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THE EFFECT OF POWER ON THE ADOPTION OF INTERORGANIZATIONAL INFORMATION SYSTEMS: THE ADOPTION POSITION MODEL

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Abstract

The adoption and implementation of interorganizational information systems (IOS) heavily depend upon the trading partner(s) of the focal organization. Power structures have been shown to have a positive effect on the adoption decision. The paper provides a critical literature review on the role of power in the IOS literature and introduces the Adoption Position model to address the shortcomings. The main argument is that power can act as a barrier to adoption as well, which has not been adequately addressed before. The model builds on previous research on IOS adoption and proposes that the relative power of a firm and its intent of adoption toward a specific IOS together predetermine its position in the decision. The result is a typology of adoption positions of two trading partners that serves as an explanatory and predictive tool for further research and hypothesis generation.

Keywords: Interorganizational systems, Power structures, Supply chain integration, Adoption
1 INTRODUCTION

Supply chain integration (SCI) is gaining increasing attention both from researchers and practitioners as technological developments, increasing competition and ever more demanding customers necessitate the supply chain to be more efficient. Waste and delays can be reduced through increased coordinated activities and through collaboration. Information visibility throughout the chain becomes a necessary ingredient to realize these goals. Interorganizational information systems (IOS) are information systems that span organizational boundaries (Gregor and Johnston, 2001). IOS can support these efforts by enabling fast and reliable information sharing about planning, demand forecasts and inventory levels between companies. This view is often referred to as the ISCM approach (Cox, 2001) or as lean thinking (Womack and Jones, 1996). Lean thinking used to encompass only internal operations management, but the authors extended it to include suppliers and envisioned seamless flow of goods throughout the whole value chain, eventually creating a “lean enterprise”.

The successful realization of such an ideal scenario is complicated by the fact that two or more organizations are needed to agree on the adoption of the interconnecting IOS. Although the use of IOS has been showed to offer ample benefits (Bakos, 1998; Banerjee and Golhar, 1994; Heck and Ribbers, 1999; Krcmar, Bjorn-Andersen and O'Callaghan, 1995; O'Callaghan, Kaufmann and Konsynski, 1992; Vlosky, Smith and Wilson, 1994) it has certain disadvantages in the form of costs and risks (Christiaanse and Markus, 2002; Hart and Saunders, 1997; Kumar and Dessel, 1996). Power differences are a source of conflict in the adoption decision (Webster, 1995) and more powerful firms tend to influence their trading partner into the formation of electronic partnership (Hart et al., 1997).

In the IOS adoption literature researchers tend to view power as an enabler of adoption, however it has not been shown clearly how it can act as a barrier. Although Tan and Raman (2002) identifies partner resistance and lack of cooperative relationships as an inhibitor of adoption, research on this side of power is lacking. This paper therefore asks the question: How does organizational power effect the adoption of IOS? Under what circumstances does power act as an inhibitor in the decision on forming electronic linkages between firms?

To answer these research questions we propose the Adoption Position model. First, a review on the role of power in the IOS adoption literature is presented. A critique on the use of power in the literature follows. At the end of the paper the Adoption Position model is introduced and propositions are derived from it.

2 LITERATURE REVIEW

2.1 Power in IOS adoption

By definition, IOS differs from intra-firm information systems in that it requires two or more organizations to agree upon its implementation, therefore an adoption decision depends heavily on the other parties (Chan and Swatman, 1998). Socio-political factors, such as inter-firm power relationships and trust come in to play an important role in the decision-making process. The seminal article by Emerson (1962), which presents a theory to study power in complex networks had a great influence on the research on the role of power in IOS adoption. According to Emerson, power resides implicitly in the other’s dependency. Dependence on the trading partner is the most often found interpretation of power in the literature; the articles however greatly differ in the further operationalization of this construct. In Figure 1 we collected the different operationalization of the concept of power in the IOS adoption literature, based on a sample of articles selected from the probing and understanding stages of the literature as categorized in Somasundaram et al. (2003).
Resource dependence theory (Pfeffer and Salancik, 1978) broadened the view of dependence to interorganizational relationships and it proposes that firms depend on their external environment to the extent of the resources they need, but do not control, hence they should strive for the acquisition of those resources to decrease their dependence. In the supply chain management literature Cox et al. (2002) brings this view further in their research on value distribution along the supply chain by defining power as the ability of a firm to own and control critical assets in markets and supply chains that allow it to sustain its ability to appropriate and accumulate value for itself by constantly leveraging its customers, competitors and suppliers. Critical assets are supply chain resources that combine high utility with relative scarcity in a buyer-supplier exchange and in a market context. This definition relies heavily on the resource-based view (Barney, 1991) in identifying the properties of those critical assets and on Emerson (1962), where dependence is a function of availability (relative scarcity) and motivational investment (utility).

Power is also defined as the capability of a firm to exert influence on another firm to act in a prescribed manner (Hart et al., 1997). Research on IOS adoption is concerned about the influential effect of power on decision-making; therefore beyond having the capacity and sources of power, the actual use of power is discussed as well. Power can be exercised in a coercive or a persuasive way or merely the potential of having power can influence adoption (Hart et al., 1997).

Damsgaard and Lyytinen (1998) distinguishes multiple levels of analysis based on the diffusion of innovation line of research (Rogers, 1995): the micro level analysis focuses on characteristics of individuals and/or organizational units, the macro level on industry-wide or national regulatory bodies, while the meso level in between the two concentrates on networks of interacting agents using strategy analysis and power dependency analysis. Gregor and Johnston (2001) creates a theoretical framework and they find that the adoption of IOS across an industry group is dependent on the current industry
structure. Our proposed model is positioned on the meso level with a dyadic exchange relationship being the unit of analysis, but it can also be extended to mapping the power regimes of an industry structure, following the method of (Cox, Sanderson and Watson, 2001)

2.2 Critiques on the use of power in the IOS literature

Although dependence and influence have been widely researched in the adoption of IOS we would like to offer some criticism on the use of power in the literature:

Critique 1: Most of the studies lack a detailed operationalization of power decreasing the validity of the research findings.

Critique 2: Oversimplification of the role of power by operationalizing it strictly based on firm size and by using “classical” examples typically from the car manufacturing industry where power was used coercively (Gregor et al., 2001; Kurokawa and Manabe, 2002; Meier, 1995; Premkumar and Ramamurthy, 1995; Webster, 1995).

Critique 3: Potential power as a source of influence is not present in recent studies.

Critique 4: Power in the literature always appears to have a positive effect on adoption although an inhibiting effect can be theorized as well.

Critique 5: Results from variance models with samples spanning multiple industries do not give adequate information about why power was important for certain respondents and why it was not for others. We need to link the concept of power with the interest (or intent) of the involved parties to adopt to be able to tell more about the mechanisms of the decision making process.

3 THE ADOPTION POSITION MODEL

Figure 2/a presents the proposed conceptual model, which we call the Adoption Position model. It was developed based on Chwelos et al. (2001) and it differs from it mainly by having the concept of power taken out from the intent to adopt construct and operationalized as dependence based on the resource-based view (Barney, 1991). This way there is an important separation of the intention to adopt and the actual adoption decision, which were viewed previously as one concept. This is an important distinction that reflects how the relative power of a trading partner could oppose the other’s intention.

Intent to adopt is operationalized as perceived benefit (the anticipated advantages that the IOS can provide for the organization)(Chwelos et al., 2001), perceived risks (Kumar et al., 1996) and switching costs. Switching cost is defined as the cost incurred by the organization when deciding to adopt a new IOS compared to the current technological and operational level. We distinguish costs incurred from infrastructure-, application- and business process level.

Relative power is operationalized based on Cox et al.(2002) where the authors combine the work of Emerson (1962) with the resourced based view to determine critical assets in an organization. These critical assets are defined as supply chain resources that combine high utility with relative scarcity in a buyer-supplier exchange and in a market context. We use the concept of critical assets to measure dependence and to determine the power relationship between the trading partners.

The matrix in Figure 2/b shows the categorical values of the adoption position construct. It combines the effect of the power position of a firm relative to its trading partner with its interest in a particular proposed IOS. Although each cell describes the position in which a firm finds itself towards an IOS adoption, it cannot be interpreted by only looking at the focal firm. One always has to specify the trading partner whom the focal firm is compared with and the type of information system and its functions, which is proposed for implementation. Therefore the adoption position of a firm is different for each interorganizational relationship and within it for each IOS adoption decision.
Each cell of the matrix describes the position that a firm takes as a function of the relative bargaining power and its intent to IOS adoption. An Enabling firm is interested in the adoption and has influence over its trading partner, therefore even when the other one is resistant it can use its power in different ways to try to make the implementation come true. Note that being in an enabling position does not guarantee that the IOS adoption will occur; instead it only gives the possibility for the firm to try starting the project.

A firm who is interested in the adoption of a certain IOS, but has no power over its trading partner is termed as being in a Willing adoption position. The Willing firm perceives a net positive return on the investment and is willing to share information through the intended electronic linkage, but it is not able to force its trading partner into the adoption. A firm with an Inhibiting position sees no interest in implementing and using the proposed IOS and it has the power to create a barrier to adoption. Those firms who fall into the last quadrant are less fortunate; they see no interest in the adoption and they have no leverage over the trading partner, therefore they are dependent on the other’s position. Their adoption position is called Exposed.

Somasundaram et al.(2003) critics the IOS adoption field for not being consistent on the definition of the dependent variable; in other words different authors mean different things under adoption, which hinders the development of cumulative knowledge. In our research we are interested in the adoption decision itself, which is the binary question of whether the trading partners agree upon implementation of an IOS or not.

Having determined the adoption position of a focal firm however still does not make it possible to predict the outcome of the adoption decision. The cause of this ambiguity is the way power positions are categorized between two firms. Cox (1997) proposes the so-called power matrix as a typology of power relationships between two firms. Next to the two cases where one of the partners dominates (supplier dominance or buyer dominance), the parties involved can be also interdependent or independent. For example knowing that the buyer has power is still not enough information to decide whether it is a case of buyer dominance or rather interdependence. This method therefore necessitates the analysis of dependence from both sides of the dyad.
When we apply the adoption position model to both parties in a dyadic relationship, we get 16 possible combinations on the position of the supplier and the buyer (see Table 1). At the intersection of each combination is a proposition for the success of the IOS adoption. A “+” sign means that the particular adoption position pair will hypothetically support the adoption, while a “–” marked pair does not. In the case of “+/-” the interdependent parties have opposing intentions and the decision is not straightforward. The “?” sign refers to the equivalently ambiguous outcome of the decision when the parties have opposing intention, but neither has the leverage to influence the other. It is important to note that this model does not claim to explain or predict whether an IOS adoption was successful in terms of implementation and use, it is only concerned whether the contingencies determined by the relative bargaining power of the firm and its interest in the adoption of the particular IOS will enable or inhibit the adoption itself. The question of IOS success comes after the decision was made to adopt the system and is beyond the scope of the current paper.

<table>
<thead>
<tr>
<th>Supplier’s adoption position</th>
<th>Buyer’s adoption position</th>
<th>Enabling</th>
<th>Willing</th>
<th>Inhibiting</th>
<th>Exposed</th>
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<tr>
<td>Enabling</td>
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<td>Exposed</td>
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Table 1: Adoption Positions in a dyadic relationship and propositions for the outcome of the IOS adoption

4 CONCLUSION

Establishing an electronic linkage with a trading partner by adopting an interorganizational information system is an important managerial decision. Reasons leading to adoption have been widely researched and there are many models that are trying to explain the phenomena using both technological and organizational factors. Our literature review on the area concluded that organizational power has not been adequately addressed, either because (1) poor operationalization, (2) oversimplification and (3) the biased assumption that adoption is preferable.

Building on previous models we propose a different approach to analyse and to predict adoption decisions in a supply chain context to overcome these shortcomings. In our view adoption is contingent on the intent to adopt and the relative power of the firm and they place the firm in one of the four adoption positions. By estimating the adoption position of both parties in a dyadic relationship one could predict the outcome of the adoption decision. This has important implications for both researchers and practitioners: Researchers would be able to map entire supply chains and examine the prospect of a supply chain-wide adoption of a technology. The model also allows the generation of further hypotheses based on the presented contingencies. Practitioners could benefit from the model by establishing a clearer view about their company’s position in the supply chain when evaluating project proposals on different IOSs.

The paper thus contributes to the IOS adoption field by identifying weaknesses on the use of the concept of power in the literature and by proposing an alternative model to explain the adoption phenomena.
References

