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Acceptance and Rejection: Two Sides of the Same Coin, or Two Different Coins?

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ABSTRACT

Technology acceptance is a topic that has garnered the attention of MIS researchers for years. Unfortunately, this stream of research is largely cross-sectional in nature, studying the phenomenon at only one point in time.

In addition it is widely assumed that the models used to explain acceptance would also explain resistance or rejection. This study addresses these issues by looking at technology use over time in order to determine whether the factors leading to acceptance are the same as those leading to rejection.

Using the Unified Theory of the Acceptance and Use of Technology (UTAUT) model as the framework, it was found that while the model adequately explained the reasons for acceptance, it did not fully explain outright or post-adoption rejection. Rejecters and adopters cited various reasons for their adoption decision, and differed on a few key characteristics. Finally, the consequences of the initial software experience were examined in order to show its effect on future use.

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INTRODUCTION

The acceptance of information technology (IT) is one of many critical success factors to IT project implementation and success. The cost of failure of an IT project can be significant. The consulting firm KPMG recently conducted a survey of 134 European companies and found that the average cost of IT project failures was $14 million, with one reaching $240 million (Anonymous 2003). A new trend is for organizations to implement Enterprise Resource Planning (ERP) systems. These integrated packages are very expensive, and so rejection of these systems can cost organizations hundreds of millions of dollars (Robey et al. 2002).

One source of project failure is employee resistance (Pinto et al. 1990). IT projects can also fail through project abandonment. In a study of IT project abandonment, 23 of 49 companies surveyed had totally, substantially, or partially abandoned an IT project in the recent past (Ewusi-Mensah et al. 1991). Besides total abandonment, another way IT projects can fail is underutilization of systems (Gefen et al. 1998). Lack of user acceptance of IT can be a contributing factor to both project abandonment and system underutilization.

While early acceptance studies were cross-sectional, (see Davis 1989; Davis et al. 1989), many recent studies contain longitudinal designs (Venkatesh 2003). Longitudinal designs allow researchers to move beyond the study of initial acceptance, and onto the factors influencing post-adoption behavior, including rejection (Jasperson et al. 2005; Lippert et al. 2005; Pollard 2003).

This paper contains an empirical study that explores three related research questions:
Research Question 1 (RQ1): Do current models of acceptance also explain rejection?
Research Question 2 (RQ2): Are the characteristics of adopters different from those of rejecters?
Research Question 3 (RQ3): What happens post-adoption?

REVIEW OF RELEVANT LITERATURE

UTAUT Model Framework

A recent work by Venkatesh et al. (2003) introduced a new model of individual user technology acceptance. This model combined elements of eight prior acceptance models, and contained a number of new constructs designed to explain behavioral intentions and actual use of technology. The new model constructs are performance expectancy (analogous to perceived usefulness from the Technology Acceptance Model (TAM)), effort expectancy (analogous to perceived ease of use from TAM), social influence (similar to social norms from the Theory of Reasoned Action), and facilitating conditions (similar to facilitating conditions from the Theory of Planned Behavior). In an empirical study, the new UTAUT model explained 70% of the variance in user intentions, while past TAM studies have only explained between 17-42% of the same variance (Venkatesh et al. 2003). A common research assumption is that the same variables that help explain acceptance will also explain rejection. This assumption will be empirically tested as RQ1.

Post-Adoption Behavior

The influencers of post-adoption behavior and the consequences of the initial acceptance decision on post-adoption behavior have been recently explored in the MIS literature. Lippert et al. (2005) tested a model in which perceived usefulness, perceived ease of use, and prior technical knowledge were hypothesized to influence post-adoption behavior. Lippert's model is based on Innovation Diffusion Theory (Rogers 1995) and TAM among others. It is conceptually similar to the UTAUT study that looked at technology acceptance over time. The same variables that explain initial acceptance are being used to explain post-adoption behaviors.

In another study on post-adoption behavior, Pollard introduced the idea that there might be more than adopters and rejecters of technology. A third type of person, deemed a stalled user, was discovered in an empirical study. Stalled users are those who accepted a technology, stopped using it, but intend to use it again (Pollard 2003). It was found that stalled users need additional organizational support, including timely and frequent training, an enthusiastic departmental champion, and a better explanation of task-technology fit, to move back to use again (Pollard 2003; Goodhue et al 1995).

Jasperson et al. (2005) take a very different approach to post-adoptive behavior. In the theoretical model presented in their publication, both individual and organizational factors are considered. While most models examine individual cognitions, they fail to take into account the influence of the organizational environment on adoption decisions. Jasperson et al. (2005) theorize that post-adoption behavior can be explained in part by individual perceptions, and in part by the organizational context, including work interventions (training) and work system sensemaking (whether the post-adoption consequences matched the pre-adoption impressions).

In summary, some models of post-adoption behavior have been very similar to models of initial acceptance (Lippert et al. 2005) while others are more complex in nature and consider variables not included in typical acceptance studies (Pollard 2003; Jasperson et al. 2005).

Resistance Models

Resistance to technology is a well-studied phenomenon. Lapointe et al. (2005) recently published an article that summarized four past models of technology resistance. Resistance and rejection have been attributed to the stress caused by the introduction of the new system (Marakas et al. 1996), to perceived power inequalities caused by the introduction of the new

system (Joshi 1991), and to power loss for some organizational employees caused by the introduction of the new technology (Markus 1983). These studies show that the factors that cause resistance and rejection are not simply the negative side of the factors that lead to acceptance. So an incorporation of these past ideas into new models of post-adoption rejection should be considered.

In order to examine the three research questions outlined in the introduction, an empirical study was conducted using the UTAUT model as the framework for acceptance. The next section outlines the empirical study undertaken to investigate the three previously stated research questions.

METHODOLOGY

RQ1 asked whether the same factors that helped explain acceptance of technology would also help explain resistance and/or rejection. UTAUT was selected as the model framework, because it was shown empirically to be superior to past individual acceptance models.

Context

Students from an introductory course in Production and Operations Management (POM) at a large public university in the Southwestern United States participated in the study. The new technology that was used to measure acceptance and/or rejection was DS for Windows 2.0, a software package designed to accompany POM courses, and aids in problem solving. Participants were given extra credit during the course for answering surveys about their perceptions of this new technology, and were informed that the software printouts could be used in lieu of writing by hand to complete the five homework assignments.

A hands-on training session was administered at the beginning of the semester to give the participants a basic understanding of how the software operated. Included in the training session was a 13-minute Power Point presentation prepared by the software developer. This presentation included all of the basic navigation and help functions of the software (http://wps.prenhall.com/wps/media/objects/89/91661/pom/main/POM_Tutorial.html). Following the presentation, the course instructor completed a linear programming problem with the software. Students were then required to solve two more problems on their own, and submit the solution files to the instructor as proof of completion. It is worth mentioning that at no point during the training session did the instructor indicate any preference for the use of the software, so as not to sway the participants toward use or non-use.

Participants who 1) attended the training session, 2) completed the homework assignments, and 3) submitted the associated surveys about their perceptions of the software were included in the final sample. Of the 120 students who started the course, 79 students fully participated and were included as subjects in this study.

Measurement Instrument and Timing

During the second week of the course, a short questionnaire was given to determine the age, gender, general computer experience, and DS for Windows experience of the subjects. The results showed that none of the participants had used the software before the training session. One week prior to the homework due date for each assignment, a survey instrument was administered.

The UTAUT model constructs of performance expectancy (PE), effort expectancy (EE), social influence (SOC), facilitating conditions (FAC), and behavioral intentions (BI) to use

technology were measured. Additionally, information was collected about attitude (ATT), self-efficacy (SE), and computer anxiety (ANX). Each of these constructs consisted of four items (except for the three-item intentions scale) and all were measured on a seven-point Likert scale with "strongly agree" and "strongly disagree" acting as the two anchors. In addition, subjects were asked to list three reasons why they completed their homework in the manner selected. This was done to determine if the quantitative data collected matched the qualitative reasons for use or non-use.

Both behavioral intentions to use technology and actual use was measured at each of the five assignment due dates. Participants were classified as software users for that time period if they submitted both the printouts and computer files associated with the particular assignment. In this way, both intentions to use technology and actual use could be captured and tested in the UTAUT model framework.

In order to explore the reasons for post-adoption rejection of technology, more than one time period is necessary. The results of this longitudinal study show that time periods 3-5 were similar to those of period 2. Thus, only the results from the first two time periods will be reported. Post-adoption consequences will be discussed using all five time periods.

Regression will be used to examine the efficacy of the UTAUT model. Paired t-tests will be used to examine the differences between the two time periods. Finally, subjects will be divided into three groups: adopters, post-adoption rejecters, and outright rejecters. An ANOVA will be conducted with post-hoc tests to determine the important factors and differences between groups.

RESULTS

Time Period 1 – Measuring Initial Acceptance

Similar to many cross-sectional studies, the results of the first time period could be labeled initial acceptance. Hierarchical regression was run with behavioral intentions as the dependent variable, gender, age, and computer experience as moderators, along with the main effect variables of EE, PE, and SOC. Since none of the moderators were significant at any point in time, the reported results will only include the main effect variables.

During the first time period, both the overall model and the individual variables PE and EE were significant predictors of BI. The model did an excellent job, explaining nearly 55% of the variance in user intentions. Below, Table 1 shows the regression results of time period one.

Table 1 – Time Period 1 Regression Results – Dependent Variable = BI

	Overall Model		
R	R^2	Adjusted R^2	p-value
.739	.546	.528	.000
Variable	Standardized Beta Coefficients	t-value	p-value
PE	**.573**	**5.497**	**.000**
EE	**.274**	**2.788**	**.007**
SOC	-.053	-.568	.572

Over 55% (44 out of 79) of the subjects used the technology during the first period. This high level of use is attributable to the high mean values for PE (5.69) and EE (5.46), the recent and relevant training session, and possibly a novelty effect. See Table 2 for descriptive statistics.

Table 2 – Descriptive Statistics

N = 79

	Time 1		Time 2	
Variables	**Mean**	**SD**	**Mean**	**SD**
PE	5.69	1.32	5.39	1.46
EE	5.46	1.22	5.43	1.31
SOC	4.51	1.15	4.21	1.09
FAC	5.5	1.03	5.71	1.04
BI	5.48	1.66	5.00	1.87
USE	0.56	0.5	0.25	0.44
Age	26.39	6.86		
Gender	0.49	0.50		
CompExp	8.89	5.10		

Time Period 2 – Post-Adoption Results

During the second time period, both the overall model and the PE construct were significant. EE was no longer significant, which is similar to past research findings where the effects of ease of use diminish over time (Venkatesh et al. 2000). The model again performed well, explaining nearly 50% of the variance in user intentions. Below, Table 3 shows the regression results of time period two.

Table 3 - Time Period 2 Regression Results – Dependent Variable = BI

	Overall Model		
R	R^2	Adjusted R^2	p-value
.699	.488	.468	.000
Variable	Standardized Beta Coefficients	t-value	p-value
PE	**.588**	**5.273**	**.000**
EE	.102	.935	.353
SOC	.084	.913	.364

During the second time period, 25% (20 out of 79) of the participants used the technology. To determine if the UTAUT model could explain this drastic use difference between time 1 and time 2, paired t-tests were conducted between the model constructs. If the significant UTAUT model constructs PE and EE were much lower in time period 2, and if BI and FAC were also lower, this would indicate that the model itself could predict the decrease in both user intentions and actual use. If not, factors outside the model need to be considered as possible reasons for post-adoption and outright rejection.

Paired t-tests

For each construct, the scores from the four items that comprised the scale were averaged. From this, an overall class average was generated. Table 2 shows the overall class averages, as well as some general demographic variables. Paired t-tests were conducted to determine the differences between the two time periods, as shown in Table 4. Significant differences were found for BI, USE, and SOC. Intentions to use and actual software use were significantly lower during time 2 than they were during time 1. SOC was also significantly lower during time 2, but since this variable was not an important predictor of intentions, the difference does not help explain why software use fell so dramatically. EE remained virtually unchanged during the two time periods, and FAC, a predictor of USE, actually increased at time 2. While not statistically significant at the alpha = .05 level (p-value =.06), the PE construct was lower during time period 2 than it was during time period 1. Since PE was the most important predictor of intentions, any decrease in PE could help explain why intentions (and therefore use) fell during time 2. At both points in time, however, participants deemed the software to be highly useful (5.69 and 5.39 respectively).

Research Question 1

The paired t-tests showed that the variables in the UTAUT model did not adequately explain the decrease in both intentions and actual use from time period 1 to time period 2. Other factors, outside of the UTAUT model, must be explored to explain the dramatic difference in USE between the two time periods. Hence the answer to RQ1 is that the current best model of user acceptance does not adequately explain rejection.

Table 4 – Paired T-tests of UTAUT constructs

Construct	Mean	Mean Difference	p-value
PE – t1	5.69		
PE – t2	5.39	.30	.061
EE – t1	5.46		
EE – t2	5.43	.03	.812
SOC – t1	**4.51**		
SOC – t2	**4.21**	**.30**	**.013**
FAC – t1	5.54		
FAC – t2	5.71	.17	.112
BI – t1	**5.48**		
BI – t2	**5.00**	**.48**	**.011**
USE – t1	**.56**		
USE – t2	**.25**	**.31**	**.000**

Differences Between Groups

The subjects in this study were then separated into three groups; those that used the software both times were called adopters (16 subjects), those that used it during the first time period only were called post-adoption rejecters (31 subjects), and those that never used it were

called outright rejecters (28 subjects). Only four subjects switched from non-use in the first period to use in the second period, so it was difficult to make any judgments about this group. The descriptive statistics from each group are presented in Table 5.

Table 5 – Descriptive Statistics By Group

	Outright Rejecters			Adopters			Post Adoption Rejecters		
Variables	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
PE1	28	5.63	1.34	16	6.53	0.39	31	5.19	1.44
EE1	28	5.43	1.21	16	6.06	0.77	31	5.07	1.31
ATT1	28	5.27	1.36	16	6.19	0.78	31	4.91	1.19
SOC1	28	4.59	1.10	16	4.67	1.35	31	4.25	1.11
FAC1	28	5.56	1.20	16	5.92	0.71	31	5.23	0.99
SE1	28	5.04	1.19	16	4.91	1.34	31	5.14	1.14
ANX1	28	2.32	1.19	16	2.09	1.09	31	2.93	1.51
BI1	28	5.58	1.37	16	6.65	0.56	31	4.67	1.92
PE2	28	5.74	1.03	16	6.33	1.52	31	4.59	1.40
EE2	28	5.56	1.12	16	5.70	1.57	31	5.15	1.30
ATT2	28	5.27	1.13	16	5.80	1.45	31	4.78	1.17
SOC2	28	4.10	1.28	16	4.44	1.23	31	4.09	0.78
FAC2	28	5.88	0.94	16	5.98	0.96	31	5.32	1.12
SE2	28	4.70	0.93	16	4.79	1.38	31	4.61	1.22
ANX2	28	2.03	0.92	16	1.77	1.13	31	2.85	1.57
BI2	28	5.35	1.51	16	6.13	1.63	31	3.96	1.86
GENDER	28	0.54	0.51	16	0.56	0.51	31	0.39	0.50
AGE	28	24.73	4.80	16	29.13	8.23	31	27.18	7.50
COMPEXP	28	8.15	4.03	16	12.10	8.21	31	7.68	3.21

Analysis of Variance (ANOVA) was conducted to determine group differences. When the groups were compared on the UTAUT model constructs, no differences were found between adopters and post-adoption rejecters. Differences were found, however, between outright rejecters and the other two groups of subjects. The significant differences are presented below in Table 6.

Table 6 – Significant Group Differences on UTAUT Model Constructs

Construct	Difference	p-value
Post-adoption rejecters compared to outright rejecters	1.15 points higher on PE	.044
Post-adoption rejecters compared to outright rejecters	1.39 points higher on BI	.007
Adopters compared to outright rejecters	1.74 points higher on PE	.048
Adopters compared to outright rejecters	2.17 points higher on BI	.033

Outside of the UTAUT variables, only three significant differences were found on the variables of age, gender, and general computer experience. These differences are summarized below in Table 7.

Table 7 – Group Differences on Non-UTAUT variables

Construct	Difference	p-value
Post-adoption rejecters compared to outright rejecters	2.45 years younger	.044
Adopters compared to post-adoption rejecters	4.1 more years of general computer experience	.048
Adopters compared to outright rejecters	4.4 more years of general computer experience	.007
Adopters compared to outright rejecters	1.08 points lower on computer anxiety	.033

What these results seem to indicate is that subjects in the adopters group had significantly more computer experience than subjects in either type of rejecter group. Another important finding is that the subjects in the group of outright rejecters were significantly older than the

group of post-adoption rejecters. This suggests that the younger subjects were more willing to initially try the software, but no more likely to continue to use post-adoption.

Additional factors outside of the UTAUT model that could explain outright and post-adoption rejection were discovered through the use of the qualitative question: "List three reasons for use or three reasons for rejection of the technology."

Adopters indicated that the reasons for use included: the assignment could be completed more quickly with software use than by hand (performance expectancy), the software was easy to use (effort expectancy) and that the software made their work more accurate (again, performance expectancy). This fits with the idea that UTAUT does a good job of explaining acceptance.

While availability should have been captured in the facilitating conditions construct, it apparently was not. During the second time period, the class average for facilitating conditions was 5.71 on a seven-point scale, and was higher than in the first period. The instructor made the software available for download, but many of subjects claimed that the lack of availability is what caused them to reject the software. Acceptance studies often look at technology in organizations where the software has already been installed and is readily available. Since more work in organizations is being accomplished off-site, this finding suggests that the technology needs to be made available wherever and whenever users need it.

Most technology acceptance studies assume that the introduced technology replaced some traditional work method. This is not always the case. Technology often changes work processes, and when it does, both the technology and the work process are new. A similar situation occurred in this study, as both the technology and the subject matter were new. These participants indicated that learning the work process was important, and claimed that technology

use hindered this learning process. In summary, outright rejecters explained their three reasons for non-use: the software could not be used on exams (performance expectancy), it was not readily available, and its use hindered the learning process.

Post-adoption rejecters were an interesting group. They shared the positive comments of the adopters (fast, accurate and easy to use), and the negative comments of the outright rejecters (not useful, not readily available, and not conducive to learning). Perhaps it is because they have experienced both positive and negative consequences from the software use and can understand both the benefits and drawbacks.

Some subjects in this group also indicated that the software was hard to use. What this suggests is that one-time, introductory training programs are not adequate. The training session introduced general navigation, data entry and help functions, but not the specific knowledge necessary to accomplish all the tasks that the subjects would face. The managerial significance of this finding is that timely and relevant training must be administered to employees.

Summary of Results

RQ1 asked whether UTAUT explained both acceptance and rejection. From the regression results, it was found that PE, EE and SOC predict BI, lending support for the idea that current models do a good job of explaining acceptance. The paired t-tests, however, showed that the decrease in both intentions and use of the software could not be explained by the same variables. Post-adoption rejecters echoed comments from both adopters and outright rejecters, and also added that the software was difficult to learn. The findings of this study indicate that many of the factors for rejection are outside the scope of the UTAUT model.

RQ2 asked whether the characteristics of the three groups of subjects were different. Adopters had significantly more computer experience than the other two groups, indicating that

those with more experience were more likely to belong to the accepter group. Post-adoption rejecters were significantly younger than the subjects in the outright rejecter group, indicating that younger people are more likely to try, but no more likely to continue on with software use.

RQ3 asked what happened after post-adoption. If extrapolated over the five time periods in the study, it was found that those labeled as outright rejecters were highly likely to remain in this group (84% of the subjects in this group never used the software). Those subjects in the post-adoption rejecter group were very likely to remain as non-users if a perceived negative outcome was experienced after initial use (68% of the subjects in this group only used the software during the first period). Subjects in the adopter group were likely to continue their use throughout the duration of the study (69% of the subjects in this group used the software for four or more of the assignments). Echoing the findings of Jasperson et al. (2005), post-adoptive use would continue if users experienced positive consequences, but would cease if negative consequences were experienced, since the software method of problem-solving had not become a fully formed habit.

DISCUSSION

Managerial Significance

Since the reasons for rejection are often different from the reasons for acceptance, it is shortsighted for managers to only focus on the usefulness and ease of use of software. While performance expectancy was found to be very important, lack of adequate training, software availability and the hindrance of learning work processes were reasons for rejection. Managers need to make training programs timely and specific to the task at hand, similar to Lippert et al. (2005). Due to the changing nature of where work is completed, software needs to be available

when and where employees need it. If work processes change due to a technology change, employees need an understanding of the new process and not just how the software operates. If training only occurs with the technology, software crashes will cause the workflow to stop.

Limitations / Future Research Directions

Three issues pose potential threats to the generalizability of the findings in this study. The sample size was relatively small, with 79 subjects fully participating in the study. Future research in this area should be conducted with larger samples. Due to the availability of subjects, this study was conducted in an educational setting. Replications need to be conducted in business organizations to ensure the generalizability of the results. This concern was mitigated, however, by the nature of the particular campus, where the students were generally older than typical undergraduates, and many were employed full-time. Finally, this study was conducted using only one piece of technology. Replications should be conducted using a wider variety of software packages to ensure that the results are not software-specific.

Resistance and rejection are concepts that, while related, are not just the negative side of acceptance. In studying the phenomenon of post-adoptive behaviors, one should look to past research on resistance for factors leading to both initial and post-adoptive rejection. Organizational variables such as availability of software and adequate training cannot be ignored. Finally, more complex models that incorporate both individual cognitions and the organizational environment (i.e. Jasperson et al. 2005) need to be empirically tested.

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