JOURNAL OF INFORMATION SYSTEMS
Vol. 25, No. 1
Spring 2011
pp. 109–128

American Accounting Association
DOI: 10.2308/jis.2011.25.1.109

The Effects of Process Accountability on Individuals' Use of a Familiar Technology

Robert M. Cornell
Oklahoma State University

Martha M. Eining
Paul Jen-Hwa Hu
The University of Utah

ABSTRACT: Individuals' technology use decisions are critical to the success of information technology in an organizational context. We investigate the influence of process accountability on individual professionals' intended and actual use of a familiar technology in decision-making tasks directly related to their work role by anchoring in the core constructs of the technology acceptance model (TAM). Our focus differs from traditional initial user acceptance research in that participants have considerable knowledge about and experience with the focal technology. According to results from an experiment involving 130 participants, process accountability has a significant, positive effect on perceived technology usefulness, intention to use, and actual technology use. Further analyses show that perceived technology usefulness mediates the accountability-intention relationship and intention to use mediates the accountability-actual use relationship. By incorporating process accountability into the TAM and empirically testing its effects, we shed light on the causal link between process accountability and people's perceptions of a familiar technology's usefulness, as well as their intentions and actual use of the technology. Our findings show that process accountability, a source of extrinsic motivation commonly found in business work contexts, has important effects on people's decisions to use a familiar technology in work-related decision-making tasks. We extend user technology acceptance research by connecting motivation theories, cognitive information processing, and user technology acceptance, particularly in scenarios that involve voluntary use of familiar technology, and the requirement to justify the procedure used for deriving a decision or completing a problem-solving task. Our findings have several important implications for technology acceptance decisions and management practice.

Keywords: process accountability; extrinsic motivation; technology acceptance; technology use; familiar technology.

This paper has benefited from the comments of the editor, associate editor, and two anonymous reviewers. We thank Kathy Hurtt, John Marsh, Brad Schafer, Perry Solheim, Rick Warne, participants and the discussant at the American Accounting Association Information Systems Section Meeting, and workshop participants at The University of Utah and Oklahoma State University.

Published Online: March 2011

Data Availability: Contact the first author.

I. INTRODUCTION

The incorporation of information technology into work roles by targeted users is essential in organizational contexts, yet technological advancements continue at a more rapid rate than our understanding of the important issues surrounding technology (Karahanna and Straub 1999; Venkatesh and Davis 2000). This alarming phenomenon underscores the intriguing disparity between technology investments by firms and actual benefits realized (e.g., Brynjolfsson and Hitt 1996; Santhanam and Hartono 2003). Therefore, continued investigations of individuals' voluntary technology use in their work settings, particularly in scenarios involving important decision-making tasks central to the work role, are warranted. Successful technology implementation, characterized by extensive and routine technology usage, can enhance both individual productivity and firm competitiveness (Venkatesh 2000); however, failures can be costly and often have a substantial, adverse impact on user experience and satisfaction, as well as firm performance.

Our study focuses on the voluntary use of a *familiar* technology in a decision-making context, a topic that seems to receive increasing research attention (e.g., Karahanna et al. 1999; Bhattacherjee 2001; Bhattacherjee and Premkumar 2004; Venkatesh 2006). This research proposes and validates a model, premised in the TAM, for technology usage by adding an important factor (process accountability, *PA*), examines the model in the context of the use of a familiar technology, and empirically tests the restated model with an emphasis on how accountability affects the use of information technology in a professional decision-making setting. Our focus differs from traditional initial user acceptance research because our participants have considerable knowledge about the technology under examination; many of them have used it in various tasks at work. We consider user acceptance interchangeable with user adoption and refer to it as including both a person's intended and actual use of a technology. Our overall research question is how accountability for the procedure used to complete a decision-making task may affect an individual's intended and actual use of a familiar technology.

Accountability refers to the need to justify a decision or decision-making process to others, a crucial extrinsic motivation common to business professionals (Tetlock 1983; Kennedy 1993; Siegel-Jacobs and Yates 1996). Although not yet directly linked to technology use, this extrinsic motivation may influence working professionals' decisions regarding technology use. Previous studies report that in various decision-making contexts, accountability can affect the complexity of a person's thoughts and elaboration (Petty and Cacioppo 1979; Tetlock 1983; Kennedy 1993; Rich 2004), which in turn can directly or indirectly influence his or her decision to use a technology.

Several theoretical models have been applied to explain or predict various technology acceptance phenomena. Among them, the TAM, a parsimonious model with robust theoretical premises and ample empirical support (Davis 1989), offers a general lens through which a broad array of technology acceptance phenomena can be analyzed. Thus far, the TAM has been used mostly to assess initial user acceptance of a new technology, with a few exceptions, e.g., Hu et al. (2003), Avlonitis and Panagopoulos (2005), and Loraas and Wolfe (2006). Prior research examining extrinsic motivation in the context of technology acceptance predominantly emphasizes the sources of extrinsic motivation that directly link to technology use or its determinants (e.g., Davis et al. 1992; Cocosila et al. 2009). Investigations of user technology acceptance also have expanded to include people engaged in various work roles (e.g., Bedard et al. 2003; Wolfe et al. 2005; Pennington et al. 2006; Greenfield and Rohde 2009; Kim et al. 2009).

In a controlled experiment, we manipulated the presence versus absence of *PA*. Participants chose freely between using and not using a familiar computer-based spreadsheet program to complete a "make-versus-buy" decision common to business managers and accountants. Specifically, we examined the effects of *PA* on participants' perceptions of the usefulness (*PU*), intention

to use (*IU*), and actual use (*AU*) of the familiar technology.[1] Our study design stipulated the presence of a superior who had authority but did not make his or her preferences known to participants, which created a *PA* requirement that we anticipated to induce more effortful and analytical cognitive efforts from the participants than they would expend otherwise. That is, the manipulated *PA* should have influenced the participants' perceptions of a technology's usefulness, which then directly affected their decision to use the technology.

According to our results, people are more likely to use a familiar technology when they are accountable for the procedure used to arrive at their decision than they would be otherwise. Furthermore, the participants in the accountable condition exhibited a stronger intention to use a familiar technology than did their counterparts who were free of such accountability requirements. We find that perceived usefulness has a significant mediating effect on the impact of process accountability on an individual's intention to use a familiar technology, and that intention to use the technology mediates the relationship between process accountability and actual technology use. We thereby validate this adaptation of TAM to include acceptance decisions associated with familiar technologies.

The organization of the remainder of the paper is as follows. In Section II, we describe our research framework and the specific hypotheses to be tested. Then, in Section III, we detail our study design and data collection, followed by the analysis results and their implications for decision-making and management practice in Section IV. We conclude in Section V with a summary and discussion of the study's contributions and limitations, as well as some future research directions.

II. RESEARCH FRAMEWORK AND HYPOTHESES

Integrating technology into work tasks and business processes has become an essential aspect of research examining individuals' technology use (Venkatesh 2006). Of particular importance is the use of a familiar technology in work settings, because its use is indispensable to organizations' ability to harness a technology's long-term benefits (Kim and Malhotra 2005). Despite its criticality, people's intention and actual use of a familiar technology in routine tasks directly related to their work roles have received little attention (Schepers and Wetzels 2007).

Previous studies examine decisions regarding technology acceptance by accountants (Wolfe et al. 2005; Pennington et al. 2006; Curtis and Payne 2008; Schafer and Eining 2006; Chandler Diaz and Loraas 2010), healthcare professionals (Chau and Hu 2001; Yi et al. 2006), and law enforcement officers (Hu et al. 2005). Examining technology use by working professionals is essential as the technologies deployed at an increasing pace in various work environments have become integral to professionals' job tasks and services. Conceivably, business professionals, including accountants and financial analysts, have important job requirements and characteristics that may affect their decisions on whether to use a technology in their routine tasks. However, our review of the literature reveals few studies of business professionals' technology use in their decision-making tasks.

Overview of Accountability and Process Accountability

Accountability, a form of external regulation that involves both a critique of performance and social approval implications, prevails in many professional work environments. By and large, accountability refers to the explicit expectation that a person may be called on to justify his or her

[1] Perceived ease of use refers to the degree to which a person believes technology use will be free of effort. Perceived ease of use seems to affect initial technology acceptance (Davis 1989; Venkatesh et al. 2003), but not continued acceptance (Szajna 1996). Our discussion of the theoretical basis omits two constructs associated with the TAM, attitude and perceived ease of use, because they are not the focus of our study.

beliefs, feelings, and actions to others (Tetlock 1992), and to the perception that people, when determining whether to perform a behavior in question, respond to influences from those whom they esteem (Fishbein and Ajzen 1975). Furthermore, accountability connotes reward versus punishment, whether implicitly or explicitly. Accountability can derive from external observations of job performance, the consequences of a decision or course of action, or the procedure and reasoning that led to a decision.

When extrinsically motivated through the requirement to explain (justify) a decision or the procedure used to reach the decision, a person may perform a task out of a desire to achieve a positive outcome, rather than for personal enjoyment. That is, an accountability requirement conveys negative consequences for those who fail to provide an acceptable justification for their behaviors, and signals that those who provide one will be rewarded. As a result, people perform the task with the belief that a superior will scrutinize their action at a later time and reward or sanction them accordingly. Previous research shows accountability to significantly impact people's judgments and decisions, as well as their processing of the available information in making decisions (Lerner and Tetlock 1999).

Accountability can be classified as either process (procedural) accountability (*PA*) or outcome accountability (OA), which can induce different cognitive processing (Siegel-Jacobs and Yates 1996). In general, *PA* requires a person to justify the means by which he or she arrived at a decision or the procedure selected to analyze the information, whereas OA emphasizes the quality of the decision or its outcome. Findings from prior research show that accountability can induce open-minded, analytical, and critical thinking during the decision-making process (Tetlock 1983). In particular, *PA* seems more likely to induce comprehensive reviews of information and thorough analyses of alternatives than does OA (Siegel-Jacobs and Yates 1996). According to Lerner and Tetlock (1999), people are likely to engage in comprehensive, open-minded, and extensive analytical thinking when they need to respond to an audience that is well informed about the task domain, knowledgeable about the focal decision topic area, interested in the process used to make a decision rather than the decision itself or the outcome of the decision, or endowed with a legitimate reason for inquiring about the decision-making process. Our study empirically examines the influences of *PA* on voluntary use of a familiar technology rather than on the longitudinal changes in important determinants between initial user acceptance and post-adoption technology use on the basis of the expectation-disconfirmation theory (Bhattacherjee 2001; Bhattacherjee and Premkumar 2004), a critical aspect of technology use that has received little attention.

The choice of a particular information-processing method to complete a decision-making task can be analyzed through the lens of the elaboration likelihood model, which identifies two processing routes: a central route and a peripheral route (Petty and Cacioppo 1979). According to this model, people motivated by sufficient compensation or by fear of appearing foolish in front of an audience are likely to take the central route of information processing by engaging in deep, effortful thinking when they are required to explain or justify their decision-making. The central route entails surveying a fuller range of relevant cues and paying closer attention to the analysis, examination, and interpretation of each individual cue, as well as their integration, than does the peripheral route, an alternative processing that demands considerably less cognitive effort. People may employ the peripheral route when they do not have to consider or analyze all of the available cues in a detailed and comprehensive manner. When taking this route, people can apply general principles or heuristics to make decisions without engaging in effortful thinking and thorough processing of all available information.

The choice of the appropriate information-processing route can be task-specific. The effortful, analytical cognitive efforts induced by *PA* appear optimal in decision-making that involves complex and relatively unstructured tasks. Conceivably, these cognitively intensive efforts demand substantial time and mental resources and therefore may negatively affect intrinsic motivation.

However, according to our literature review, people accountable for the procedure used to reach a decision are likely to examine most, if not all, available information to complete the task. Because of this tendency, their desire to use an adequate, familiar technology for enhanced job performance should increase.

User Technology Acceptance Research

User acceptance is indispensable to the success of a technology in an organization and, thus, has been studied extensively. The TAM, adapted from the theory of reasoned action (Ajzen and Fishbein 1980) and developed specifically to explain technology acceptance by individuals (Davis et al. 1989), has gained remarkable prevalence. According to the TAM, a person's acceptance of a technology is jointly determined by his or her perceptions of the technology's usefulness and ease of use. Perceived usefulness refers to the extent to which a person believes that his or her use of the technology can increase job performance (Davis 1989). Therefore, those who perceive a technology to be useful likely will have positive beliefs toward or assessments of the technology and its use. Perceived ease of use refers to the degree to which a person believes his or her use of a technology will be free of effort. Perceived ease of use seems to affect initial technology acceptance (Davis 1989; Venkatesh et al. 2003), but not continued acceptance (Szajna 1996).

Although it accounts for considerable variance in intended or actual technology use, the TAM is parsimonious and therefore offers limited insights into people's motivations, effective management interventions for desirable technology use, or systems development practices that can foster technology acceptance. To mitigate these intrinsic constraints, efforts in extending the model have been undertaken, e.g., Venkatesh et al. (2003), Venkatesh (2006), and Im et al. (2008). Motivation theories have also been considered, particularly with respect to the role of motivation in influencing user decision-making through perceived usefulness (Davis et al. 1992; Venkatesh 1999; Venkatesh 2000).

The impact of motivation, both intrinsic and extrinsic, on voluntary technology acceptance appears prominent (Davis et al. 1992; Karahanna and Straub 1999; Venkatesh 1999; Venkatesh 2000; Yi and Hwang 2003; Yujong 2005; Cocosila et al. 2009). Many studies examining motivation in individuals' technology acceptance emphasize the motivations directly associated with the use of a technology and typically conceptualize them as key determinants of perceived usefulness. Other important sources of motivation may be equally important, but have not been examined properly. To advance our understanding of people's voluntary technology use in work settings, we employ the TAM as a general framework to investigate the influence of external regulation, the imposition of rewards for or constraints against the performance of a behavior, which is an essential form of motivation not directly linked to technology use.

External regulation (Vallerand 1997) is common to business professionals and prevails in various work environments. When achieving a goal depends on a person's ultimate performance or ability to justify his or her decision, that person has a good reason to feel anxious, tense, or pressured. As Vallerand (1997, 279–280) notes, "an extrinsically motivated individual is likely to understand and anticipate the pressure from external regulation." In addition to other behavioral implications, such pressure may affect a person's choice of technology use.

Previous research examining issues that pertain to incentives for or monitoring of technology use essentially functions in concert with the premises of external regulation. In this light, managers can influence their employees' voluntary use of a technology in the work environment by providing sufficient incentives or implementing appropriate control systems to overcome agency problems (Bhattacherjee 1998). Professional accountability is crucial and can induce people to use a more cognitively intensive, thorough, or detailed process to complete a task. In turn, such explicit requirements to explain and justify the process for arriving at a decision may also favor technol-

ogy use. Examining the impact of accountability becomes particularly important in scenarios in which working professionals have considerable autonomy, but must explain or justify their decisions or decision-making processes to their peers or superiors.

We posit that *PA* has a significant influence on an individual's perception of the usefulness of a familiar technology, as well as his or her intended and actual use of the technology. The theoretical premise of our reasoning is that the presence of *PA* motivates more thorough, effortful, cognitive processing to perform tasks at a desired or acceptable level. This particular extrinsic motivation can increase the likelihood that a person "sees" the usefulness of a familiar technology and thereby increases his or her intention to use and actual use of the technology. Our study does not consider the effect of *PA* on perceived ease of use because we focus on the use of a familiar technology by working professionals who already know the technology and its use.[2] As Venkatesh et al. (2003) note, the direct effect of perceived ease of use may be significant only in early stages of technology use (i.e., initial technology acceptance) and its influences likely will diminish over time as people accumulate knowledge about and experience with the technology.

PA can affect perceived usefulness, which denotes the extent to which an individual believes a technology may support and enhance his or her job performance. When a technology is perceived as likely to improve job performance, people form positive assessments of it and its usefulness and any performance improvement reinforces their favorable assessment. We expect people motivated by *PA* to use relatively more thorough, effortful cognitive processing in a decision-making or problem-solving task because they want to explore alternative ways to improve job performance, in order to increase the likelihood of receiving praise, recognition, or rewards associated with satisfactory performance while avoiding negative consequences or penalties for unacceptable performance. As a result, those accountable for the procedure used to complete a task will be more likely to consider an appropriate, familiar technology useful than those without this accountability requirement (Davis et al. 1992). Accordingly, we test the following hypothesis:

H1: Accountability for the procedure used to complete a work task will lead to higher perceived usefulness.

Those accountable for the procedure used to reach the decision or solve a problem are likely to reveal a stronger intention to use an appropriate technology than their counterparts who are free of such requirements, because they have a greater need or desire to perform satisfactorily. In turn, such needs and desires encourage the use of an adequate, familiar technology to increase the likelihood of achieving a desirable outcome; i.e., they promote a strong intention to use the technology. The analytical and evaluative processing induced by *PA* not only influences the overall decision-making procedure, but also motivates people to explore available decision aids, such as an appropriate technology, to enhance their task performance. The increased intention to use a technology that results from the presence of *PA* can become even more prominent when people already are knowledgeable about and experienced with the technology. As a result, when an appropriate, familiar technology is available, people with *PA* requirements should exhibit a stronger intention to use it than those without any *PA* requirements. Hence, we test the following hypothesis:

H2: Accountability for the procedure used to complete a task will lead to a higher intention to use the technology.

[2] Our study does not consider attitude as well because previous research, including Davis et al. (1989) and Venkatesh and Davis (1996), has shown a limited mediation role of attitude in the relationships between technology acceptance and its key determinants.

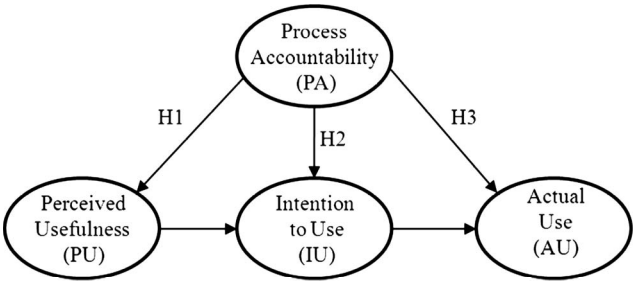
We anticipate a similar effect on actual technology use; i.e., those motivated to use more thoughtful and cognitively intense processing to complete a decision-making or problem-solving task will be more likely to use an appropriate, familiar technology than are those without such motivations. Most previous research examining user acceptance emphasizes people's intentions to use a technology; relatively few studies investigate actual technology use. Lee et al. (2003), in their review of representative studies of prior user technology adoption that involve the TAM, advocate the inclusion of actual technology use as a dependent variable. When making a decision or completing a work task, business professionals with *PA* requirements may be more likely to use an appropriate, familiar technology than are those free of such requirements. That is, an individual who is required to explain and justify to a superior the specific process he or she used to reach the decision or complete a task may be more likely to incorporate an adequate technology in the task than otherwise. Accordingly, we hypothesize the following:

H3: Accountability for the procedure used to complete a task will lead to greater use of the technology.

In Figure 1, we depict our overall research framework.

We also examine the indirect effects of *PA* on a person's intention to use a familiar technology. In general, people accountable for their decision-making or problem-solving procedures are extrinsically motivated to perform satisfactorily; thus, they are likely to consider an adequate, familiar technology useful for completing a work task, to exhibit a strong intention to use the technology in the task, and to actually use the technology in their work role. Further analysis of how *PA* yields a higher intention to use a familiar technology suggests a mediating effect of perceived usefulness. In essence, *PA* may heighten a person's perception of a technology's usefulness, not only for completing a complex task or solving a challenging problem, but also for explaining and justifying his or her decision-making or problem-solving path. Hence, the intention to use a familiar technology can be driven by perceived technology usefulness in arriving at a decision and explaining how the decision was made. According to Baron and Kenny (1986), a variable may function as a mediator to the extent that it accounts for the relationship between a predictor and a criterion. In our case, such mediating effects can explain how an external condition (i.e., the presence versus the absence of *PA*) can affect a dependent variable (e.g., intention to use or actual use of a familiar technology). A mediating variable can account for all or a significant portion of the variance between two variables (i.e., total versus partial mediation) and thereby explain why such changes occur.

FIGURE 1
Overall Research Framework



In light of H1 and H2, we posit that perceived usefulness may have a significant mediating effect that explains why accountability leads to a stronger intention to use a technology. If this effect exists, the inclusion of perceived usefulness in the mediation model should reduce the direct effect of *PA* on intention, as manifested by a noticeable decrease in the magnitude or statistical significance of the path coefficient from *PA* to intention. When we incorporate perceived usefulness into the mediation model, the best predictor of the increased intention resulting from the accountability is the indirect path from accountability to intention through perceived usefulness. Thus, we test the following hypothesis:

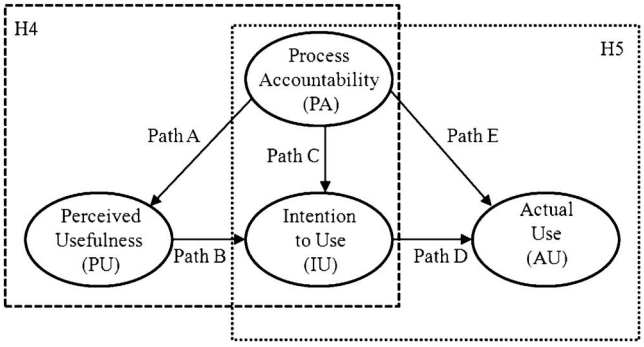
H4: Perception of a technology's usefulness will mediate the effect of accountability on intention to use the technology.

Similarly, we also postulate a mediation effect of intention on the relationship between *PA* and actual technology use (*AU*), in conjunction with H2 and H3. If this mediating effect exists, the inclusion of intention in the model should reduce the direct effect of accountability on actual technology use, as manifested by a noticeable decrease in the magnitude or statistical significance of the path coefficient from *PA* to *AU*. When we incorporate intention into the mediation model, the best predictor of the increased actual use resulting from the accountability is the indirect path from accountability to actual use through intention. Accordingly, we hypothesize the following:

H5: Intention to use the technology will mediate the effect of accountability on actual technology use.

In Figure 2, we illustrate these mediation relationships. Overall, our hypotheses propose that people accountable for the procedure used to complete a work task are likely to show a stronger intention to use an appropriate, familiar technology and exhibit a higher level of actual technology use than those not accountable for such procedures. We hypothesize that the anticipated increase in the intention to use the technology results from the increasing perception of the technology's usefulness. Plausibly, people motivated to engage in more thorough cognition and comprehensive processing in an accountable scenario may recognize more clearly the usefulness of a technology

FIGURE 2
Mediating Effects between Process Accountability and Intention to Use and between Process Accountability and Actual Use



for supporting the underlying information processing. The influence of accountability on actual technology use may also be mediated by perceived usefulness and intention, in addition to its direct effect.

III. STUDY DESIGN AND DATA COLLECTION

To test our hypotheses, we conducted a controlled experiment using a randomized between-groups design. Our study includes 130 business students from a major university in the western United States. On average, our participants were 23.5 (SD = 4.0) years of age and had 3.4 (SD = 4.0) years of full-time work experience. At the time of our study, most participants (51.7 percent) worked full-time in business organizations, often performed accounting-related tasks at work, and had to use information technology routinely. Thus, our choice of participants offers a reasonable surrogate for business professionals. We randomly assigned each participant to either the treatment (accountable) group or the control (nonaccountable) group. Participants received extra class credit for their voluntary participation in the experiment. We observed no significant between-groups differences in age, gender distribution, or work experience. Every participant was presented with a "make-versus-buy" decision problem that included information regarding the current and projected manufacturing costs for a product. Participants were asked to analyze the associated cost information to determine an appropriate price for purchasing that product from an external supplier. Our experimental task is similar to those studied in previous research (e.g., Gross 1966; Savich 1977; Cánez et al. 2000; Arya et al. 2005) and resembles real-world decision-making problems commonly encountered by business professionals.

The problem used in the experiment was only moderately complex to avoid skewing technology use decisions by excessive task complexity; hence, participants were able to arrive at a decision using the provided technology aid or a traditional, manual method of calculation (i.e., pencil and paper). The problem entailed a business scenario in which a manufacturing firm with a limited capability has the option of outsourcing production of a product. In the experiment, participants received all the essential cost figures associated with production, e.g., direct materials, direct labor, and manufacturing overhead (traceable and allocated). According to our instructions, participants had to analyze the cost information and reach a pricing decision about how much to pay an external supplier to produce that component.[3] Similar to Mathieson (1991), we asked participants to complete the task using a computer-based spreadsheet, paper and pencil, or some combination of both.

Use of paper and pencil is common among business professionals (e.g., accountants); the inclusion of this traditional calculation method offers a "baseline" for assessing participants' voluntary technology use. The prospect of using a computer-based spreadsheet program offered participants an opportunity to use a technology with which they had considerable familiarity from previous courses and work experience. We chose this spreadsheet program for several reasons. First, our participants were familiar with the spreadsheet technology and, thus, required no additional training for its use in the experiment. Second, the use of spreadsheet-based programs is common among business professionals (e.g., accountants, financial analysts, business managers) and is generally expected to continue into the future (Institute of Management Accountants 2003). Third, spreadsheet programs similar to that used in our experiment are widely available in business organizations and are routinely used in business decision-making and analyses. In sum, the focal technology was familiar to our participants and its choice enabled us to examine the influences of *PA* on participants' technology use decisions beyond initial acceptance, as measured by both intention to use and actual use. All of our participants had received formal training in

[3] The Appendix provides a description of the task used in the experiment.

computer-based spreadsheet programs, including that offered by a school-wide required course in computer proficiency. We analyzed the participants' self-reported efficacy in using the spreadsheet program and their previous experience with the technology (in number of years) and found no significant between-groups differences.

We randomly assigned participants to two groups of approximately equal size, with 67 participants in the treatment group and 63 in the control group. The instructions to the participants in the accountable (treatment) group explicitly stated that they would probably be interviewed after completing the task. To establish and effectively communicate the manipulated *PA*, the instructions emphasized that the participant could be required to discuss the procedure he or she used for arriving at the solution, but not the solution itself. That is, each participant was clearly informed that the sole basis of these potential interviews would be the legitimacy of the procedure used to reach his or her decision, regardless of the decision or its consequence. The instructions to participants in the nonaccountable (control) group did not mention the possibility of such a post-experiment interview.

Specifically, we used the accountability manipulation from Kennedy's (1993) work and presented the following instructions to participants in the treatment group:

> This study is part of an important effort to enhance the effectiveness and efficiency of business practice. We are interested in learning about the process by which students at your level of education and experience make decisions. Your responses to the following materials will be reviewed and may be selected for a follow-up conference with you and members of the School of Business Faculty. If you are selected for this conference, you will be asked to explain and justify the process by which you arrived at the solution to the task. You will not be asked to explain or justify the actual solution to the problem, only the process by which you arrived at the solution. Please print your name and telephone number in the space provided so that we can contact you. Thank you for your cooperation.

Similar to those used by Kennedy (1993), we clearly conveyed the following instructions to the control-group participants:

> This study concerns how students with your level of education and experience solve problems. Your solution to the problem will be totally confidential and not traceable to you personally. Your responses to the materials will be aggregated and averaged with the responses of others to determine general characteristics of the solution. Please do not identify yourself in any way on these materials. Thank you for your cooperation.

After indicating their understanding of the instructions and readiness for the experiment, participants in both groups received the experimental task that mimicked a business scenario in which a financial decision is required in order to recommend the maximum price that a firm should pay to purchase instead of manufacture a product. To complete this task, participants were given contextual information commonly considered by business professionals. All participants had equally convenient access to the computer-based spreadsheet and were free to choose whether to use the technology to complete the experimental task.

After completing the task, each participant filled out a questionnaire designed to gather his or her assessment of the technology and its use. We measured perceived usefulness and perceived ease of use with six items adapted from Davis (1989), with some minor wording changes appropriate to our study context. We measured behavioral intention to use the technology with three items adapted from a scale reported by Jackson et al. (1997). All question items employed a seven-point Likert scale, with 1 being "extremely unlikely" or "strongly disagree" and 7 being "extremely likely" or "strongly agree." Table 1 summarizes the measurement items used in the study, together with important descriptive statistics and Cronbach's alpha values.

We purposefully chose a spreadsheet technology familiar to the participants because our research focuses on the impact of *PA* on an individual's intention to use and actual use of a

TABLE 1
Question Items and Descriptive Statistics

Construct	Items	Mean	SD	Alpha
Perceived Usefulness (*PU*)	*PU*-1: Using the spreadsheet program would enable me to solve this and similar problems more quickly.	4.12	1.73	0.90
	PU-2: Using the spreadsheet program would improve my performance on this and similar problems.	4.30	1.54	
	PU-3: Using the spreadsheet program in completing this and similar problems would increase my productivity.	4.58	1.50	
	PU-4: Using the spreadsheet program would enhance the effectiveness of my work on problems such as this one.	4.52	1.48	
	PU-5: Using the spreadsheet program would make it easier to complete problems such as this one.	4.45	1.55	
	PU-6: Overall, I find the spreadsheet program useful in completing problems similar to this one.	4.26	1.58	
Intention to Use (*IU*)	*IU*-1: I would rather use the spreadsheet program to solve problems such as this one.	3.92	1.72	0.91
	IU-2: My intention would be to use the spreadsheet program to complete similar tasks.	4.04	1.71	
	IU-3: To complete a similar task, I would prefer to use the spreadsheet program.	4.03	1.73	

familiar technology in decision tasks directly related to his or her work role. The use of a new technology in this case would have created additional complexity and potential confounding effects. A central consideration was to avoid masking the effects of the *PA*, the extrinsic motivation under examination, with the influence of a new technology on task performance. Because the spreadsheet program in the experiment was already familiar to all participants, we expected no significant changes in their general perception of the technology over the course of the experiment. Whereas most previous research has examined user technology acceptance using behavioral intention as a surrogate, we measured actual technology use by dichotomizing the dependent variable consistent with several prior studies, including Venkatesh et al. (2003).

IV. RESULTS

Although the questionnaire items used in this study have been validated by prior research (Mathieson 1991), we reexamined the instrument's reliability by assessing its internal consistency. According to our analysis of the participants' responses, the Cronbach's alpha is 0.90 for perceived usefulness (*PU*) and 0.91 for intention to use (*IU*). These alpha values exceed the commonly suggested threshold of 0.80 (Cohen 1983) and therefore suggest adequate reliability of our instrument.

We performed a manipulation check by asking participants to indicate on a seven-point scale their perceived level of accountability for the procedure they used to arrive at their recommendation, with 1 equal to "not at all accountable" and 7 as "very accountable." The perceived accountability in the treatment group (mean = 6.49, SD = 0.91) is significantly ($F(1,128) = 22.854$, $p < 0.001$) higher than that in the control group (mean = 4.36, SD = 1.71).

We tested our hypotheses using linear and binary logistic regression-based models, which are advantageous for examining the moderating and mediating effects of an independent variable on a dependent variable, and depict in detail how the accountability manipulation influences each key

acceptance determinant suggested by our framework. Although alternative statistical analysis methods can test the overall joint effect of predictor variables on a dependent variable (e.g., structural equation modeling), our analysis method is more appropriate in this context as it allows first for direct testing of our individual hypotheses, as well as for the testing of an overall mediation model (Kenny et al. 1998). These analyses have been used to test mediation models in previous accounting research (e.g., Hammersley 2006; Cornell et al. 2009). Specifically, we tested used regression models in order to separate the direct effects (i.e., H1–H3) from the mediating effects (i.e., H4, H5) of a predictor variable.

Effects of Process Accountability on Perceived Usefulness

We tested H1 by performing a linear regression with *PU* as the dependent variable and the accountability manipulation as the predictor variable. We measured perceived usefulness by summing each participant's responses to the six items for *PU*. As Panel A of Table 2 shows, the results reveal a significant, positive effect of accountability on perceived usefulness ($t = 3.209$, $p = 0.002$); that is, process accountability leads to positive perceptions about a technology's usefulness. Our data thus support H1: *PA* has a significant, positive influence on an individual's perception of the technology's usefulness.

Effects of Process Accountability on Intention to Use

To test H2, intention to use, we again employed a linear regression model, in which the independent variable is accountability and the dependent variable is intention. We measured intention as the sum of each participant's responses to the three questions that pertain to this construct. As summarized in Panel B of Table 2, accountability shows a significant, positive effect on a participant's intention to use the technology ($t = 3.123$, $p = 0.002$). Hence, our data support H2; that is, *PA* has a significant, positive influence on an individual's intention to use a familiar technology.

Effects of Process Accountability on Actual Technology Use

To test H3, which hypothesizes a relationship between accountability and actual technology use, we took a dichotomous approach. Our experimental design allowed us to save any work performed on the spreadsheet using a unique identifier for each participant. We were then able to code each participant as "using the technology" (1) or "not using the technology" (0) and link this to work on the task and responses to questionnaire items.

We performed a binary logistic regression test to assess the relationship between *PA* and actual technology use and, as shown in Panel C of Table 2, found that the Wald statistic is significant ($Wald = 8.840$, $p = 0.003$). According to our analysis, participants accountable for the procedure used to reach the solution are more likely to use the technology to complete the experiment task than are their counterparts who are free of such requirements; hence, our data support H3.

Mediating Effects of Perceived Usefulness on Accountability-Intention Relationship

To test the mediating effect of perceived usefulness on the relationship between accountability and intention to use the technology, we used the methodology by Kenny et al. (1998), which requires two steps to show mediation: a significant relationship between the independent variable and the mediating variable, and decreasing significance of the independent variables when the mediator is included in the model.

To test the mediating relationship hypothesized in H4, we examined whether path "C" (the relationship between accountability and intention) is either considerably reduced (partial media-

TABLE 2

The Effects of Process Accountability on the Usage of a Familiar Technology

Panel A: Effect of Process Accountability on Perceived Usefulness (Hypothesis 1)[a]

$$PU = \beta_0 + \beta_1(PA) + e$$

Variable	Coefficient	t-statistic	p-value[e]
Constant	24.000	25.851	<0.001
PA	4.419	1.293	0.002

Panel B: Effect of Process Accountability on Intention to Use (Hypothesis 2)[b]

$$IU = \beta_0 + \beta_1(PA) + e$$

Variable	Coefficient	t-statistic	p-value[e]
Constant	10.683	18.391	<0.001
PA	0.809	3.123	0.002

Panel C: Effect of Process Accountability on Actual Technology Use (Hypothesis 3)[c,d]

$$AU = \beta_0 + \beta_1(PA) + e$$

Variable	Coefficient	Wald	p-value[e]
Constant	−0.693	6.726	0.009
PA	1.086	8.840	0.003

[a] Path "A" in Figure 2.
[b] Path "C" in Figure 2.
[c] Path "E" in Figure 2.
[d] Chi-square = 9.182, df = 1, p = 0.002 (one-tailed).
[e] p-values are one-tailed.

Variable Definitions:
AU = Actual Use;
IU = Intention to Use;
PA = Process Accountability; and
PU = Perceived Usefulness.

tion) or completely diminished (total mediation) when perceived usefulness is included in the model as a predictor of intention (path "B" in Figure 2). Following the Kenny et al. (1998) methodology, we first must show that the independent variable (*PA*) is associated with the mediating variable (*PU*), as theorized in H1. We then must show that the relationship between the independent variable (*PA*) and the dependent variable (*IU*) is explained by variation in the mediating variable (*PU*) when both *PA* and *PU* are included as predictors of *IU* in the model.

Our analysis satisfies both conditions necessary for supporting H4; thus, perceived usefulness appears to be a mediating variable that helps explain the positive effect of accountability on intention. Our results from testing H1, summarized in Panel A of Table 2, establish the significance

of path "A" in Figure 2. As we show in Panel B of Table 2 and Panel A of Table 3, the effect of accountability on intention (t = 3.123, p = 0.002) becomes statistically insignificant when we incorporate the path through perceived usefulness, denoted as path "C" in Figure 2 (t = 0.731, p = 0.466), implying a between-groups difference in intention to use the technology that can be explained by the total mediating effect of perceived usefulness. That is, increasing *PA* seems to strengthen the intention to use a technology through an increased perception of the technology's usefulness.

Mediating Effects of Intention to Use on Accountability-Actual Use Relationship

To test the mediating relationship posited in H5, we examined whether the significance of path "E" (the relationship between accountability and actual technology use) is either partially or totally reduced when intention is included in the model as a predictor of actual use, path "D" in Figure 2. Again following the methodology of Kenny et al. (1998), we first must show that the independent variable (*PA*) is associated with the mediating variable (*IU*), as hypothesized in H2, and then must show that the relationship between the independent variable (*PA*) and the dependent variable (*AU*) is explained by variation in the mediating variable (*IU*) when both *PA* and *IU* are included as predictors of *AU* in the model.

TABLE 3

Mediating Effects of Process Accountability on the Usage of a Familiar Technology

Panel A: Mediating Effect of Perceived Usefulness on Intention to Use (Hypothesis 4)

$$IU = \beta_0 + \beta_1(PU) + \beta_2(PA) + e$$

Variable	Coefficient	t-statistic	p-value[b]
Constant	−2.031	−2.624	0.010
PU	0.530	17.932	<0.001
PA	0.328	0.731	0.466

Panel B: Mediating Effect of Perceived Usefulness on Intention to Use (Hypothesis 5)[a]

$$AU = \beta_0 + \beta_1(IU) + \beta_2(PA) + e$$

Variable	Coefficient	Wald	p-value[b]
Constant	−8.797	28.542	<0.001
IU	0.577	32.026	<0.001
PA	0.671	1.046	0.306

[a] Chi-square = 116.306, df = 2, p = < 0.001 (one-tailed).

[b] p-values are one-tailed.

Variable Definitions:
AU = Actual Use;
IU = Intention to Use;
PA = Process Accountability; and
PU = Perceived Usefulness.

Our results satisfy both conditions necessary for demonstrating mediation in support of H5. That is, intention to use the technology appears to be a mediating variable that helps explain the positive effect of accountability on actual use. The results of testing H2, summarized in Panel B of Table 2, establish the significance of path "C." As we show in Panel C of Table 2 and Panel B of Table 3, the effect of accountability on actual use (Wald = 8.840, p = 0.003) becomes statistically insignificant when we incorporate the path through intention to use, denoted as path "D" (Wald = 1.046, p = 0.306), indicating total mediation. Our results imply a between-groups difference in actual use of the technology which can be explained by the mediating effect of intention. That is, increasing *PA* appears to strengthen actual technology use through an increased intention to use the technology.

Our data support all the hypotheses tested in the study. According to our results, when people are held accountable for the procedure they use to arrive at a decision or to complete a task, they are likely to perceive an appropriate, familiar technology as more useful than if they are not held accountable. In addition, they show stronger intentions to use the technology and are more likely to actually use the technology to make decisions or complete tasks than otherwise.

Ex Post Analysis of Technology Use and Cognitive Effort

Psychology theory suggests that process accountability can induce cognitively intensive effort (Siegel-Jacobs and Yates 1996), and prior accounting research has incorporated information technology into cognitively complex work tasks (e.g., Benford and Hunton 2000). We therefore examined whether the use of the spreadsheet program was associated with increased cognitive effort beyond that required by simple calculation of the maximum price with pencil and paper. Specifically, we compared the accountable and nonaccountable conditions by examining the amount of time participants who used the technology took to complete the experimental task, and the number of characters (not including spaces) they entered in the spreadsheet program when attempting to complete the task.[4] According to our results, participants in the accountable condition who used the spreadsheet technology spent more time (mean = 19.05 minutes, SD = 3.60) on the task than those using the technology in the nonaccountable condition (mean = 14.77 minutes, SD = 3.20), and the difference is statistically significant (t = 4.67, p < 0.00).[5] A similar difference is also observed between the participants who did not use the technology in the accountable versus nonaccountable condition. In addition, participants in the accountable condition who used the spreadsheet technology entered more characters (mean = 308.93, SD = 103.43) than those using the technology in the nonaccountable condition (mean = 252.81, SD = 108.23); the difference is also statistically significant (t = 1.98, p = 0.05). The number of characters a participant entered in the spreadsheet was positively correlated with the amount of time he or she took to complete the task (r = 0.261, p = 0.04). Taken together, our *ex post* analysis suggests that people are more likely to employ the central route processing when accountable for the procedure used to reach their decision than otherwise, and that the use of the spreadsheet technology appears to be associated with increased cognitive effort compared with the use of pencil and paper.

---

[4] We also analyzed the amount of time all participants took to complete the experimental task and found those in the accountable condition spent more time (mean = 18.90 minutes, SD = 4.00) than did their counterparts in the nonaccountable condition (mean = 17.16 minutes, SD = 5.09); the difference is of statistical significance (t = 2.17, p = 0.03).

[5] These and the following comparisons reported in this section are based on 63 participants in the nonaccountable group (21 used the technology and 42 did not use the technology), and 67 participants in the accountable group (40 used the technology and 27 did not use the technology).

V. DISCUSSION AND CONCLUSION

Voluntary technology use for improving people's job tasks and decision-making has become a growing challenge for organizations as they increase their investment in information technology (Riemenschneider et al. 2003; Mitra 2005; Walczuch et al. 2007). Whereas most previous technology acceptance research considers why targeted or prospective users may or may not accept a newly implemented technology, our study addresses a related but different question: Will the extrinsic motivation of needing to justify the process used to arrive at a decision affect people's intention to use and actual use of a familiar, available technology to complete work-related tasks?

In this study, we investigated whether accountability for the procedure used to arrive at a decision can positively influence people's perceptions of a technology's usefulness and thereby increase both the intention to use and actual use of that technology. According to our results, an individual who is held accountable is likely to perceive an appropriate technology as more useful and exhibit a stronger intention to use it to complete work tasks. Actual technology use also increases when people are accountable for the procedure they use to reach decisions or complete tasks. The increased intention to use a familiar technology associated with accountability can be partially explained by favorable perceptions of the technology's usefulness; the resulting intention also helps explain the increase in actual technology use.

Our findings suggest that noteworthy differences may exist in how individual professionals evaluate the usefulness of a technology, shape their intentions, and actually use a familiar technology. As organizations continue their investments in information technology, important situational variables that include extrinsic motivation for task performance deserve further research attention. Our findings show that managers must assess not only how targeted users initially perceive the technology, but also how the technology can affect their task performance or decision-making. Anchoring in the key components of the TAM, we propose an enhanced model of the usage of a familiar technology, test the enhanced model, and show how an important form of external regulation (i.e., *PA*) affects familiar technology usage decisions. Business professionals who are cautious about their decision-making or problem-solving procedures seem to seek appropriate technology aids to improve their task performance, particularly when they are required to explain or justify the procedure they used to reach a decision or solve a problem. Accountability increases cognitive effort in decision-making tasks and augments perceptions about the usefulness of a technology for completing such tasks (Tetlock et al. 1989).

This study contributes to the research in user technology acceptance in general by connecting motivation theories, cognitive information processing, and user technology acceptance. We identify a promising direction for extending the applicability and practical value of salient, parsimonious models (e.g., the TAM) by examining how *PA* affects familiar technology usage decisions. We have expanded the research on technology acceptance by individual professionals by examining how common workplace motivators may affect voluntary technology use decisions, thereby extending the robustness and applicability of salient theoretical models that include the TAM.

Our study is limited in task diversity and complexity. Our experiment involves a specific decision-making task appropriate for our participants and hypotheses, but nevertheless limited in diversity and complexity. This limitation could constrain the generalizability of our results across different tasks. Our choice of participants represents another limitation; i.e., the participants in the study are business students at a university and, thus, business professionals-in-the-making. However, most already work in accounting and related business areas on a full-time basis, which justifies the use of their responses to approximate technology use decisions. We cannot, however, rule out the potential differences between these participants and more experienced professionals.

Further research, therefore, should address these limitations. Of particular importance is a reexamination of the effect of process accountability on technology acceptance by business professionals (e.g., accountants, financial analysts) in their real-world work settings. It also will be

important to design and conduct field-based studies to investigate the different effects of *PA* and OA on individuals' technology acceptance decisions. Both qualitative and quantitative approaches are desirable and together can shed more light on how each source of accountability influences a professional's use of a technology. By comparing these sources of accountability, additional research could further extend theories of user technology acceptance.

APPENDIX

Experimental Task

The Hayes Company manufactures and sells several different products, one of which is called a slip differential. The company normally sells 30,000 units of the slip differential each month. At this activity level, unit costs are:

Direct Materials	$4
Direct Labor	$3
Variable Manufacturing Overhead	$4
Fixed Manufacturing Overhead	$5
Variable Selling	$3
Fixed Selling	$1

An outside supplier has offered to produce the slip differentials for the Hayes Company and to ship them directly to Hayes' customers. This arrangement would permit the Hayes Company to reduce its variable selling expenses by one-third (due to elimination of freight costs). The facilities now being used to produce the slip differentials would be idle, and fixed manufacturing overhead would continue at 60 percent of its present level. The total fixed selling expenses of the company would be unaffected by this decision.

What is the maximum acceptable price quotation for the slip differentials from the outside supplier? _____

REFERENCES

Ajzen, I., and M. Fishbein. 1980. *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice Hall.

Arya, A., J. Fellingham, and B. Mittendorf. 2005. Make-or-buy in the presence of uncertainty and private information. *Journal of Accounting Education* 23: 189–203.

Avlonitis, G. J., and N. G. Panagopoulos. 2005. Antecedents and consequences of CRM technology acceptance in the sales force. *Industrial Marketing Management* 34: 355–368.

Baron, R. M., and D. A. Kenny. 1986. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 15: 1173–1182.

Bedard, J. C., C. Jackson, M. L. Ettredge, and K. M. Johnstone. 2003. The effect of training on auditors' acceptance of an electronic work system. *International Journal of Accounting Information Systems* 4: 227–250.

Benford, T. L., and J. E. Hunton. 2000. Incorporating information technology considerations into an expanded model of judgment and decision making in accounting. *International Journal of Accounting Information Systems* 1: 54–56.

Bhattacherjee, A. 1998. Managerial influences on intra-organizational information technology use: A principal-agent model. *Decision Sciences* 29: 139–162.

———. 2001. Understanding information systems continuance: An expectation-confirmation model. *Management Information Systems Quarterly* 25: 351–370.

———, and G. Premkumar. 2004. Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *Management Information Systems Quarterly* 28: 229–254.

Brynjolfsson, E., and L. Hitt. 1996. Productivity lost? Firm-level evidence on the returns to information systems spending. *Management Science* 42: 541–558.

Cánez, L. E., K. W. Platts, and D. R. Probert. 2000. Developing a framework for make-or-buy decisions. *International Journal of Operations & Production Management* 20: 1313–1330.

Chandler Diaz, M., and T. Loraas. 2010. Learning new uses of technology while on an audit engagement: Contextualizing general models to advance pragmatic understanding. *International Journal of Accounting Information Systems* 11: 61–77.

Chau, P. Y. K., and P. J. Hu. 2001. Information technology acceptance by individual professionals: A model comparison approach. *Decision Sciences* 32: 699–719.

Cocosila, M., N. Archer, and Y. Yuan. 2009. Early investigation of new information technology acceptance: A perceived risk-motivation model. *Communications of the Association for Information Systems* 25: 339–358.

Cohen, J. 1983. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Hillsdale, NJ: Erlbaum.

Cornell, R. M., R. C. Warne, and M. M. Eining. 2009. The use of remedial tactics in negligence litigation. *Contemporary Accounting Research* 26: 767–787.

Curtis, M. B., and E. A. Payne. 2008. An examination of contextual factors and individual characteristics affecting technology implementation decisions in auditing. *International Journal of Accounting Information Systems* 9: 104–121.

Davis, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly* 13: 319–339.

———, P. R. Bagozzi, and P. R. Warshaw. 1989. User acceptance of computer technology: A comparison of two theoretical models. *Management Science* 35: 982–1002.

———, ———, and ———. 1992. Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology* 22: 1111–1132.

Fishbein, M., and I. Ajzen. 1975. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.

Greenfield, G., and F. Rohde. 2009. Technology acceptance: Not all organizations or workers may be the same. *International Journal of Accounting Information Systems* 10: 263–272.

Gross, H. 1966. Make or buy in growing firms. *The Accounting Review* 41: 745–753.

Hammersley, J. S. 2006. Pattern identification and industry-specialist auditors. *The Accounting Review* 81: 309–336.

Hu, P. J., T. H. K. Clark, and W. W. Ma. 2003. Examining technology acceptance by school teachers: A longitudinal study. *Information & Management* 41: 227–242.

———, C. Lin, and H. Chen. 2005. User acceptance of intelligence and security informatics technology: A study of COPLINK. *Journal of the American Society for Information Science and Technology* 56: 235–244.

Im, I., Y. Kim, and H. Han. 2008. The effects of perceived risk and technology type on users' acceptance of technologies. *Information & Management* 45: 1–9.

Institute of Management Accountants (IMA). 2003. *Accounting Best Practices Survey: 98% Receive Inaccurate Cost Information*. Montvale, NJ: Institute of Management Accountants.

Jackson, C. M., S. Chow, and R. A. Letich. 1997. Toward an understanding of the behavioral intention to use and information system. *Decision Sciences* 28: 357–389.

Karahanna, E., and D. W. Straub. 1999. The psychological origins of perceived usefulness and ease of use. *Information & Management* 35: 237–250.

———, ———, and N. L. Chervany. 1999. Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *Management Information Systems Quarterly* 23: 183–213.

Kennedy, J. 1993. Debiasing audit judgment with accountability: A framework and experimental results. *Journal of Accounting Research* 31: 231–245.

Kenny, D. A., D. A. Kashy, and N. Bolger. 1998. Data analysis in social psychology. In *The Handbook of Social Psychology*, Vol. 1, edited by D. Gilbert, S. Fiske, and G. Lindzey., 233–265 Boston, MA: McGraw-Hill.

Kim, H. J., M. Mannino, and R. J. Nieschwietz. 2009. Information technology acceptance in the internal audit profession: Impact of technology features and complexity. *International Journal of Accounting Information Systems* 10: 214–228.

Kim, S. S., and N. K. Malhotra. 2005. A longitudinal model of continued IS use: An integrative view of four mechanisms underlying post-adoption phenomena. *Management Science* 51: 741–755.

Lee, Y., K. Kozar, and K. Larsen. 2003. The technology acceptance model: Past, present, and future. *Communications of the AIS* 12: 752–780.

Lerner, J. S., and P. E. Tetlock. 1999. Accounting for the effects of accountability. *Psychological Bulletin* 152: 222–275.

Loraas, T., and C. J. Wolfe. 2006. Why wait? Modeling factors that influence the decision of when to learn a new use of technology. *Journal of Information Systems* 20: 1–23.

Mathieson, K. 1991. Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research* 2: 173–191.

Mitra, S. 2005. Information technology as an enabler of growth in firms: An empirical assessment. *Journal of Management Information Systems* 22: 279–300.

Pennington, R. R., A. S. Kelton, and D. DeVries. 2006. The effects of qualitative overload on technology acceptance. *Journal of Information Systems* 20: 25–36.

Petty, R. E., and J. T. Cacioppo. 1979. The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology* 46: 69–81.

Rich, J. 2004. Reviewers' responses to expectations about the client and preparer. *The Accounting Review* 79: 497–517.

Riemenschneider, C. K., D. A. Harrison, and P. P. Mykytn. 2003. Understanding IT adoption decisions in small business: Integrating current theories. *Information & Management* 40: 269–285.

Santhanam, R., and E. Hartono. 2003. Issues in linking information technology capability to firm performance. *Management Information Systems Quarterly* 27: 125–153.

Savich, R. S. 1977. The use of accounting information in decision making. *The Accounting Review* 52: 642–652.

Schafer, B. A., and M. M. Eining. 2006. Auditors' adoption of technology: A study of domain experts. Working paper, The University of Utah.

Schepers, J., and M. Wetzels. 2007. A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Information & Management* 44: 63–73.

Siegel-Jacobs, K., and J. F. Yates. 1996. Effects of procedural and outcome accountability on judgment quality. *Organizational Behavior and Human Decision Processes* 65: 1–17.

Szajna, B. 1996. Empirical evaluation of the revised technology acceptance model. *Management Science* 42: 85–92.

Tetlock, P. E. 1983. Accountability and the complexity of thought. *Journal of Personality and Social Psychology* 45: 74–83.

———. 1992. The impact of accountability on judgment and choice: Toward a social contingency model. *Advances in Experimental Social Psychology* 25: 331–376.

———, L. Skitka, and R. Boettger. 1989. Social and cognitive strategies for coping with accountability: Conformity, complexity, and bolstering. *Journal of Personality and Social Psychology* 57: 632–640.

Vallerand, R. J. 1997. Toward a hierarchical model of intrinsic and extrinsic motivation. *Advances in Experimental Social Psychology* 29: 271–360.

Venkatesh, V. 1999. Creation of favorable user perceptions: Exploring the role of intrinsic motivation. *Management Information Systems Quarterly* 23: 239–260.

———. 2000. Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research* 11: 342–365.

———. 2006. Where to go from here? Thoughts on future directions for research on individual-level technology adoption with a focus on decision making. *Decision Sciences* 37: 497–518.

———, and F. D. Davis. 1996. A model of the antecedents of perceived ease of use development and test. *Decision Sciences* 27: 451–481.

———, and ———. 2000. A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science* 46: 186–204.

———, M. G. Morris, G. B. Davis, and F. D. Davis. 2003. User acceptance of information technology: Toward a unified view. *Management Information Systems Quarterly* 27: 425–478.

Walczuch, R., J. Lemmink, and S. Streukens. 2007. The effect of service employees' technology readiness on technology acceptance. *Information & Management* 44: 206–215.

Wolfe, C., M. Chandler Diaz, T. Loraas, and U. Raja. 2005. Auditor learning and use of software-intensive solutions: Goal-directed behavior as a model. Working paper, Texas A&M University.

Yi, M. Y., and Y. Hwang. 2003. Predicting the use of web-based information systems: Self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies* 59: 431–449.

———, J. D. Jackson, J. S. Park, and J. C. Probst. 2006. Understanding information technology acceptance by individual professionals: Toward an integrative view. *Information & Management* 43: 350–363.

Yujong, H. 2005. Investigating enterprise systems adoption: Uncertainty avoidance, intrinsic motivation, and the technology acceptance model. *European Journal of Information Systems* 14: 150–161.