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Carolyn Wilson Green
Texas A&M University, cwgreen@satx.rr.com

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Carolyn Wilson Green

Texas A&M University - Kingsville
College of Business

(210) 680-2430
cwgreen@satx.rr.com

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ABSTRACT

The purpose of this study was to explore the extent to which rationalistic and institutional considerations affect the decision to adopt information technologies and to explore how adoption rationales relate to the extent of implementation achieved after adoption. A multiple-case study approach was used. Institutional isomorphism rationales were more prevalent than strategic choice rationales. The most extensive implementations were found in organizations with a strategically-oriented rationale for adopting and/or extending use of EDI. The study also found evidence of a shift toward strategic choice rationales for EDI extension. These shifts in rationale originated to some extent in the same institutionally-based mechanisms that motivated the initial decisions to adopt the EDI technology.

Adoption Rationale and Post-Adoption Activity:
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Organizations adopt information technologies for a variety of reasons. Although it seems reasonable that the decision would be part of a well-conceived plan to improve organizational performance, we find that there are often other, less rationalistic reasons for adoption. As Markus has noted, information systems' purposes may be "to appear as though they were intended to rationalize work or to improve decision-making without having any real impact on organizational procedures or outcomes" (1983:6). Although the question of what motivates information technology adoption might be interesting in its own right, one might also ask what difference it really makes. Does anything different happen after adoption when the motivation or rationale for adoption is different? We might, for example, consider whether, in a situation involving non-rationalistic reasons for adoption, a very superficial implementation might be all that is necessary to achieve the adopters' goals. Similarly, if a technology were adopted in an effort to make the organization more efficient or to gain a competitive advantage, might we find a much more concerted effort to implement and make use of the technology?

These differing perspectives on why organizations adopt information technologies fall into two broad categories -- a rationalistic perspective oriented toward improving organizational performance and an institutional perspective which expects technology decisions to be governed by exercises of power and efforts to maintain organizational legitimacy (Kling, 1980; Markus 1983). An understanding of the prevalence of each of these rationales for IT adoption might prove helpful in understanding the disappointing track record associated with many IT implementations and unexpected patterns of IT diffusion. As Weill (1992) has suggested, understanding how IT affects firm performance may depend on categorizing IT investments by

the management purposes for which the investments are made. The purpose of this study is to explore the extent to which rationalistic and institutional considerations affect the decision to adopt information technologies and to explore how adoption rationales relate to the extent of implementation achieved after adoption.

THEORETICAL PERSPECTIVES RELATED TO INNOVATION ADOPTION

The organizational theories which formed the foundation of this study -- strategic choice and institutional isomorphism -- were selected because they represent the two primary schools of thought in organizational decision-making research (Goodstein, 1994) and they are specifically applicable to innovation adoption and utilization decisions (e.g., Teo, Wei et al., 2003; Tingling & Parent, 2002; Orlikowski & Barley, 2001; Barrett & Walsham, 1999; King et al. 1994; Kling & lacono, 1988; Child , 1987). Strategic choice, typical of rationalistic perspectives on organizational action, suggests that technology adoption decisions are made voluntarily in order to optimize the achievement of objective organizational goals (Chandler, 1962; Child, 1972, 1987; Whittington, 1988; Hitt & Tyler, 1991). According to this school of thought, choice of strategy is guided by a concern for efficient use of resources in accomplishing organizational goals. The role of information technology in the strategic choice model is specifically described in Child (1987). In a series of considerations of how IT may be used to accomplish organizational objectives, Child laments the failure to use IT to its fullest potential, a possibility achievable only if the technology is made a part of the organizational routine and subsequently infused into its processes (Cooper & Zmud, 1989, 1990).

In contrast to strategic choice's expectation of organizational variation, institutional isomorphism theory begins by asking why organizations have become so homogeneous

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(DiMaggio & Powell, 1983, 1991). DiMaggio and Powell, arguing that "structural change in organizations seems less and less driven by competition or by the need for efficiency" (1983:147), see a tendency toward unreflective organizational action. Seemingly irrational and ineffective practices are expected to persist due to a "taken-for-granted" correctness conferred by a process of legitimation and reproduction through self-sustaining structures established in organizational fields (DiMaggio & Powell, 1991). An organization's field is represented by its industry group and its trading partners, as well as professional groups from such areas as management, accounting, and information systems that act as important reference groups as the organization's professional members make decisions about what is the best course for the organization. In such an institutional environment, rewards may be given more for conformity to institutional rules, myths, and symbols than for efficiency and effectiveness in production (Fennell & Alexander, 1987). These rules and myths may lead the organization to adopt technologies more for their symbolic value than for their technical efficiency, signaling other organizations of its commitment to rationality and good business practice (Perrow, 1979; Pfeffer, 1981; Fennell & Alexander, 1987).

Three different sources of this tendency toward homogeneity (i.e., isomorphism) are proposed in institutional isomorphism -- coercive, normative, and mimetic (DiMaggio & Powell, 1983). DiMaggio and Powell note that these mechanisms are not always empirically distinct. They point out that all three mechanisms might be involved in a single action as, for example, an organization might be coerced by members of a professional organization into imitating its peers. The typology is delineated into three mechanisms to facilitate analysis.

Coercive isomorphism refers to organizational conformity with formal and informal pressures brought to bear by organizations on which the organization depends and by cultural

expectations arising from the society in which the organization operates. Normative isomorphism refers to the homogenizing effects of professionalization within the organization.(DiMaggio & Powell, 1983, 1991). Professional associations encourage organizations to conform to standards of professional practice disseminated through formal education and participation in professional networks and associations that promote the legitimation of the profession's autonomy (DiMaggio & Powell, 1983), through such means as workshops, seminars, training sessions, and professional publications (Galaskiewicz & Wasserman, 1989). Mimetic isomorphism is associated with conditions of uncertainty. When an organization is faced with uncertainty about organizational technologies or ambiguity about goals, it may resolve the problem by imitating the practices of other organizations that it considers successful (DiMaggio & Powell, 1983; Dacin, 1997; Mizruchi & Fein, 1999; Greve and Taylor, 2000; Staw & Epstein, 2000). Awareness of other organizations' practices is fostered by environmental actors like consultants, industry trade associations, regulatory bodies, and public opinion (DiMaggio & Powell, 1983; Deephouse, 1996).

Strategic rationales and institutional rationales for organizational action are not mutually exclusive. Just as the decision to take a particular action may at the same time involve elements of mimetic, coercive, and normative influence, it may also involve desires to achieve organizational efficiencies or to gain a competitive advantage. The complementary nature of strategic and institutional rationales is suggested by DiMaggio and Powell's (1983) recognition of two types of isomorphism in organizational fields: competitive and institutional (Mizruchi & Fein, 1999). DiMaggio and Powell note that "organizations compete not just for resources and customers, but for political power and institutional legitimacy, for social as well as economic fitness" (1983:150). This is consistent with Scott's (1987) contention that institutional

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arguments are better seen as complementing and contextualizing rational and efficiency

arguments than as opposing them (Dacin, 1997).

The Study

The study used to address the research questions is described in the following section.

The data were gathered as part of a more extensive exploration of EDI adoption rationale using

interview data gathered in 1992 and 1993. The first portion of this section deals with the design

of the study. The last two portions describe the data gathered with respect to the rationales for

adoption of EDI and the extent of implementation achieved in each of the organizations.

Design. A multiple-case study of ten organizations that adopted EDI was undertaken.

EDI was chosen as the focal technology because of the organizational performance

improvements predicted for its use and the interorganizational relationship patterns which are

inherent in its implementation. Organizations were selected in accordance with EDI connection

patterns: two organizations that were among the first to adopt EDI and whose positive

experiences with EDI were reported in their industry group, four less publicized adopters in the

same industry sector, and four smaller trading partners that had implemented an EDI exchange

with the first two organizations.

Respondents in each of the organizations were executives and managers who had been

involved in the EDI adoption and extension decisions (see Table 1). At Focal-A, Competitor-A,

Competitor-B, Supplier-B, and Supplier-D, it was possible to talk with the decision-makers

themselves. At Focal-B, the manager of control and audit was also the champion who

shepherded the process of EDI adoption, and at Competitor-C and Competitor-D, it was possible

to talk with the chief implementers of the initial EDI applications. The accounts of EDI adoption

given by the respondents at Supplier-A and Supplier-C were confirmed in interviews with the

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trading partners with whom they implemented the companies' first EDI applications.

Interviews of 1 – 1 ½ hours were conducted with two respondents in each large organization and with one respondent for each small organization. The interviews were tape-recorded and transcribed for later analysis. Since the small organizations were suppliers for the larger organizations included in the study, the responses of both the large and the small organizations were correlated to gain an informal triangulation of their accounts (Lacity & Janson, 1994). Similarly, since the larger organizations were all competitors in the petroleum industry, their references to the actions of competitors provided further substantiation of the accounts given in the interviews.

Analysis of responses was pursued with a recognition that institutional and strategic choice rationales for adoption are not mutually exclusive. Dean and Sharfman (1996), for example, note that procedural rationality and political reasons for decisions are distinct dimensions of the strategic decision-making process, thus indicating that a decision may be rational but not political, political but not rational, both or neither.

Historical and contextual records were also consulted to gain additional insight into the reasons for adoption, as well as to serve as a check on the validity of the exegetical analysis (Lacity & Janson, 1994). These included internal project justification reports, magazine articles describing the organizations' adoption of EDI, internal EDI progress reports, internal memos related to EDI trading partner recruitment, published accounts of EDI adoption history within the petroleum and chemicals industries, journal articles related to EDI within the petroleum industry, Transportation Data Coordinating Committee (TDCC) conference proceedings, and the organizations' annual reports.

In the case examples which follow, the participating companies are named according to

their positions in the study, with Focal-A and Focal-B representing the two publicized adopters, Competitor-A, Competitor-B, Competitor-C, and Competitor-D representing their competitors, and Supplier-A, Supplier-B, Supplier-C, and Supplier-D referring to the small suppliers. Annual company revenues ranged from as much as $40 billion to as little as $35 million. The companies' staff sizes ranged from as many as 40,000 to as few as 80 employees. The largest of the companies were Focal-A, Focal-B, Competitor-A, and Competitor-B. The smallest were the suppliers. Time since adoption ranged from 3 to 9 years. The latest adopters, having adopted within 3 to 5 years of the study, were Competitor-C, Supplier-B, Supplier-C, and Supplier-D.

Adoption Rationales

As suggested by the goals of the study, the reasons for deciding to implement the initial EDI application were explored in the interviews. In the course of discussing subsequent EDI extension activity (e.g., extending EDI to other customers), it became apparent that decisions to extend the EDI implementation were very similar to the original decision to adopt, although often accompanied by different rationales than those that governed the adoption decision. Consequently, in the analysis of the results, the reasons for implementation were explored with respect both to initial decisions to adopt and subsequent decisions to extend the EDI implementation.

What follows are brief summaries of the adoption and extension rationales provided by each company's respondents, as well as excerpts from the interviews. The names of the respondents have been changed to protect their privacy. Reasons for adoption and extension decisions are summarized in Tables 2 and 3.

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Focal-A

Adoption

Information about Focal-A's experience with EDI was obtained from Mr. Smith, a senior purchasing accountant and manager, and Mr. Jones, manager of EDI for the whole corporation, both of whom were involved in the first EDI implementations at Focal-A. Focal-A's decision to adopt EDI was a gradual process exhibiting evidence of both strategic choice and institutional rationales.

Mimetic influences can be seen in the accounts of early awareness of EDI and the decision to adopt. Mr. Smith indicated that Focal-A staff members had attended TDCC trade shows and had been aware of the EDI initiatives underway in the automotive industry. Mr. Smith described how the manager of an accounting-related computing group had come back from a TDCC meeting convinced that EDI should be pursued within Focal-A. The manager wrote a position paper on the desirability of implementing EDI and formed an internal coordinating group to begin introducing EDI into Focal-A's activities. At about the same time, one of Focal-A's general managers attended an executive business roundtable meeting and heard of the commitment to EDI by large companies like General Motors and Ford. According to Mr. Smith, the general manager "came back with a target -- kind of like putting a man on the moon. He wanted to see Focal-A using EDI." The decision to adopt came when a group of Focal-A's managers agreed to participate in an EDI pilot project involving Dupont, Chemical Leaman, and Conrail. Focal-A's managers heard what the other companies were doing and decided that EDI "made sense".

Normative influence in the form of a desire for professional legitimation also played a role in the decision. Mr. Jones, whose group implemented the pilot application, cited a need to

improve morale in the accounting group as a reason for agreeing to implement and help recruit carriers to join in the project. Implementing an EDI application would "help make the work more interesting, more challenging and less rote." Morale was low not only because the work was routine, but because the group was considered "the graveyard of accounting." As a result of implementing the EDI application, the group came to be seen as "the forerunner of accounting."

A strategic choice rationale was also evident. To gain management approval for the pilot project, EDI was presented as a means of reducing the cost of processing transactions by reducing the number of personnel assigned to the associated accounting group. Mr. Jones reported that his group undertook a cost/benefit analysis beforehand and followed up by monitoring the results after implementation. The project produced measurable cost reductions. About half of the staff were moved to other areas of the organization as a result of the reduction in transaction handling requirements.

Extension

As Focal-A continued to expand its commitment to EDI, its reasons for extending to additional applications of EDI continued to include a focus on efficiency improvement. The selection of subsequent EDI transactions was accompanied by conscious concern for cost reduction.

<p align="center">Focal-B</p>

Adoption

Information about Focal-B's experience with EDI was obtained from Mr.Green, an accountant serving in the controller's office at the time of Focal-B's adoption of EDI. Mr. Green was also a leader in COPAS, a society of crude oil petroleum accountants. Information was also obtained from Ms. Brown, a joint interest accountant who was very active in professional

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organizations of petroleum accountants. Both Mr. Green and Ms. Brown were EDI advocates at

Focal-B.   The adoption decision at Focal-B was a gradual process, exhibiting both strategic

choice and institutional influences on the decision.

Normative and mimetic influences can be seen in the awareness of EDI that led up to its

adoption. Awareness of EDI came from the involvement of Focal-B's accountants with other

accounting professionals from the oil and gas industry. Mr. Green became aware of EDI when

COPAS began to take an active role in standardizing emerging intra-industry data exchanges.

Similarly, Ms. Brown reported that the petroleum industry professional group she was involved

in had concluded that EDI would be a standard feature of future business practice:

> So the industry took up the cause as well, saying, "Well, if [General Electric] can do it or
> if General Motors is going to be doing it, that's going to be the future. So we better start
> promoting it."

Consultants were the messengers who published the positive accounts essential to Focal-B's

imitation of others' EDI actions. Representatives of General Electric and a professor, Dr. Ned

Hill, who were serving as EDI consultants to the accounting organizations, described General

Motors' determination to establish a paperless operation.

Evidence of strategic choice rationales for adoption are also found in the respondents'

accounts. Asked if he felt any pressure for Focal-B to get into EDI, Mr. Green answered:

> Well, sure. All the presentations you heard – that number one, if you don't do it, others
> will and they'll be the lower-cost producer, and number two, if you don't get involved in
> it early and get your system set up, other people will tell you how to set your system up
> and it will cost you more than it would if you started early.

Mr. Green worried about the possibility of being at a competitive disadvantage by not being

among the early adopters. In his presentations to management, Mr. Green emphasized "cost

savings and value added". The predicted advantages for Focal-B were based on the reported

advantages gained by the automotive and manufacturing industries. Mr. Green described the

presentation:

> First of all, definitions and economics – **potential** economics – and then how I see it working with Focal-B. I predicted out two to five years what the transactions would be, what the savings would be, what the organization impacts would be, as best as I could at the time…And I drew [a graph] that looked like [Dr. Hill's] and I quoted him and said it's going to take a couple of years to set this up, but once you see what happens and, if and when the business picks up, we'll be able to respond to it quicker and with less people even than now.

Extension

Management approved the implementation of two pilot applications, but their support for EDI was lukewarm. Although Mr. Green was able to get the controller and the vice-president of MIS to sign a letter saying that EDI was the preferred way of doing business, it didn't seem to make much difference. Mr. Green noted, "I don't think anybody ever **read** that letter and I never pulled it out like a gun or anything." Mr. Green continued to have difficulty in getting the staff he needed to implement the EDI pilot projects and MIS support for the technical aspects of the implementation. Once the individuals who had championed EDI left the company, management discontinued all but one of the EDI projects. No further extension of EDI had been undertaken at the time of the study.

Competitor-A

Adoption

Information about Competitor-A's experience with EDI was obtained from Ms. Butler, the MIS staff member tasked with responding to the first EDI demand, and Mr. Lowe, vice-president of MIS at the time of adoption. Ms. Butler was serving as Competitor-A's EDI coordinator at the time of the interview.

Coercive influence is evident in Competitor-A's decision to adopt EDI. The decision was made in response to General Motors' demand that its suppliers adopt the new technology.

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Competitor-A's management perceived that the company was sufficiently dependent on General

Motors to warrant immediate acquiescence. Ms. Butler described the initial contact:

> My first introduction to EDI was when…an industrial customer of lubricants called and said, "You **will** do EDI with us", and we said, "Sure we will. What is it?"   And it was General Motors.

> Normative influence on adoption also played a role in the decision. Mr. Lowe observed,

"There was never any question in my mind or anybody else in the company's that that's what we

wanted to do." His professional affiliation predisposed him to favor the implementation of

electronic document exchange:

> This was obvious to many of us as we moved into the computing field -- that this whole way of doing business, you know, this whole concept ... I guess the paperless office was always something you heard about, dreamed about -- never thought it would come into fruition, but you wanted to try to make as much of that come true as possible ... It was just so right.

> Mimetic influence was evident in the pressure the chemical division personnel began to

feel as they learned that many of the chemical companies had already endorsed EDI and were

actively pursuing its standardization and implementation:

> A number of the chemical companies had endorsed EDI and were pushing ahead with it and [Competitor-A's chemical division] was beginning to feel the pressure of that because it had become a hot topic among the executives of those chemical companies ... At their gatherings, chemical industry gatherings ... as soon as the [Competitor-A] executive was beginning to get a left-out feeling in some of these conversations, that put more thrust into it.

Extension

.   Strategic rationales are found in Competitor-A's decision to extend the use of EDI. It

was a senior executive's active support for EDI that prompted discussions of using EDI to

improve operating efficiencies, focusing on the strategic role EDI could play within the

company. The message conveyed a need to pursue EDI in order to achieve operating

efficiencies:

> [The message was] along the line of the global economy, and, you know, just the general business trends and looking for efficiencies ...

The response to the letter was to adopt EDI as one of the key strategic initiatives to be pursued by Comp-A as it entered the decade of the 1990s. By the time of the interview, new EDI efforts were subject to formal cost/benefit analysis, usually citing such advantages as expected savings and reduced manpower.

Imitation of other companies in the petroleum and chemicals industries continued to be an influence in the days that followed the first EDI implementation effort. As Competitor-A personnel began to attend ANSI X12 meetings, they found that a competitor from the petroleum industry was already participating, providing further evidence that EDI was going to become a "competitive necessity".

Coercion also continued. When other customers began to demand EDI relationships, Competitor-A agreed without hesitation:

> Again, another retailer . . . sent us a letter of "You **will** do EDI with us." And we said, "Sure, we will" . . . and we stayed in the mode of doing EDI on demand -- at the customer's demand.

Competitor-B

Adoption

Information about Competitor-B's decision to adopt EDI came from Ms. Ford, the EDI coordinator for the North American marketing division, and Mr. Potter, the corporate EDI coordinator. Awareness of EDI and the decision to adopt came as the result of coercion on the part of a large, important customer in the railroad industry. Ms. Ford described the event:

> One of our major companies came to us and the bottom line was, "If you want to remain a preferred supplier, you will do EDI with us."

The railroad customer was among Competitor-B's top ten customers and a customer of

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Competitor-B's parent company. The decision to comply was based on Competitor-B's strategy, described by Ms. Ford:

> And one of the strategies for or the mission for marketing is to be a preferred supplier. Call it a strategy or a mission, whatever you want to call it, being a preferred supplier is a key ingredient of that …[Competitor-B] has a philosophy, a basic marketing philosophy. It may not be stated as such, but we do what our customer wants. Very much service-oriented.

Extension

Strategic choice rationales and coercion are both found in the accounts of extending the use of EDI. When EDI extensions were later demanded by Competitor-B's customers, EDI proponents began to "evangelize" other Competitor-B personnel by relating success stories from other industries. Expansion of customer-oriented EDI was presented as a "strategic project" that would benefit the customer and provide Competitor-B with a competitive advantage. Ms. Ford described the internal sales effort undertaken to get project funding for a fully-integrated EDI invoicing application:

> For this project we did not sell on benefits ... We told them it was all cost and no tangible benefits. But then we went into pages of intangibles at the end, explaining how that was going to benefit the customer. And that's how we sold it as a strategic project.

Customer-oriented EDI was viewed as a competitive advantage that would very likely become a competitive necessity in a not-too-distant future:

> So right now we view it as a competitive advantage to do EDI. We anticipate that at some point it will be a competitive disadvantage not to do EDI.

Competitor-C

Adoption

Information about Competitor-C's decision to adopt EDI came from Ms. York, a senior analyst hired to work on the initial EDI project, and Ms. Hughes, the manager of the MIS EDI group. Evidence of mimetic influence can be seen in the accounts of early awareness and adoption of EDI. According to Ms. York, the first encounters with EDI were at a TDCC meeting attended by an MIS analyst and a member of the marketing staff. The two staff members also attended a trading partner seminar hosted by Montgomery Ward, a customer that wished to initiate an EDI trading relationship with Competitor-C. The proposed relationship with Montgomery Ward was not, however, the proposal that prompted a decision. The decision to adopt EDI was made by the vice-president of MIS. The first discussions about Competitor-C's participation in the relationship were initiated by IBM, serving as the value-added network provider for Wal-Mart. The MIS executive agreed without significant consultation with the marketing executives. According to Ms. York, the EDI aspects of the ensuing purchasing enhancement project were not of interest to the marketing personnel, but were part of "the deal" made between MIS and marketing to accomplish the objectives of both parties -- purchasing system enhancements for marketing and EDI for the MIS department:

> The users were a lot more interested in the enhancements to [the order processing system] than they were – I mean, they wanted to be able to get orders in faster – they wanted these new features…They were a lot more interested in the enhancements to the system than they were in EDI.

Extension

Once Competitor-C got past the initial EDI implementation, discussions about EDI technology turned to efficiency improvement. Respondents from Competitor-C noted that the success of the initial project led the marketing personnel to actively campaign for implementing EDI with another of their large customers:

And then, like from the [marketing] area, just the success of it has made a big difference. Because they were really -- I mean, once we had brought up the first couple of them ... they were saying, "We need to bring up Customer Y. We have to bring up Customer Y. Customer Y is killing us with paperwork." I mean, and so, it was like, "OK, we can see that there's a benefit to doing this."

The extent of the shift in attitude can be seen in the justification used for one of Competitor-C's later EDI implementation projects. The project's cost/benefit analysis projected the elimination of staff as a result of the EDI implementation. Competitor-C's management saw reduced cost, improved productivity and reduction of headcount as prime reasons for developing a corporate EDI strategy.

Evidence of mimetic influence is also seen in Ms. Hughes' account of Competitor-C's extensions of EDI usage:

And there's a senior-level manager that says, "Hey, I talked to other companies and they say this is the thing to do and this is what I want to do."

Ms. York noted that awareness of other companies' use of EDI helped convince management that it was a good idea:

So if some of the people at Competitor-C go to these different industry user groups, they're also hearing about this ... I mean, like, having the fact that they're hearing it from other companies in their own specialty field, I think, also helps. Because it makes it -- when they come back here they go, "OK, everybody else is doing this, too. We need to start looking into it."

Normative influence is seen Ms. York's account of influence from the MIS professional staff. Initiated and funded by MIS, the accountants who were directly affected by the proposed EDI transaction were not involved in the decision to implement:

That was a strictly MIS thing. And apparently, I guess, [the MIS vice-president] did not even bother talking to the users. [He] was paying for that one. That one was never charged back to the users. That was his.

Not only were the accountants not consulted, they didn't believe the exchange was beneficial:

And so our senior-level management were saying "we don't want to do this because we

don't get any benefit and it's going to cost us."

The accountants subsequently refused to use the application after it was developed and tested.

Competitor-D

Adoption

Information about Competitor-D's decision to adopt EDI cam from Ms. Grayson, the senior MIS analyst responsible for supporting the company's EDI applications, and Ms. Barrett, Competitor-D's MIS manager. Mimetic influence can be seen in Competitor-D's decision to implement its only EDI application. Competitor-D first became aware of EDI when other oil and gas producers approached the company to ask them to participate in a check stub data exchange (CDEX), part of a larger EDI application known as PETROEX. Competitor-D agreed to participate "basically to cooperate with other producers" with which the company had joint venture applications. In evaluating the request prior to implementation, Competitor-D's management decided that "the economics were fairly inexpensive", so the cost of cooperation would be quite low. No further EDI implementation activity had been pursued at the time of the interview.

Supplier-A

Adoption

Information about Supplier-A's decision to adopt EDI came from Mr. Dulles, EDI specialist and coordinator for all of supplier-A's businesses. Supplier-A's adoption of EDI resulted from the coercive influence of one of its most important customers. Mr. Dulles described the decision as "customer driven", with the customer saying, "We're **going** to do EDI with you". The response from Supplier-A's management was to agree without hesitation..

Extension

Strategic rationales and mimetic influences can be seen in Supplier-A's decisions to extend their use of EDI. As Supplier-A became more involved in supporting its customers' EDI needs and participating in industry-based EDI associations, senior management began to believe that EDI would be beneficial to the company in improving operating efficiencies:

> We like to be real involved in things like [EDI standards development], because we want to have efficient systems, we want to make EDI work, but then we also want to have low prices so that we can remain competitive . . .

This aspect of the new attitude resulted in Supplier-A's planning to extend its implementation to include its own suppliers in order to get the full benefit of EDI:

> We're doing EDI, but it's not on a large-enough scale to save us money . . . You have to get your customers and your suppliers involved to really get the full benefit . . . We're hoping to do that next year -- start really focusing on our suppliers . . .

Coercion continued as Supplier-A extended its use of EDI. Mimetic influence is also seen in Supplier-A's new attitude toward EDI after its initial compliance with a customer's demand. When extensions to the original EDI implementation were demanded by other customers, the decision to comply with the first EDI demand came to be viewed as a matter of good fortune in that it permitted Supplier-A to get in on the ground floor of EDI usage and become one of its customers' favored suppliers:

> And, in turn, we hope that that will help [us], you know, get a name as being a progressive company that, you know, understands EDI and the concepts that need to take place for it to be successful in the industry . . . [The] major benefit would probably be PR. The companies know that we're doing EDI and that we're part of the team -- a team player with what the industry's trying to accomplish.

Supplier-B

Adoption

Information about Supplier-B's decision to adopt EDI came from Mr. Arnold, a senior

manager whose responsibilities include oversight of applications of computer technology.

Mimetic influence is seen in Supplier-B's decision to adopt EDI. Supplier-B's first awareness of

EDI came when Focal-A contacted them and asked if they would like to establish an electronic

trading relationship, describing EDI as "the thing to do". Mr. Arnold was glad to accept the

offer, even "not knowing what we were really going into". He was inclined to agree because he

liked "computer stuff like that". The implementation went smoothly and resulted in cost

reductions for Supplier-B and the advantage of being perceived as cooperative.

Extension

Extension of Supplier-B's EDI implementation came as the result of coercion by its

customers. After the initial adoption of EDI, the company found that many customers required

EDI support as a prerequisite to contract bidding:

> You have to have EDI, otherwise they say don't [bid on the contract] . . . And there is a
> trend -- has been going on for several years -- whereby they want to shrink their base of
> suppliers.

Supplier-C

Adoption

Information about Supplier-C's adoption of EDI was provided by Mr. King, EDI

coordinator for the MIS department. Supplier-C's first awareness of EDI came as the result of

coercion in the form of adoption mandates from three of its largest customers. The message

conveyed was that continued supply relationships depended on supporting business via EDI.

Supplier-C's managers believed that "We didn't have a choice".

Extension

Further extensions of EDI came as the result of continued demands from Supplier-C's

customers.

Adoption

Information about Supplier-D's EDI adoption came from Mr. Mason, the company's

Chief Financial Officer. Supplier-D agreed to adopt EDI because its management perceived that

refusal to comply with a large chemical industry customer's request would eventually result in

losing the account. Mr. Mason was responsible for responding to Apex Chemical's request. He

described the initial contact, in which Apex asked the company to implement receipt of EDI

orders:

> Apex said, "You will" … That was about it… saying, "It won't be too many years before
> we won't be doing business with anybody but people that have these things' and they
> gave us a general idea of how far they expected us to go into it.

Supplier-D had not extended its use to other EDI transactions at the time of the interview.

Summary. As shown in Tables 2 and 3, evidence of strategic choice rationales (improved

efficiency and competitive advantage) were found in the adoption accounts of two companies

and in five of the companies' extension decision accounts. Evidence of institutional

isomorphism rationales (coercive, normative, and mimetic) were found in the adoption accounts

of all ten of the companies and in six of the companies' extension decision accounts.

Extent of Implementation

Achievement of productivity and performance improvements through the use of IT can

be expected only if adoption is followed by usage extensive enough to achieve the efficiencies

and advantages predicted at the outset. Since implementations following adoptions consistent

with institutional isomorphism were expected to be more superficial than those following

adoptions consistent with strategic choice, exploration of that possibility necessitated

determining the extent of each company's EDI implementation.

The possibilities for EDI use range from implementing only one transaction with a single

trading partner to conducting all of a company's external business transactions via EDI. Having

noted a commonality in the ways in which the companies had implemented EDI, a

comprehensive list of implementation actions was developed and used to categorize the extent of

adoption for each company. The implementation actions which emerged from the cases are

summarized in Table 4.

The stage of implementation was assessed using the implementation stage model

developed by Cooper and Zmud (1989, 1990). The implementation actions which emerged from

the cases were:

(1) Integration of EDI transactions with the transaction processing systems which use or create them
(2) Extension of EDI with its first trading partners
(3) Active recruitment of trading partners for the first EDI application
(4) Participation in standards organizations and EDI advocacy groups
(5) Creation of an enterprise-wide EDI coordination position
(6) Implementation of new EDI transaction sets
(7) Active recruitment of new groups of trading partners
(8) Development of an EDI strategic plan
(9) Establishment of regular reports of EDI activity for senior management monitoring of goal accomplishment

The implementation actions listed in Table 4 were mapped to the stage of implementation

identified in Cooper and Zmud – acceptance, routinization or infusion. The last three stages are

ordered in terms of an increasingly extensive use of the technology, with stages consisting of:

Acceptance:
  Process: The information technology application is developed, installed, and maintained. Organizational procedures are revised and developed. Organizational members are trained both in the new procedures and in the information technology application.

Product: The information technology application is employed in organizational work.

Routinization:

Process: Usage of the information technology application is encouraged as a normal activity.

Product: The organization's governance systems are adjusted to account for the information technology application; the information technology application is no longer perceived as something out of the ordinary.

Infusion:

Process: Increased organizational effectiveness is obtained by using the information technology application in a more comprehensive and integrated manner to support higher level aspects of organizational work.

Product: The information technology application is used within the organization to its fullest potential.

Table 4 summarizes the actions taken by each of the companies in implementing their initial and subsequent EDI applications. Table 4 also includes the stage of implementation achieved by each company, determined by considering the extent of implementation implied by the actions taken after adoption. The first five of the implementation actions are most consistent with the stage described as routinization. Companies that had taken fewer than half of these first actions were classified as having reached only the acceptance stage of implementation; the remainder were considered to have reached the routinization stage. The last four implementation actions are more consistent with efforts to infuse the technology throughout the organization. Companies that had taken at least half of these latter actions were considered to have begun the process of infusion. Table 5 shows the relationship between rationale (for adoption, extension and both) and the stage of implementation achieved by the company.

Having implemented the initial EDI application, most of the organizations included in the study decided to extend their use of the technology. In some instances, organizations had positive experiences with their initial implementations of EDI. Realization of reduced transaction handling or personnel requirements, for example, gave impetus to extending the use of EDI. In other instances, organizations that had exhibited only institutional reasons for

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adoption later expressed strategic choice rationales for extending their use of EDI. This shift in rationale for implementation was not based upon actual benefits achieved within the organization, but seemed rather to flow from an awareness of the positive opinion of EDI entertained by competitors, business leaders, trade associations, and the proponents' respective professions. Formal analysis of how the technology might specifically affect the organization was not performed. The strategic benefits of EDI appear to have been accepted without question, thus suggesting that the strategic choice rationales within these organizations arose as a result of institutional influences. Development of a strategic choice rationale for EDI usage seems to have resulted to some extent from the same sorts of institutional influences that led to adoption.

Conclusion

The purpose of this study was to explore the extent to which rationalistic (strategic choice) and institutional (institutional isomorphism) considerations affected the decision to adopt an information technology (EDI) and to explore how adoption rationale related to the extent of implementation achieved after adoption. With respect to the first question, the picture that emerged was one of adoption in conformity with other organizations' actions, as well as for more rationalistic reasons. Conscious, economically-oriented analysis of the potential effects of implementing EDI within the organization was not prevalent. Decisions to make the initial investment were most often characterized by decisions influenced by coercion, normative influence or mimetic mechanisms.

Rationales consistent with institutional isomorphism were more prevalent than rationales consistent with strategic choice. Although applicable to both initial adoption decisions and subsequent extension decisions, the prevalence of institutional rationales was most pronounced

with respect to the initial decision to adopt. The shift toward strategic choice rationales for EDI

extension originated to some extent in the same institutionally-based mechanisms that motivated

the initial decisions to adopt the EDI technology. In more than half of the cases, the initial EDI

decision was made in a context bearing evidences of normative and/or mimetic influences. In

each of these instances, the organizational actors involved in deciding whether to implement EDI

were confronted with performance improvement claims emanating from professional bodies

(e.g., COPAS), trade associations (e.g., API, TDCC), and consultants (e.g., General Electric

Information Services). The arguments used in their own presentations about EDI's potential

often came from these sources (evident, for example, in the use of a consultant's graphs in EDI

promotion presentations made to Focal-B's management and use of success stories from other

industries in efforts to "evangelize" Competitor-B's personnel).

The second question addressed in this study concerned whether there is a relationship

between reasons for adoption and the extent of subsequent implementation activity. The picture

that emerged suggests that such a relationship may exist. No consistent pattern was found when

attention was focused on the relationship between implementation extent and adoption rationale.

When the focus of attention was expanded to include the way in which reasons for using the

technology evolved as its use was extended, i.e., to the more general utilization rationale, a

clearer pattern emerged. Organizations with the most extensive implementations had developed

a strategically-oriented rationale for implementing EDI. The most superficial implementations

were associated with organizations whose utilization reasons were solely institutional.

Future research directions should include exploring the applicability of the study's

findings beyond the scope of the current research design, focusing particularly on whether such

results apply to other industries and technologies. Future research should also explore whether

utilization rationale related to other technologies undergoes an evolution similar to that found

among the organizations included in this study, shifting from institutional to more strategically-

oriented rationales over time. In addition, research focusing on the structuration of

organizational fields (Orlikowski and Robey, 1991; Giddens, 1979) and the process of

institutionalizing or legitimating IT practices and technologies (DiMaggio, 1988) may prove

enlightening. In particular, exploration of the messages conveyed in motivating diffusion and

consideration of whether organizational actors merely reinforce existing structures or actively

seek to transform those structures could contribute to an understanding of how patterns of

meaning and domination are established in the diffusion of technologies.

REFERENCES

Barrett, M., and Walsham, G. (1999) Electronic Trading and Work Transformation in the
        London Insurance Market, Information Systems Research, 10(1), 1-22.
Chandler, A. (1962). Strategy and structure. Cambridge,Mass: MIT Press.
Child, J. (1972). Organization structure, environment, and performance: The role of strategic
        choice, Sociology, 6,1-22.
Child, J. (1987). Information technology, organization, and the response to strategic challenges,
        California Management Review, Fall, 33 - 50.
Cooper, R. & R. Zmud (1990). Information technology implementation research: A
        technological diffusion approach, Management Science, 36(2), 123-139.
Cooper, R. & R. Zmud (1989). Material requirements planning system infusion, OMEGA
        International Journal of Management Science, 17(5), 471-481.
Dacin, M. T. (1997). Isomorphism in context: The power and prescription of institutional norms.
        Academy of Management Journal, 40(1), 46-81.
Dean, James W. Jr. & Mark P. Sharfman (1996). Does decision process matter?   A study of
        strategic decision-making effectiveness. Academy of Management Journal, 39(2): 368-
        96.
Deephouse, D. L. (1996). Does isomorphism legitimate? Academy of Management Journal,
        39(4), 1024-1036.
DiMaggio, P.J. (1988). Interest and agency in institutional theory. In L. Zucker (ed.),
        Institutional Patterns and Organizations. Cambridge, Mass.: Ballinger Publications Co.
DiMaggio, P.J. & W.W. Powell (1983). The iron cage revisited: Institutional isomorphism and
        collective rationality in organizational fields, American Sociological Review, 48:
        147-160.
DiMaggio, P. & W. Powell (1991). Introduction. In Powell, W. & P. DiMaggio (eds.), The New
        Institutionalism in Organizational Analysis. Chicago: University of Chicago Press, 1-38.

Fennell, M.L. & J.A. Alexander (1987). Organizational boundary spanning in institutionalized environments, <u>Academy of Management Journal</u>, 30(3), 456-476.

Giddens, A. (1979). <u>Central problems in social theory: Action, structure, and contradiction in social analysis</u>. Berkeley: University of California Press.

Goodstein, Jerry D. (1994). Institutional pressures and strategic responsiveness: Employer involvement in work-family issues. <u>Academy of Management Journal</u>, 37(2): 350-382.

Green, C. (1993). Strategic Choice and Institutional Isomorphism in the Diffusion of Innovations: An Investigation of EDI Adoption Rationale, unpublished dissertation, University of Houston.

Greve, H. R. & A. Taylor (2000). Innovations as catalysts for organizational change: Shifts in organizational cognition. <u>Administrative Science Quarterly</u>, 45(1), 54-80.

Hitt, M. & B. Tyler (1991). Strategic decision models: Integrating different perspectives, <u>Strategic Management Journal</u>, 12, 327-351.

King, J. L., Gurbaxani, V., Kraemer, K. L., McFarlan, F. W., Raman, K. S., and Yap, C. S. (1994). Institutional Factors in Information Technology Innovation, <u>Information Systems Research</u> (5:2), 1994, 139-169.

Kling, R. (1980). Social analyses of computing: Theoretical perspectives in recent empirical research. <u>Computing Surveys</u>, 12(1), 61-110.

Kling, R., and Iacono, C. S. (1988), The Institutional Character of Computerized Information Systems, <u>Office: Technology and People</u> 5(1), 7-28.

Lacity, Mary C. & Marius A. Janson (1994). Understanding qualitative data: A framework of text analysis methods, <u>Journal of Management Information Systems</u>, 11(2), 137-155.

Levy, S. (1993). The case of purloined productivity, <u>Macworld</u>, 10(3), 57-60.

Markus, L. (1983). Power, politics and MIS implementation, <u>Communications of the ACM</u>, 26(6).

Markus, L. & J. Pfeffer (1983). Power and the design and implementation of accounting and control systems. <u>Accounting, Organizations and Society</u>.

Mizruchi, M. S. & L. C. Fein (1999). The social construction of organizational knowledge: A study of the uses of coercive, mimetic, and normative isomorphism. <u>Administrative Science Quarterly</u>, 44(4), 653-683.

Orlikowski, Wanda & Stephen Barley (2001). Technology and Institutions: What Can Research on Information Technology and Research on Organizations Learn from Each Other?, <u>MIS Quarterly</u>, 25(2), 145-165.

Orlikowski, Wanda & Daniel Robey (1991). Information technology and the structuring of organizations, <u>Information Systems Research</u>, 2(2), 143-169.

Perrow, C. (1979). <u>Complex organizations: A critical essay</u>. Glenview, Ill.: Scott, Foresman & Co.

Pfeffer, J. (1981). <u>Power in organizations</u>. Marshfield, Mass.: Pitman.
Scott, W. R. (1987). The adolescence of institutional theory. <u>Administrative Science Quarterly</u>, 32, 493-511.

Staw, B. M. & L. D. Epstein (2000). What bandwagons bring: Effects of popular management techniques on corporate performance, reputations and CEO pay. <u>Administrative Science Quarterly</u>. 45(3), 523-556.

Teo, H. H., K. K. Wei & I. Benbasat (2003). Predicting intention to adopt interorganizational linkages: An institutional perspective. <u>MIS Quarterly</u>, 2791), 19-49.

Tingling, P. & M. Parent (2002). Mimetic isomorphism and technology evaluation: Does imitation transcend judgment? <u>Journal of the Association of Information Systems</u>, 3, 113-143.

Weill, P. (1992). The relationship between investment in information technology and firm performance: A study of the valve manufacturing sector, <u>Information Systems Research</u>, 3(4), 307-333.

Whittington, R. (1988). Environmental structure and theories of strategic choice, <u>Journal of Management Studies</u>, 25(6), 521-536.

TABLE 1

INTERVIEW RESPONDENTS

Focal-A
>Manager, Accounting; EDI Coordination
>Manager, Purchasing

Focal-B
>Manager, Control and Audit
>Manger, Accounting

Competitor-A
>Vice-president, Management Information Systems
>Manager, Management Information Systems; EDI Coordination

Competitor-B
>Manager, Marketing
>Manager, Management Information Systems; EDI Coordination

Competitor-C
>Manager, Management Information Systems; EDI Coordination
>Senior Analyst, Management Information Systems

Competitor-D
>Director, Management Information Systems
>Manager, Management Information Systems

Supplier-A
>Manager, EDI Coordination

Supplier-B
>Executive, Operations

Supplier-C
      Manager, EDI Coordination

Supplier-D
      Chief Financial Officer

TABLE 2

RATIONALES FOR EDI ADOPTION DECISIONS

	Strategic Choice		Institutional		
	Efficiency/ Effectiveness	Competitive Advantage	Coercive	Normative	Mimetic
Focal-A	Yes			Yes	Yes
Focal-B	Yes	Yes		Yes	Yes
Competitor-A			Yes	Yes	Yes
Competitor-B			Yes		
Competitor-C					Yes
Competitor-D					Yes
Supplier-A			Yes		
Supplier-B					Yes
Supplier-C			Yes		
Supplier-D			Yes		

TABLE 3

RATIONALES FOR EDI EXTENSION DECISIONS

	Strategic Choice		Institutional		
	Efficiency/ Effectiveness	Competitive Advantage	Coercive	Normative	Mimetic
Focal-A	Yes				
Focal-B					
Competitor-A	Yes		Yes		Yes
Competitor-B		Yes	Yes		
Competitor-C	Yes			Yes	Yes
Competitor-D					
Supplier-A	Yes	Yes	Yes		Yes
Supplier-B			Yes		
Supplier-C			Yes		
Supplier-D					

Italics indicate company had not extended use of EDI

TABLE 4

RATIONALE AND STAGES REACHED

	Focal		Competitors				Suppliers			
	A	B	A	B	C	D	A	B	C	D
RATIONALE										
Strategic Choice Rationale for Adoption?	Yes	Yes								
Strategic Choice Rationale for Extension?	Yes		Yes	Yes	Yes		Yes			
Strategic Choice Rationale for Either?	Yes	Yes	Yes	Yes	Yes		Yes			
STAGE REACHED										
Acceptance						Yes		Yes		Yes
Routinization		Yes		Yes			Yes		Yes	
Integrate with system	x		x	x	x	x	x		x	
Extend transaction set	x		x		x		x	x	x	
Recruit for first transaction	x	x	x					x		x
Standards participation	x	x	x	x	x	x	x			
EDI coordinator	x		x	x	x		x		x	
Infusion	Yes		Yes		Yes					
New transaction sets	x	x	x		x					
Recruit new groups of trading partners	x		x							
EDI strategic plan	x		x		x					
EDI progress reports to executives	x		x							

TABLE 5

RATIONALE VERSUS STAGE OF IMPLEMENTATION

	Acceptance	Routinization	Infusion
ADOPTION DECISION			
Strategic Choice	**0**	**1**	**1**
Institutional Only	**3**	**3**	**2**
EXTENSION DECISION			
Strategic Choice	**0**	**2**	**3**
Institutional Only	**3**	**2**	**0**
ADOPTION OR EXTENSION DECISION			
Strategic Choice	**0**	**3**	**3**
Institutional Only	**3**	**1**	**0**