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AN EMPIRICAL STUDY OF THE APPLICABILITY OF THE TECHNOLOGY ACCEPTANCE MODEL TO APPLICATION DEVELOPMENT OUTSOURCING DECISIONS

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Abstract

This study empirically tests the applicability of the Technology Acceptance Model (TAM) to application development outsourcing decision making. Advances to TAM posit that perceived usefulness and ease of use mediate the effects of other variables on users' attitudes towards a technology. The model tested in this study suggests that perceived usefulness and ease of use of outsourcing mediate the effects of the external environment, prior outsourcing relationships, and risks on outsourcing decision makers.

A survey was developed and sent to 3000 IT decision makers. One hundred and sixty respondents provided data to confirm the applicability of TAM and the influences of these external variables. Support for the applicability of TAM was found. Three sub-dimensions of risk, Project Management, Relationship, and Employee Risk were identified. Project Management and Employee Risks along with Prior Relationships were found to significantly influence decision maker perceptions about application development outsourcing.

Keywords: Outsourcing, application development outsourcing, IT management, technology acceptance model

Introduction

Kodak brought IT outsourcing to the forefront with their landmark decision to outsource their IT functions in 1989. Recent surveys indicate that around the globe, firms of all sizes across many industries view outsourcing as a realistic alternative for some or all of their IT functions (Barthelemy and Geyer 2001; Kakabadse and Kakabadse 2002). The use of IT outsourcing continues to grow at a phenomenal rate (Kern et al. 2002).

Although a wide variety of IT functions are outsourced, this study focuses on one particular function, applications development (AD). AD was identified in multiple prior studies as an IT function commonly outsourced (McFarlan and Nolan 1995; Hurley and Schaumann 1997; Elmuti and Kathawala 2000). Furthermore, recent surveys indicate that AD Outsourcing is on the rise (Hurley and Schaumann 1997; Ketler and Willems 1999; King and Cole-Gomolski 1999). More and more of it is also done offshore which adds complexity to the decision making process (Elmuti and Kathawala 2000; Robb 2000; Prencipe 2001). Thus, a better understanding of the AD outsourcing decision is important. More importantly, this knowledge may help to better understand other outsourcing decisions.

A recent outsourcing study (Benamati and Rajkumar 2002) proposed an application of the Technology Acceptance Model (TAM) (Davis 1989; Davis, Bagozzi and Warshaw 1989) as a basis for investigating AD outsourcing decision making. The model also proposes risk, prior outsourcing relationships, and an organization's external environment to be important antecedents to decision maker perceptions and hence important factors in AD outsourcing decisions and (Benamati and Rajkumar 2002).

The goal of this research is to empirically test that model and in an attempt to both validate it as a basis for further study and shed new light on factors that influence AD outsourcing decisions. The following section reviews the proposed model of outsourcing

acceptance and develops hypotheses from it. The methodology used and findings from an empirical validation of that model are then explained. Finally, the implications of both the results and the model for future research are discussed. No other research has empirically applied TAM in this way. Nor has there been empirical testing of the influence of these three antecedent factors on the decision to outsource AD.

The Research Model and Hypothesis

The model, shown in Figure 1, illustrates TAM constructs, outsourcing decision antecedent constructs, and posited relationships among the constructs. It implies that TAM constructs are applicable to the acceptance of outsourcing. The TAM constructs and interrelationships are applied consistently with previous TAM research. Decision maker perceptions of AD outsourcing are posited to influence their attitude about it which in turn affects their intention to do it. Consistent with TAM, the model proposes that a decision maker positively inclined towards outsourcing is more likely to decide to outsource.

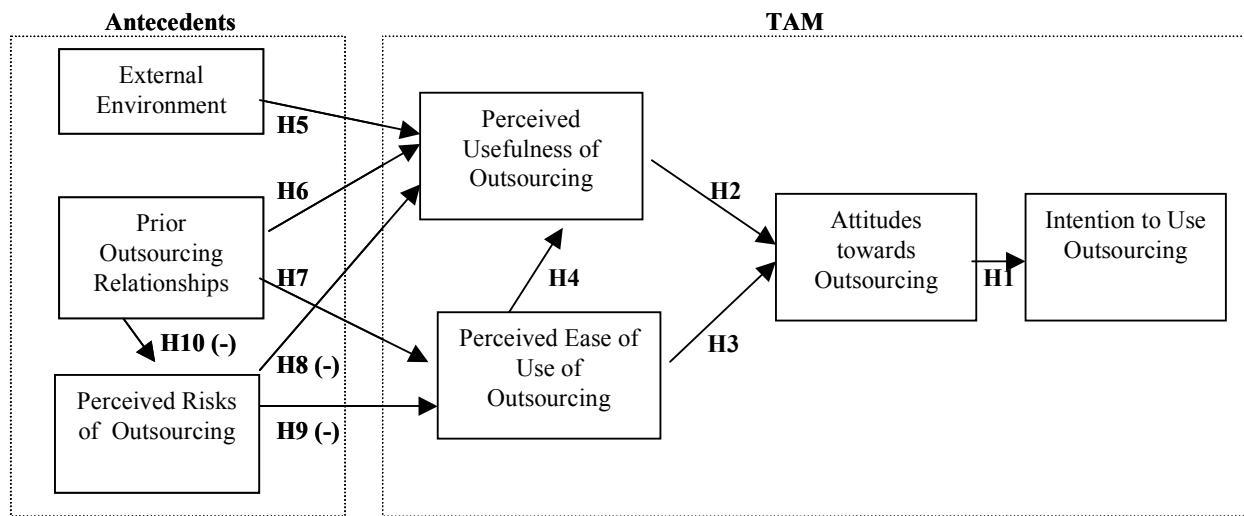


Figure 1. Outsourcing Acceptance Model

Studies indicate that more and more IT outsourcing decisions are made by individual executives (Barthelemy and Geyer 2001; Kakbadse and Kakabadse 2002). Hence, TAM may be applicable to high-level decision makers' acceptance of outsourcing. Furthermore, TAM is rooted in the Theory of Reasoned Action (Azjen and Fishbein, 1980), and other research has drawn on attitude based choice theory rooted in the theory of reasoned action to study organizational-level decisions. Mykytyn and Harrison (1993) studied the acceptance of strategic information systems by senior management and Candel and Pennings (1999) the choice of financial services by entrepreneurs. This provides further support for organizational-level decision makers as a unit of analysis.

Figure 1 also illustrates the hypotheses tested in this study. Hypotheses one through four stem directly from the established TAM relationships. We hypothesize that these relationships will hold in the AD outsourcing decision context as well. Hence we hypothesize that:

- H1: Decision maker attitude toward outsourcing AD positively affects their intention to use it.
- H2: Decision maker perception of the usefulness of AD outsourcing positively affects their attitude towards it.
- H3: Decision maker perception of the ease of use of AD outsourcing positively affects their attitude towards it.
- H4: Decision maker perception of the ease of use of AD outsourcing positively affects their perception of its usefulness.

The model also proposes the external environment, prior outsourcing relationships, and the perceived risk of outsourcing AD as antecedents to decision maker perceptions of AD outsourcing. Each is proposed to affect one or both of the TAM perception variables. Support for the influence of these antecedents on outsourcing decisions can be found in prior literature.

A firm's external environment plays a role in decision making (Goll and Rasheed 1997). A dynamic, competitive, or uncertain environment can lead firms to focus on core competencies and outsource others (Slaughter and Ang 1996). As hypercompetition becomes an unavoidable way of life in many industries (D'Aveni 1994), IT plays a bigger and bigger role in achieving and sustaining competitive advantages. Furthermore, environmental change prompts organizations to maintain flexible organizational structures (Burns and Stalker, 1961; Perrow, 1970; Thompson, 1967; Woodward, 1965). Outsourcing provides flexibility and can be useful to address an uncertain environment. For example, the critical contingencies that arise due to stiff competition were found to influence IT outsourcing decisions in the banking industry (Ang and Cummings 1997). This lends support for the fifth hypothesis in the model.

H5: A more competitive external environment positively affects decision maker perception of the usefulness of AD outsourcing.

Recently, the importance of the client supplier relationships has received more attention in the outsourcing literature. Organizations and their outsourcing vendors have become more tightly coupled (Lee et. al. 2000) and long term partnerships are more appropriate (Nam, et al., 1996; Saunders et al. 1997; Mazzawi 2002). Some outsourcing arrangements form as strategic alliances with deep levels of interdependence (Lacity and Willcocks 1998; King 2001) and the ability to build a trusted partnership and avoid relational trauma is imperative for success (Kern et.al 2002). The quality of the relationship is clearly important (Lee and Kim 1999).

Early outsourcing research predominantly overlooked the fact that many outsourcing decisions are not independent decisions but instead are based on prior outsourcing experiences (Nam et al., 1996; Lee et. al. 2000). Prior experiences certainly effect follow-on outsourcing decisions. The model suggests that prior outsourcing relationships will influence decision maker perceptions about the usefulness and ease of use as stated in hypotheses six and seven.

H6: Helpful prior AD outsourcing relationships positively affect decision maker perception of the usefulness of AD outsourcing.

H7: Helpful prior AD outsourcing relationships positively affect decision maker perception of the ease of use of AD outsourcing.

Risk is also an important factor in the AD outsourcing decision (Earl, 1996; Ketler and Willems, 1998). Risk, if ignored, increases the likelihood of project failure (Lyytinen et al., 1998). IS managers may perceive outsourcing to reduce risk because it can provide skills the organization lacks to develop a particular application. However, outsourcing introduces many new risks such as hidden costs, staff morale problems, and loss of control (Ketler and Walstrom 1993; Hurley and Schaumann 1997; Smith, et al., 1998; Barthelemy 2001). Offshore outsourcing adds many additional challenges and risks to the outsourcing engagement (Ramarapu et al., 1997). For example, the project team is, by definition, virtual and must be managed across, time, distances and perhaps even borders or oceans. Although, some virtual organizations succeed, the value of virtual organizations has been oversold and more fail than succeed (Chesbrough and Teece, 2002).

As the model portrays, (see figure 1) an inverse relationship between perceived risk and the usefulness and ease of use factors would be expected. When the perceived risks are higher, the decision maker's perceptions would lower. Hypotheses eight and nine state these expectations.

H8: Decision maker perception of the risk of AD outsourcing negatively affects their perception of its usefulness.

H9: Decision maker perception of the risk of AD outsourcing negatively affects their perception of its ease of use.

Just as good experiences will increase perceptions of ease of use and usefulness, it would be expected that positive past experiences will reduce the perception of risk associated with outsourcing. This expected inverse relationship forms the basis for the final hypothesis.

H10: Positive prior AD outsourcing relationships negatively affect decision maker perception of the risk of AD outsourcing.

Methodology

A survey instrument was implemented to empirically test the model and hence the applicability of TAM and the influence of the antecedent variables. Most prior outsourcing research has applied more qualitative or case study research. Very few studies employed quantitative methods. This research is the first to employ a quantitative instrument in the study of the applicability of TAM and one of only a few to quantitatively examine antecedents to outsourcing decision making.

Instrument Development

The instrument items used to operationalize the constructs in Figure 1 were all derived from past research. All questions used a 1 to 7 scale where 1 meant "strongly disagree" and 7 meant "strongly agree."

The items for the four TAM constructs are revisions of items from previously validated TAM instruments (Argawal and Prasad 1999; Hu et. al. 1999; Venkatesh and Davis 2000). The items were reworded to change the focus from systems to outsourcing. For example, the TAM intention to use item "Given that I have access to the system, I predict that I would use it." became "Given that I have access to an outsourcer for applications development I predict that I would use them." These items were applied to test the TAM hypotheses (H1-H4).

The items for external environment and prior relationships originated from instruments used in marketing research. To measure the competitive nature of the environment, items from Industuct (Pecotich et al., 1999), an instrument developed to measure Porter's (1980) five competitive forces model were adapted. Only items from intensity of rivalry defined as "the extent to which firms in this industry frequently and vigorously engage in outwardly manifested competitive actions and reactions in their search for competitive advantage in the marketplace. (Pecotich et al. 1999 p. 410)" were applied. That study found that rivalry was the strongest force of the five. Competitive rivalry is also probably the most directly applicable to help test hypothesis five.

Many marketing studies have measured dimensions of relationship quality. The items for measuring relationship quality used here were drawn from two separate marketing instruments. This was done to tap into a representative set of relationship quality dimensions that may be applicable to outsourcing relationships. The first dimension adapted was relational norms (Heide and John 1992). Relational norms specify the expectations or prescriptions of behaviors directed toward maintaining the relationship as a whole and limiting self promoting behavior in the relationship. The measures tap into three aspects of the relationship norms; flexibility - the expectation of a willingness of the parties to be adaptable to changing circumstances, information exchange – the expectation that a proactive exchange of useful information will occur, and solidarity – the expectation that both parties place a high value on the relationship. Trust is also commonly identified as an important aspect of relationship quality (Crosby et al. 1990; Moorman et al. 1992; Morgan and Hunt 1994, Rindfleisch 2000). Rindfleisch's five item scale for organizational trust, which he defined as "...confidence in an exchange partner's reliability and integrity. (2000, p. 87)" was adapted. This combination of 15 measures adequately represented the dimensions of relationships from an outsourcing perspective. These measures were applied to test hypotheses six, seven and ten?

Established measures for outsourcing risk were not found in prior research and hence were developed from outsourcing risks identified in qualitative research (Elmuti and Kathawala 2000). This was the most complete list that was found and is applied to explore risk factors and test the last three hypotheses?

Pilot Study

A pilot study was conducted with two IT academicians experienced in survey development, three IT executives who have outsourced applications development, and two executives from application development outsourcing providers. The pilot was to ensure that the survey was clear and concise, and that items portrayed their intended meaning. Feedback was also sought on the length of the survey, its overall appearance, and how each participant would react to receiving it in the mail. Comments and suggestions were used iteratively to revise the survey. The comments of each participant were incorporated before meeting with the next participant. The pilot resulted in substantial improvement in the clarity of the survey definitions and items. It also resulted in the addition of one ease of use item - Using application development outsourcing makes it easier to share risk with the vendor. Appendix 1 lists all the survey items along with the instructions to subjects.

Data Collection

To implement the survey, a random sample of 3000 IT executives was drawn from subscribers to an IS application development journal. Subjects were qualified based on their level in the organization. Only those with the level of director or higher were included in the sample. The journal randomized the sample selection. Two mailings were done. The first contained a solicitation letter, the survey, and a postpaid return envelope. The letter also included the URL of an online version of the survey. The second mailing was a reminder card that also pointed to the online version. The IT executives provided a total of 160 usable responses.

Subjects’ demographics indicate they were indeed high level IT executives. They averaged 19.4 years of IS experience, 9.6 with their current employer. In addition, they managed 78 subordinates on average. All subjects indicated they played significant roles in outsourcing decisions for their organizations.

Subjects’ organizations represented a variety of industries. Table 1 summarizes them. The “Other” category includes all industries with only one organization. Subject IT organizations ranged in size from under 50 to over 1000 IT professionals. Just under half employed more than 100 suggesting a good mix of small and large companies. Self reported annual IT budgets ranged from under \$100 thousand to over \$10 million with a nearly identical number above and below \$5 million. Subjects estimated that on average 13.2% of their IT budget was spent on application development outsourcing and 19.7% on all types of IT outsourcing. AD outsourcing decisions were being made in these organizations.

Table 1. Subject Organization Industries

Industry	Number	Percentage
Finance	20	12.50%
Other	19	11.88%
Education	18	11.25%
Manufacturing	18	11.25%
Consulting	15	9.38%
Government	14	8.75%
Communication	9	5.63%
Health Care	8	5.00%
Transportation	7	4.38%
Insurance	6	3.75%
Systems Integrator	5	3.13%
Utilities	4	2.50%
marketing	4	2.50%
software development	4	2.50%
Banking	3	1.88%
Publishing	2	1.25%
Construction	2	1.25%
Legal	2	1.25%

Data Analysis

The data analysis proceeded through two phases. The first addressed the first research question about the applicability of TAM to outsourcing acceptance and the second examined the three antecedents. The following two sections discuss these phases.

The Applicability of TAM

The TAM analysis proceeded through two steps. The first employed exploratory factor analysis (EFA) techniques to establish the validity of the instrument and identify the coping mechanism categories (Hatcher 1994; Stevens 1996). The second used simple linear regression to test the TAM hypotheses in the context of AD outsourcing.

The EFA used the principle factor method with promax oblique rotation. Oblique rotation is suggested when factors are thought to be correlated factors (Harmen 1976; Hatcher 1994). The factors are hypothesized to interrelate. (In fact, the data later showed that each resulting factor correlated with at least one other factor at .24 or higher.) Based on the prior expectation of four TAM factors and the percent of variance criterion (Hatcher 1994) with a five percent cutoff, four factors variables were retained.

In the factor analysis items PU2, PU8, and IN5 cross loaded onto the Attitude construct, indicating multidimensionality in these measures. All three were dropped. Additionally, PU1, PU5 and EOU1 did not load above the recommended .40 cutoff on their factors and were also dropped. All remaining items loaded on their expected constructs. The constructs all had Cronbach alphas of .77 or higher, well within recommended thresholds (Nunnally 1967). This indicated the reliability of the instrument. Table 2 presents the descriptive statistics for the analysis.

Table 2. Final Results of TAM Exploratory Factor Analysis

Item	Attitude Towards Outsourcing	Perceived Usefulness of Outsourcing	Intention to Use Outsourcing	Perceived Ease of Use of Outsourcing
AT2	.90	.03	-.07	-.02
AT3	.79	.08	.09	-.13
AT1	.77	-.09	.09	.11
AT4	.62	-.08	.05	.17
PU4	-.13	.80	.05	.01
PU7	.07	.66	-.13	.06
PU3	.12	.63	.14	-.14
PU9	.28	.55	.09	.02
PU6	-.11	.49	.09	.06
IN2	-.02	-.01	.95	.01
IN1	.02	-.01	.91	.01
IN3	.19	.15	.48	.05
IN4	.17	.25	.41	-.04
EOU2	.04	.07	-.04	.75
EOU1	-.10	-.11	.03	.67
EOU3	.16	.21	.00	.60
EOU4	.26	-.01	.07	.46
Alpha	.87	.82	.87	.77
Eigenvalue	6.833	1.564	0.832	0.688
Percent of Variance explained	71.0	16.3	8.7	7.2

The second step in this analysis employed simple linear regression to test the TAM research hypotheses (H1 through H4). The regression results illustrated in Table 3 indicate that all four hypotheses were strongly supported.

The Effects of the Antecedents

The same two steps were followed to analyze the effects of the three antecedents, the external environment, prior outsourcing relationships, and the perceived risk of outsourcing. An EFA was done including all 42 antecedent items. The expectation was that three factors would emerge. However, five factors accounted for more than five percent of the variance in the data and were retained.

Table 3. TAM Hypotheses Linear Regression Results

Dependent Variable	R ²	F-Value (p-value)	Independent Variable(s) (Hypothesis)	T value (P-value)	Estimate
Intention to Use Outsourcing	.37	93.44 (<.0001)	AT (H1)	9.67 (<.0001)	
Attitude Towards Outsourcing	.45	61.95 (<.0001)	PU (H2) PEOU (H3)	7.11 (<.0001) 5.59 (<.0001)	.4414 .3794
Perceived Usefulness of Outsourcing	.12	20.86 (<.0001)	PEOU (H4)	4.57 (<.0001)	.3769

The initial EFA indicated that the risk items actually loaded on three separate factors. Five items were dropped in subsequent runs. Items EN9, RSK7, RSK15, and RSK17 did not load above .40 on their respective factors and REL9 cross loaded onto one of the risk factors. All remaining items loaded on their expected constructs. The constructs all had Cronbach alphas above .73 indicating the reliability of the instrument. Table 4 presents the descriptive statistics for the analysis. The authors named the three risk factors Project Management Risk, Relationship Risk, and Employee Risk based on an interpretation of the concepts embodied by the items in each. These names are reflected in Table 4.

To test hypotheses H5 through H10, again simple linear regression was employed. Due to the multidimensionality of Perceived Risk of Outsourcing, hypotheses H8, H9, and H10 were replicated into H8a, H8b, H8c etc. Table 5 summarizes the results. Support was found for six of the twelve hypotheses. The effect of Prior Relationships on Perceived Ease of Use (H6, p<.001) and Perceived Usefulness (H7, p<.01) suggest it to be an important antecedent to outsourcing decisions. The risk factors' inverse relationships with the other factors in the model were partially substantiated. Results indicated that Project management risk inversely affected Perceived Ease of Use (H9a, p<.01), Employee Risks inversely influenced Perceived Usefulness (H8a, p<.05) and Prior Relationships negatively affected Relationship Risk (H10b, p<.01). Surprisingly, Employee Risk had a positive affect on Perceived Ease of Use (H9c, p<.01).

A substitute test for response bias compared responses received at different times. The absence of differences would be consistent with the claim that response bias was not present (Anderson and Gerbing 1988). The average responses for all of the factors were tested for responses received before and after the second mailing. None of the t-tests showed the means to be significantly different. Hence, response bias was not found.

Discussion

The use of outsourcing is rapidly expanding. It is even growing outside the realm of IT outsourcing. Outsourcing decisions are strategically important to organizations. While much research has focused on IT outsourcing, little has done so empirically. By empirically focusing on application development outsourcing decisions, this research has made several significant contributions to this body of knowledge.

First, it has contributed by empirically validating that the Technology Acceptance Model has application to a higher unit of analysis, specifically organizational-level decisions. Many organizational-level decisions are ultimately made or strongly influenced by a single individual. This study found that for outsourcing decisions TAM may apply. Perceptions of the Usefulness and Ease of Use of outsourcing strongly influence decision makers Attitudes about and hence their Intention to Use AD outsourcing.

Empirical support was also found for antecedents to these decision maker perceptions. Prior Outsourcing Relationships strongly influence both perceptions. While this seems intuitive, perhaps this study provides the motivation needed for both providers and receivers of outsourcing to attend to existing relationships more carefully. Doing so will relieve Relationship Risk, one dimension of risk identified in the study and increase decision maker perception of outsourcing AD.

Most decisions are made in the face of risk. The three dimensions of risk identified here Employee, Project Management and Relationship Risks also provide needed knowledge for the purpose of outsourcing decision making. These are potential hazards faced when outsourcing. Employee Risks negatively impact the Perceived Usefulness of Outsourcing and Project Management Risks affect perceptions of Ease of Use in the same negative way. Again, both providers and receivers of these services should work to manage these risks.

Table 4. Final Results of Antecedent Exploratory Factor Analysis

Item	Prior Outsourcing Relationship	External Environment	Project Management Risks	Information Risks	Employee Risks
REL11	0.76	-0.07	0.17	-0.07	-0.05
REL4	0.74	0.00	0.06	-0.03	-0.10
REL7	0.68	-0.19	-0.11	0.05	-0.03
REL10	0.67	0.10	-0.07	0.12	-0.12
REL13	0.65	-0.04	0.11	-0.12	0.14
REL1	0.65	-0.23	-0.09	0.05	0.04
REL8	0.65	0.06	0.26	-0.17	0.02
REL3	0.64	0.18	-0.04	-0.01	-0.11
REL2	0.63	0.16	-0.08	-0.03	-0.15
REL14	0.58	0.09	-0.08	-0.02	0.10
REL6	0.56	0.14	0.03	-0.05	-0.08
REL15	0.54	-0.02	-0.21	0.24	0.23
REL5	0.51	-0.06	-0.01	0.00	0.08
REL12	0.51	-0.03	0.01	0.02	0.08
EN6	0.03	0.81	0.10	0.03	0.00
EN3	0.00	0.79	0.05	0.05	-0.01
EN8	-0.06	0.74	0.02	-0.03	0.09
EN1	-0.06	0.73	0.06	0.00	-0.01
EN5	0.02	0.73	-0.17	0.18	-0.04
EN2	0.01	0.71	0.00	0.02	-0.04
EN7	0.02	0.67	-0.03	-0.09	0.08
EN4	0.08	0.41	0.04	-0.02	0.11
RSK4	-0.09	0.09	0.70	0.06	-0.07
RSK3	-0.05	0.09	0.59	-0.12	0.10
RSK5	0.13	0.04	0.54	0.13	0.03
RSK11	-0.06	-0.07	0.50	0.12	0.11
RSK16	-0.04	-0.27	0.46	0.12	-0.07
RSK1	0.07	0.23	0.45	-0.01	-0.02
RSK14	0.06	0.07	-0.13	0.74	0.04
RSK9	0.01	0.04	0.09	0.72	0.00
RSK8	-0.15	0.03	0.11	0.55	-0.18
RSK18	-0.10	0.07	0.07	0.53	0.00
RSK13	0.07	-0.24	0.31	0.45	0.03
RSK12	0.07	0.00	0.27	0.43	0.14
RSK2	0.07	0.02	-0.01	-0.10	0.82
RSK6	0.05	0.05	0.06	0.05	0.78
RSK10	-0.13	0.07	0.04	0.04	0.77
Alpha	.89	.87	.73	.76	.86
Eigenvalue	6.402	5.252	3.487	1.935	1.435
Percent of Variance explained	26.1	21.4	14.2	7.9	5.8

Table 5. Antecedent Hypotheses Linear Regression Results

Dependent Variable	R ²	F-Value (p-value)	Independent Variable(s)	T value (P-value)	Estimate
Perceived Usefulness of Outsourcing	.26	7.57 (<.0001)	5)	3.61 (.0004)	.3441
			REL (H6)	1.16 (.2486)	.0418
			PMRISK (H8a)	2.95 (.0037)	.0983
			RRISK (H8b)	1.21 (.2267)	.0921
			ERISK (H8c)	-1.37 (.1736)	.0863
			-2.53 (.0127)	.2363	
Perceived Ease of Use of Outsourcing	.19	8.10 (<.0001)	REL (H7)	4.25 (<.0001)	.1211
			PMRISK (H9a)	-2.63 (.0094)	-.1770
			RRISK (H9b)	0.05 (.9624)	.0027
			ERISK (H9c)	3.22 (.0016)	.2632
Project Management Risk	.02	2.19 (.1409)	REL (H10a)	-1.48 (.1409)	-.0574
Relationship Risk	.05	6.91 (.0095)	REL (H10b)	-2.63 (.0095)	-.1127
Employee Risk	.01	1.07 (.3029)	REL (H10c)	-1.03 (.3029)	-.0316

PMRISK = Project Management Risk **RRISK** = Relationship Risk **ERISK** = Employee Risk

This research also found no support for the influence of the External Environment on outsourcing decisions. The structured interviews in the model building study (Benamati and Rajkumar 2002) found mixed responses about the importance of the external environment. In spite of assertions that competition may drive the need to outsource, this was not the case in the subject organizations in this study.

Implications for Future Research

The applicability of TAM as a basis for explaining the mediating effects of decision maker attitude on organizational decision making is a major contribution of this study. The instrument developed here based on prior TAM research could provide a basis for other decisions at this level. The decision making processes for outsourcing other IT functions or entirely different decisions could be examined. Additionally, external variables for these alternative decisions could be studied.

Additionally, the antecedents established in this research provide a basis for further study. This study identified Prior Relationships and Project Management, Employee and Relationship Risks as important to the decision. Future research should look more closely at these to both validate and extend these findings. It might also be interesting to explore why Employee Risk had a positive effect on Perceived Ease of Use. Additionally, the antecedents could be examined for other types of outsourcing. They could also be studied across organizations of different size, of different organizational structures, or in different industries. Finally, the R² values in Table 8 indicate that these are not the only antecedents to the outsourcing decisions. The methodology applied here could be used to identify and study other important influential elements in outsourcing decisions.

Conclusion

The use of outsourcing application development is increasing. This study is the first to empirically validate the applicability of Technology Acceptance Model to enhance the understanding of the decision to outsource application development. Decision maker perceptions about outsourcing influence their decisions. The identification of Prior Relationships and the three dimensions of risk; Project Management, Employee, and Relationship Risk as strong influencers of these perceptions is useful knowledge to both decision makers and outsourcing providers. Providers should work to manage decision maker perceptions and decision makers should pay attention to the antecedents that have been identified as influential by others. Researchers can use this work as a platform for future research.

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Appendix 1

For the purpose of this survey, outsourcing vendors are defined as any organization external to your own to which you have in some way transferred responsibility for any type of application development efforts. This definition excludes contract workers.

Industry Environment

Please indicate your level of agreement with the following statements about the industry in which your organization operates.

- EN1 In our industry, price cutting is a common competitive action.
- EN2 In our industry, firms compete intensely to hold and/or increase their market share.
- EN3 In our industry, competitive moves from one firm have noticeable effects on other competing firms and thus incite retaliation and counter moves.
- EN4 In our industry, foreign firms play an important role in industry competition.
- EN5 In our industry, firms have the resources for vigorous and sustained competitive action and for retaliation against competitors.

- EN6 In our industry, price competition is highly intense (i.e. price cuts are quickly and easily matched).
- EN7 In our industry, advertising battles occur frequently and are highly intense
- EN8 In our industry, appropriate terms used to describe competition are "warlike," "bitter," or "cut-throat".
- EN9 In our industry, there is a diversity of competitors (i.e. competitors may be diverse in strategies, origins, personality, and relationships to their parent companies).

Potential Outsourcing Risk

Outsourcing applications development involves a level of risk to the organization requiring the application. To what level do you agree that each of the following is a concern when outsourcing application development in your organization?

- RSK1 Inadequate training/skills needed to manage application development outsourcing
- RSK2 Fear of job loss by employees due to projects being outsourced
- RSK3 Unclear expectations/unclear objectives of outsourcing
- RSK4 Inadequate control mechanisms on the outsourced project
- RSK5 Uncertainties in the environment
- RSK6 Decline in performance of in-house employees due to the project being outsourced
- RSK7 Over emphasis on short term benefits of outsourcing
- RSK8 Meeting and enforcing time schedules are problematic with outsourcing
- RSK9 Security is harder to maintain on outsourced projects
- RSK10 Decline in morale of employees due to outsourcing
- RSK11 Lack of infrastructure to support outsourcing efforts
- RSK12 Excessive length of outsourcing contract
- RSK13 Lack of flexibility by you and/or vendor
- RSK14 Confidentiality is harder to maintain on outsourced projects
- RSK15 Fear of becoming dependent on the outsourcing vendor
- RSK16 Inadequate high level management support for outsourcing
- RSK17 Inadequate knowledge transfer back from the outsourcing vendor
- RSK18 Vendor's lack of knowledge of our business

Perceptions of Outsourcing

Please assess your level of agreement with the following statements relative to outsourcing applications development work in your organization.

- PU1 Using applications development outsourcing improves the IS function's effectiveness
- PU2 Using applications development outsourcing improves the quality of IS applications
- PU3 Using applications development outsourcing allows the IS function to accomplish tasks critical to the organization
- PU4 Using applications development outsourcing allows the IS function to develop more systems than would otherwise be possible
- PU5 Using applications development outsourcing allows the IS function to reduce costs.
- PU6 Using applications development outsourcing helps the IS function meet staffing goals.
- PU7 Using applications development outsourcing allows the IS function to develop systems more quickly than would otherwise be possible
- PU8 Using applications development outsourcing makes it easier to perform IS functions
- PU9 In general using applications development outsourcing is useful.
- EOU1 I understand how to use outsourcing
- EOU2 Using outsourcing does not require a lot of mental effort
- EOU3 I find outsourcing to be easy to use
- EOU4 I find it easy to accomplish what I set out to do through outsourcing
- EOU5 Using application development outsourcing makes it easier to share risk with the vendor
- AT1 I like using application development outsourcing.
- AT2 Outsourcing provides an attractive alternative to in house application development.
- AT3 Using application development outsourcing is in general a good idea
- AT4 Using application development outsourcing creates a pleasant project environment
- IN1 Assuming I have an outsourcer for applications development, I intend to use them.

- IN2 Given that I have access to an outsourcer for applications development I predict that I would use them.
- IN3 I intend to increase my usage of application development outsourcing in the future
- IN4 I intend to use application development outsourcing as often as needed
- IN5 To the extent possible, I would use application development outsourcing frequently.

Outsourcing Relationships

If your organization has never outsourced application development work, please skip to the Demographic Information section. Otherwise, please think about your organization's relationships with past outsourcing vendors and indicate your level of agreement with the following statements.

- REL1 We generally trusted our vendors.
- REL2 Flexibility in response to requests for changes was a characteristic of past relationships.
- REL3 We kept each other informed about events or changes that might have affected the other party.
- REL4 Both our vendors and us did not mind helping each other out.
- REL5 If we were unable to monitor our vendors' activities, we trusted them to fulfill their obligations
- REL6 Both us and our vendors expected to be able to make adjustments in the ongoing relationships to cope with changing circumstances
- REL7 We trusted our vendors to carry out important project-related activities
- REL8 Problems that arose in the course of these relationships were treated by both us and our vendors as joint rather than individual responsibilities.
- REL9 We were willing to let our vendors make important decisions without our involvement
- REL10 In these relationships, it was expected that any information that might have helped the other party would be provided to them.
- REL11 Both our vendors and us were committed to improvements that benefited the relationship as a whole, and not only the individual parties.
- REL12 When some unexpected situation arose, together with our vendors, we worked out a new deal rather than hold each other to the original terms
- REL13 We trusted our vendors/vendors to do things we could not do ourselves
- REL14 Exchange of information in these relationships took place frequently and informally, and not only according to a prespecified agreement
- REL15 It was expected that we and our vendors would share our proprietary information if it could help the other party.