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Abstract

Organizations have been exploiting the increasing capabilities of networking technologies, to widely adopt Electronic Commerce (EC) in their operations. However, the phenomenon of EC adoption is complex and continues to evolve, even as organizations try to develop an understanding of how these technologies could be effectively used. There is a need to understand what the different drivers for the adoption of EC are, and how these could affect the scale and nature of investment in EC. Therefore, research in this area needs to be directed at developing a holistic and integrated understanding of why organizations should adopt EC and how they can effectively manage EC environments. Existing research in this domain is based on distinct and isolated areas of study and does not provide a conceptually coherent understanding of different aspects of the phenomenon of EC adoption. The paper proposes an integrated and interdisciplinary approach to understanding the phenomenon of organizational adoption of EC, based on the General Systems Theory (GST). The approach used is in line with similar attempts to understand complex organizational phenomena. Existing literature is analyzed and deficiencies in the current understanding of the phenomenon are identified. Subsequently, a framework for directing future efforts in this area is developed. The framework has strong implications for interdisciplinary research. Potential research directions proposed in the framework would enable organizations to effectively predict the determinants of EC adoption, and explain, anticipate, control and manage changes in the nature and extent of EC adoption

Keywords: IS research, interdisciplinary IS research, electronic commerce drivers, electronic commerce adoption, general systems theory

Introduction

Increasing capabilities of networking technologies have generated new opportunities for business. Consequently, organizations have used these technologies and have widely adopted Electronic Commerce (EC) in their operations. However, the phenomenon of EC adoption is complex and continues to evolve, even as organizations try to develop an understanding of how these technologies could be effectively used. In order to explain when and how EC could be used, there is a need to understand what the different drivers for the adoption of EC are, and how these could together affect the scale and nature of investment in EC technologies. Hence, research in this area needs to be directed at developing a holistic and integrated understanding of why organizations should adopt EC and how they can effectively manage EC environments.

General Systems Theory - GST (Ellis and Ludwig 1962, Bertalanffy 1972) provides an integrated and interdisciplinary approach for understanding and controlling organizations. It has been used to study varied and complex social and organizational phenomenon such as urban planning, employee motivation and environmental control (Ackoff 1974). It has also been used to analyze information systems (IS) development in organizations (Davis 1974). In this paper we utilize the general appeal and strong intuitive support of GST and use it to identify different dimensions of the phenomenon of adoption of EC by organizations. We

then analyze existing literature in the light of this framework and specify conceptual gaps in the current understanding of the phenomenon of EC adoption. Building upon this analysis, we propose a model suggesting areas of future research.

A General Systems Theory Approach to Understanding EC Adoption

According to GST, a system is a schema that behaves according to some defined description. It consists of an assembly of different components, which act together as an organized and complex whole, to perform specific functions. Organizations are widely regarded as open, goal seeking systems (Ackoff 1974, Davis 1974). This definition implies that organizations take in information and material inputs, and combine them in specific ways to achieve certain outcomes. These outcomes are used to modify further decisions regarding organizational choice of inputs, based on a feedback loop.

Organizational phenomena can therefore be described in terms of certain variables. The nature and values of these variables determine different aspects of the phenomenon. State variables are output variables for the system and describe its manifested characteristics. Control or Input variables are independent parameters, which control the functioning of the system. Disturbance variables describe external influences that affect the system. The Transfer Function provides an explanation of the manner in which the State variables and Disturbance variables combine together to determine the behavior of the system and influence the values of the State variables.
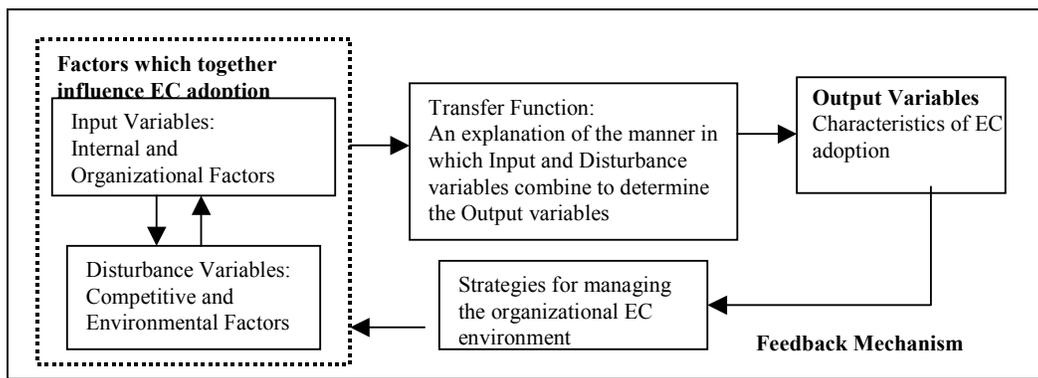

Figure 1. A General Systems Theory Framework for Analyzing the Phenomenon of EC Adoption

The phenomenon of EC adoption can be analyzed in the GST framework. The Output variables are the characteristics of EC adoption, which are manifested in the organization. These would include, for example, the nature of EC applications and the specific functional areas of adoption of EC. The Input variables are controllable factors that influence the adoption of EC. These would consist of internal and organizational factors such as IT capabilities and attitude towards innovation. Disturbance variables describe conditions related to the competitive environment of organizations that have an effect on the adoption of EC. The manner in which organizational factors, and environmental and competitive conditions, together combine to influence the characteristics of EC adoption, gives an explanation of the Transfer Function. Organizational strategies for managing the EC environment determine the effectiveness of EC adoption. This information provides the feedback mechanism for further decisions regarding the choice of Input variables. These concepts have been illustrated in Figure 1.

To understand the various facets of EC adoption therefore, it is required to understand the different influencing factors and how they individually and collectively determine the characteristics of EC adoption in organizations. We also need to evolve strategies for effectively managing the EC environment. The purpose here is to understand the EC adoption phenomenon, analyze the different fields from which inputs are needed for such understanding and specify the insights that are required from these fields. In the next section, we analyze existing literature in the light of the GST framework.

Existing Areas of Research

Existing behavioral research in EC relates to the adoption of B2C and B2B systems, as well as EDI. It broadly addresses three dimensions of the adoption and management of EC. The first category of studies suggests means of classifying organizations based on the nature of EC deployment. These studies describe manifestations of differences in the characteristics of organizational

adoption of EC, such as the extent of adoption, the scale of investment in EC, the nature of inter-organizational systems and applications, and the spread of EC in an organization. A second category consists of studies that point out factors that influence the adoption of EC. These factors relate to the external and internal environments of the organization. Here we consider the set of internal and external factors that have been studied. We then segregate them with respect to the variables in the GST framework. As we shall see, the `Control' and `Disturbance' nature of the respective factors will become clear as we discuss them individually. Finally, there is a third category of studies, which proposes strategies for managing the Information Systems (IS) and Information Technology (IT) in an EC environment. The three strands of research have been described below.

Studies Describing Manifestations of Differences in the Characteristics of E Commerce Adoption

In this section, we discuss studies that describe the manner in which the adoption of EC gets manifested in organizations. The studies also develop classification schemes for organizations, based on the scale and nature of EC adoption and use, and propose some metrics of EC adoption.

Extent of Integration
Barett and Konsynski (1982), classify inter-organizational systems on the basis of the extent of integration between the systems of the two concerned companies. They propose that the greater the degree of integration between the systems in terms of integrated platforms, applications and databases, the higher the extent of adoption of EC. This classification scheme has implications for the categorization of organizations adopting B2B EC. Related observations suggest that organizations adopting B2B EC could differ in the extent of integration (Premkumar et al 1994, Crook and Kumar 1998, Slywotzky 2000), and the extent of information exchange (Straub and Watson 2001) with external entities such as suppliers and customers.

Nature of Linkages
Johnston and Vitale (1988) have proposed that firms differ with respect to the nature of B2B systems, depending on the relationship that they have with the linked organizations: whether they are customers, suppliers or competitors. Kumar and Van Dissel (1996) have developed a typology of inter-organizational systems, based on the nature of the linkages that the system establishes. Based on this typology, B2B systems can be categorized into three kinds. Pooled systems share common IT resources such as databases and applications. Value Chain inter-organizational systems support customer and supplier relationships by linking common processes such as purchasing and invoicing. Networked inter-organizational systems are used to perform joint advertising, marketing, production, and information gathering, analysis and dissemination. In a related study, Kaplan and Sawhney (2000), have categorized B2B systems as vertical and horizontal linkages, depending on whether the linkages are along upstream and downstream activities in the same value chain or across different value chains. Shaw et al (1997) describe three kinds of organizational linkages using B2B EC systems. These linkages could be with suppliers, customers and distributors

Nature of Strategic and Operational Benefits
Johnston and Vitale (1988) have proposed that firms differ in the business purpose for adopting EC. EC applications are used in different functional areas and processes. Consequently they facilitate different kinds of transactions and result in different kinds of information flows. The importance of these information flows depends on the importance of the functional area, for the business. Hence, the impact that is expected from the use of these EC applications, also differs (Iacovou and Benbasat 1995). In a related observation, Farbey et al (1994) have suggested that B2B systems can be categorized into two groups, based on whether they provide operational support or strategic support.

Hong (2002) has combined the frameworks of Farbey et al (1994) and Kaplan and Sawhney (2000), and proposed a four-way categorization of organizations along two dimensions. The first dimension describes the role of EC systems (strategic or operational). The second category describes the nature of linkages they help to create (vertical or horizontal).

Other Observations
Various other studies have mentioned measures that describe different aspects of EC adoption. Organizations differ with respect to the diffusion of E-Business within the organization (Premkumar et al 1994, Iacovou and Benbasat 1995, Crook and Kumar 1998), that is, the extent to which E-Business has penetrated in different functional areas. In another study (Premkumar and Ramamurthy 1995), it has been suggested that organizations could adopt EC in a proactive manner, driven by the need for

business innovation, or in a reactive manner, in response to actions by competitors. Different B2B and B2C business and revenue models have also been described in Kalakota and Robinson (1999).

All these studies are unconnected and have not been explicitly related to one another.

Studies Identifying Factors Which Influence the Adoption of EC by Organizations

Various studies have identified different factors, which influence the adoption of E-Commerce. We find that these factors can be broadly classified into two categories. The first category consists of factors internal to the organization and within its control. They are hence in the nature of the Control variables. These factors can be further classified to include among others, product characteristics, IT resources and innovation capabilities. The second category of factors includes environmental and competitive variables, which are primarily external and cannot be directly controlled by the organization. These are equivalent to the Disturbance variables.

The different factors have been described below.

Internal Factors

Organizational Factors
Studies in this category have identified organizational factors that influence the adoption of EC.

(a) Attitude towards Innovation. A number of studies have approached the adoption of EC from the point of view of adoption and diffusion of innovation in organizations. In this context, it has been reported that a favorable attitude towards systems innovation increases the adoption of EC technologies (Iacovou and Benbasat 1995, Mehrtens et al 2000). It has also been suggested that the context, need and preference for EC varies across firms. Premkumar et al (1994, 1995) and Chircu and Kauffman (2000) argue that different organizations feel the need for EC to different extents. Moreover, EC technologies which are perceived as being consistent and compatible with organizational values, norms, past experiences and present needs are more likely to be adopted than those which are not (Beatty et al 2001). In related findings, Grover (1993), Premkumar and Ramamurthy (1995), Crook and Kumar (1998) and Beatty et al (2001), in their research on EDI adoption, suggest that a proactive approach and active championship on part of top managers and users leads to the adoption of EC systems.

(b) IT Capabilities. Organizational IT capabilities, technical knowledge and skills (Mehrtens et al 2000), digital literacy (Slywotzky 2000), IT sophistication (Chwelos et al 2001) and IT capability (Crook and Kumar 1998) increase the adoption of different EC technologies. Similarly, Chircu and Kauffman (2000) have found that inability to acquire skill and expertise in new technologies, lack of training and education, and incapability of learning new technology, form significant knowledge barriers to the adoption of EC systems.

(c) Specific Organizational Parameters. Some studies have reported the effect of various organizational parameters such as size (Grover 1993, Hart and Saunders 1997, Crook and Kumar 1998) and centralization (Grover 1993) on the extent of EC adoption. Some of the findings reported by these studies are in conflict with one another, as will be described later.

Product and Customer Characteristics
Relevant characteristics of products and services, and the nature of their acquisition and use by customers, have affected the adoption of EC technologies.

In this context, many studies have focused on the nature and information content of products and services, as factors that influence the adoption of B2C systems. Malone et al (1987) suggest that products that require complicated development processes and significant accompanying information to describe them can be effectively distributed through electronic means. Similarly, the information intensity of products and processes (Porter and Millar 1985 and Grover 1993) has been found to influence the potential for the adoption of EC in the B2C segment. Information based products can be effectively differentiated by B2C commerce (Straub and Watson 1995, Choudhury et al 1998).

The nature of information processing that is carried out by customers in order to use a product, also affects the adoption of B2C systems. In this regard, the content and context of information that is required to be supplied to customers, along with the product,

has implications for the use of B2C systems (Rayport and Sviokla 1994). Christensen and Tedlow (2000) suggest that products which do not require rich information (Daft and Lengel 1986) to be transmitted along with the product are well suited for B2C E-Commerce.

Other characteristics which influence the adoption of EC technologies include customer loyalty, trust with regard to the integrity of the information and security of transactions on the Internet, and the cost of access to information on part of the customer (Rayport and Sviokla 1994, Choudhury et al 1998, Reichheld and Schefter 2000).

Resource Availability

A number of studies show that organizations, which are willing to allocate sufficient resources for the development of EC systems, tend to have a high degree of EC adoption.

Iacovou and Benbasat (1995), have reported that "organizational readiness" which is the availability of adequate financial and technical resources, is an important determinant of the extent of EC adoption. Technical resources are concerned with the ability of the organization to integrate sophisticated B2B systems such as EDI, with existing IS. Financial resources indicate the availability of funds for installation, development and implementation of EC systems. The presence of technically skilled human resources is also a crucial factor influencing the adoption of EC (Crook and Kumar 1998, Chircu and Kauffman 2000).

Complexity of Information Technology

The characteristics of the adopted EC technology influence organizational decisions for EC adoption. Studies suggest that the more complex the technology being considered, the less likely it is to be adopted. Additionally, EC technologies which are compatible with existing applications, hardware and software platforms, are more likely to be adopted. These findings have been reported in studies by Grover (1993), Premkumar et al (1994) and Beatty et al (2001).

Factors related to proactive organizational actions as a result of expected benefits

Organizations often proactively push for EC adoption, with the intention of realizing operational and strategic benefits. Iacovcou and Benbasat (1995) and Crook and Kumar (1998) suggest that an awareness of potential/perceived benefits leads to greater adoption of EDI. Mehrten et al (2001) have found that recognition by organizations, of the greater information reach of websites, leads to the adoption of the Internet as a communication medium. Directly perceived benefits in terms of reduced costs, reduced inventory, better communication, quick response, a wider reach, and increased process efficiency, have a positive influence on the extent to which organizations adopt EC technologies (Premkumar et al 1994, Crook and Kumar 1998, Kaplan and Sawhney 2000, Beatty et al 2001, Chwelos et al 2001, Mehrtens et al 2001). The expectation of indirect benefits such as improved customer service, competitiveness and overall productivity also influences the intention to adopt EC (Chwelos et al 2001, Beatty et al 2001). Malone et al (1987) have studied the effect of production and co-ordination costs, and requirements of Just - in -Time inventory planning systems on the adoption of EC technologies.

External Factors

One of the primary reasons for EC adoption is that organizations could be driven towards it by the actions of competitors and the expectations of customers. External pressure has been a major factor influencing the adoption of EC. In such cases, the driving force for EC comes from factors external to the firm and hence not directly within its control.

Factors related to competitive and strategic imperatives

Competitive pressure causes an organization to adopt EC when most other firms in the industry have done so (Grover 1993, Iacovou and Benbasat 1995, Premkumar and Ramamurthy 1995, Teo et al 2000). Encouragement, commitment, support and coercion from customers and suppliers have also increased in EC adoption (Reich and Benbasat 1990, Grover 1993, Iacovou and Kumar 1995, Crook and Kumar 1998, Hart and Saunders 1998, Payton 2000, Chwelos et al 2001, Mehrtens et al 2001). In the case of B2B technologies, adoption by partners has resulted in positive externalities. This has caused firms to adopt EDI and other B2B electronic integration technologies, as a strategic necessity (Bouchard 1993). Hart and Saunders (1997, 1998) have reported that trust and interdependence between a company and its suppliers and customers act as strategic facilitators for EC adoption. Some organizations have adopted EDI to increase credibility in the eyes of their customers and obtain up to date information about their business (Mehrtens et al 2001).
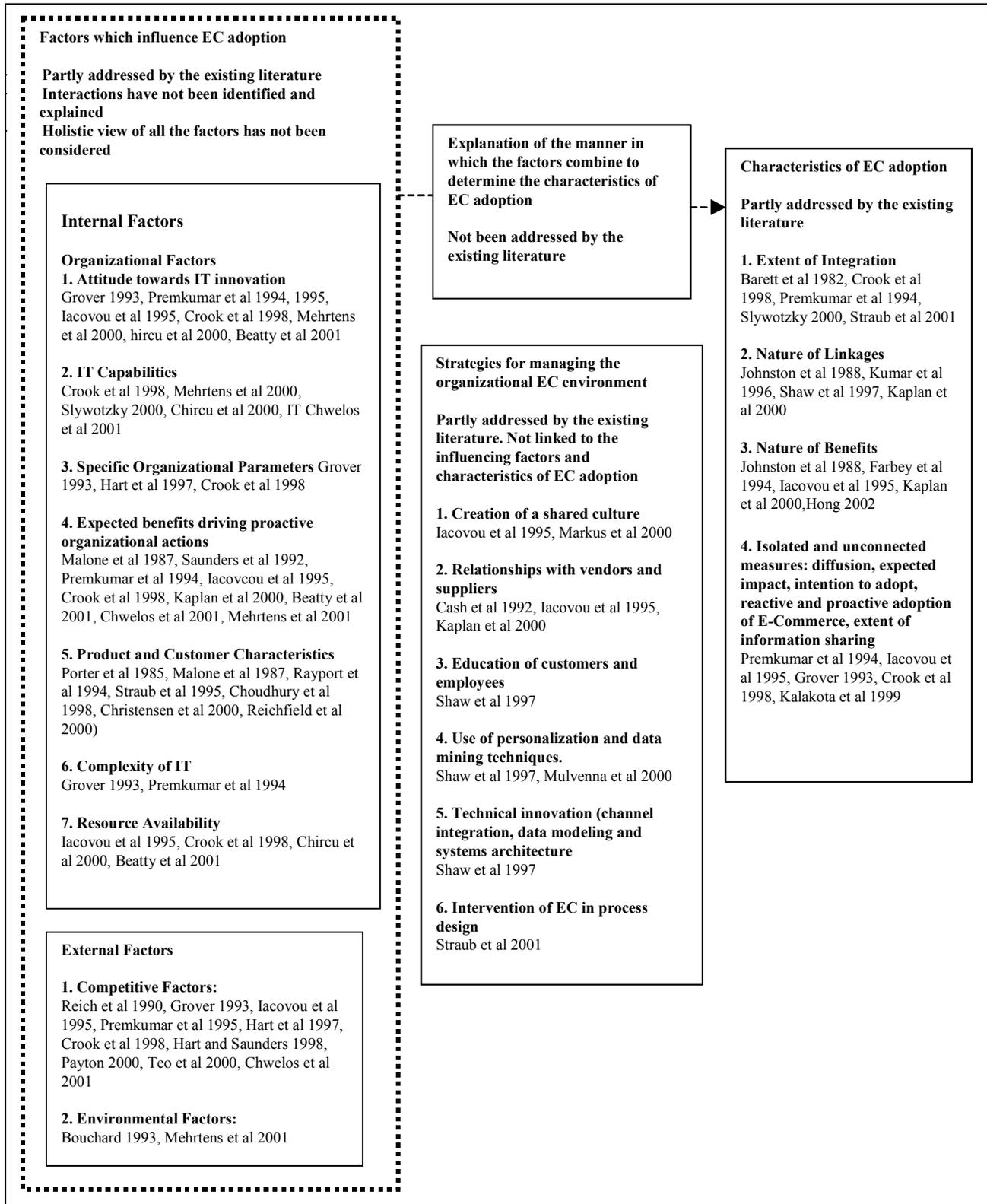
Factors which influence EC adoption

Partly addressed by the existing literature
Interactions have not been identified and explained
Holistic view of all the factors has not been considered

Internal Factors

Organizational Factors
1. Attitude towards IT innovation
Grover 1993, Premkumar et al 1994, 1995, Iacovou et al 1995, Crook et al 1998, Mehrtens et al 2000, hircu et al 2000, Beatty et al 2001

2. IT Capabilities
Crook et al 1998, Mehrtens et al 2000, Slywotzky 2000, Chircu et al 2000, IT Chwelos et al 2001

3. Specific Organizational Parameters Grover 1993, Hart et al 1997, Crook et al 1998

4. Expected benefits driving proactive organizational actions
Malone et al 1987, Saunders et al 1992, Premkumar et al 1994, Iacovcou et al 1995, Crook et al 1998, Kaplan et al 2000, Beatty et al 2001, Chwelos et al 2001, Mehrtens et al 2001

5. Product and Customer Characteristics
Porter et al 1985, Malone et al 1987, Rayport et al 1994, Straub et al 1995, Choudhury et al 1998, Christensen et al 2000, Reichfield et al 2000)

6. Complexity of IT
Grover 1993, Premkumar et al 1994

7. Resource Availability
Iacovou et al 1995, Crook et al 1998, Chircu et al 2000, Beatty et al 2001

External Factors

1. Competitive Factors:
Reich et al 1990, Grover 1993, Iacovou et al 1995, Premkumar et al 1995, Hart et al 1997, Crook et al 1998, Hart and Saunders 1998, Payton 2000, Teo et al 2000, Chwelos et al 2001

2. Environmental Factors:
Bouchard 1993, Mehrtens et al 2001

Explanation of the manner in which the factors combine to determine the characteristics of EC adoption

Not been addressed by the existing literature

Strategies for managing the organizational EC environment

Partly addressed by the existing literature. Not linked to the influencing factors and characteristics of EC adoption

1. Creation of a shared culture
Iacovou et al 1995, Markus et al 2000

2. Relationships with vendors and suppliers
Cash et al 1992, Iacovou et al 1995, Kaplan et al 2000

3. Education of customers and employees
Shaw et al 1997

4. Use of personalization and data mining techniques.
Shaw et al 1997, Mulvenna et al 2000

5. Technical innovation (channel integration, data modeling and systems architecture
Shaw et al 1997

6. Intervention of EC in process design
Straub et al 2001

Characteristics of EC adoption

Partly addressed by the existing literature

1. Extent of Integration
Barett et al 1982, Crook et al 1998, Premkumar et al 1994, Slywotzky 2000, Straub et al 2001

2. Nature of Linkages
Johnston et al 1988, Kumar et al 1996, Shaw et al 1997, Kaplan et al 2000

3. Nature of Benefits
Johnston et al 1988, Farbey et al 1994, Iacovou et al 1995, Kaplan et al 2000, Hong 2002

4. Isolated and unconnected measures: diffusion, expected impact, intention to adopt, reactive and proactive adoption of E-Commerce, extent of information sharing
Premkumar et al 1994, Iacovou et al 1995, Grover 1993, Crook et al 1998, Kalakota et al 1999

Figure 2. Summary of Existing IS Research in Organizational Adoption of E-Commerce

Studies Identifying Strategies for Managing IS/IT EC Environments

The third category of research provides suggestions for managing the IS/IT environment in organizations that have adopted EC. These studies mention different strategies for IS/IT management and related organizational management, which are effective in various EC environments.

Organizational strategies for increasing the extent of EDI adoption have been suggested in the form of internal communication and promotion efforts and the creation of a shared culture (Iacovou and Benbasat 1995, Markus et al 2000). Management of the strategic environment of the firm in the form of financial and technical support, or coercion of partners to adopt EC (Iacovou and Benbasat 1995, Wang et al 1995, Kaplan and Sawhney 2000), external communication and promotion with suppliers (Cash et al 1992) and education of customers (Shaw et al 1997) have been cited as effective strategies for managing B2B and B2C environments. In this regard, the use of personalization and data mining techniques has been suggested, to obtain superior customer knowledge and hence increase customer trust (Shaw et al 1997, Mulvenna et al 2000). Technical strategies include research in the field of XML and channel integration, and security and legal issues (Shaw et al 1997). On the operational side, (Straub and Watson 2001) suggest that appropriate intervention of EC in process redesign and substitution of physical processes with information based ones is a crucial part of the management of the EC environment.

The existing literature, which consists of distinct and largely unconnected areas of study, has been summarized in Figure 2.

Analysis of Literature

In this section we analyze the existing literature in the framework of GST as proposed in Section 2. The following observations are pertinent in this regard.

1. Various authors have discussed the characteristics of EC adoption in organizations, and described the different ways in which EC can be used. Organizations have therefore been classified with respect to the nature and level of adoption of EC, areas of application of EC and diffusion of EC. Therefore the Output variables have been defined by some of the existing studies. However, the common feature of all these studies is that they do not explain the reasons for these differences. Hence they have limited predictive and prescriptive value. They describe, but do not explain.

2. Present research has identified factors internal and external to the organization, which influence EC adoption. These studies provide isolated statistical relations between some of the factors and the extent of EC adoption. We find that these factors can be further classified into product related, organization related, IT capability related and resource related categories. Therefore some of the Input and Disturbance variables have been identified. However, there have been few attempts to explain *how* these factors influence the adoption of EC. In other words, the conceptual linkages between the factors, that is, drivers of EC, and the characteristics of EC deployment, have not been studied. Hence the System Transformation Function has not been understood or specified. Therefore, it is not possible to understand how the different factors (Inputs and Disturbances) lead to differences in the characteristics of EC deployment (Outputs). This has resulted in two inadequacies in the current understanding of EC adoption.

    (a) Firstly, the combined effects of the internal and external variables have not been studied, and the interactions between them have not been understood. There is no explanation, as to why or how these different factors interact with each other and the effect of this interaction on EC adoption. For instance, it has been found that both top management support and a realization of perceived benefits leads to EC adoption. However there is no explanation of how EC adoption would be affected if one of these factors is present, and the other is not. The implication of this is that the influence of different factors has not been studied in a holistic manner.

    (b) Secondly, there are conflicting findings regarding the effect of many of the factors on EC adoption. For instance, the dependence on trading partners has been found to both positively (Hart and Saunders 1998) and negatively (Chwelos et al 2001) influence the degree of EC adoption. Similarly, industry pressure has been found to increase the extent of adoption of EC in some cases (Teo et al 2000) and decrease the adoption in others (Chwelos et al 200). Such contradictions can probably be explained if we consider the combined effect of all the factors.

3. There is prescriptive literature on how to manage IS/IT in different types of EC environments. Therefore the feedback mechanism has been partly addressed by present literature. However, the treatment is largely based on observations and

experience. The IS management strategies do not explicitly relate to either the characteristics of EC in the organization, or the internal and external factors. In the absence of comprehensive knowledge of the factors and the nature of their influences on the characteristics of EC adoption, these strategies in the EC context are of limited use because there is no clear basis for understanding their rationale and the context in which they are to be applied.

The analysis has been summarized in Figure 2. We find that all the different components of the EC phenomenon exist in isolation. Conceptual and theoretical links between them have not been defined or understood. Hence it is clearly impossible to predict and control the behavior of the system, and hence that of the phenomenon of EC adoption.

Framework for Identifying Opportunities for Future Research in Organizational Adoption of EC: An Interdisciplinary Approach

Existing research in EC provides some understanding of three distinct dimensions of the phenomenon of EC adoption. However, the present understanding of these three areas is largely isolated and unconnected. It is suggested that future research efforts should be directed at establishing theoretical and empirical linkages between these areas. Interesting opportunities for research, which emerge thereby, have been described in Figure 3.
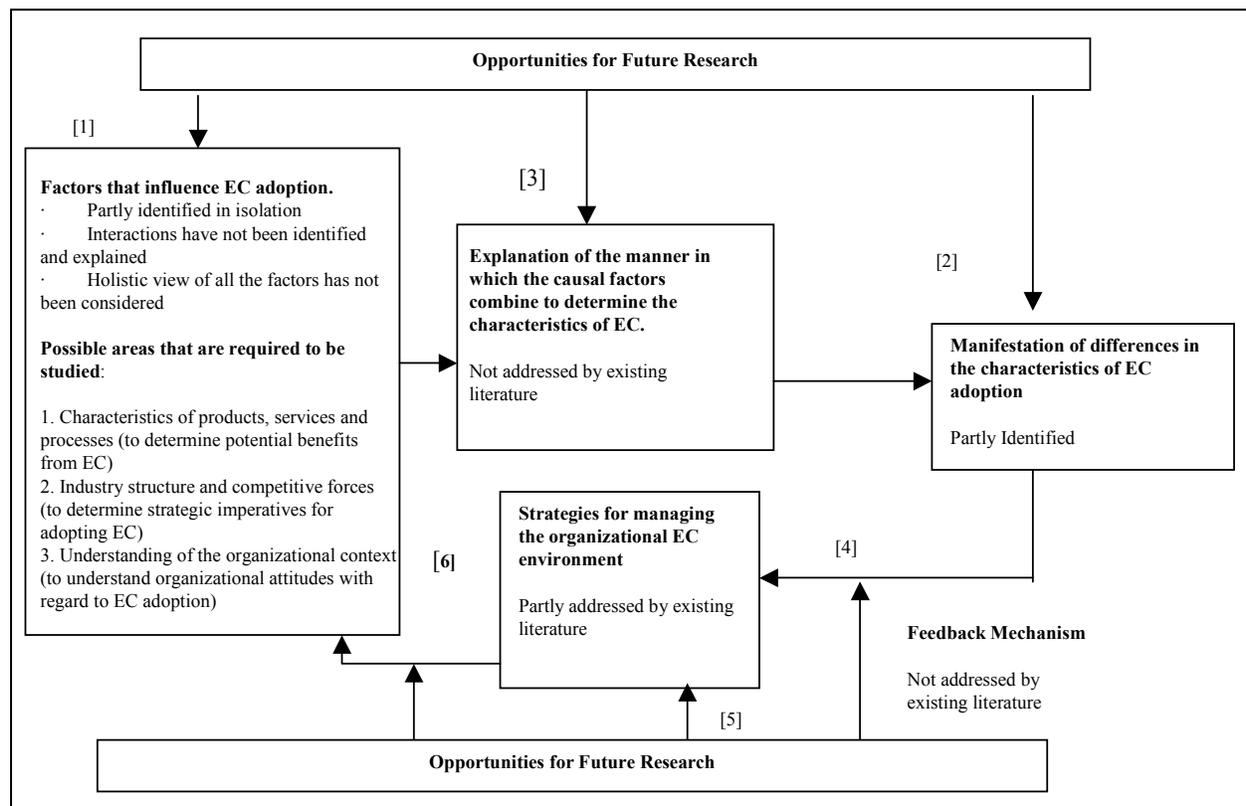

Figure 3. Framework for Identifying Opportunities for Future Research in Organizational Adoption of EC

The inputs and disturbances to the system have not been studied comprehensively. That is, our knowledge of the driving factors for EC is incomplete. Opportunity [1] indicates the need to develop a **coherent, consistent, holistic and integrated description** of the basic factors and constructs that lead to differences in the characteristics of EC adoption. An integrated knowledge of these factors is required in order to predict and analyze the implications for changes in the nature and extent of EC use, with changes in these factors. It is also essential, in order to be able to understand possible different ways of managing these factors in order to direct and influence the planned EC investments and uses. A study of relevant characteristics of products/services, customers and organizational processes is required to understand the possible benefits and potential areas for the use of EC. Areas of strategic management literature would give pointers to the strategic and competitive imperatives for adopting EC. Finally it is also essential to understand the organizational context in which EC is adopted and used. Some of these areas of study have been proposed in

Benbasat et al (1999). An exhaustive and theoretically consistent description of the drivers of EC and their interaction effects would address (2) as identified in Section 4.

Opportunity [2] indicates the need to identify specific manifest characteristics of EC adoption and use in organizations, which are influenced by, and are a natural consequence of, the driving factors for EC. In this connection Straub and Watson (2000) have remarked that "the sundry and diverse outcomes of network enabling activity need to be articulated. B2B and B2C have different objectives and outcomes, and robust classification schemes are required to study and categorize these." Addressing this opportunity would help to complete our understanding with regard to (1) in Section 4.

Opportunity [3] is concerned with developing a conceptual and empirical explanation of how the causal factors affect the characteristics of EC deployment. Clearly, there are significant gaps in our present understanding, as illustrated in Figure 2. Research in these two areas needs to theoretically linked and then empirically verified. For example, we need to understand how characteristics of products, customers, processes and the competitive environment, together determine the possible nature of the emphasis on B2B and B2C applications. Addressing this opportunity is imperative if organizations are to understand **how** the relevant areas of emphasis on EC should change, with changes in the basic factors. This would help understand issues (2) and (3) as described in Section 3. Such research possibilities have been articulated and proposed by Shaw et al (1997), Benbasat et al (1999) and Straub and Watson (2001).

Opportunities [4], [5] and [6] suggest research possibilities for understanding the feedback mechanism and identifying appropriate strategies for managing IS/IT in EC environments, based on the basic factors and characteristics of EC adoption and use. Such theoretical linkages, which would take into account the cause-effect relationships, are required for understanding the rationale for the strategies and the context in which they are to be applied. In this regard, questions such as "How and when do we use information processing techniques for personalizing, analyzing and responding to relevant customers' electronic behavior patterns?", "Which systems should be effectively used to support end-to-end fulfillment?" have been proposed by Benbasat et al (1999) and Straub and Watson (2001). Answering such questions would help address issues related to [3], as mentioned in Section 4.

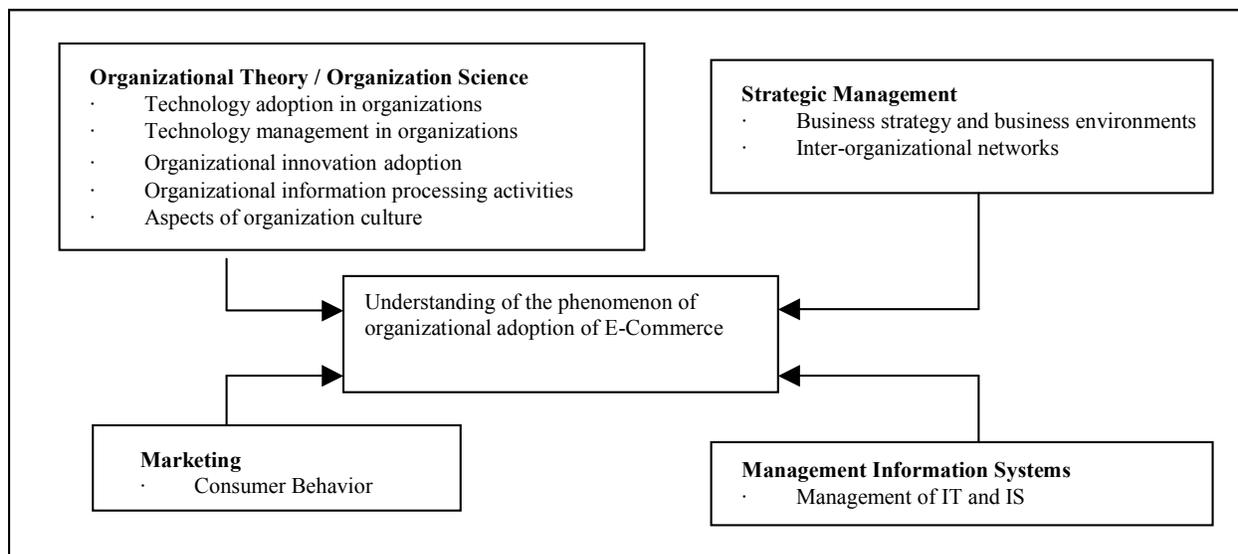The framework has strong implications for interdisciplinary research, as shown in Figure 4.

Figure 4. Research in Organizational Adoption of E-Commerce: An Interdisciplinary Approach

The following topics in Organization Theory, Strategic Management, MIS and Marketing are required to be studied in order to understand the phenomenon of EC adoption in organizations.

Organization Science / Organization Theory
> Adoption of technology in organizations
> Management of technology in organizations

Organizational innovation adoption
Organizational information processing activities
Aspects of organization culture
Strategic Management
Business strategy and business environments
Inter-organizational networks
Marketing
Consumer behavior
Management Information Systems
Management of IT and IS

Concepts from these areas would need to be theoretically and empirically linked with metrics of EC use and issues of IS management. This would lead to a richer understanding of what the fundamental determinants of EC are, how they combine to shape the characteristics of EC adoption, and how organizations can anticipate and manage their IS in potentially changing EC environments.

Conclusion

The phenomenon of EC is evolving and far reaching: it touches many more aspects of organizations, and their relationships with customers, partners and society at large, than traditional information systems have. It is also a complex phenomenon, which needs to be understood such that its effects can be predicted and its direction controlled. The problem is both interesting and critical because of the apparent failure of many companies, with regard to their efforts at adopting EC. In this paper we have presented a framework for analyzing this phenomenon from the perspective of the General Systems Theory. We have proposed requirements for meaningful research in this domain and identified gaps in the present literature. Subsequently we have developed a framework for directing future research efforts. It is suggested that the framework proposed here provides potential directions for research that would enable organizations to effectively predict the determinants of EC adoption, and explain, anticipate, control and manage changes in the nature and extent of EC adoption.

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