ADOPTION OF TECHNOLOGY STANDARDS IN SUPPLY CHAINS: A CASE OF ADOPTING ROSETTANET STANDARDS

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Abstract

This paper represents research work in progress. The factors that influence an individual's decision to begin using a certain type of technology have come under much study. Several theoretical models, commonly referred to as technology adoption models, have been developed to understand these factors in hopes of successfully predicting the use of an information system prior to launching the costly systems development effort. The purpose of this research is to leverage the successful ingredients from existing technology adoption models, and extend the framework into a technology standards adoption environment. The theoretical foundations of this new model are presented and the constructs include *perceived usefulness, perceived ease of use, economic, norms*, and *compatibility*. RosettaNet is a non-profit consortium of more than 400 of the world's leading Information Technology, Electronic Components, Semiconductor Manufacturing and Solution Provider companies working to create, implement and promote open e-business process standards. A field study utilizing the adoption of RosettaNet's Partner Interface Process standards is presented and a summary of findings is provided. The major contributions of this work will be to compare and contrast results of prior technology adoption models to the adoption of technology standards (as opposed to a specific type of technology). This paper will also assess how significant determinants of technology adoption models change between members along the supply chain. Special consideration is given to the economic construct. Based on preliminary results from the field study thus far, significant determinants of technology standards adoption include *perceived usefulness, norms* and *economic* constructs. Also, based on the preliminary results thus far, the set of significant determinants towards adoption did differ between the manufacture and distributor along the supply chain.

Key Words

Technology Adoption Models, Technology Standards, Innovation Diffusion, Technology Acceptance

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I. INTRODUCTION

This paper represents research in process. The study of technology adoption models is rapidly becoming a popular line of study in the information systems research. Academians, business managers, IT mangers and other commercial organizations have benefited significantly from this line of research for some of the following reasons.

- Predicting the use of a system prior to a costly development process
- Insight into system features and functionality to incorporate in a system.
- Results applicable across multiple types of technology.
- Possible solutions to increasing the use of an information system.
- Findings are particularly relevant to an industry standard setting organization.

Despite this progress, however, a number of opportunities remain for additional research in the technology adoption arena. For example, is there a different set of determinants toward behavioral intentions to adopt technology versus determinants to adopt technology standards? Also, are economic constructs significant determinants toward behavioral intentions to adopt technological standards? How do these results compare to past results of technology adoption models? How does the use of more recently developed technology (e.g. B2B systems) impact the common set of significant determinants in technology adoption models? Does the set of determinants toward behavioral intentions to adopt technology change between various participants in a supply chain?

The purpose of this research is to leverage the successful ingredients from existing technology adoption models, and extend the framework into a technology standards adoption environment. The theoretical foundations of this new model are presented and the constructs include perceived usefulness, perceived ease of use, economic, norms, and compatibility. RosettaNet is a non-profit consortium of more than 400 of the world's leading Information Technology, Electronic Components, Semiconductor Manufacturing and Solution Provider companies working to create, implement and promote open e-business process standards. A field study utilizing the adoption of RosettaNet’s Partner Interface Process standards is presented and a summary of findings is provided. The major contributions of this work will be to compare and contrast results of prior technology adoption models to the adoption of technology standards (as opposed to a specific type of technology). This paper will also assess how significant determinants of technology adoption models change between members along the supply chain. Special consideration is given to the economic construct. Based on preliminary results from the field study thus far, significant determinants of technology standards adoption include perceived usefulness, norms and economic constructs. Also, based on the preliminary results thus far, the set of significant determinants towards adoption did differ between the manufacture and distributor along the supply chain.

To address these driving research questions, the paper is organized as follows. Part I provides a brief background of the RosettaNet organization. Part II provides a literature survey regarding technology adoption models and also discusses specific opportunities for additional research in this area. Part III describes the contributions of this paper and also provides a theoretical model used in the field study. Part IV provides a brief executive overview of the RosettaNet field study. Part V provides a discussion of the preliminary findings as well as the associated managerial implications.

II. BACKGROUND OF ROSETTANET

RosettaNet is a non-profit consortium of more than 400 of the world's leading Information Technology (IT), Electronic Components (EC), Semiconductor Manufacturing (SM) and Solution Provider (SP) companies working to create, implement and promote open e-business process standards. RosettaNet was founded in February 1998 by 40 IT companies and joined by a collection of EC companies in mid-1999 and SM companies in October 2000. By establishing a common language -- or standard processes for the electronic sharing of business information -- RosettaNet opens the lines of communication and opportunities for everyone involved in the supplying and buying of today's technologies. Businesses that offer the tools and services to help implement RosettaNet processes gain exposure and business relationships. Companies that adopt RosettaNet standards engage in dynamic, flexible trading-partner relationships, reduce costs and raise productivity. End users enjoy speed and uniformity in purchasing practices.

RosettaNet seeks to drive adoption and implementation of common processes and standards within and between member companies. RosettaNet's approach is to bring business owners from member companies together to define and agree on common processes and to develop XML-based standards to support these processes. The following are a sample of standard's setting partner interface process (PIP™) clusters and segments utilized by RosettaNet.

RosettaNet has many challenges in the near future. Overall, RosettaNet's mission is to drive collaborative development and rapid deployment of Internet-based business standards, creating a common language and open e-business processes that provide measurable benefits and are vital to the evolution of the global, high technology trading network. RosettaNet's strategic goals include, first and foremost, producing and enabling the adoption of standards (PIP™s). This first goal will be discussed at length, as it is the topic of this paper and the focus of the field study. Second, is to increase global membership in the consortium. With over 400 participating members already on board, and regional offices established in the Americas, Europe and Asia; RosettaNet has already done an effective job toward achieving this goal. The third strategic goal is to embrace urgent, adjacent vertical supply chains. This includes continuing discussions in industries that have complimentary supply chains with current RosettaNet member organizations (e.g., automotive, consumer electronics, telecommunications and aerospace). The fourth strategic goal includes extending standards to new business process and business models. This includes a host of new opportunities including the support of universal and supply-chain specific business processes (e.g., forecast to order, order to finance), support of existing and emerging business connectivity models (e.g. supply web, partner to partner), and support of common operational business models (e.g. discrete manufacturing, process manufacturing).

III. A REVIEW OF IT ADOPTION RESEARCH FRAMEWORK

Described below are definitions of key terms used in IT adoption literature and throughout this paper. Fishbein defines Behavioral Intentions (BI) as "a measure of the strength of one's intention to perform a specified behavior" (Fishbein 1975, pg. 216). Subjective Norms (SN) refers to "the person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein 1975, pg. 302). Davis defines perceived usefulness (PU) as meaning, "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (Davis 1989, page 985). Perceived Ease of Use (PEOU) refers to, "the degree to which the prospective user expects the target system to be free of effort" (Davis 1989, page 985).

A review of eight papers, encompassing eleven studies toward determining BI and nine studies toward determining current usage was conducted for purposes of this literature survey. *See Table #1 – Summary of Key IT Adoption Studies* and *Table #2 - Summary of Key IT Adoption Studies: Significant CONSTRUCTS (Variables)* for a summary of all the IT Adoption studies included in this research synthesis (located in the appendix). What follows below is best described as 'descriptive' comparisons, conclusions and analysis of the studies included in this research synthesis. Although an extensive amount analysis and effort went into deriving the results thus far, much work remains to be done. Future research synthesis work in this area (Fall 2001) will include quantitative assessment procedures for proper tests of homogeneity in comparing studies, as well as calculation of overall effect sizes among combined studies (if appropriate and applicable). Based on an analysis of the studies included in this research survey, several comparisons, conclusions and trends should be discussed.

First, studies conducted in a real work environment have an overall lower explanatory power than studies conducted in a lab / classroom environment. The average explanatory power (adjusted R2) toward BI in real work environment studies is .26, whereas the lab / classroom environment was nearly twice that with .51. (Note: both averages are simple arithmetic means of the adjusted R2 values). From an intuitive standpoint, this relationship does make sense. One would expect the more controllable environment permissible in a lab / classroom research setting would allow for greater explanatory power, as compared to studies conducted in a real work environment.

Another important finding is the predominance of the construct PU as a significant determinant toward BI to use the technology. Seven out of the eleven studies found PU to be a significant determinant of BI (of the four studies that did not find PU to be significant, three were considered 'mandatory' use technologies and the fourth found PU to be a significant determinant of the Attitude mediator construct). In addition, from a directional perspective, studies did consistently find a positive relationship between PU and BI. By far, PU was found to be the most common direct determinant of BI than all other construct and variables. This provides substantial <partial> support for Davis' original TAM model, which had originally hypothesized a significant-positive-direct-causal relationship between from PU to BI. In addition, the fact that PU has been found to be significant across different technologies (GUI interfaces, WWW, word processing, windows and graphics software) and across different levels in an organization

(MBA students, small business owners, IT executives) lends solid support to this constructs external validity and overall generalizability.

Similarly, but to a lessor extent, PEOU is the second most common direct and / or indirect determinant of BI. Although only three out of the eleven studies found PEOU to be significant determinant towards BI, four additional studies found PEOU to be a significant indirect determinant to other constructs in their models (see Lucas 1999, Davis 1989).

Another important trend occurring in IT adoption studies is the notion regarding the degree of exposure that subjects have with the target technology prior to participation in the survey / questionnaires. This research survey found that the greater the degree of exposure to the technology, the greater the overall explanatory power of the studies in explaining BI and current usage. Table #1, column 5 'Experience with this type of IT' indicates studies with subjects that had the greatest amount of exposure with the target technology prior to administration of the survey (these are indicated with shading in column 5).

Another important trend that is emerging is that BI and current usage appear to have a different set of constructs as their primary determinants. As previously discussed, a core set of determinants has definitely emerged toward explaining BI to use a technology (PU, PEOU and to a lessor extent Attitude and Norms). The fact that the majority of these determinants have resulted in significant findings over eight different types of technology and at three different levels in an organization provides substantial external validity and generalizability to the BI determinant set. However, the same can NOT be said regarding the current usage determinant set. Davis found that the Attitude construct was much less of a significant determinant for current usage than for BI as users gained more experience with the system (Davis 1989). In fact, of all the studies included in this literature survey, the Attitude construct was found as a significant determinant of current usage only once.

The most that can be said about determinants of current usage is that its' set of determinants is very different than those of BI. And, one of the components to this set of determinants for current usage appears to be Norms. Further analysis reveals that this result should not be surprising. First, recall that the notion of current usage does NOT encompass end-users intentions. The current usage measure is limited to whether the subjects are currently using the technology or not. By it's very definition, the reason that a technology is available to be used is due to standard practices within an organization (e.g. norms). That is, the reason the technology is currently being used is because "it's the way things are done around here". And who are the individual's who communicate those standard practices (Top Management, Central IS support organizations, peers, etc.).

IV. RESEARCH ISSUES AND CONTRIBUTIONS

Despite the successful replications and extensions of technology adoption models, there are a number of opportunities for additional research.

Economic Considerations

For example, based on the studies included in this literature survey, only one found a direct correlation or causation associated with quantifiable financial indicators to determining BI or current usage. (Although every paper included discussions in their introductions and managerial implications of how there research findings potentially could enable economic benefits to organizations.) Lucas attempted this by associating sales commissions of brokers and sales assistants to actual system usage of high-end PC workstations (Lucas 1999). Although Lucas found limited support for this notion, this remains a 'ripe' area for a logical extension of technology adoption models. There is a long-standing 'productivity paradox' and 'profitability myth' by academic researchers concerning the financial returns from investments in information technology (Hitt 1995, Strassmann 1996). One of the primary reasons for sustaining these 'myths' in academic literature is the limited number of publications with studies of profitability and productivity from IT investments at an individual systems level, as opposed to firm, industry or economy levels.

Types of Technology Considerations

Another opportunity in technology adoption models is to vary the types of technology that the models have been tested. Granted, if one looks at the studies included in this research survey, the span of different technologies is impressive: 107 subjects were high-end workstation users, 230 subjects were utilizing GUI software interfaces, 73 subjects were utilizing WWW browser software, 377 subjects were utilizing standard off-the-shelf software packages (WriteOne, Chartmaster, Pendraw or Windows), 113 subjects were utilizing EIS and 166 subjects were requested to assess the overall IT usage in a small business environment. Impressive as this list may be, however, there's very limited research of technology adoption models on recently developed technology. For example, B2B systems (procurement, online requisitions), or business-to-consumer (B2C) systems (e-storefronts, virtual shopping malls) or consumer-to-consumer (C2C) systems (online auctions, online garage sales) - just to name a few of the types of systems that have evolved with the explosive growth of the Internet. Similarly, there's limited research regarding the adoption of technology standards, as opposed to a specific type of technology. The IT industry changes rapidly. For any theoretical model to sustain generalizability across these new technologies (or across the inter-changing levels involved) it needs to be re-tested as these innovations emerge. Are the same constructs of PU, PEOU and NORMS still prevalent with these new technologies? Do these constructs change with the adoption of technological standards, at a systems level, as opposed to a specific type of technology?

Co-Adoption of Technology Considerations

Another opportunity in the study of technology adoption models is the co-adoption of technology, or technology standards, among members in a supply chain setting. Inter-organizational systems (IOS) are information systems that span across organizational boundaries (Gebauer 2000). Examples of IOS systems include the B2B or B2C systems previously discuss (e-market exchanges, procurement systems, e-auctions) and proprietary dedicated systems (EDI). The lack of testing technology adoption models with these new types of technology has already been noted above. The point here is the corresponding notion that technology adoption models lack the new inter-organizational constructs associated with information systems operating in an inter-organizational setting. For example, Iacovou, in his 1995 study of small businesses' willingness to adopt electronic data interchange (EDI) technology found that long-term commitments, subsidies by EDI partners, and competitive pressures were key considerations in their decision process. Iacovou was simply reporting on case study results and did not test these constructs in the technology adoption model format. Similarly, Gebauer conducted research into IOS systems in 1999 (utilizing recent technology) and discovered that the key considerations had changed to trust, network interoperability and relative bargaining power (Gebauer 2000). In fact, she found that long-term commitments and financial subsidy incentives were beginning to 'back-fire' due to the reduced costs and advancements in Internet-based technologies. A limited number of adoption studies have included these types of potential determinants in their models. Yet, as previously discussed, these types of technologies and settings have experienced explosive growth. Are the previously accepted constructs in technology adoption models (PU, PEOU, Norms) still significant determinants with information systems operating in an supply chain setting? Do the set of constructs differ between supply chain partners in a co-adoption setting? Are there measurable organizational characteristics that could be added to existing technology adoption models to improve their explanatory and predictive power?

Contributions of Current Study

Based on the above literature survey and opportunities for additional research, the contributions of this study is three-fold. First, this study will seek to compare and contrast the significant determinants of BI to adopt technology versus those of adopting technological standards. Second, this study will seek to compare and contrast significant determinants in a supply chain setting (manufacturer and distributor). Third, this study will consider key economic constructs into its' technology adoption model. The technology adoption model utilized to test this field study is in Figure 1.

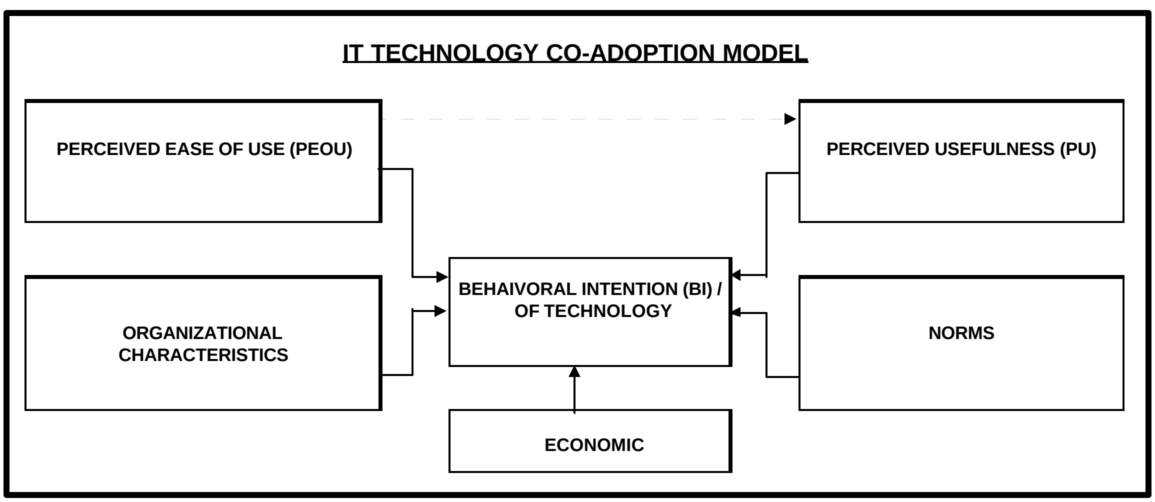

Figure 1 – IT Technology Co-Adoption Model

Significant Contributions of this Research

- Adoption of technology standards (as opposed to a specific type of technology).
- Assess the change in constructs in a co-adoption (supply chain) setting.
- Inclusive of key economic constructs in the adoption model.

V. CO-ADOPTION OF TECHNOLOGY STANDARDS FIELD STUDY

The following is a one-page executive overview of the field study. Due to space limitations and the pending approvals from participating organizations to release this information, company names and certain key facts have been withheld. Approval for release of this information is expected by November 2001. This case study examines the impact of a new web-based B2B e-commerce system implementation between a manufacturer and distributor in the electronics industry. The technical solution utilizing RosettaNet's Partner Interface Process™ is presented and the new system's benefits are described and quantified.

Challenges

The manufacturer and supplier faced many challenges. The current debit-request process between the manufacturer and distributor is a hybrid of manual and automated steps including the use of fax machines, phone calls, voice messages, and internal paper work moving back and forth between departments and companies. This has created numerous problems in the current environment including manual keying errors, unintended lost discounts, unintended expired debit-requests, and a host of logistical problems. In fact (prior to adoption) the average debit-request rejection rate was 40% to 60% and the average response time per credit-request was 2 to 5 days.

Technical Solution

The new system (see Figure 2) was developed consistent with RosettaNet's Partner Interface Process™ *Marketing Information Management* standards series. The manufacturer and distributor both agreed to co-adoption of Rosettanet's standards. The following are key standards (features) of the new system:

- A centralized debit authorization database with ubiquitous web-access by all partners (supplier, distributor, and manufacturer representative).
- Electronic receipt, notification and communication of debit authorization requests.
- Automated centralized approval-progression status of debit authorizations with automatic tolerance checks and electronic notifications of *ready-to-expire* debit authorizations.

Benefits of the New System

The new system will enable significant benefits to both the manufacturer and distributor. Specifically, co-adoption of the new system by the manufacturer and supplier will enable:

- Reduced manual processing such as faxing, writing e-mails, re-keying information, researching debit request information and inquiring on approval status.
- Enforce a 24-hour *initial* response from the manufacturer to the distributor's initial debit authorization request. The distributor will have the initial option to 'accept', 'reject', or indicate 'additional research necessary'.
- Significant reductions in unintended lost discounts, unintended expired debit authorization requests, and manual re-keying errors.
- Circumvent a host of delays inherent in manual-based processes and exacerbated in a business to business relationship (personal vacations, verbal commitments, employee turnovers, and timing).

Quantified Benefits of the New System

Overall, the quantified benefits of the new system are anticipated to be substantial. The manufacturer is anticipating a 45-minute reduction in handling time. The distributor is anticipating an 82% reduction in size of the 're-work' queue. Overall, the manufacturer is anticipating a 250% increase in transaction capability per hour and the distributor is anticipating a 47% increase in transaction capability per hour. From a financial performance perspective, the new system is expected to reduce ongoing transaction costs by 47% for the manufacturer and by 20% for the distributor. The anticipated ROI in year one is 42% for the manufacturer (with a payback in 1.9 years) and 45% for the distributor (with a payback in 1.8 years).

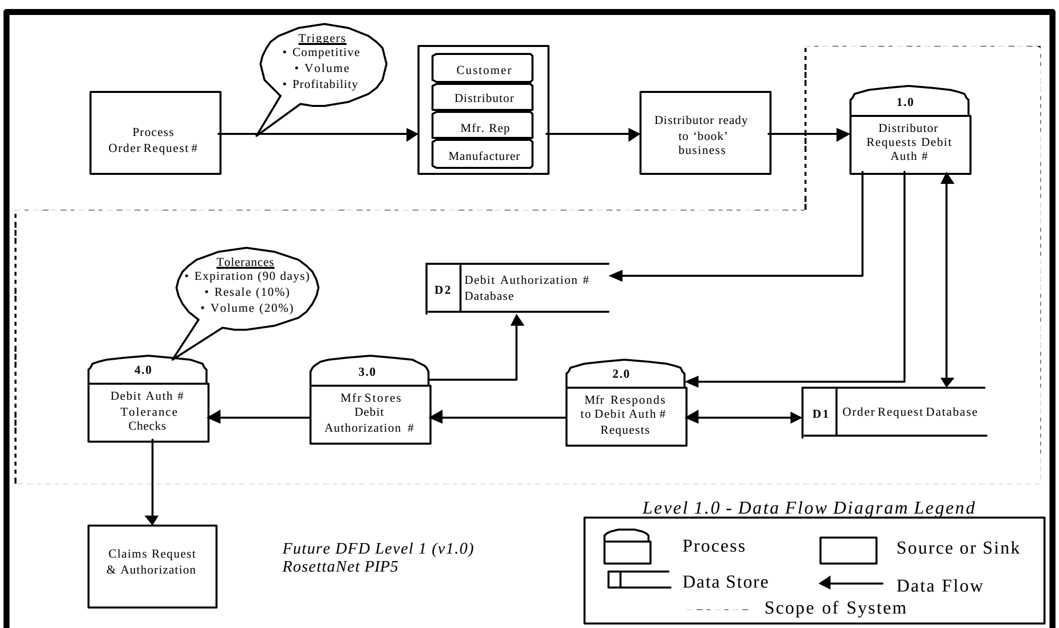

Figure 2 – Level 1 Data Flow Diagram of the New System

VI. DISCUSSION AND CONCLUSION

This section represents research work in progress. The section includes preliminary findings regarding the technology adoption study and organizes the discussion around the three key areas that this paper is offering contributions: (1) adoption of technological standards, (2) supply chain setting impact and (3) economic constructs.

Adoption of Technological Standards

As previously discussed, the predominant determinants of BI in past technology adoption studies have concluded that PU, PEOU and to a lessor extent Attitude and Norms to be significant constructs. Based on preliminary results in this field study, the significant determinants of BI to adopt technology standards include (in the order of strength) PU, Norms and to a lessor extent economic constructs. In fact, the PEOU construct was found to be not significant.

The differentiation between the study of adopting a specific type of technology (e.g., a word processing package or web-browser) versus technological standards (such as those specified by RosettaNet's 5D series) is a subtle difference, but potentially an important one. Standard-setting organizations will vary the level of standards (or requirement specifications) according to their intended audience and objectives of the organization. For example, a desktop standards setting group within a business unit may precisely specify the make and model of computer, printer and the exact version of software required to be running on all desktops. Whereas, an external global-standards setting organization may provide general high-level minimum requirements for desktops, with out specific reference to a computer's manufacturer. Between these two extremes are an array of various organizations that set technology standards and / or are in the business of developing information systems for end-users. From a managerial implication standpoint, prior research findings in technology adoption models are much more applicable to the low-level, very precise standards setting organizations. For example, the knowledge that PU and PEOU are the significant constructs in determining an individual's BI towards the usage of Chartmaster and Pendraw (see Venkatesh 1996) is more relevant to a desktop standards setting group within a small business unit as opposed to a global standards setting organization in a multi-national corporation. In addition, based on these preliminary findings, larger standards setting organizations should be focusing adoption efforts towards the perceived usefulness attributes of the technology standards (improved effectiveness in job performance and quality of work), enhancing normative pressures (gaining support of top management and the internal IT organization), as well as explaining the economic benefits to the organization.

Supply Chain Setting Impact

The field study findings as it relates to differences in partners along the supply chain are particularly interesting. The top two significant constructs in determining BI for the manufacturer were PU and Compatibility (e.g. the extent to which the new technology standards will be complimentary with the users work environment and style of work). Whereas the top two significant constructs in determining BI for the distributor were PU and economic.

Initially, these findings were unexpected since the economic benefit of adopting the new technology (from a transaction process cost perspective) was much greater to the manufacturer than the distributor. However, upon further investigation, the distributor in this field study anticipates significant financial benefits from a product cost perspective due to the automated system control features that will be incorporated into the new system (e.g. system enforced 24 hour initial response time, fewer unintended lost discounts, etc.). Although the distributor would not allow the researchers to quantify the anticipated product cost savings, the distributor did expect the savings to be much greater than the savings generated from transaction processing cost reductions.

Overall, these preliminary findings do support the notion that determinants of BI could differ between members along a supply chain. This preliminary finding could have significant managerial implications to standards setting organizations. For example, the manufacturer in this case (fully realizing the economic downside of product prices that it will be receiving from the distributor in the future) placed the Compatibility construct as a higher priority determinant of BI. Thus, to promote adoption of the standards by the manufacturer in the case, RosettaNet should promote the usefulness of the new standards, as well as fully describe how the standards will be compatible with existing technology, the work environment and business processes.

Economic Constructs

Based on the preliminary findings from the case study, the economic construct has been found to partially significant in determining BI towards adopting the technology standards. The economic construct was significant in determining BI to adopt for the distributor, but was not in the case of the manufacturer. Additional discussion will be provided on this issue based on further analysis of the results.

Conclusions

Although the results of this field study are preliminary, trends have emerged. Based on the initial preliminary results, the study of technology *standards* adoption (at the systems level) does generate a slightly different set of significant constructs then past technology adoption studies. In addition, these set of significant constructs change, due to economic considerations, in a co-adoption setting between different members along a supply chain. With the ever-increasing collaboration between organizations enabled by continuing advancements in the information technology industry, these findings will require a new perspective in the study of technology (and technology standards) adoption. The study of RosettaNet's Partner Interface Process standards adoption has provided this needed insight. This paper does represent research work in progress. The authors are in the process of collecting additional data from the field study and working towards improving the statistical validity regarding the conclusions.

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Table #1 - Summary of Key IT Adoption Studies

Reference	Year of Publication	Type of Technology	Sample Size (n)	Experience with this Type of IT	Prior Overall IT Exposure	Research Setting	Organization Type
Agarwal, Prasad	Spring 1999	PC's, GUI Interfaces	230	2.34 on a 7-point LS	High	Real Work Environment	Multi-National IT Services Company
Lucas, Spitler	Spring 1999	PC Workstations - Brokers	49	1.5 months of use (avg)	High	Real Work Environment	Financial Banking / Brokerage Firm
Lucas, Spitler	Spring 1999	PC Workstations - Sales Assistants	58	1.5 months of use (avg)	High	Real Work Environment	Financial Banking / Brokerage Firm
Lucas, Spitler	Spring 1999	PC Workstations - Full Sample	107	1.5 months of use (avg)	High	Real Work Environment	Financial Banking / Brokerage Firm
Agarwal, Prasad*	Summer 1997	World Wide Web (WWW)	73	3.18 on a 7-point LS	High	Lab / Classroom	Educational Institution (part-time MBA students)
Davis, Bagozzi, Warshaw	August 1989	Word Processing (Write One) - 1 hr Overview	107	1hr Overview	Low	Lab / Classroom	Educational Institution (full-time MBA students)
Davis, Bagozzi, Warshaw	August 1989	Word Processing (Write One) - After 14 weeks	107	14 wks of usage	Low	Lab / Classroom	Educational Institution (full-time MBA students)
Venkatesh, Davis	Summer 1996	Chartmaster and Pendraw	40	Video & Hands-on Training	Moderate	Lab / Classroom	Educational Institution (part-time MBA students)
Rai, Bajwa**	Fall 1997	Executive Information Systems - Collaboration	59	5.83 on a 9-point scale	High	Real Work Environment	Top Computer Executives across 14 industries
Rai, Bajwa**	Fall 1997	Executive Information Systems - Decision Support	54	4.13 on a 9-point scale	High	Real Work Environment	Top Computer Executives across 14 industries
Karahanna, Straub, Chernay	June 1999	Windows Operating System - Potential Adopters	77	Never Used	Moderate	Real Work Environment	Large Financial Institution
Karahanna, Straub, Chernay	June 1999	Windows Operating System - Current Users	153	Current Users	Moderate	Real Work Environment	Large Financial Institution
Thong	Spring 1999	Overall IT Assessment of a Small Business	166	PC's and 1 s/w application	Moderate	Real Work Environment	Small Businesses through out Singapore

Table #2 - Summary of Key IT Adoption Studies - Significant CONSTRUCTS (Variables)

Reference	Year of Publication	BI - Intentions to Use Technology			CU - Current Technology Usage			Actual Usage Measure
		Adj R2	Significant CONSTRUCTS (Variables)	p Levels	Adj R2	Significant CONSTRUCTS (Variables)	p Levels	
Agarwal, Prasad	Spring 1999	0.26	ATTITUDE (Pu, Peou), PU (Peou)	p<=.05	n/a	n/a	n/a	Subjective
Lucas, Spitler	Spring 1999	0.17	NORMS, LNPER94(-)	p<=.10, p<=.05	0.20	LNPER94(-)	p<=.05	Subjective
Lucas, Spitler	Spring 1999	0.20	NORMS	p<=.01	0.14	NORMS	p<=.05	Subjective
Lucas, Spitler	Spring 1999	0.33	NORMS, LNPER94(-)	p<=.01, p<=.05	0.30	NORMS	p<=.05	Subjective
Agarwal, Prasad*	Summer 1997	0.46	PU*, RESULT	p<=.01	0.48	VOLUNT(-), VISIB, COMPAT, TRIAL	p<=.01, .01, .01, .05	Subjective
Davis, Bagozzi, Warshaw	August 1989	0.47	ATTITUDE, PU	p<=.01, p<=.001	0.12	BI (Attitude, Pu)	p<=.001	Subjective
Davis, Bagozzi, Warshaw	August 1989	0.51	PU	p<=.001	0.40	BI (Pu, Peou)	p<=.001	Subjective
Venkatesh, Davis	Summer 1996	0.58	PEOU, PU	p<=.05, p<=.001	n/a	n/a	n/a	Subjective
Rai, Bajwa**	Fall 1997	n/a	n/a	n/a	0.29	TOP MGMT	p<.00	Subjective
Rai, Bajwa**	Fall 1997	n/a	n/a	n/a	0.34	ENV UNCERT, TOP MGMT, IS SUPPT	p<.002, .024, .02	Subjective
Karahanna, Straub, Chernay	June 1999	0.38	NORMS (Top Mgmt, Supv, Peers, IS Suppt	p<.1, .01, .01, .01, .01	n/a	n/a	n/a	Subjective
Karahanna, Straub, Chernay	June 1999	0.24	ATTITUDE (Useful, Image), VOLUNT(-)	p<.01, .01, .05, .01	n/a	n/a	n/a	Subjective
Thong	Spring 1999	n/a	CEO (Innov, IS Knowl), IS CHAR (Pu, Peou), ORG CHAR (Bus Size, Emp IS)	p<.05, .01, .01, .05, .01, .01	0.43***	ORG CHAR (Bus Size, Emp IS, Inform Intens)	p<=.01, .01, .05	Objective