How Organization Goals Affect Interorganization System Implementation Projects: Evidence and Implications

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Abstract

The factors leading to the initial adoption of an interorganizational system (IOS) are reasonably well understood, but this is not true of the determinants of the activities performed following that decision. This paper proposes that the motivation to implement a system is the starting point for understanding the implementation process and develops a theory about the relationship between the motivation to implement an IOS system and the types of activities likely to be performed in the project. We then compare predictions against activities actually performed in three electronic data interchange (EDI) projects, and find that the patterns predicted are observed. On this basis, we assert that motivation influenced business decisions regarding which activities to conduct in each project. We finally assess the likely long-run consequences of each organization’s activity pattern, noting that each motivation-based pattern brings with it a number of potential risks and opportunities that need to be managed carefully.

Keywords: Interorganizational system, motivation

1. Introduction

In the past 20 years, many companies have implemented interorganizational systems (IOS) in partnership with their suppliers and customers. The specific capabilities of these systems vary from one organization to another, but, in essence, these systems are designed to help companies share information and to integrate key business processes across companies including procurement, sales, and billing. However, implementing and maintaining these systems is typically expensive and difficult because of the need to interface with internal systems as well as systems in other organizations. No definitive data is available regarding the failure rate for such systems, but it is reasonable to expect that failure rates are similar to the 30 per cent figure commonly cited for other types of system (Yeo, 2002). Developing an understanding of how such systems are implemented and how to manage that process is therefore important both theoretically and for IT managers in organizations.

This research develops theory using the premise that that the primary motivation underlying the decision to adopt an IOS influences subsequent system investigation, development, and implementation activities, how the system will be used, and long-term
consequences for the adopting firm. The objective of this paper, therefore, is to develop and test theory about these relationships.

Results are based on interviews with multiple senior managers in each implementation project. Through these interviews, we were able to confirm details about why each system was implemented and the procedures used in that process. This data set indicates that the stated motivation has a substantial and consistent effect on the types of activities performed, the design of the system, and subsequent development and maintenance activities.

This paper is organized as follows. We first describe the mechanism by which motivation affects the implementation process for an IOS. We propose that system implementation activities are a chain of related events, which are initiated and influenced strongly by the motivation underlying the decision to proceed with the system implementation project. We then describe data gathering procedures and the characteristics of the firms from which we gathered that data. Finally, we present our data, showing for each firm the motivation behind the decision to implement, the implementation process employed, and the post-implementation issues described by participants.

2. Theory: Motivation and implementation processes

Organizational motivation affects implementation activities and post-implementation outcomes in our model. But what do we mean when we talk about the motivation of an organization? Given that our unit of analysis is an IOS implementation project, we are obviously not describing an emotional state. Instead, motivation, in this context, refers to the high-level objectives that are the basis for initiating that project. In other words, motivation is the business justification for activity; the answer to the why are we doing this? question.

In the context of technology implementation, we argue that why an organization decides to adopt an IOS influences how that project is conducted and what is implemented. Evidence for this activity sequence can be found in the system development literature, which indicates that both the specific problem and the way in which it is framed influence the focus adopted by the system development team, including the types of issues considered in system investigation and analysis activities (Bonnardel and Sumner, 1996; Hodgkinson et al., 1999). Investigation and analysis, in turn, affects the way in which the business problem is solved, including the technology selected and the features implemented (Markus and Tanis, 2000).

Applied to IOS implementation activities, this principle can be re-expressed as: the motivation to implement an IOS determines the implementation activities performed in a project, how they are performed, and the ultimate outcomes for the organization. This motivation-implementation-outcome model is shown in Figure 1. Because we predict that motivation affects which activities are performed and how they are performed, implementation is represented as a type of black box. Specific activity sequences within the process box are predicted to vary according to the motivation, and so are not shown.

![Figure 1: Generic technology motivation-based model](image-url)
We argue through our model that a high-level business objective (business motivation) initiates an activity chain in which a technology is selected or possibly developed, then implemented, and eventually used. Selection and implementation (often hard to separate in practice) involve a variety of activities including examining information and process requirements, conducting a financial assessment, selecting a specific technical solution (the make or buy decision), and ensuring that the system can communicate with other systems (internal and/or external).

A similar argument – that motivation influences implementation activities and, through this, the design of a system – is advanced in studies with an emergent process emphasis by researchers such as Robey and Boudreau (2000) and Markus and Tanis (2000). For example, Markus and Tanis, assert that “researchers should … take into account the wide variation in motivation to adopt enterprise systems when attempting to assess or explain their impacts and downstream consequences. … Clearly, what companies think they are about [sic.] when they adopt enterprise systems must figure somehow in the ways they approach the enterprise system experience and in the outcomes they achieve” (p. 180).

Note that our model contains no explicit reference to project-success factors, such as organizational resources, or technical readiness (Jeyaraj et al., 2006). Their absence is deliberate: we want to explain variation in the activities performed rather than whether a technology will be adopted or the success of the implementation project. Factors with no direct conceptual influence on the activities performed are therefore outside of the model’s scope.

Our model is partially based on the principles underlying emergent process (EP) theories (e.g. Markus and Robey, 1988; Orlikowski, 1992) which assert that, although systems are generally implemented to achieve specific goals, the actual outcomes observed often do not match those goals exactly due to interactions between forces within and external to the organization. The IMM and EP theories do differ in some important ways, however. For example, EP theories are conceptual lenses that help us analyze past events in terms of motivations and institutional forces without making specific predictions about how either should influence outcomes. Markus and Robey actually refuse to acknowledge a dominant cause of change in their EP theory, claiming that behavior cannot be predicted a priori either by the intention of individual actors or by the conditions of the environment.

Our model, in contrast, asserts that different configurations of implementation activities are likely to be observed for each motivation, with the caveat that the external environment and organizational capabilities sometimes moderate the relationship between motivation and outcomes (i.e. implementation process). This difference in emphasis means that our motivation model, like EP theory, can be used to explain outcomes in terms of goals, influences external to the organization, and organizational (internal) factors. Unlike EP theory, however, our motivation model can be used to explore the impact of alternative motivation scenarios.

Our theory also draws on work by Peffers et al. (1998), who describe the IOS implementation efforts of six firms, detailing for each the motivation, implementation activities, and the post-implementation impact, and by Rahim et al. (2006, 2007), who propose that techno-economic and socio-political motivations affect the types of implementation activities performed. We build on those studies by developing a more detailed explanation of how the motivation to adopt an IOS affects investigation, and implementation activities, how the system is used, and long-term consequences for the adopting firm.

3. Example motivation – process – outcome chains

The effect of differing motivations on cooperative relationships has been a research theme for many years in the literature on interorganizational cooperation (e.g. Schermerhorn, 1975;
Hymer, 1976). A large number of specific motivations are described in that literature, although (fortunately) surveys tend to cluster these into just a few motivational categories. For example, Schermerhorn (1975) describes three types of motive (resource scarcity, value expectancy, and coercive pressure), while Child et al. (2005) describe seven motives (risk reduction, scale, technology needs, competition, trade barriers, overseas expansion, and resource complementarities).

Interestingly, these motives are generally not cited in the conceptual research literature on IOS implementation and use. Instead, IS research typically skirts around the issue of why the IOS is implemented by describing general classes of motivation (e.g. voluntary or involuntary adoption), or whether the company is an initiator/first-mover or a follower (Teo et al., 1995). Where motivations are described, researchers focus on a narrow range of motives derived from one or two theoretical perspectives. For example, Bakos and Brynjolfsson (1993) and Clemons et al. (1993) use transaction cost economics to argue that IOS technology is generally implemented to reduce coordination costs, increase productivity, or in response to the demands of a powerful trading partner. Other theoretical approaches include Johnston and Vitale (1988) and Mukhopadhyay et al. (1995), who apply theories of market power to IOS adoption, and Bouchard and Markus (1996) and Harrington and Beard (1996), who use impression-management theory to explain how reputation (image) considerations can influence implementation behavior.

We now synthesize these theories to describe three broad motivations to adopt an IOS: survival, incremental process improvement, and process transformation. All have been cited in past IOS studies as reasons to adopt an IOS (Iacovou et al., 1995; Peffers et al., 1998). Our descriptions differ from prior work, however, in terms of the breadth of theory because the underlying theory is based on a wider set of theories (not limited to IOS implementations), and are described in more detail. The motivations we have selected are also not exhaustive. The theories we describe here are drawn from a wider set of motivations described by Smith et al. (2007).

3.1 Survival

Many supplier organizations that implement IOS technology do so only at the insistence of a dominant customer and receive little or no benefit themselves (Clemons and Row, 1993). For these firms, implementation is costly but required to preserve an existing business relationship, with the dominant business partner threatening to withhold business if implementation does not occur within a specified time-frame. Mutter (1994) describes this situation as an EDI (electronic data interchange) or Die choice, and Iacovou et al. (1994) describe these firms as coerced adopters. Because no ongoing benefits are associated with the new system (other than continued business), these adopter firms have a strong incentive to make a low-cost, one-off investment in IOS technology. In other words, these firms will select a low cost solution, and once purchased, minimize the ongoing cost by not maintaining the technology. The low cost of this solution suggests that management involvement will be minimal (other than approving the package selected), and that the technology will not be integrated with other systems (i.e. operated as an add-on to the normal transaction-processing activities of the business). The main disadvantage of this approach is that a low-cost stand-alone system may not represent an effective solution should EDI transaction needs increase over time. Systems developed under this motivation therefore need to be reviewed regularly as trading conditions change.

3.2 Incremental process improvement

Incremental process improvement refers to a situation where a firm adopts IOS as a cost-saving initiative rather than as a strategic investment, and justifies the project purely on financial grounds. Chen and Williams (1998) and Kheng and Al-Hawamdeh (2002) describe
examples of this approach, where investments in IOS infrastructure were motivated by the potential to improve efficiency (fewer data entry errors and lower labor costs). In those cases, the IOS was designed to automate processing (a minor change) without making any fundamental changes to existing processes.

However, empirical evidence (Clark and Stoddard, 1996) indicates that automating provides only modest performance improvements, and that large improvements in efficiency and profitability tend to occur only when a firm transforms business processes to leverage the capabilities of IOS technology. A problem with the incremental improvement motivation, therefore, is that by not transforming business processes the firm may put itself at a long-term competitive disadvantage.

3.3 Process transformation

The final motive described here, process transformation, is characterized by a desire to use the data management capabilities of an IOS as the basis for transforming key processes. These transformational IOS projects tend to be strategic, with a much greater focus on integrating systems and improving the depth and quality of information available to decision-makers (Smithson and Hirschheim, 1998). Johnston and Mak (2000) provide an in-depth description of this type of motivation in their discussion of Coles Myer’s IOS strategy. They show that the Coles Myer IOS implementation, regarded as a strategic necessity by top management, is a key part of a larger effort to increase efficiency throughout the supply chain (not just internally), and so has been accompanied by a number of large-scale re-engineering projects. In other words, the IOS is not an end in itself, but rather a platform for advanced process infrastructure such as just-in-time or vendor-managed inventory.

Under the process transformation approach, therefore, we predict that processes will be transformed substantially in a major IT implementation project. The scope of these projects suggests that it will attract significant interest from top-management, and possibly even active involvement from top management. A potential disadvantage of the process transformation motive is that it may facilitate the creation of a relationship lock-in effect by business partners, and thereby increase the risk and impact of opportunism (Subramani, 2004).

Table 1. Predicted impact of three motivations

<table>
<thead>
<tr>
<th>Proposition number</th>
<th>Project phase</th>
<th>Issue</th>
<th>Survival</th>
<th>Incremental process improvement</th>
<th>Process transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning</td>
<td>Amount of planning</td>
<td>Minimal</td>
<td>Substantial</td>
<td>Substantial</td>
</tr>
<tr>
<td>2</td>
<td>Implementation</td>
<td>Project control</td>
<td>Little or no monitoring,</td>
<td>Little or no monitoring,</td>
<td>Close monitoring at senior level</td>
</tr>
<tr>
<td>3</td>
<td>Top management involvement</td>
<td>No top-management involvement</td>
<td>Little or no top-management involvement</td>
<td>Substantial top management involvement</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Amount of integration</td>
<td>Little or no integration</td>
<td>Partial (for preparing EDI documents)</td>
<td>Extensive</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Post-implementation activities</td>
<td>No review. System maintenance a low priority</td>
<td>Major review. System kept up-to-date (regular maintenance)</td>
<td>Major review. Continuous improvement.</td>
<td></td>
</tr>
</tbody>
</table>
These theory-based predictions are summarized in Table 1, which shows the activities expected to occur in each phase of an implementation project for three motivations. Propositions describe the impact of motivation on the amount of planning conducted, the amount of monitoring throughout the project, the amount of top management involvement, the extent to which the IOS is integrated with other systems, and the post-implementation activities conducted. Proposition 1, for example, holds that the amount of planning conducted will be minimal for the survival motive, and substantial (i.e. extensive formal investigation procedures) when implementation is initiated by either the incremental process improvement motivation, or the more extreme process transformation motive.

4. Method

For each project (the unit of analysis), the relationships between motivation (the conceptual classification variable) and the implementation process employed and between the process and post-implementation outcomes of the project were examined through a case analysis of two firms the automotive industry. Data gathering and analysis was conducted by adhering to the rigorous principles of Yin (2003). This involved (a) defining theoretical constructs, including motivation, implementation processes, and events, (b) defining falsifiable propositions about the relationships between constructs, and (c) designing interview questions to allow us to test those propositions.

In-depth interviews were sought from people closely associated with the IOS implementation project, with a minimum two senior executives interviewed for each project (e.g. IT manager and inventory manager) as well as employees with in-depth knowledge of the implementation (e.g. systems analyst), although only the statement of motivation provided by the project leader was used to classify the project. Each interviewee reviewed the interview transcript to ensure that no errors or misstatements were present. Both organizations also gave us access to documents that helped us to corroborate key facts.

When analyzing interview data, statements were coded to indicate the construct discussed and the specific value recorded. For example, the statement …we wanted to speed up the process, describing why an IOS was implemented, was coded MP indicating a process improvement related motivation. To ensure that coding was rigorous, multiple coders were employed, with discrepancies resolved via additional analysis and discussion. These statements and codes were then analyzed using pattern matching logic (Yin, 2003) to assess the whether the patterns predicted by the theory for each motivation corresponded to the patterns actually found in the case data.

For one of the companies, two distinct implementation projects were described. One in which rudimentary IOS technology was implemented to replace a manual system at the behest of a dominant trading partner, and a later project in which more advanced technology was installed to support an increased need to transact electronically that had emerged progressively since the initial project. Because the project is unit of analysis, each is analyzed separately. With the project from the other company, that gives us a total of three projects to use as empirical evidence when answering three research questions:

(a) Why do organizations implement interorganizational systems?
(b) What activities are performed by organizations when implementing these systems?
(c) Does the motivation to implement affect implementation activities?

4.1 Selection of the firms

Two firms from the Australian automotive-industry participated in this study: a major assembler and a significant first tier parts manufacturer. Together, they provide us with a mixture of roles and settings for the study. Limiting firms to the automotive industry restricts our ability to identify industry-specific effects, but was a deliberate research strategy to help
ensure that firms shared some common characteristics and so could be compared in a meaningful manner. Two of the projects described are more than 10 years old (AutoA and AutoB phase 1). All key decision-makers and project documents were still available, but results must nevertheless be treated with some caution. The remaining project had been implemented within the past 15 months (AutoB phase 2), and all key decision-makers were both available and had a clear recollection of the implementation process. The automotive industry was chosen for this study because firms in this industry vary significantly in the extent to which they regard information and IT as strategic tools (Weill and Broadbent, 1998; Levy et al., 1999), even though all face intense competitive pressures and are heavily reliant on information technology.

4.2 Characteristics of firms sampled

Brief profiles of the two participating case companies are shown in Table 2. AutoA is a well-known automotive assembly company that wholly designs, develops and assembles a range of vehicles. The company has several thousand staff and has introduced a wide range of IT enabled applications to support major business processes. Information processing is conducted using an ERP system that is fully integrated with the materials planning system.

AutoB is an established first-tier producer of oil and air filters for both the production and parts accessories divisions of all four automotive assembly companies located in Australia. It also supplies filters direct to hundreds of small spare parts retailers some of which are located in the South Pacific islands. It is a medium-sized enterprise with only two IT managers, and currently uses the MFGPRO ERP system on a UNIX platform to support all key business processes.

Table 2. Key characteristics of the participating case organizations

<table>
<thead>
<tr>
<th>Case site</th>
<th>Nature of business</th>
<th>Annual sales</th>
<th>Total staff</th>
<th>IT staff</th>
<th>Back-end IT applications</th>
<th>Type of IOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutoA</td>
<td>Automotive assembly</td>
<td>Approx. AS1 billion</td>
<td>&gt;1000</td>
<td>&gt;50</td>
<td>ERP integrated with MRP system</td>
<td>A traditional EDI system and an internet-based EDI system</td>
</tr>
<tr>
<td>AutoB</td>
<td>Auto parts manufacturing</td>
<td>AS50 million</td>
<td>200</td>
<td>2</td>
<td>MFG PRO ERP system</td>
<td>A standalone and an integrated EDI system</td>
</tr>
</tbody>
</table>

5. Case descriptions

5.1 Case AutoA (assembler)

5.1.1 Motivation (pre-implementation)

Towards the end of the 1980s, AutoA experienced severe competitive and financial pressures: the Australian government was withdrawing tariff protection for the domestic automotive industry (increasing the amount of competition), interest rates had risen sharply worldwide (dampening demand), and Japanese car manufacturers were expanding their market share aggressively (Singleton, 1992).

In response, senior IT managers of AutoA began to promote EDI technology (internally) as an efficient way to transact with key suppliers, particularly highlighting EDI’s purported ability to eliminate data entry errors and reduce the amount time required to produce and transmit order documents. IT managers argued that these efficiency improvements would allow the company to compete more effectively, both domestically and internationally.

Through this internal lobbying, materials planning managers realized that EDI could also form the basis for radical changes to the materials ordering process, and with the assistance of the IT department, prepared a formal proposal for senior management of the company. This proposal included a detailed justification for introducing the EDI technology (a cost-benefit
analysis and clearly specified benefits in terms of immediate efficiency gains and long term advantages over its competitors), a timetable for implementing EDI, and an overview of the critical technical and relationship issues. The argument was that, when coupled with changes to administrative processes, exchanging key materials documents electronically would result in substantial time and cost savings (faster document exchange and processing, and fewer document processing and data entry errors), and that these electronic links would help provide a competitive advantage over rivals (which had not yet implemented such a system). According to the materials planning manager:

\textit{We were at the forefront of the initial introduction of EDI in the automotive supply chain in Australia. ...We wanted to speed up the process of receiving [documents] from suppliers and to process those documents in our back-end systems ... but if we look well ahead, we want to implement a system call Pay-On-Production (POP), which is like this – when a car rolls off (completed) the assembly line, it is only at that point that we pay our suppliers. Instead of a whole bunch of paperwork when goods are brought in, we are giving the suppliers the responsibility to supply the parts in accordance to the requirements for building a vehicle. At the end of the day, we will align all vehicles produced with the components from each supplier used to build them. This will then enable us to calculate our pay to each supplier.}

The process transformation motive is evident here. That is, although the technology is partly justified on the basis that automation will eliminate errors and increase efficiency, a clear strategic focus is evident, with the company aiming to use the IOS as the platform to support a radical process change (POP) in the long term.

5.1.2 Implementation process

The project to implement EDI capability was a high-value project in which a significant application was custom-written in-house, primarily in COBOL, and extensive reprogramming work was performed to integrate the new EDI system with the existing inventory control system, and modifying internal processes to accommodate this new approach to data handling. The project was approved at board level, and senior management took an active interest in the project from the earliest stages, requesting extensive briefings before the project was approved, as well as regular briefings throughout the course of the project. The project manager stated:

\textit{It was a major exercise, with tight financial controls, and really careful project management. We hadn’t done this type of thing before, and there was a lot at stake.}

5.1.3 Post-implementation

Following implementation, AutoA reviewed internal processes and its interactions with suppliers to refine and enhance the system. Externally, the company attempted to force its suppliers into joining the EDI network, stating that those who failed to adopt EDI would be locked out of future contracts. The senior analyst stated:

\textit{Our company has an overpowering relationship with all our suppliers as we are far bigger than most of them, and we tend to dictate to them how to run their business.}

That is, most suppliers felt compelled to join the network (confirmed in subsequent interviews with suppliers). Interestingly, although potential efficiency benefits were a selling point within AutoA, no serious attempt was made to encourage suppliers to adopt EDI on this basis. Instead, the company adopted a militant stance, threatening that suppliers who failed to obtain EDI capability would be punished via unfavorable performance ratings and a consequent loss of business.
5.2 Case AutoB (Automotive Parts Supplier)

Our second case site is an automotive parts supplier (AutoB) who performed two distinct EDI implementation projects. In its first initiative AutoB introduced a DOS based EDI system, while its second initiative focused on introducing a fully integrated EDI system.

Stage 1: Implementation of a DOS-based EDI System

5.2.1 Motivation

In early 1990s, AutoB was approached by a large automotive assembly company (AutoA) which expressed a strong desire to communicate and transact with all first-tier suppliers electronically (using EDI). The manufacturing company further insisted that the supplier use its proprietary EDI format to exchange documents with them through its preferred value-added network (VAN) provider, and that failure to comply with this request would result in a possible complete exclusion from future business dealings. The supplier expected that even complying with this request in a minimal way would satisfy AutoA, and thus avoid the penalties threatened. According to a senior business manager:

The EDI initiative at our company started at the request of a major customer [AutoA]. They were adamant we had to comply with their request to make them happy.

Clearly in this case, EDI capability was introduced due to external pressures. A single motivation is evident, the survival response, in which the IOS is implemented to preserve an existing business relationship. Theoretical benefits of this type of system, such as cost-saving or strategic positioning, were not considered relevant due to the low volume of EDI transactions expected (when operational, the system received only a weekly production schedule each week, and sent back several shipping notices in response). Senior management therefore believed that no benefits from the system were likely apart from continued business with its key customer. The IT department manager stated:

We not see much value [in the system]. We wanted to use this standalone EDI system to make the customer happy.

5.2.2 Implementation process

The minimalist philosophy adopted by the company extended to all planning and implementation activities. For example, because obtaining EDI messaging capability had been mandated (and so represented a business survival issue), no cost-benefit analysis was conducted, little time or effort was devoted to planning the project, no effort was made to integrate the system with the back-end ERP system (or other organizational systems), and no post-implementation review was conducted. Such activities were considered a waste of time; the supplier had no desire to investing any more resources in the EDI project than the absolute minimum required for a working system. The actual system implemented was a DOS-based standalone EDI system, costing close to AUD$5000 (including hardware), which was believed to be the least expensive of the systems capable of meeting AutoA’s requirements.

5.2.3 Post-implementation

In the earlier AutoA case, the introduction of EDI was seen as a strategic issue, and was accompanied by major changes to existing supply chain management practices. For AutoB, however, the EDI system was seen merely as a tool that helped the supplier to maintain good business relations with a key customer, and certainly not strategic in any way. Given the low volume of transactions, this attitude is not surprising. The potential to access additional information using this type of system, such as determining the number of filters used in the various production lines of AutoA, was therefore not considered useful in any way. The senior business manager expressed this view:
Our management did not consider EDI to be a strategic application. Hence, we did not exert any influence on the customer to use the system for sharing additional information with us.

Stage 2: Implementation of fully integrated EDI System

5.2.4 Motivation

In early 1998, a newly appointed IT manager initiated an audit of AutoB’s portfolio of IT assets, partly in response to the Y2K problem, but also to identify opportunities for improvement. This review highlighted a number of serious difficulties experienced by customer service staff when using the DOS-based standalone EDI system. Specifically, the review found that the system was cumbersome to use when processing more than a few transactions, was hard to configure, and, because it was not integrated with the back-end ERP system, duplicate data entry was required, causing keying errors and data inconsistency problems. In addition, the review indicated that EDI messaging requirements had changed substantially in the years following the initial introduction of the system: EDI exchanges now occurred more frequently between AutoA and AutoB, but, more importantly, EDI-based communications were now also used in transactions with other major assemblers and a significant number of AutoB’s smaller customers (mainly retailers of spare parts).

In response to these findings, the IT manager proposed that a fully integrated EDI system was needed to resolve the chronic difficulties experienced by operational staff, and advised senior management to consider a new generation EDI system. This proposal comprised a formal implementation plan, including detailed estimates of cost-savings and efficiency improvements, a time frame for EDI implementation, and package selection criteria, and was supplemented with a series of presentations from four leading EDI vendors. According to the IT manager:

“We made a capital expenditure request. We also had presentation conducted by various EDI vendors, and then we weighed the pros and cons of each EDI offering in terms of how much it was going to cost us as well as the benefits to be obtained...so we had to prepare a business case.”

The core argument advanced in the proposal document was that transacting electronically, using a new generation EDI system, with a high proportion of AutoB’s 500 small customers (located throughout the country) would lower data processing and other administrative costs by increasing data processing efficiency, reducing the number of data errors, and increasing the quality of the data throughout the system. Senior management approved the proposal to scrap the ageing DOS-based EDI system providing the savings in the first year offset the initial cost of the project. The IT manager stated:

“The new EDI system was driven by our need to carry out electronic transactions with our small trading partners. It was not introduced in response to a push from them. We wanted to reduce data entry errors and cost of transactions.”

Note that senior management did not approve more substantial work, stating that there was no need to make any substantial changes to the existing ordering process (which they felt was working well). In other words, although a fully integrated system was proposed, the system actually approved represented a minor modification to existing processes. The new system is integrated at the system level (i.e. applications can share data), but not at the business process level (the EDI application does not interact with business processes directly).

In this second implementation attempt, the motivation advanced by the IT manager is more strategic in nature, although the project as approved is primarily operational. The rationale for the new system is mainly based on the process-automation argument that the technology will save money by eliminating errors and increasing efficiency, although some
process transformation elements are also evident in the argument that the data management capabilities of an IOS can be used to improve information quality and eliminating wasteful administrative activities.

5.2.5 Implementation process

Following the decision to proceed, top management took little interest in the project, with no progress communications (either formal or informal) prepared at any stage for senior managers (other than the IT manager). An off-the-shelf EDI application package was chosen in early 2001 based on its ability to integrate with the existing ERP system (the package chosen is essentially a bolt-on application) and its user-friendliness. Following acquisition, the IT department spent the next two months integrating the new system with the back-end ERP system, thereby eliminating any need for customer service staff to manually process EDI documents, but no additional changes were made to existing business processes.

While this integration work was proceeding, a second team worked on configuring the external data translation and communication functions. No uniform standard for exchanging EDI messages had been agreed to by the major assembly companies (Ford, GM, Toyota, etc.). As a result, considerable effort was involved in constructing a separate set of EDI templates and maps for each assembler. According to the Head of the IT department:

At this stage, the new EDI system has not changed much of what our sales and marketing people do. We had to prepare EDI forms and maps and stuff. It was difficult because each of our key customers [automotive assembly companies] had their own maps and their own message guidelines.

5.2.6 Post-implementation

Following deployment, a post-implementation review took place to identify implementation problems and specify corrective actions. As these issues were addressed, the integration began to yield tangible benefits, particularly evident in the significant reduction in the amount of paperwork and the number of data entry errors. Additional savings were achieved by redeploying some of the administrative personnel previously required to process EDI documents to more productive activities. Externally, the supplier did not coerce its small customers (the parts retailers) into trading with them through EDI. The supplier instead described the possible administrative savings and improvement in data accuracy that each retailer was likely to achieve by embracing EDI.

6. Discussion

AutoA used the data management capabilities of their IOS as the basis for transforming key processes and designed the system to integrate with other systems. The amount of attention to the project given by senior management of AutoA indicates that this transformation was regarded as financially and strategically significant. These characteristics of the project form a pattern virtually identical to the typical process transformation response described in our theory development section. This close conformance to the activity pattern described in other studies suggests that the process transformation motive is associated consistently with the pattern of activities described earlier and in Table 3.

For AutoB, gaining EDI capability was of critical importance, but only minimal capability was required due to the low transaction volume and consequent lack of benefits possible from such a system. The minimalist approach used by AutoB is thus sensible. As the company grew, however, this system proved inadequate, but, possibly due to the low initial benefits of the system, efficiency problems with the system were ignored and allowed to grow. This chain of activities is virtually identical to the activities described in the survival motive theory.
As was found for the process transformation motive, therefore, it appears that the survival motive is associated with a predictable chain of activities.

Table 3. Activities conducted by case organizations

<table>
<thead>
<tr>
<th>Proposition number</th>
<th>Project phase</th>
<th>Issue</th>
<th>AutoB phase 1 (Survival motive)</th>
<th>AutoB phase 2 (Incremental improvement)</th>
<th>AutoA (transformation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning</td>
<td>Amount of planning</td>
<td>Minimal ✓</td>
<td>Substantial ✓</td>
<td>Substantial ✓</td>
</tr>
<tr>
<td>2</td>
<td>Implementation</td>
<td>Project control</td>
<td>Little/no monitoring ✓</td>
<td>Little/no monitoring ✓</td>
<td>Close monitoring ✓</td>
</tr>
<tr>
<td>3</td>
<td>Implementation</td>
<td>Top management involvement</td>
<td>No involvement ✓</td>
<td>Little or no involvement x</td>
<td>Substantial involvement ✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Amount of integration</td>
<td>Minimal ✓</td>
<td>Partial ✓</td>
<td>Extensive ✓</td>
</tr>
<tr>
<td>5</td>
<td>Post-implementation activities</td>
<td>No review, no maintenance ✓</td>
<td>Major review, regular maintenance ✓</td>
<td>Major review. Continuous improvement. ✓</td>
<td></td>
</tr>
</tbody>
</table>

By the time the AutoB’s second-stage project was initiated, substantial efficiency benefits were available. However, that the implementation approved by top management is much smaller in scope than that project advocated by the IT manager. That is, the IT manager advocated a major process reengineering exercise; senior management, however, rejected that approach in favor of a more modest exercise designed to save costs by automating some information handling procedures. The design of the system thus generally conforms to the pattern we would expect when the project is motivated by a desire to leverage the capability of an IOS to increase efficiency quickly through relatively small changes to existing processes (short-term pay-off, financial benefit focus, small-to-medium scale project, and few changes to existing processes). The exception to this pattern is that management involvement is far more substantial than expected for this type of implementation. Closer analysis indicates that top management perceived the project advocated by the IT manager as too risky, and intervened to reduce the scope of the project (and project risk) to a more manageable level. Apart from this difference, the observations recorded for the Phase 2 project also support our theoretical propositions.

These motivations and implementation approaches are summarized in Table 3. In each cell, observed results are reported together with an indication as to whether or not each proposition is supported (tick or cross). Overall, results support our main proposition that the motivation to implement an IOS results in predictable activity patterns. One proposition is not supported, the outcome observed regarding Proposition 3 for AutoB’s Phase 2 implementation. Specifically, we proposed that little or no top management involvement would occur when transaction efficiency motivated implementation. This is true in the sense that top management took little interest in the day-to-day progress of the project, but the proposition is nevertheless is listed as not supported due to the substantial involvement in defining the scope of the project.

7. Conclusion

In this paper, we have developed and tested a theory of the effect of motivation on the adoption of IOS technology and its consequent impact on an organization. While analysis of
three cases does not support statistical generalization, results are nevertheless reliable in the sense that the logic of analytical generalization was applied in interpreting evidence for evaluating research propositions.

In each case, managers indicated that the motivation to implement influenced the range of activities conducted. Just as importantly, however, the correspondence between observations and our theoretical predictions indicates that motivation also played a role in determining the activities not conducted. For example, the minimal set of activities performed in the AutoB Phase 1 implementation is consistent with predictions. It is also important to note, however, that quality-assurance steps associated with other motivations (e.g. regular review) could have been performed but were not. This omission created an environment in which inefficient work practices introduced with the EDI system were allowed to consume considerable administrative resources over a considerable period, with senior management having no way to detect the problem. As another example, the reluctance of AutoB management to approve a fully integrated system is perhaps understandable given the high-cost (and negative ROI) of the initial EDI system. However, given that many of the potential efficiency benefits associated with EDI are obtained through integrating systems and transforming business processes, it seems likely that the new system will deliver few long-term efficiency improvements. Overall, therefore, although the activities reported for each project are a defensible response to the competitive requirements perceived by managers, this does not mean that they represent optimal responses.

Our findings have several implications for practice. Firstly, motivation to adopt a system appears to affect key outcomes, including the design of the system and how it will be used. This is significant for managers because such design choices, once implemented, are usually expensive and difficult to modify. Secondly, results illustrate a potential danger associated with using the positive experiences of other firms as a basis for system analysis and implementation decisions. In particular, managers must ensure that they are aware of the motivations underlying those systems and implementation processes, and ensure that their own motivations are similar, or at least compatible.

The theoretical contribution of this work is our framework for understanding the role of motivation in the activities conducted when implementing a system. For example, our research model can potentially be used to predict the activities that follow logically from different starting points, and so illustrates to decision makers the long-term importance of motivations, particularly the need to ensure that operational issues do not jeopardize long-term plans (Rahim et al., 2006).

The case evidence presented supports our argument that the business goals underlying the system implementation decision influences the pattern of activities performed in an implementation project. The theory applied here is the basis for a wider research program, currently in progress, that assesses these relationships in detail using a variety of data sources. IOS technology is the initial focus of this program (Rahim et al., 2006, 2007; Smith et al., 2007), but follow-up work will also examine other types of large scale system implementation processes, particularly enterprise systems and customer relationship management systems.

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References


