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Electronic Commerce Adoption & Success: A Study of Organizational Factors and Influences

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Abstract

Rapid growth in electronic commerce activity raises many questions about technology adoption, implementation, and success that to date has not been addressed with empirical research. Extending the results of an in-depth case study of electronic commerce adoption, this paper seeks to test several propositions across organizations and industries, and explores the organizational characteristics that appear to influence adoption. Early results seem to indicate that the historical use of technology is not a predictor of success or failure in electronic commerce adoption and that an aggressive business strategy is a stronger indicator of adoption behavior. With the electronic commerce phenomenon, even conservative users of technology can change their normal adoption strategy and become successful in a new and innovative area that supports their core competence.

Introduction

Adopting electronic commerce as a business model offers a considerable challenge to organizations. Whether viewed as an alternative or supportive strategy, or a competitive move, electronic commerce requires the use of cross-functional resources as perhaps no other business model before. Exploring this line of thought, the cross-functional nature of electronic commerce projects seems to reflect a trend toward technical and process innovation led by groups outside the traditional IS organization [Swanson 1994] and a change in approach from the way many organizations typically adopt and implement new technologies.

The innovation diffusion literature (El Sawy et al., 1999; Premkumar & Nilakanta 1994; Wolfe 1994) and extensive research on change in organizations (Tushman & Anderson 1986; Stoddard & Jarvenpaa 1995) help explain why implementing new technologies such as those employed by electronic commerce is not a trivial undertaking. Tushman and Anderson (1986), for example, refer to cycles of extensive new technology development as "technological discontinuities," or "periods of incremental technological change punctuated by technological breakthroughs that either enhance or

destroy the competence of firms in an industry" (p.439). Electronic commerce in the world of Internet time is escalating the impact of new technology deployment, often forcing conservative users of technology to diverge from past practices and become early adopters.

Organizations able to use new technology to enhance their current competencies have a distinct competitive advantage over firms entrenched in their current systems and practices. Organizations slow to adopt new technologies, however, can find themselves playing catch up to competitors, until the new technology becomes a competitive necessity. Prahalad (1998) labels this operating mode a strategic discontinuity, as late arrivals struggle to handle change and use the technology to support an evolving business strategy. Other studies in the innovation literature explore adoption related to firm characteristics, characteristics of the new technology, and innovation beginning outside the IS organization (Swanson 1994; Premkumar et al., 1994). This paper explores several propositions drawn from the author's previous research, keying in on organizational characteristics that might influence technology adoption as well as past technology deployment experiences.

Research Background

This paper is part of a continuing research stream originating with an in-depth case study on the electronic commerce adoption experiences of a large US regional airline. The case resulted in a set of propositions about electronic commerce adoption, project characteristics, and a model of EC success factors. The initial exploratory case work followed Eisenhardt's (1989) recommendations for identifying preliminary constructs of interest, as well as Yin's (1994) suggestion of using multiple data gathering methods and a formal protocol to define and document study goals and activities.

For this extended study, a composite survey instrument was developed from the case study material and mailed to a random sample of 1500 IS executives. Although a disappointing response rate of 3% precludes making extensive generalization from the results, the data support several case propositions about technology adoption, the relationship to an organization's past experiences with new technology, and electronic commerce adoption

success. While additional data collection is needed, initial results support the need for further work in this area.

Strategy & Firm Characteristics Related to Technology Adoption

The survey questionnaire was designed to measure the firm's use of IS to support business strategy and competitive advantage, and the degree to which the firm demonstrated innovation adoption characteristics. Instrument elements were developed from work on strategic alignment by Venkatraman (1989) and later expansion by Chan (1992). Additionally, it measured respondents' perception of success factors for electronic commerce as defined in the original case study. Results shown in table 1 reflect those of the case firm early adopter (1995 launch), other early adopter respondents (1994-96), later adopters (1997-99) and respondents who plan to adopt in 2000. Values represent respondents agreement on a 1 to 5 Likert scale with 1 - completely disagree to 5 - completely agree). The sample size equaled 42 firms, fairly well distributed between those who had adopted and those who were planning on adoption in 2000.

These preliminary results seem to reflect some interesting and surprising trends that require more data to support. An initial examination of the data shows some differences between the case company and other early adopters and those adopting later on or planning to adopt electronic commerce technologies. While information technology seems to be considered critical to most organizations across a variety of industries, industries such as the airlines that used technology competitively very early on, may today consider technology more of a status quo than a critical component. While we might expect organizations with large budgets to be able to adopt new technology more easily than others, investment in technology within an industry does not seem to effect adoption tendency.

Few of the responding organizations considered themselves more than average regarding the early adopters of new technology, but in spite of that, many of these firms did make early moves into electronic commerce projects. Furthermore, they considered their projects successful. Results were mixed in terms of whether or not IT was viewed as a source of business opportunity for the firm, perhaps somewhat contradictory to what we teach in our management information systems classes, and reflecting somewhat the information systems orientation.

Table 1

Question summary	Case firm 1995	Early 1994-96	Later 1997-99	Plan to Adopt 2000	P values
IT is critical to the business	2.0	4.4	4.45	4.55	.993
Industry trend is heavy investment in IT	3.0	3.6	3.59	3.71	.397
Firm adopts new technologies to defend market position	2.0	3.0	2.91	2.95	.808
Firm is an early adopter of innovation	2.5	3.4	2.73	2.50	.131
IT is viewed as source of business opportunities	2.0	3.5	3.29	3.19	.880
Organization employs aggressive business strategy	5.0	3.6	2.78	2.95	.084*
IT is fully aligned with business strategy	3.0	4.0	3.55	3.68	.695

*significant at the .1 level

The most interesting item of these data is the measurement of aggressive business strategy for the case firm and other early adopters. The case firm viewed its business strategy as extremely aggressive, and other early adopters rated themselves above average. This represents the only significant difference when comparing early adopters with later adopters and planned adopters. These data reflect moderate support for two of the propositions of the earlier case work:

1. An aggressive business strategy is a stronger driver for electronic commerce technology adoption than IS strategic orientation.
2. Electronic commerce offers opportunities for change in the way technology has been adopted and used within a firm, and prior innovation experience is not an overriding factor.

Preliminary data also reflect that in 40% of the organizations, electronic commerce was initiated outside the IS department, supporting observations by Swanson (1994) and others of this trend. This was true in the case firm, where IT provided skill sets, infrastructure, and network security, but did not play a strategic role in the initiation or direction of electronic commerce for the firm. The role of the IT organization in electronic commerce projects, in general, remains undefined and firm specific.

Obviously, more data needs to be collected to fully support these observations. With additional data we might also expect to see a possible variation between industries and sizes of organizations and their technology adoption behavior. The choice of how to strategically adopt and deploy IT remains a complex decision for organizations. IT may be used to deliver revolutionary new products and thereby impact the industry. Alternatively, we may continue to see functions outside of

IT initiate or be involved in the adoption decision as we more to more complex and cross-functional organizational dynamics.

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