Motivators for IOS Adoption in Denmark

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EXECUTIVE SUMMARY

Organizational adoption of innovations does not always follow easily comprehendible patterns. This is often the case with interorganizational information systems (IOS), where adoption is dependent on attributes related both to the organization and to its environment. The present study operationalizes the Tornatzky and Fleischer (1990) model for organizational adoption in order to investigate reasons for adoption and non-adoption among businesses in the Danish steel and machinery industry. This particular industry segment had been subject to massive information campaigns focusing on the benefits of IOS in the form of EDI from business associations. The study suggests that environmental and organizational attributes rather than technological attributes are the main determining forces for adoption of EDI.

Keywords: B2B e-commerce, interorganizational information system, electronic data interchange, adoption, and diffusion

INTRODUCTION

Why do some organizations adopt a technological innovation that is announced to yield both operational and strategic benefits, while others hesitate or decide not to adopt? This question is highly relevant, especially in the case of interorganizational information systems (IOS), due to the great importance of IOS in transforming industries, value chains, and markets. Surprisingly, few Danish organizations have adopted IOS, in spite of their relevant technical capabilities and their high degree of IT usage. From this perspective, the reluctance to adopt IOS appears to be even more irrational and incomprehensible. The phenomenon of organizations lagging behind adoption of IT, regardless of their capabilities to do so, is well known (Harrison, Mykytyn, & Riemenschneider, 1997). What is missing are sensible explanations for this situation.

Small companies dominate the Danish business sectors. About two-thirds of the approximately 50,000 companies within the industrial sector has less than 10 employees. National and international industry and trade associations have created a
number of awareness campaigns and have focused on creating advantageous conditions for the SMEs (small and medium-sized enterprises) to enable them to adopt IT, especially IOS such as EDI. The aims of these campaigns were to assist the companies in reducing or eliminating work routines and to support them in a market characterized by increased competition. The technological development has led to an increase in quality and functionality and a decrease in cost of hardware and software (Harrison et al., 1997). The traditional technological barriers for organizational adoption of IOS, therefore, might not play the same dominant role as it did earlier. This new situation makes it highly relevant to examine explanatory factors for IOS adoption among SMEs, which traditionally have relatively fewer resources allocated to IS acquisitions than larger companies (Lai & Guynes, 1997).

In order to find an explanation for the puzzling situation of the limited IOS adoption and diffusion among Danish SMEs, a survey was conducted. The survey addressed SMEs in the Danish steel and machinery industry. The main reason for choosing this particular sector was the fact that business associations had targeted information campaigns toward this sector prior to the inception of the study.

ADOPOTION OF INNOVATIONS

Adoption can be viewed as having or not having an innovation (Tornatzky & Fleischer, 1990), or it can be viewed as using the innovation vs. not having it (Rogers, 1995). Adoption, according to Rogers (1995), is “a decision to make full use of an innovation as the best course of action available and rejection is a decision not to adopt an innovation.” Rogers’ (1995) definition does not distinguish between adoption and use of the innovation. In this article, the core understanding of the term adoption is having vs. not having(Tornatzky & Fleischer, 1990) rather than not having vs. using (Rogers, 1995). Consequently, measures related to effects of adoption of the innovation are not considered. The important point relevant to this study is that some dividing line is crossed when the adopters decide to invest resources necessary to accommodate the effort to change (Kwon & Zmud, 1987).

Tornatzky and Fleischer (1990) suggested that three explanatory contexts influence the process by which innovations are adopted in organizations. These three contexts are the organizational context, the environmental context, and the technological context.

The three explanatory contexts depicted in Figure 1 were operationalized for

Figure 1. The Tornatzky and Fleischer (1990) model for adoption
this study of the Danish steel and machinery industry.

**OPERATIONALIZATION OF THE RESEARCH MODEL**

In this study, the adoption-decision variables in relation to IOS adoption are related mainly to secondary innovation attributes. Downs and Mohr (1976) distinguished between primary and secondary innovation attributes. Primary attributes are considered to be invariant across settings and organizations (e.g., company size), which can be measured fairly objectively. Secondary attributes are based on subjective characteristics; for example, complexity and relative advantage. The perception of secondary attributes is assumed to be influenced by characteristics of both the particular setting as well as individuals involved in the adoption of an innovation. The measures applied in the present survey are subjective in the sense that they are perceived and interpreted by the responder.

**The Organizational Context**

Tornatzky and Fleischer (1990) suggest that an organization provides a rich source of formal and informal structures and processes that either constrain or facilitate the adoption of innovations. Generally, profitability and improved performance have been found to be motivators for adoption of IS (Attewell, 1992). Performance improvements (Clark & Stoddard, 1996), accurate exchange of business information (Srinivasan, Kekre, & Mukhopadhyay, 1994), and benefits related to integration of EDI (Massetti & Zmud, 1996; Premkumar, Ramamurthy, & Nilakanta, 1994) are among the themes that have been studied in the IS literature. Direct savings are rarely reported in IOS studies (Cox & Ghoneim 1996; O’Callaghan & Turner, 1995). Indirect savings, on the other hand, often are explored. These savings can be related to reduction in the workforce due to less rekeying of data and a decreased need for manual storing of documents, lower inventory costs, and shortened duration of transactions (O’Callaghan & Turner, 1995). The following six propositions were operationalized for the organizational context.

The first proposition examines how expected savings have influenced the motivation to adopt IOS.

**Proposition O1.** Prospects of future savings motivate IOS adoption.

Tornatzky and Fleischer (1990) focus on human resources in relation to the organizational context. IS studies have included issues such as adequate education (Kurnia & Johnston, 2000) and employees’ IS knowledge (Thong, 1999). The EDI literature has focused to a limited extent on issues related to work environment and human resources. Swatman and Swatman (1992) suggest that adoption of EDI may lead to organizational restructuring involving staff retraining due to changing work functions. Especially training of employees has been found to be one of the major determinants for SMEs gaining benefits from EDI adoption (O’Callaghan & Turner, 1995; Raymond & Bergeron, 1996). Proposition O2 focuses on the perception that adoption of IOS will create better work conditions for employees, which will lead to more independent job functions for employees.

**Proposition O2.** The assumption that IOS will create a better work environment motivates adoption.
Proposition O3 focuses on re-training due to changes in staff functions, as described by Swatman and Swatman (1992).

Proposition O3. The assumption that IOS will benefit from the development and utilization of human resources motivates adoption.

Proposition O4 focuses on the often-claimed benefit of EDI related to the elimination of redundant rekeying of data and elimination of manual control of data (O’Callaghan & Turner, 1995).

Proposition O4. The assumption that IOS eliminates trivial work motivates adoption.

Most IOS adoption studies have focused on commodities and standardized products such as aircraft parts (Choudhury, Hartzel & Konsynski, 1998), hospital supplies (Steinfield, Kraut, & Plummer, 1995), and office supplies (Jelassi & Figon, 1994). Research has especially shown a high level of adoption of EDI in the automotive industry (Tuunainen, 1998) and in the grocery sector (Andersen, Juul, Henriksen, Bjorn-Andersen, & Bunker, 2000). Commodities and standardized products characterize both of these sectors. Even though EDI is useful for exchanging business information, regardless of the item being a commodity or something highly specific, the EDI literature and practice so far have mainly concentrated on commodities. In order to investigate whether or not the type of business activities influences the motivation for EDI adoption, the following proposition was formulated.

Proposition O5. The decision maker’s awareness that the company’s business activities are well suited for IOS motivates adoption.

Iacovou, Benbasat, and Dexter (1995) directly referred to organizational readiness for EDI. The study related organizational readiness to the level of financial and technological resources. Lai and Guynes (1997) referred to employees’ positive attitudes to organizational change. One aspect, which has been seen as a factor for organizational readiness for EDI adoption, is related to whether adopters are EDI initiators or followers (Swatman & Swatman, 1992). Companies that are persuaded or directly forced to adopt EDI are not well prepared for EDI and, consequently, might not immediately, if ever, reap the full benefits of EDI. This led to the formulation of proposition O6.

Proposition O6. The assumption that companies consider themselves to be well prepared for IOS motivates adoption.

The Environmental Context

The environmental context is the arena in which the organization conducts its business (Tornatzky & Fleischer, 1990). The environmental context comprises the organization’s competitors, its access to resources, and its dealings with government agencies. Three IS studies, which included the environmental context in their survey instrument, focused on competition (Kurnia & Johnston, 2000; Thong, 1999). A number of studies suggests that adoption of EDI could lead to improved competitiveness (Chatfield & Bjorn-Andersen, 1997), new business opportunities (Jelassi & Figon, 1994), and changes in interfirm processes.
and politics (Lee, Clark, & Tam, 1999). The following five propositions were operationalized for the environmental context. Proposition E1 is related directly to possible improved competitiveness due to IOS adoption.

**Proposition E1.** The prospect of improving the company’s competitiveness motivates IOS adoption.

Proposition E2 is related to the strategic alliances between business partners for the purpose of maintaining a competitive edge (Chau & Tam, 1997).

**Proposition E2.** The prospect of increasing the company’s market share motivates IOS adoption.

IOS adoption often relates to power and pressure, which relates to the obligation of a firm to adopt an innovation in order to stay on good terms with its customers or suppliers (Hart & Saunders, 1998). Hart and Saunders (1998) explored the different ways to exert power in relation to business partners. They distinguished between persuasive and coercive power. Iacovou, et al. (1995) distinguished between competitive pressures and imposition by trading partners. Bergeron and Raymond (1992) included the benefits from strategic repositioning of the firm due to implementation of EDI in their survey. Pressure related to imposition of business partners (Iacovou et al., 1995) was operationalized in Proposition E3, which is related to the knowledge that EDI is being used among business partners.

**Proposition E3.** The knowledge that several business partners already use IOS motivates adoption.

Proposition E4 is related to a situation in which the company is subject to persuasive power (Hart & Saunders, 1998). The company is not directly forced to adopt IOS, but business partners may take steps, such as informing about IOS benefits and offering assistance in relation to the adoption and implementation process.

**Proposition E4.** The fact that IOS has been recommended by others motivates adoption.

Proposition E5 is related to direct pressure from business partners. Pressure can take different dimensions, ranging from promises to threats (Iacovou et al., 1995). Promises include rewards, such as rebates due to IOS usage, and threats include sanctions, such as suspension of the partnership.

**Proposition E5.** The fact that the company is put under pressure to use IOS motivates adoption.

**The Technological Context**

The technological context comprises both the internal and external technologies relevant to the firm. It includes current practices and equipment internal to the firm as well as the pool of available technologies external to the firm. Decisions to adopt a technology depend on what is available as well as how the available technology fits the firm’s current technology. Tornatzky and Fleischer (1990) call attention to the fact that not all innovations are relevant to all industries. The following four propositions were operationalized for the technological context. Proposition T1 is related to managers’ perception of the importance of the technical level of IOS. Instead of specifi-
cally investigating issues related to standards, means for transportation, or prospect of integration, this opinion data item was kept in very general terms.

**Proposition T1.** A reasonable technical level of IT solutions motivates adoption.

Proposition T2 is directly related to price. A theoretical reference to T2 is the relative advantage of IOS adoption (Rogers, 1995) or cost-benefit considerations.

**Proposition T2.** A reasonable price level of IT solutions motivates adoption.

None of the reviewed studies concerning adoption of IOS specifically included issues related to the threat of technological marginalization due to reluctance to adopt a technological innovation. The included studies were rich in examples of economic marginalization in the sense that non-adoption, for example, could lead to weakened competitive advantages. The adoption and diffusion theory, on the other hand, is rich in examples related to the issue of technological marginalization (Attewell, 1992; Rogers, 1995). The first perspective is related to the situation in which the potential adopter is in a neutral position toward the innovation, per se. However, mere knowledge that not having the innovation might exclude the company from being up-front might serve as a motivator for adoption. The threat of being a laggard (Rogers, 1995) with respect to adoption was formulated in Proposition T3.

**Proposition T3.** A feeling of being left behind with respect to IOS motivates adoption.

Proposition T4 is directly related to the fads and fashion phenomenon presented by Abrahamson (1996). Though researchers do not perceive IOS as new and interesting, this might not be the case for practitioners. Innovation is a relative term, which is conditioned by the perception of the potential adopter (Rogers, 1995).

**Proposition T4.** The assumption that IOS is new and interesting motivates adoption.

**RESEARCH METHOD**

A postal questionnaire was used for collection of survey data for this study. The questionnaire was sent to the management of 917 manufacturers and wholesalers in the steel and machinery sector in Denmark. A total of 252 responses were received, out of which 247 were included in the analysis, resulting in a response rate of 27.4%. The response rate was approximately equal to the response rate of other similar studies (Chau, 2001).

The methods of principal components and exploratory factor analysis, which are often used in similar studies, are based on a matrix of Pearson’s correlation coefficients, and therefore, data should satisfy the assumptions for these statistical methods (Hatcher & Stepanski, 1994). However, it can be argued that Likert scales are merely manifestations of ordered categories (Siegel & Castellan, 1988), and therefore, the requirement of at least an interval scale for the Pearson correlation coefficient is not met. Based on the previously mentioned considerations, it was decided to use non-parametric methods of analysis for this study. The main objective of the statistical analysis was to uncover the patent priorities of the responders with respect to adoption of IOS. Here, patent
priority refers to the manifest, face-value expressions of the responders.

Two preliminary steps were used to identify the factors motivating or demotivating adoption of EDI. First, Fischer’s exact two-sided test was applied to identify those items that were strongly related to one of the three levels of adoption: adoption, planning to adopt, and non-adoption. Fischer’s exact test was chosen, because many cell counts in the two-by-two tables were relatively small. Second, data were analyzed by applying the technique of graphical models using the DIGRAM software application (Kreiner, 2001). This technique made it possible to analyze the relationships between all the items taken together and the respective levels of adoption. Logistic regression analysis was chosen as the final step in the search for patent priorities. The independent explanatory items for logistic regression analysis were the items that were identified either by the two-way tables using Fischer’s exact tests and/or through the exploratory analysis using graphical models.

Similar to other adoption studies (Moore & Benbasat, 1991) multi-item indicators were used for the opinion data items concerning the motivation for adoption. Seven-point Likert scales ranging from fully agree to strongly disagree were used. Due to the limited number of responders, it was necessary to collapse the seven-point scales to binary scales. These binary scales were constructed to reflect agreement and disagreement with the adoption items in question.

If the construct scales are not reliable, it may not make sense to perform additional analyses. An analysis of Cronbach’s coefficient alpha was performed, based on the operationalization of the three constructs: organizational context, environmental context, and technological context given adoption status.

Generally, the lower acceptable limit for summed scales traditionally is considered to be 0.70 (Nunnally, 1978). The constructs for the organizational context and the environmental context showed an acceptable reliability level independent of adoption status (cf. Table 1). On the other hand, the operationalization of the technological context is below the generally acceptable reliability level, independent of adoption status.

### Exploratory Analysis of Opinion Data Items Related to the Three Adoption Levels

Based on the results from Fischer’s exact test, it was found that six items were strongly related to adoption. Four items were found to be of importance for planners, and nine items were of importance for non-adopters. The exploratory multivariate analysis suggests that four opinion data items had a causal relationship with adoption. For planners, there were causal rela-

| Table 1. Cronbach’s coefficient alpha for the three constructs |
| --- | --- | --- | --- |
| Context   | Adopters | Planners | Non-adopters |
| Organizational | 0.76 | 0.72 | 0.82 |
| Environmental | 0.70 | 0.74 | 0.82 |
| Technological | 0.52 | 0.34 | 0.49 |
Finally, for non-adopters, five causal relationships with three opinion data items. Finally, for non-adopters, five causal relationships were found.

**Binary Logistic Regression Analysis for Adopters, Planners, and Non-Adopters**

Binary logistic regression analyses were performed in order to estimate the explanatory power and strength of the adoption motivators summarized in Table 3 for these dependent variables: adopter, planner, and non-adopter. The stepwise forward selection method was selected for the logistic regression analysis procedures. The level of inclusion and exclusion was set at the 5% level, as recommended by Hosmer and Lemeshow (1989).

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**Table 2. Opinion data items identified for inclusion in the binary logistic regression**

<table>
<thead>
<tr>
<th>Proposition</th>
<th>Fischer's Exact</th>
<th>Graphical Modeling</th>
<th>Items for Inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A   P  N</td>
<td>A   P  N</td>
<td>A  P  N</td>
</tr>
<tr>
<td>T1</td>
<td>*   *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>** *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O1</td>
<td>*** ***</td>
<td>←</td>
<td>←</td>
</tr>
<tr>
<td>O5</td>
<td>** ***</td>
<td>←</td>
<td>←</td>
</tr>
<tr>
<td>O2</td>
<td></td>
<td>←</td>
<td></td>
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<tr>
<td>O3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O4</td>
<td>** ***</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>O6</td>
<td>*** ***</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>E1</td>
<td>*** ***</td>
<td>+</td>
<td>+</td>
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<tr>
<td>E2</td>
<td>*** ***</td>
<td>←</td>
<td>←</td>
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<td>E3</td>
<td>*** ***</td>
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<td>E5</td>
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<td>T3</td>
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<td>T4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>E4</td>
<td>**</td>
<td>←</td>
<td>←</td>
</tr>
</tbody>
</table>

Legend: A = adopter, P = planner, N = non-adopter.
* = p <= 0.050, ** = p <= 0.010, *** = p <= 0.001,
← = p <=0.05, + = item for inclusion in the binary logistic regression analysis

**Table 3. Summary results of the logistic regression analysis given the status indicator**

<table>
<thead>
<tr>
<th>Status</th>
<th>Parameter</th>
<th>Maximum Likelihood Estimates</th>
<th>Odds Ratio Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pr &gt; ChiSq</td>
<td>Point Estimate</td>
</tr>
<tr>
<td>Adopter</td>
<td>Intercept</td>
<td>-1.2413 0.0004</td>
<td>3.292 0.977</td>
</tr>
<tr>
<td></td>
<td>O6, yes</td>
<td>0.5958 0.0546</td>
<td>10.744 3.492</td>
</tr>
<tr>
<td></td>
<td>E3, yes</td>
<td>1.1872 &lt;.0001</td>
<td>11.019 3.492</td>
</tr>
<tr>
<td>Planners</td>
<td>Intercept</td>
<td>-1.5351 0.0073</td>
<td>0.087 0.009</td>
</tr>
<tr>
<td></td>
<td>E2, yes</td>
<td>1.1998 &lt;.0001</td>
<td>11.019 3.492</td>
</tr>
<tr>
<td></td>
<td>E4, yes</td>
<td>-1.2237 0.0327</td>
<td>0.087 0.009</td>
</tr>
<tr>
<td>Non-Adopters</td>
<td>Intercept</td>
<td>-2.2777 0.0011</td>
<td>0.021 0.002</td>
</tr>
<tr>
<td></td>
<td>O6, yes</td>
<td>-1.1409 0.0147</td>
<td>0.102 0.016</td>
</tr>
<tr>
<td></td>
<td>E2, yes</td>
<td>-1.4475 0.0026</td>
<td>0.055 0.008</td>
</tr>
<tr>
<td></td>
<td>E3, yes</td>
<td>-1.9272 0.0015</td>
<td>0.021 0.002</td>
</tr>
</tbody>
</table>
Table 4 shows that for adopters, planners, and non-adopters, the Hosmer and Lemeshow (1989) goodness-of-fit tests are all greater than 5%, which supports the fit of the model. For more details concerning the statistical analysis, see Henriksen (2002).

**DISCUSSION OF RESULTS**

Propositions related to the technological context were not found to influence the motivation for adoption for any of the respondents, regardless of the level of adoption. One reason could be that the opinion data items were not well defined. As shown in the Cronbach’s coefficient alpha test, the construct of the technological context was not well defined for any of the three adoption levels.

For adopters and non-adopters, the opinion data items related to the organizational context and environmental context were found to explain motivation for IOS adoption or non-adoption. For planners, the opinion data related to the environmental context were found to explain the motivation for IOS adoption. In the following section, a closer look at the significance of each of the explanatory opinion data items for each of the adoption levels are presented.

**Factors Motivating Adoption**

Two factors were found to motivate IOS adoption. The two propositions—O6: “The assumption that companies considering themselves to be well prepared for IOS are more likely to adopt”; and E3: “The knowledge that several business partners already use IOS motivates adoption”—could not be rejected.

One could argue that proposition O6 (“The assumption that companies considering themselves to be well prepared for IOS are more likely to adopt”) from a managerial point of view comprises all of the organizational context opinion items. When a company states that it is well prepared for EDI adoption, the implication is that the remaining organizational context items in some way or another are covered.

Another interpretation supporting the outcome of the analysis is related to the nature of the social system (Rogers, 1995). If the prevailing attitude in the social system is that IOS adoption is the norm, then companies are likely to perceive themselves as being ready for adoption. Finally, the importance of organizational readiness could be a result of the influence from change agents’ promotional efforts that through campaigns have informed about the innovation. The importance of proposition O6, according to this interpretation, is influenced by social processes and communication about the innovation. If this interpretation is accepted, then the knowledge that several business partners already use IOS (proposal E3) supports even more
strongly the notion of a social process attitude toward adoption.

Among the environmental context opinion data items, proposition E3 appears to be the most important statement. The awareness that business partners already use IOS induces the potential adopters to perceive adoption as the norm. Another interpretation of the importance of proposition E3 for adopters can be supported by the exponential diffusion curve (Atteawaill, 1992). Adoption according to this view becomes more and more attractive, when more and more people have adopted the innovation. This is especially the case when interorganizational attributes are related to an innovation, where critical mass is important for benefits to accrue from the investment (Markus, 1987).

One aspect that is important to consider when interpreting the priorities indicated by the adopters is that their responses reflect an ex-post evaluation. The two propositions, O6 and E3, that were found to be statistically significant in the logistic regression analysis are less concrete and of a more general nature than the rest of the propositions comprising the organizational context and the environmental context. Instead of specifically replying that the motivation for adoption was related, for example, to concrete attributes, the motivation is expressed in more general and more vague terms.

Factors Motivating Companies Planning to Adopt IOS

Two factors were found to motivate companies to adopt IOS. Propositions E2 (“The prospect of increasing the company’s market share motivates adoption”) and E4 (“The fact that IOS has been recommended by others motivates adoption”) could not be rejected.

For planners, the determining factors motivating IOS adoption are related solely to the environmental context. Here, it should be noted that planners do not consider recommendations from others to be of great importance. This indicates that recommendations from other businesses and from business associations are of little importance, when businesses decide to adopt IOS. This appears to be contrary to the variables determining adoption defined by Rogers (1995). As mentioned in relation to adopters, the variables related to the nature of the social systems and change agents’ promotion efforts were used as a suitable framework for understanding why these particular propositions were relevant to adopters.

One interpretation is that rationality rather than social processes drives the motivation for IOS adoption among the respondents that indicated that they plan to adopt. One reason could be that planners, compared to adopters, indicated contemporary adoption preferences contrary to the adopters who expressed an ex-post evaluation of their motivation for adoption. The planners, in contrast to the adopters, indicated more concrete motivation priorities. This suggests that the planners, independent of recommendations from change agents and norms in the social system, consider adoption of IOS to improve the organization’s strategic performance, thereby leading to increased market shares.

Factors Causing a Non-Adopting Attitude toward IOS

Three factors were found to cause a non-adopting attitude toward IOS. Propositions O6 (“The assumption that companies considering themselves to be well prepared for IOS are more likely to adopt”), E2 (“The prospect of increasing the
company’s market share motivates adoption”), and E3 (“The knowledge that several business partners already use IOS motivates adoption”) could not be rejected.

The environmental context seemed to be the dominant explanatory factor for respondents remaining as non-adopters. However, one opinion data item related to the organizational context also was found to be a significant explanatory factor for non-adopters. Proposition O6 was found to be of major importance for adopters. Non-adopters, on the other hand, stated that they did not consider organizational readiness to be of any importance with respect to IOS adoption. A similar pattern was found in relation to proposition E3. This opinion data item was of major importance for adopters, whereas it had no relevance for non-adopters. However, there might be some logical explanation for this inconsistency of preferences among the two levels of adoption—what makes good sense for adopters and planners does not appear to make sense for non-adopters. Common for all opinion data items for non-adopters was their disagreement with all of these statements. One explanation for non-adopters not finding IOS attractive at all might be related to the attributes of the non-adopting companies included in the analysis sample. The non-adopters generally were small, independent companies. Such companies are believed to have limited power to initiate an IOS partnership, and, most likely, they are allotted the role of an IOS follower. Generally, it is found that followers do not derive the same benefits as initiators (Swatman & Swatman, 1992). Operational and strategic gains from IOS adoption for small companies, therefore, might be limited. This is also the case in relation to the five innovation attributes defined by Rogers (1995). The relative advantage of IOS for small adopters is limited in relation to the efforts required to set up an IOS solution with very few business partners.

In relation to adopters, it was argued that a possible reason for adopters indicating that organizational readiness was a motivator for IOS adoption could be found in the nature of the social system and the change agents’ promotion efforts. According to the non-adopters, organizational readiness was not important. One interpretation of this outcome is that non-adopters did not consider themselves to be addressees of the IOS campaigns launched by change agents. Pedagogical intervention (Eckhoff, 1983; Henriksen, 2002), therefore, might be of limited value for companies that postpone or reject adoption of IOS. Additionally, the social system, to which they perceive themselves to belong, may not attach much value to IOS.

The two opinion data items concerning the environmental context, which resulted from the logistic regression analysis for non-adopters, were related to a possible increase of the company’s market share due to IOS adoption and the awareness that several business partners were using IOS. Proposition E3 was considered as the mildest form of pressure leading to IOS adoption among the 15 opinion data items. This external community pressure did not influence non-adopters. A rational interpretation might be that non-adopters did not expect to reach a critical mass of business partners using IOS. An interpretation guided by social processes could be that non-adopters simply do not identify themselves with IOS adopters. Therefore, there is no basis for an imitation process. With respect to proposition E2, it could be argued that if the non-adopters thought that
IOS adoption was likely to increase their market share, they would probably already have adopted IOS.

To sum up, it looks like the non-adopters think that they can do fine without this innovation. Therefore, they do not agree with or show any sign of enthusiasm with respect to any of the defined motivators for IOS adoption.

CONCLUDING REMARKS

About 16% of the companies in the Danish steel and machinery industry had adopted IOS in the form of EDI at the time of the survey. The national rate of EDI adoption for all industries was about 15% (Henriksen, 2002). Given the claimed strategic and operational advantages companies can derive from IOS adoption, this low level of adoption is difficult to understand. In the reported survey, 15 propositions related to a mix of operational and strategic benefits of IOS were tested, based on data from 247 Danish companies in the steel and machinery industry. The objective of the study was to uncover the patent priorities of the responders. Based on the analysis, it was found that organizational and environmental attributes rather than technological attributes determined IOS adoption in this particular sector. Pressure and organizational readiness were found both to be the primary motivating factors for IOS adoption and also for rejection of the innovation.

One of the lessons learned from the study is that there is a discrepancy in the way an innovation is presented by business associations and the way it is perceived in the business community. The business associations representing the steel and machinery industry communicated the innovation as a means for improving competitive advantage. However, businesses belonging to the categories of planners and non-adopters did not share this viewpoint. Planners did not follow the recommendations of others, but they did view IOS as a competitive tool (e.g., a means for increasing their market share). What is remarkable in this survey is that what made adopters accept the innovation was exactly what influenced non-adopters not to adopt. Non-adopters disagreed with the notion that organizational readiness or pressure would influence their decisions to adopt. For both planners and non-adopters, the opinion data item related to increase of market share was one of the patent priorities. However, non-adopters did not indicate that this would influence their decision to adopt.

It is surprising that the responders did not pay much attention to the technological attributes as promoters or inhibitors of adoption. One reason could be that the awareness campaigns on EDI, after all, have demystified the technological dimension of EDI. Another explanation might be that the technological attributes related to an innovation determine the rate of adoption to a lesser extent than IS researchers normally expect.

REFERENCES


Kurnia, S., & Johnston, R. B. (2000). The need of a processual view of inter-


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