Fostering the Adoption of Open-standard IOS by Business Partners – Exploring the Role of Institutional Pressures

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Abstract

Inter-organizational information systems (IOS) play a critical role in today’s organizations and their relationships with business partners. While large organizations already began utilizing such systems since their dawn in the late 1970’s, SMEs have largely been reluctant to adopt and use this technology. For a focal organization considering adoption of IOS this is especially troublesome, as such systems are subject to high network effects. By laying special focus on IOS based on open standards for communication and business interaction, this study draws from institutional theory and the technology-organization-environment framework (TOE) as theoretical lenses with the aim to provide additional insights into the mechanisms of open-standard IOS adoption. By investigating how institutional pressures exerted on organizations can contribute to mitigating inhibiting forces in the organizational and technological contexts of organizational open-standard IOS adoption, the study aims to uncover influence strategies for organizations to foster adoption of such systems among business partners.

Keywords

Inter-organizational information systems, open standards, institutional pressures, influence strategies, business partners

Introduction

The fast changing and highly dynamic global business environment of today’s organizations confronts these with ever increasing demands, such as cost savings, process efficiency, and process transparency, and impels them to continuously innovate to retain competitiveness over time. The ability to conduct business transactions across organizational borders in electronic form by utilizing inter-organizational information systems (IOS) can generate considerable business value for today’s organizations (Loukis and Charalabidis 2012), and is thus able to help reach these goals (Rai et al. 2006). IOS have existed for several decades (Barrett and Konsynski 1982), and were successfully utilized in numerous contexts and industries (Iacovou et al. 1995; Ramamurthy and Premkumar 1995), with prominent examples of such IOS including but being not limited to systems for electronic integration based on custom proprietary standards for electronic data exchange (EDI) (Massetti and Zmud 1996), electronic business-to-business (B2B) marketplaces such as Covisint for the automotive industry (Howard et al. 2006), or Internet-based ordering platforms such as PharmX for the pharmaceutical sector (Reimers et al. 2013).

More recently, open communication protocols and procedures became increasingly important with the uptake of the Internet (Hovav et al. 2004). Based on such open standards for communication and business interaction, the goals of IOS shifted towards supporting collaboration among organizations of any size by utilizing open standards to provide systems with low asset specificity to businesses of practically any size (Zhu et al. 2006a). Because of the lower investments needed to adopt such open-standard IOS, these systems became especially valuable for small and medium-sized enterprises (SME), which otherwise would not consider adoption (Kauffman and Mohtadi 2004).
However, while large organizations already began utilizing IOS to digitalize business processes since their dawn in the 1970’s, small and medium-sized enterprises (SME) have largely been reluctant to their use (Chwelos et al. 2001; Iacovou et al. 1995). While this was primarily caused by the high asset specific investments in the case of proprietary IOS (Kauffman and Mohtadi 2004), the same issue still exists for open-standard IOS (Zhu et al. 2006). For a focal organization considering adoption of or already having adopted open-standard IOS this is especially troublesome, as such systems are subject to high network effects, thus their value for each adopter largely depends on the total number of adopters using them (Zhu et al. 2006). To gather the full potential from open-standard IOS, a firm has to actively reach out to its business partners to achieve a critical mass of adopters among its business partners (Au and Kauffman 2001; Oh 2006). Thus, a focus on the right strategy to achieve a critical mass of adopters is of particular importance in this context.

Extant literature on the adoption of IOS has investigated and put forward several strategies aiming at fostering the adoption of IOS by business partners of a focal firm, primarily focusing on dyadic exchanges utilizing IOS based on proprietary standards for electronic data interchange (EDI) between a focal organization and its suppliers (Son et al. 2008). By relying on economic theories such as transaction-cost theory (TCE) (Williamson 1985), or diffusion of innovations theory (DiMaggio and Powell 1983) into the investigations of IOS adoption identifying mimitic, coercive and normative institutional forces influencing adoption decisions of suppliers. However, while the direct influence of institutional forces on organizational adoption decisions has been the focus of several studies, the institutional perspective has not yet received much more in-depth attention from research on IOS adoption beyond that (Robey et al. 2008). Thus, a focus on the role of institutional forces and in particular the mechanisms through which they are able to influence organizational adoption of open-standard IOS may lead to a better theoretical understanding of organizational adoption of such systems and uncover further influence strategies for decision makers.

By laying special focus on open-standard IOS in the following, this study sets out to alleviate the shortcoming of a missing attention towards the institutional perspective on open-standard IOS adoption in extant literature, and to further extend the strategic repertoire of organizations in the context of influence strategies. To this end, this study draws from institutional theory and the technology-organization-environment framework (TOE) as theoretical lenses with the aim to investigate the suitability of these theories to provide additional insights into the mechanisms of institutional influence on open-standard IOS adoption. By investigating how institutional pressures exerted on organizations can, besides their direct influence on organizational adoption decisions (Teo et al. 2003), in addition contribute to mitigate inhibiting forces in the organizational and technological contexts of organizational open-standard IOS adoption through moderation effects, the study aims to uncover further influence strategies for organizations to foster adoption of such systems among their business partners. Thus, the primary research questions of the study are:

RQ1: How do institutional pressures to adopt open-standard IOS exerted by a focal firm affect organizational adoption decisions of its business partners in the organizational and technological contexts?

RQ2: Which strategies to foster open-standard IOS adoption among business partners can be derived for a focal firm?

Several hypotheses concerning the direct influence of institutional pressures on organizational adoption decisions are derived from extant literature. To further elaborate on the role of institutional pressures in the context of organizational open-standard IOS adoption, they are in addition further complemented by several propositions towards the influence of institutional pressures on inhibiting forces in the organizational and technological contexts of organizational open-standard IOS adoption decisions.
Organizational and Technological Inhibitors of Open-standard IOS Adoption

The TOE framework describes the process of adoption of technological innovations by an organization as being influenced by factors of the technological context, the organizational context, and the environmental context (Tornatzky et al. 1990). The technological context of the framework describes the extent of technological readiness of the firm in terms of existing technologies, as well as the relevance the firm adheres to the new technology in terms of such measures as compatibility, complexity or relative advantage taken from classical DoI theory. The organizational context describes organizational measures such as size, industry type and structure of an organization, as well as measures such as organizational support towards the new technology from management and staff. The environmental context describes the business environment of an organization through measures such as pressures exerted by the industry, business partners or legal entities, as well as the level of dependence on business partners.

From the viewpoint of a business partner, the focal firm applying an influence strategy is situated in the external environment. However, through the provision of incentives and support to its business partners, the focal organization is able to increase awareness, as well as organizational and technological readiness of suppliers (Iacovou et al. 1995; Son et al. 2008), and thus mitigate forces in the organizational as well as technological contexts of its business partners hindering them from adopting technological innovations such as open-standard IOS.

Organizational Inhibitors to Open-standard IOS Adoption

Organizational factors inhibiting adoption of open-standard IOS relate to difficulties in organizational change pertaining to changes in corporate culture, organizational structure or redesigning business processes (Bala and Venkatesh 2007). Hong and Zhu (2006) describe resistance to change and the degree of entrenchment with existing systems and infrastructure as a hindering factor to open-standard IOS adoption. Howard et al. (2006) further describe internal organizational resistance as a factor hindering adoption of open-standard IOS. Similarly, Venkatesh and Bala (2012) describe routine rigidity or the difficulty to change tightly embedded organizational routines as an important factor inhibiting adoption of such systems.

Technological Inhibitors to Open-standard IOS Adoption

Iacovou et al. (1995) describe a lack of awareness and expertise on the part of business partners as well as the lack of organizational readiness in terms of financial and technological resources as one of the main reasons for failing to see the full benefits and realize the relative advantage of IOS. Similarly, technological readiness is described as encompassing technology infrastructure, relevant systems, as well as technical skills and IT professionals in the context of open-standard IOS (Venkatesh and Bala 2012; Zhu et al. 2006b). Furthermore, Teo et al. (2006) describe a lack of IT expertise and infrastructure, as well as existing unresolved technical issues as inhibiting open-standard IOS initiatives in organizations. In addition, several studies describe adoption costs as being able to hinder organizations’ intentions to adopt (Hong and Zhu 2006; Soliman and Janz 2004; Zhu, Kraemer, and Xu 2006).

Institutional Forces as a Motor of Open-standard IOS Adoption

According to neo-institutional thoughts (DiMaggio and Powell 1983), the institutional environment of organizations can be dictating a certain code of conduct upon its members, which can also involve the use of inferior technologies. Such an institutional force can be of coercive, mimetic, and normative type. Mimetic force is the result of pressure expressed through the need to imitate actions and decisions of successful competitors in the presence of uncertainty about future outcomes of an organization’s own decisions. Formal or informal influence on an organization by another organization it is dependent upon is called coercive pressure and leads to coercive force, e.g. the sanctioning of illegitimate or promoting legitimate actions of suppliers in a dyadic trade relationship. Normative pressure is described as being the result of professionalization. Two primary aspects of professionalization are described by DiMaggio and Powell (1983). One aspect is the similarity of professionals concerning education, training and career expectations which leads to the formation of norms and values to establish a cognitive base and legitimation for their occupational autonomy. The other aspect is the exchange of information among professionals.
and the development of professional networks, through which perceptions of industry norms, expectations and new mental models can diffuse more quickly.

**Coercive Pressures**

Literature on IOS adoption has largely acknowledged the direct influence of external coercive pressures as enablers of IOS adoption, positively influencing organizational adoption intentions. Chwelos et al. (2001) investigate external pressure on trading partners as competitive pressure, dependency on trading partners as well as trading partner power exerted on an organization. Similarly, Iacovou et al. (1995) describe external pressure from trading partners as an important factor influencing IOS adoption. Finally, several studies identified the exertion of bargaining power as a strategy to coerce suppliers to adopt IOS (Barua and Lee 1997; Iacovou et al. 1995; Son et al. 2008).

In the context of open-standard IOS adoption, Christiaanse et al. (2004) similarly identify coercive forces as an important factor influencing adoption of open-standard IOS, describing them as the exercised power by dominant business partners. Lin (2006) investigates the influence of coercive forces, described as the degree of competitive pressure, on a focal organization’s decision to adopt open-standard IOS. In accordance with extant literature, this leads to the hypothesis that:

**H1:** *The extent of exerted coercive pressure on business partners of a focal organization will have a direct positive influence on their intention to adopt open-standard IOS*

However, while the exertion of bargaining power is proposed to lead to conformity as a result of fear from sanctions such as the discontinuance of trading relationships, it is unlikely to mitigate organizational resistance towards adopting open-standard IOS. Furthermore, it may even lead to a sensitized perception of organizational resistance towards adoption as a result of resentfulness towards the coercing organization (Son et al. 2008). Thus, this leads to the proposition:

**P1:** *The extent of exerted coercive pressure on business partners will amplify the relationship between organizational resistance and open-standard IOS adoption*

Similarly, the exertion of bargaining power is unlikely to help business partners to increase technological and organizational readiness, however may lead to a suppressed perception of the benefits and relative advantage of the technology as a result of the decision being imposed and thus being not necessarily beneficial. Thus, this leads to the proposition:

**P2:** *The extent of exerted coercive pressure on business partners will suppress the relationship between perceived relative advantage and open-standard IOS adoption*

**Mimetic Pressures**

Mimetic pressures stem from imitation of successful peers or competitors and are driven by organizations’ desire to reduce uncertainty and gain legitimacy by imitating organizations in their field that they perceive to be more legitimate (DiMaggio and Powell 1983). Teo et al. (2003) describe mimetic forces as originating from perceptions of organizational decision makers that other competing firms, which already adopted IOS, will capture a greater market share through an improved relationship with a focal organization.

In the context of open-standard IOS, Bala and Venkatesh (2007) analogously describe mimetic pressures as the need to imitate successful competitors. Sodero et al. (2013) further describe the risk of adopting a technology outside the industry standard as a source of mimetic pressures towards open-standard IOS adoption. In accordance with extant literature, this leads to the hypothesis that:

**H2:** *The extent of exerted mimetic pressure on business partners will have a direct positive influence on their intention to adopt open-standard IOS*

As mimetic pressures are proposed to directly influence the intention of business partners to adopt open-standard IOS as a result of the pressure resulting from fears to lose competitive advantage to more successful peers, they correspondingly may lead to the imitation of successful peers’ organizational and technological characteristics, thus increasing relative advantage and decreasing organizational resistance. However, suppressing or amplifying effects of mimetic pressures on the relationships between organizational resistance and relative advantage are not expected, as the influence of mimetic pressures directly influences the organizational and technological contexts. Furthermore, as mimetic pressures occur inside
the adopting organization itself and cannot be controlled by an external organization, it is therefore arguable, if and how such pressures can be deployed as an influence strategy.

**Normative Pressures**

Teo et al. (2003) describe normative forces as resulting from the extent of trading partners or competitors of an organization having already adopted the IOS, as well as the extent of the organization’s participation in industry, business, and trade associations. Kuan and Chau (2001) further describe normative pressures from governmental authorities as well as industry as being able to influence organizational adoption intentions.

In the context of open-standard IOS, Soliman and Janz (2004) further identify normative pressures felt from the business community of an organization as a factor influencing organizational adoption of IOS. Similarly, Bala and Venkatesh (2007) describe normative pressures as a result of participation in professional and trade associations forming perceptions of industry norms and expectations. In accordance with extant literature, this leads to the hypothesis that:

**H3:** The extent of exerted normative pressure on business partners will have a direct positive influence on their intention to adopt open-standard IOS

Furthermore, the development of professional networks and the exchange of information among professionals enable flows of information, professionals and shared mental models across organizational borders. Thus, by actively promoting benefits of and providing circumstantial information about the technology to business partners, a focal organization is able to increase awareness and expertise among its business partners. Sharing expertise and information creates a shared understanding among both parties, suppressing the perception of organizational resistance towards adoption of a particular open-standard IOS by attributing a higher legitimacy to organizational changes associated with its adoption. Thus, this leads to the proposition:

**P3:** The extent of exerted normative pressure on business partners will suppress the relationship between organizational resistance and open-standard IOS adoption

Similarly, the increase in awareness and expertise on the part of the business partners of a focal organization may lead to an amplified perception of benefits and relative advantage as a result of a clearer view on and a shared understanding of the benefits of the open-standard IOS in question. Thus, this leads to the proposition:

**P4:** The extent of exerted normative pressure on business partners will amplify the relationship between perceived relative advantage and open-standard IOS adoption

The overall research model of the study is presented in Figure 1. Each of the variables presented in Figure 1 is described above along with corresponding hypotheses or propositions.

**Methodology**

This study seeks to collect empirical evidence from business partners of a larger German SME being in the process of adopting an open-standard IOS for electronic invoice exchange. The sample profile will include all business customers of the focal organization comprising SMEs of various sizes and industry types, which receive invoices from the focal organization. The majority of customers will be allocated towards the industry type of crafts and trades.

**Operationalization of the Concepts**

In order to test the propositions, each of the described concepts will be carefully operationalized from extant literature by utilizing the results of a structured literature review on open-standard IOS adoption conducted among the eight journals from the AIS Senior Scholars’ Basket of Journals between the years 2003 – 2013. Each operationalized construct will be measured with at least three measurement items, with each item being measured on a 7-point Likert scale. Control variables comprising industry type, the number of employees, annual turnover, as well as age of the organization will be included. All measurement items will be assembled into a multi-page questionnaire.
Data Collection

The data collection will be presented to participating organizations via web. Invitations will be sent to accountants or financial managers of participating organizations via email. To generate a high number of respondents, a reminder will be sent out after a circulation period of two weeks.

Data Analysis

To address the two research questions outlined in the beginning, the hypotheses derived from extant literature and the additional propositions presented in this study will be converted to testable hypotheses for the operationalized constructs. The proposed research model, as shown in Figure 1, will be operationalized as a structural equation model.

![Figure 1. Research Model](image)

The partial least squares (PLS) method will be used for validation, as the PLS algorithm handles measurement errors in exogenous variables better than other methods such as for example multiple regression analysis. Furthermore, PLS requires fewer distributional assumptions about the underlying data, easing up the task of data gathering (Chin 1998). Furthermore, PLS is the recommended SEM approach regarding small sample sizes (Chin and Newsted 1999). In addition, the bootstrapping procedure will be utilized to test for the significance of the path estimates, weights, and factor loadings (Chin 1998).

Contributions to Research and Practice

First, by drawing from institutional theory and the technology-organization-environment framework (TOE) as theoretical lenses to investigate the ability of institutional pressures to mitigate inhibiting forces in the organizational and technological contexts of organizational adoption of open-standard IOS, this study yields additional theoretical insights into the mechanisms through which institutional pressures influence organizational adoption decisions. By laying particular focus on moderation effects of institutional pressures on inhibiting forces in the organizational and technological contexts of organizations, this study further is able to confirm prior findings from an institutional theory viewpoint, as well as extend the repertoire of influence strategies available to decision makers of organizations considering the adoption of open-standard IOS and its promotion to the business partners of their organization. Besides confirming the strategies of coercing organizations to adopt, as well as to provide support to organizations as a means to increase relative advantage, this study is further able to present an additional influence strategy of ac-
tively promoting benefits of and providing circumstantial information about the open-standard IOS in question to business partners. This strategy can be particularly beneficial, when the provision of support is too costly and the organization is not willing or able to utilize coercive force on its business partners.

REFERENCES


