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Understanding Motivations for IOS Adoption

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Abstract

Inter-organisational systems (IOS) are of great importance to businesses as these systems enable different organisations to work together through the exchange of information. Despite this significance, the diffusion of IOS is disappointingly slow. There have been a number of studies of the factors affecting IOS adoption but they have yielded inconsistent results. We argue that adoption of IOS is also contingent upon the motivations of organisations. In this paper, we develop a model that explains the variation in motivations for IOS adoption. The model categorises motivation to adopt IOS along two dimensions; type of motivation and locus of motivation. The model also provides four scenarios for IOS adoption and identifies typical tasks for each scenario. The model can help practitioners and researchers to better understand the differences in motivations between particular organisations involved in IOS implementations.

Keywords

Inter-organisational systems, IOS adoption, motivation, IOS adoption motivation

INTRODUCTION

With growing maturity in the use of information systems within organisations and developments in telecommunications technology, there is great interest in establishing inter-organisational connectivity, leading to the emergence of inter-organisational (IOS) systems. These are the systems that enable different organisations to work together through the exchange of information, normally in support of key business processes (Kuljis et al., 1999). Typical IOS include electronic data interchange, shared databases, electronic fund transfer and supply chain management systems among others. Information exchange through IOS has the potential to increase operational efficiency by reducing ordering costs, inventory costs and supply lead times. IOS create competitive advantage by facilitating information sharing and providing cross-functional value. However, despite such potential, the adoption of IOS has been disappointingly slow (Hendon et al., 1998, Johnston and Gregor, 2000). A number of studies have investigated IOS adoption but the majority of them have focused on the factors affecting IOS adoption, and have largely ignored how the motivation for IOS was developed in the first place.

IOS lies at the heart of business-to-business electronic commerce (B2B EC). It is estimated that B2B transactions will be more than 80% of the expected US$3 trillion EC market by 2003 (Economist, 2000). However, the potential benefits of IOS can only materialise if they are widely adopted by organisations. Hence, there is a real need to better understand the motivations for IOS adoption and to develop theoretical models to explain the variation in motivations for IOS adoption in existing empirical studies.

In this paper, we argue that the actions taken by an organisation to successfully adopt IOS and the benefits that are subsequently realised do not depend on the success factors alone, but are contingent upon how the motivation was developed. Based on this realisation, this paper presents a model that explains the variation in motivations for IOS adoption. The model classifies motivations along two dimensions: (a) *type* of motivation and (b) *locus* of motivation. The *type* of motivation is formulated using a synthesis of theoretical perspectives in technology adoption. Two types of motivations are suggested: techno-economic and socio-political. The *locus* of motivation refers to the source of motivation, which is either internal or external. Combining these two dimensions, the model provides a useful lens through which practitioners and researchers alike can better understand the motivations for IOS adoption and the differences in motivations between particular organisations involved in IOS implementations. This model further allows predictions to be made about the likely outcome for IOS adopters with different motivations.

This paper is organised as follows. The next section synthesises theoretical perspectives on technology adoption and identifies two dominant types of motivations for IOS adoption. The third section introduces the notion of locus of motivation and highlights its significance in relation to IOS adoption. The fourth section describes a model of motivation for IOS adoption. The fifth section discusses how IOS practitioners and researchers may

use the four scenarios within the model. Finally the sixth section concludes by suggesting some areas for future research and provides a brief explanation of an on-going research project on IOS adoption in which the authors are currently involved.

THEORETICAL PERSPECTIVES ON MOTIVATIONS FOR IOS ADOPTION

In this paper, we consider IOS as an application of new technology and hence theories related to technology adoption are drawn upon to better understand the motivations of organisations to adopt IOS. We acknowledge that these theories were not specifically designed to address IOS adoption, but the characteristics of IOS are sufficiently similar to those assumed in the theories. Hence, technology adoption theories are relevant and useful to explain the theoretical positions on motivations for IOS adoption in organisations. We have also referred to the innovation and IT implementation literature to support the positions expressed by the technology adoption theories.

Types of Motivation

The notion of 'technological determinism' was introduced by Campbell (1996), who advocated that a technology will gain acceptance if it possesses superior technical characteristics. Thus, technical specialists design a new product, organisations utilise those products, and the community at large benefits. According to this notion, lack of adoption of a new technology is attributed to its technical inadequacies (e.g. too slow or cumbersome) (Naisbitt, 1984, Feigenbaum and McCorduck, 1991, Giuliano, 1991). Toffler (1980) on the other hand offered the concept of 'economic determinism' and emphasised that technologies are beneficial to a society as they yield economic benefits. According to this position, adoption of new technology is an essential pre-requisite for survival of both private and public sector organisations, because non-adoption will seriously constrain the achievement of benefits. These arguments are consistent with the views of diffusion of innovation researchers. For instance, Dean (1987) suggested that in order to obtain adoption approval from management, it must be demonstrated that investment in the technology will improve an organisation's financial position or its competitive position in its industry, while McFarlan and McKenny (1983) emphasised that new technologies of potential value to a company should be identified in order to initiate corporately mandated productivity improvement programs Several other researchers (More, 1992, Norris, 1999, Child, 1987) share this view.

There are however some situations in which organisations decide to adopt technologies for reasons which are not based on either the technology's superior capabilities or its potential economic impact. For instance, sometimes organisations make decisions without complete information about their environment (Simon, 1965). In such situations decision makers often look for direction from outside their organisational boundaries, and may model themselves on other similar organisations that they perceive to be more successful in their field. Therefore, when modelling the technology adoption practices of other successful organisations, decision makers may find themselves pursuing options that have little to do with either efficiency or goal attainment (Galaskiewicz and Wasserman, 1989). Furthermore, organisations look for opportunities to advance their status, even if temporarily, and certainly are not inclined to accept losing their status with indifference. Status can be conferred by many things including possessing esoteric knowledge through new technology adoption (Mohr, 1987). Thus, organisations scan their environment to look for technologies to enhance their status, and also take careful note of possible status damage that may be caused for being portrayed as laggard for not possessing such technologies.

Sometimes, technologies are adopted to as a result of the norms and beliefs of certain groups of professionals working within a company. Larson (1977) explained that influence arises from the collective struggle of members of an occupation to define the conditions and methods of their work, to control "the production of producers", and to establish a cognitive base and legitimacy for their occupational autonomy. Universities, professional and trade associations are the important sources that contribute to the development of norms among these professional people (Perrow, 1974). Hence, in organisations facing technology adoption decisions managers may turn to the norms and standards held sacred in their business and professional communities (Galaskiewicz and Wasserman, 1989). Hence, such adoption of technology is not aimed at a specific organisational problem but is intended to support the work culture and values of certain groups of people within the company.

There also exist formal and informal pressures exerted on organisations by other organisations upon which they are dependent, as well as by cultural expectations in the society within which they operate. These pressures include force, persuasion, or invitations to join in collusion. For example, large conglomerate corporations also impose standard practices, procedures and structures on their subsidiaries (Coser et al., 1982), while Pfeffer and Salancik (1978) argued that resource-dependent organisations may be forced to adopt a technology in response

to the pressure exerted by powerful resource-rich organisations. In some circumstances, a decision to adopt a technology is made in a direct response to government mandate (King et al., 1994).

In summary, the theoretical perspectives as presented above indicate the presence of two major types of motivation for the adoption of new technology: (a) socio-political motivation and (b) techno-economic motivation. The techno-economic motivation emerges due to the combination of two related theoretical perspectives: technological determinism and economic determinism. The reason for producing a single perspective is that without superior technical features in place, the potential adopters are unlikely to perceive a new technology's relative advantage over its rival technology. Hence, techno-economic motivation is characterised by the systematic analysis of benefits, either technological or economic, that are the prime motivations for IOS adoptions. Socio-political motivation acknowledges that some organisations may adopt technologies for reasons that are not driven by technologically generated economic benefits. Thus, these organisations may adopt technologies for the symbolic issues of legitimacy, compliance with external demand, influence arising in an organisation's external environment, or because of an opportunity to enhance their image in the society. These alternative reasons for technology adoption are grouped together under the rubric of 'socio-political' motivation.

Locus of Motivation

Next, we introduce the notion of 'locus of motivation'. The term 'locus of motivation' is used to indicate whether the source of motivation to adopt IOS is internal or external to an organisation. For organisations in which the locus of motivation is internal, motivations usually derive from champions who are either MIS managers or managers of functional areas. On the other hand, for organisations where the locus of motivation is external, the motivation to adopt IOS comes from sources beyond organisational boundaries. In such organisations, adoption of IOS is often initiated by customers, suppliers, or government bodies.

Those organisations that have an internal locus of motivation are usually the leaders of IOS adoption in their industry. For example, automotive giants like Ford and Chrysler developed their own proprietary EDI systems that locked in their suppliers and set EDI adoption pace in the automobile industry (Mukhopadhyay et al., 1995, Webster, 1995, Ratnasingam, 2000). Organisations that have an external locus of motivation do not build any IOS or EDI systems, but embrace a standard IOS or EDI network as required by their trading partners. For example, in the context of the US transportation industry, Walton (1994) observed that the carrier's decisions to adopt EDI were externally driven. These carriers did not develop any EDI systems; rather they decided to join in those EDI networks as desired by the powerful shippers. Thus, these carriers, in which the locus of motivation is external, represent typical followers of IOS adoption in their industry sector.

We argue that IOS researchers should recognise the distinctions between IOS leaders and IOS followers, as there exist considerable differences in the characteristics of organizations that have internal initiation from those that have external initiation. For example, Hwang et al. (1991) reported that EDI initiators are often characterised by greater top management support, perform more strategic IT planning, have a greater degree of IT diffusion, and possessed a higher degree of implementation capability compared with EDI followers. Additionally, being the centre of transaction flows, the transaction volume is typically large among IOS leaders. In contrast, IOS followers have a lower volume of transactions, for which the entry costs of hardware and software represent a significant investment (Murchland, 1995). Typical IOS followers are usually busy running their day-to-day businesses and are not always well-informed about all that happens beyond their immediate environment (Cavaye, 1995). IOS followers also tend to be conservative and late adopters of IOS (Grover, 1993). Moreover, IOS followers are likely to have little control over their external environment, whereas IOS leaders are likely to be very influential companies who can construct or modify the technological vision for the entire industry.

As a result of these differences, the motivations for IOS adoption may be different between IOS leaders and IOS followers. This implies that IOS leaders may invest in IOS for reasons which are often different from those of IOS followers. Additionally, the benefits that are likely to arise as a result of IOS adoption may also vary between IOS leaders and IOS followers. This argument is consistent with the views of Riggins and Mukhopadhyay (1994) who suggested that the benefits arising from EDI are unequal between EDI initiators and followers. Cavaye (1995) reported that varying degrees of benefits were realised between IOS initiators and followers. Peffers et al. (1998) also confirmed that those firms that were drawn into EDI due to external initiation reaped limited cost savings.

It is important to note that the types of organisations that play the roles of IOS leaders and IOS followers may differ between industries. For instance, in the grocery industry, retailers often initiate IOS development projects, and thus act as IOS leaders. Suppliers, who are often less powerful than retailers, join in IOS networks initiated by retailers, and assume the role of IOS followers. In the automobile industry, manufacturers initiate IOS

projects and thus are regarded as IOS leaders, while suppliers of automotive parts producers act as IOS followers who are often locked in by the manufacturer's IOS networks. However, in the pharmaceutical industry, the demand for electronic connection often originates from pharmaceutical suppliers who develop their own IOS, which connect them to their customers. An example is the widely publicised American Hospital Supply Company's (AHSC) ASAP system that was developed to connect AHSC with large hospitals (Buday, 1986). Another example of supplier developed IOS is the Economost system. In 1975, the McKeson Drug Company introduced Economost as an electronic order entry system for its customer (Clemons and Row, 1988).

A MODEL OF MOTIVATION FOR IOS ADOPTION

Based on the type of motivation and the on locus of motivation, we now propose a model of motivation for IOS adoption. As explained in the second section, two types of motivation (techno-economic motivation and socio-political motivation) were deduced from the existing theories of technology adoption. We have also highlighted the significance of locus of motivation in the third section. When combined, these provide four scenarios of motivation for IOS adoptions that help explain the differences in motivations between particular organisations involved in IOS implementations. Each of the four scenarios is shown in Figure 1 and discussed below.

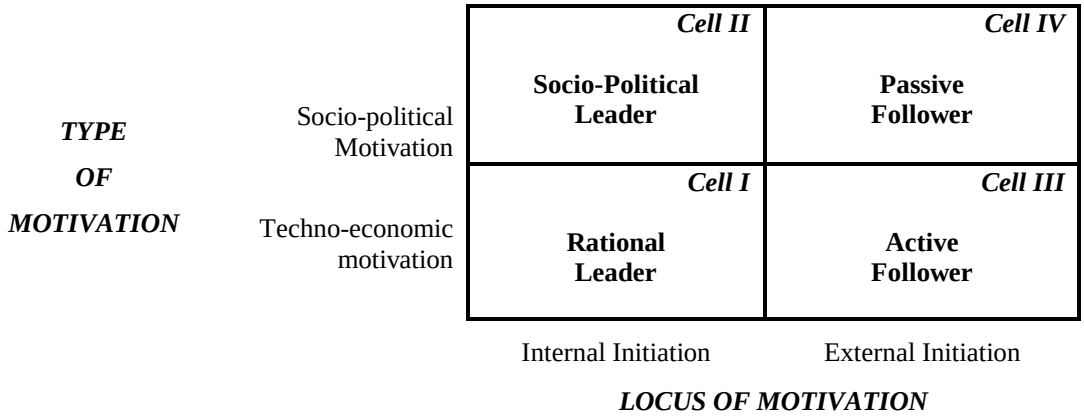

Figure 1: A Model for IOS Adoption Motivations

Rational Leader Scenario

Cell I defines the "Rational Leader" scenario and occurs when an IOS initiator is motivated by the techno-economic perspective, and makes a voluntarily investment in IOS believing that the investment will improve organisational performance with regard to internal efficiency and competition in the marketplace. We argue that since rational leaders are driven by economic promise, their management will allocate necessary resources to integrate IOS thoroughly into their business practices with an aim to achieve the anticipated benefits. Additionally, their management is likely to put strong pressure on their business partners to join in their IOS networks, as lack of enthusiasm on the part of their partners to embrace the IOS may jeopardise the potential success of the IOS implementation. Hence, rational leaders are expected to market IOS concepts aggressively. The implication is that rational leaders will take considerable interest in how IOS are being used by their trading partners, and will not hesitate to resort to coercive means to ensure IOS acceptance by their trading partners. These leaders may even suggest that their partners integrate the IOS into their own internal information systems. Such integration may provide rational leaders greater access into their partners' processes and databases, which in turn would assist leaders to meet the business objectives of IOS introduction.

Socio-Political Leader Scenario

Cell II defines the "Socio-Political Leader" scenario and occurs when an IOS initiator is inspired by socio-political motivations, and implements an IOS for reasons other than efficiency gains but nevertheless with a clear intention of perhaps portraying a "progressive" image in the industry, or with the realisation that there is no other way forward given their trading partner's IOS adoption strategies. However, the motivation to adopt IOS is initiated internally.

We argue that a socio-political leader may not be willing to integrate an IOS into their business practices to the same extent as a rational leader. The management of organizations that are socio-political leaders would be willing to invest limited resources to implementation of an IOS to build a positive image. As there is a lack of drive to use IOS for economic gain, socio-political leaders would be reluctant to disrupt their existing business

practices. Consequently the degree of integration of IOS with their business practices is expected to be minimal and socio-political leaders are more likely to persuade their trading partners to embrace their IOS, rather than resort to coercive mechanisms to force IOS adoption. This also means that socio-political leaders would not take much interest in how IOS are being used by their partners, all they desire is some form of information exchange via IOS so that they can realise their socio-political goals.

Active Follower Scenario

Cell III is defined as the "Active Follower" scenario and occurs when an organisation is approached by other organizations (including its business partners or a third-party) about IOS adoption and having evaluated the potential benefits of the IOS, makes a voluntarily investment in IOS. Although the motivation to adopt IOS is initiated externally, the decision is clearly made based on techno-economic reasons. We argue that active followers of IOS would make serious attempts to incorporate IOS technology into their business practices in order to maximise their benefits. Hence, management of these organisations is likely to invest considerable resources in IOS implementation and would strive hard to ensure that the implementation proceeds systematically in order to achieve the expected benefits. These organisations may also attempt to capitalise on IOS technology to strengthen their ties with and secure additional business activity with the partner that initiated IOS. In short, the decision to adopt IOS would be seen largely in a positive light and would be regarded as a business opportunity.

Passive Follower Scenario

Cell IV is defined as the "Passive Follower" scenario and occurs when an organisation is forced to adopt an IOS by its trading partners or other third-party organizations. There is no rational or economic analysis conducted for the IOS implementation. The decision is externally initiated and complied with for reasons of legitimacy, compliance, influence or social status. We argue that management of passive followers will not be addressing a defined organisational efficiency problem when adopting an IOS, but will attempt to relieve the stresses caused by the external pressure. Hence, these organisations are unlikely to conduct systematic evaluation of the advantages and drawbacks associated with IOS. Management would invest a minimum of resources for IOS adoption in order to secure a satisfying response from the external source that caused the initiation. This would most likely result in a superficial incorporation of technology in their business practices.

DISCUSSION

The model of IOS adoption motivations, as presented above, is useful to management, because it identifies the major tasks that need to be undertaken by organizations when adopting an IOS. Table 1 summarises these tasks, which were discussed in the previous section for each of the four scenarios in the model. The table also contains our predictions concerning the extent to which management of these four types of IOS adopters is likely to put effort and funding to perform the tasks. These predictions need to be validated through further empirical studies.

We also suggest that the IOS adoption motivation model can also be used by organisations considering IOS implementations to better understand their motivations relative to those of their trading partners. Organisations that consider themselves to be socio-political leaders may decide to move towards the role of rational leaders by conducting systematic cost-benefit analyses of their planned IOS implementation. They could consult Table 1 to find typical tasks undertaken by rational leaders. Similarly, organizations that consider themselves to be passive followers may decide to move towards the active follower role by also conducting systematic cost-benefit analyses.

We further suggest that when an organisation is requested by an trading partner to adopt IOS technology, the organisation should determine if the IOS adoption in the initiator firm occurred as a result of socio-political influence or due to the prospect of economic gains. If the requesting organisation is found to be socio-political leader, we then suggest that organisations should proceed cautiously towards committing to IOS. On the other hand, if the request comes from a rational leader, then the organisation should decide whether it wishes to assume the roles of an active follower or a passive follower. Depending upon the kinds of roles it desires to play, the organisation should formulate necessary strategies to maximise its benefits.

Tasks	Rational Leader	Socio-Political Leader	Active Follower	Passive Follower
Evaluation of the potential of IOS is conducted.	High	Low	High	None
Systematic implementation plan is developed.	High	Low-Medium	Medium-High	None
IOS is integrated with internal systems	High	Low	Medium-High	None
Tendency to apply coercive pressure on partners.	High	Low	N/A*	N/A*
Interest in how IOS are being used by partners.	Medium-High	Low-None	Low-Medium	N/A*
Post-implementation assessment of benefits is conducted.	High	Low	High	None
Tendency to renegotiate business terms.	High	Low-None	Medium-High	None
Tendency to exploit IOS as a business opportunity.	High	Low-None	Medium-High	None

*Note: N/A refers to 'Not Applicable'

Table 1: Predictions of the efforts spent on IOS adoption related tasks.

CONCLUSION

The model proposed in this paper uses the "type of motivation" and "locus of motivation" as the basis to identify four generic categories of potential IOS adopters. The model further describes certain characteristics of each category of adopter. The advantage of this model is that it provides a useful lens through which practitioners and researchers alike can better understand the differences in motivations between particular organisations involved in IOS implementations, and allows them to predict the likely outcomes of their IOS adoption. Further empirical studies of IOS adoption are however necessary to confirm and extend the model and to develop further uses of the model.

The authors are currently engaged in a research project that would adopt process oriented multiple case study approach and will investigate IOS adoption practices of six organisations in the pharmaceutical industry. These organisations include two wholesalers, two manufacturers, and two retail pharmacies. Initial contact with the industry indicates that the wholesalers are the initiators of IOS and act as IOS leaders in the industry, while pharmaceutical manufacturers and retailers are more likely to assume the role of followers. In each of these organisations, in-depth interviews will be sought with managers responsible for information systems, IOS project managers, and some functional managers who were involved in IOS adoption. These interviews will solicit information regarding the types of IOS adoption motivation, locus of motivation, and will also identify the important tasks performed by the organisations, while introducing IOS and as well as an estimation of the efforts spent on each of these tasks. Additionally, attempts will be made to study if these organisations have moved from quadrant to another (as discussed in Figure 1), how much extra efforts did they spend to perform such movement, and their motivations for such movements. This information will be used to examine the validity of the IOS adoption model and to provide some empirical support to our predictions as presented in Table 1.

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