating party as well as for all business partners involved. The expenses can be categorized [13] according to the *point in time* and *frequency* at which they occur (one time setup costs and current costs), and according to their *specificity* (general system- related costs and partner-related costs). *One time setup costs* involve all expenses necessary in the installation of the technical and organizational solution (i.e., the infrastructure). *Current costs* occur subsequently and on an ongoing basis and relate to the use and maintenance of the system (i.e., the firm's operations). We assume that one-time costs occur only once in the beginning of a given planning period. Current costs occur in each following period until the end of the planning horizon. In order to turn this model into a managerially useful tool to assess the value of IOS investments, a discount factor for these periodical costs needs to be applied [13]. *General system- related costs* refer to all expenses necessary to the set up the system and to the preparation of the organization for participation in the IOS environment, independent of the links with specific partners. This includes expenses for hardware, software, user training and administration to set up, run and maintain the systems. *Partner-related costs* occur in relation to the establishment of links with specific partners. This type of cost varies according to the type of system and the standards that are used. While in the case of EDI, they can be quite significant the Web often makes it easier to connect, as only a browser might be necessary.

E. Perceived benefits

IOS may provide organizations with many benefits. Therefore, higher perceived potential benefits of IOS should lead to higher levels of IOS implementation. The distinction between strategic and transactional benefits is important since we hypothesize that even those organizations, which do not use IOS and do not regard them as strategic, are aware of their potential transactional benefits. This awareness is due to the increasing utilization of IOS worldwide. However, we expect that the awareness of IOS users to their potential strategic benefits will be greater than that of non-users. Though, we posit that the perceived potential strategic value of IOS positively influences the IOS adoption.

VI. Conclusion/Contributions

IOS are used in various ways to facilitate IOR. In this paper, we have analyzed the literature in order to examine the insights that have been obtained thus far in IOS adoption. This study has presented a theoretical framework for identifying the factors influencing the decision of an organization to adopt/implement Internet-based IOS. Recommendations offered here can assist managers in recognizing the various facets of IOS and making appropriate decisions regarding the adoption and use of IOS that offer different functionalities.

The paper has many contributions to the existing body of knowledge: First, it proposes that the readiness of firms in itself is not sufficient to assume seamless integration between trading partners; derived costs resulting from changing business practices are still taking a large portion of the costs and can act as a barrier to adoption. Second, we aim to evaluate current Internet-based systems. There is an increasing need for such empirical work, because 1) more and more businesses migrate to Internet-based IOS 2) a single firm faces different system requirements per trading partner 3) but we do not know whether Internet-based systems deliver the modularity and flexibility they promise. Third, the generalizability of study, in the SCM context, and the proposed factors are independent of industry type and are applicable to all supply-chain relationships. Fourth, we found both top management support (the adoption of Internet-based business-to-business applications is considered strategically important) and competitive pressure to be important determinants of IOS use. Fifth, the power position of an initiator was the most influential factor on IOS adoption. We support previous research cited before, which found that imposition by trading partners significantly influenced IOS adoption. Moreover, when there is a powerful trading partner who imposes on the organization to adopt an IOS, senior management becomes aware of its importance, allocates the necessary financial resources and leads the change process.

From a practical perspective, the findings presented here do suggest that supply chain managers should and will be considering Internet-based IOS implementations with increased frequency. When viewed as a system, the supply chain and the solutions needed to optimize it will require that the factors uncovered here be considered in order to achieve supply chain success.

Appropriate methodologies must now be implemented to take this exploratory model to the next stage of investigation. Empirical testing will be necessary in validating and refining the premises on which the propositions presented in this paper were constructed. Future research is needed to operationalize the new variables and empirically validate the model of this study. We are in the process of testing the propositions of the model using case studies.

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