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**Investigating Factors Related to Individuals'  
Intention to Use New Information Technology: An  
Extension of TAM**

**Hasnain Rizvi**

**A Thesis**

**In**

**The John Molson School of Business**

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**For the Degree of Master of Science**

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# **ABSTRACT**

## **Investigating Factors Related to Individuals' Intention to Use New Information Technology: An Extension of TAM**

This study investigates individuals' intentions towards using a new technology being implemented in their workplace. Based on the technology acceptance model (TAM), an extended model is proposed incorporating tool functionality, strategy commitment and supervisor support to explain employees' intention to use the new information technology. 81 completed surveys were collected from 3 organizations in the financial, food distribution and hydraulics industries. The surveys were distributed early in the implementation stage when widespread use of the new system had not begun. Using multiple regressions to analyze the data, the results indicate that a significant and positive relationship exists between a tool's functionality and a user's perception of its usefulness and ease of use. The perceived ease of use of a new IT is positively related to its perceived usefulness. In turn, perceived usefulness, IT strategy commitment and supervisor support are significantly related to one's intention to use a new IT. Additionally, supervisor support was also found to be indirectly related to intention to use through IT strategy commitment. The construct of perceived ease of use did not appear significantly related to intention to use in this study. This study's main contribution lies in the identification of new and significant antecedents of intention to use, as well as validated measures of IT strategy commitment and tool functionality when studying technology acceptance. Practical contributions include the possibility of better understanding IT acceptance prior to new IT implementation.

## ACKNOWLEDGEMENTS

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# INTRODUCTION

With the ever increasing globalization of markets, and the fast paced technological era in which we now live, the proper investment and use of information technologies (IT) by businesses is becoming paramount to their survival. In response to this need, IDC which is a subsidiary of IDG, the world's leading technology media, research, and events company had predicted expenditure on information technology in the United States would reach an estimated \$391 billion in 2004<sup>1</sup>. Meanwhile, it has been suggested that up to 80% of system development efforts fail; and not because of the failure of the technology itself<sup>2</sup>. It has been argued that one of the factors affecting the success of an information technology initiative is its usage; in other words, if the technology implemented is not used, then the technology initiative does not provide the anticipated return on the investment. In order to minimize this wastage of resources, companies should ideally be able to predict whether or not their employees will be using the new system before actually investing in and implementing it. In order to be equipped with this prediction power, it is of utmost importance to examine and study the antecedents and the factors that are related to the actual use of a system. For this reason, this study aims to examine the factors that influence users and their intentions towards using new information technologies. The goal is to determine whether certain user perceptions, tool characteristics and social influences do in fact affect employees' intention to use a new information technology that is to be implemented in their workplace.

Using an extension of the theoretical framework provided by the Technology Acceptance Model (Davis, 1989), the research model consisting of the constructs of tool

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<sup>1</sup> <http://www.itfacts.biz/index.php?id=P729>

<sup>2</sup> <http://www.umsl.edu/~lacity/whymis.html>

functionality, perceived usefulness, perceived ease of use, IT strategy commitment, supervisor support and behavioral intention to use was proposed. Employees from three organizations in the fields of finance, food distribution and hydraulics were surveyed in order to understand which factors influence their intention to use a new IT. Multiple regressions were used to analyze the responses of the employees. The results indicate that a significant and positive relationship exists between a tool's functionality and a user's perception of its usefulness and ease of use. Also, the perceived ease of use of a new IT is significantly and positively related to its perceived usefulness. The supervisor support perceived by employees is positively related to their commitment to the IT strategy, while it is also directly and significantly related to their intention to use the new IT as are the individual's perceived usefulness and IT strategy commitment. The only relationship that proved not to be significant is the one between perceived ease of use of a new IT and the intention to use it.

This document is organized as follows: A review of the literature is provided in the first chapter. The research model developed for this study is then presented in chapter 2, followed by a description of the research design and methodology, as well as the results in chapter 3. Chapter 4 presents a detailed discussion of the results. The contributions provided by this research as well as its limitations are also outlined. Lastly the recommendations for future research and conclusions achieved are discussed.

# CHAPTER 1- LITERATURE REVIEW

This chapter presents a review of the main research models used in information systems (IS) for studying individual acceptance of a new IT. A review of empirical studies in the area will also allow for the identification of additional potentially influential factors which will be introduced and discussed.

## *Information Technology Acceptance*

Information technology acceptance by employees is a major issue for companies making large and costly investments in order to gain competitiveness, or even maintain pace with the technological era (Agarwal & Prasad, 1999). However, the day-to-day use of these technologies relies heavily on individual employees whose tasks are directly related to these technologies rather than the executives and managers that make the implementation decisions. According to Dillan and Morris (1996), solely conducting an in-depth analysis determining whether or not an organization has the ability to use a given technology cannot determine an employee's willingness to use it. Furthermore, employee's refusal to accept the technology can lead to its underutilization which can eventually result in wasted resources. Therefore, researchers have long studied the factors that can predict an individual's tendency to accept and use a technology and have aimed to discover additional influential factors that can increase this predictive power. This has led to the emergence of a large theoretical base, studies, and models concentrating on the phenomenon of technology acceptance, of which the Technology Acceptance Model (TAM) (Davis, 1989) has proven itself as a pioneer and leader (Igbaria, Zinatelli, Cragg & Cavaye, 1997; Venkatesh & Morris, 2000, Venkatesh, Morris, Davis & Davis, 2003).

## ***Technology Acceptance Model (TAM)***

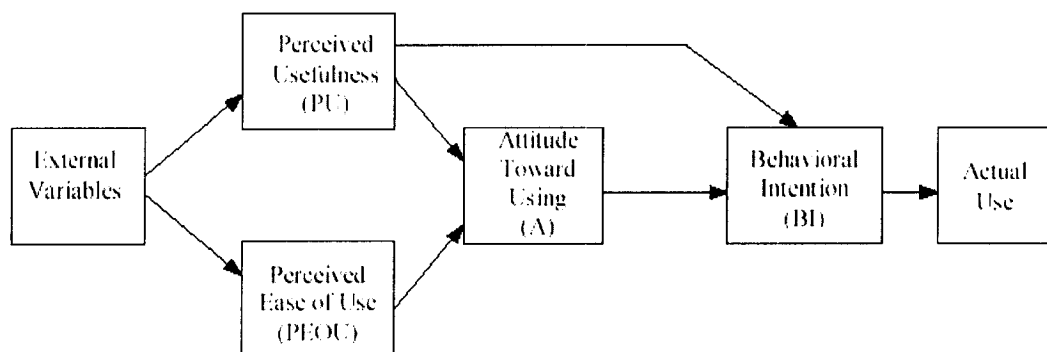
According to the work of Venkatesh et al. (2003), there are eight prominent models that emerge with the goal of better explaining and predicting the phenomenon of technology acceptance. These eight models include the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model, the Theory of Planned Behavior (TPB), a model combining the TAM and TPB, the model of PC utilization, the Innovation Diffusion Theory (IDT) and the Social Cognitive Theory. Of the models identified above, TAM originally proposed by Davis (1989) has received considerable support in the domain of information technology acceptance and has proven to be a robust, as well as parsimonious model in explaining user acceptance and usage behavior (Igbaria et al., 1997; Venkatesh & Morris, 2000, Venkatesh et al., 2003). TAM, originally adapted from TRA (Fishbein & Ajzen, 1975), hypothesizes that beliefs influence attitudes, which in turn lead to intentions that ultimately guide or generate behaviors. TAM has proven to be easier to use and a more powerful model of the determinants of user acceptance than its predecessor, while being specifically suited to the domain of information technology (Igbaria et al., 1997). In an effort to increase the performance of TAM and the models mentioned above, it is not uncommon to investigate model extensions. However, TAM as a foundation has established itself as one of the leading theories of use when examining and studying technology acceptance.

TAM, presented in Figure 1.1, is a model suited specifically to the field of information systems and information technology in order to examine and predict technology usage at the individual level. This model analyzes the perceptions of users and the relationships they may have with the individual's attitude, intentions to use a technology as well as the actual use that results. An individual's attitude is a concept that was originally adapted from TAM's reliance on its predecessor of TRA and is

defined as “an individual’s positive or negative feelings (evaluative affect) about performing the target behavior” (Fishbein & Ajzen, 1975). However, the significance of the attitudinal construct as a mediator of individuals’ perceptions towards usage intentions has proved to be not as significant as was originally proposed (Davis, Bagozzi & Warshaw, 1989; Taylor & Todd 1995; Legris, Ingham & Colletette, 2003). Consequently, many researchers such as Venkatesh and Davis (1996) as well as the revised Venkatesh and Davis (2000) and Venkatesh and Morris (2000) have tested models with the attitude construct removed because of this apparent lack of significance. The resulting components of interest from TAM are those of perceived usefulness (PU), perceived ease of use (PEOU) and the construct of behavioral intention to use (BI).

**Figure 1.1**

**Technology Acceptance Model (Davis et al., 1989)**



### **TAM's core constructs**

TAM assumes that the intention to use a new IT and the actual use of it is influenced by the user perceptions of usefulness and ease of use. The following section discusses these core constructs of TAM and the studies that have investigated them.

## IT use

A variety of constructs have been examined throughout the IT literature in order to better predict and assess an individual's acceptance of a technology. A construct referred to as personal computing acceptance has been studied in an effort to understand whether personal computing technologies such as spreadsheets or database softwares used by professionals and managers to prepare plans or analyze debtors, sales and costs have in fact been accepted by users (Igbaria et al., 1997). There has also been work done that has investigated individual acceptance in order to examine and understand the broader concept of organizational adoption (Frambach & Schillewaert, 2002).

In terms of studying acceptance of individuals, many studies have focused on looking at employees' actual use of technologies in order to determine whether or not the technology has been accepted (e.g. Davis, 1989; Pijpers, 2001). This has been done through the use of constructs that examine current use (Agarwal & Prasad, 1997), and short term and long term use of technologies (Venkatesh, Speier & Morris, 2002). It has however been claimed by Szajna (1996) and Lucas and Spitler (1999) that there are limitations to the systematic and objective analysis of actual use through measures such as frequency of use for instance, due to the associated difficulty in its interpretation. Szajna (1996) provides the example of an accountant who regularly uses income tax software throughout the fiscal year. He/She can be assumed to have successfully accepted the software. However, the same argument of acceptance can be provided for another professional who uses it simply to file his/her tax return at one time during the year and is capable of doing so accurately and in a timely fashion. Lucas and Spitler (1999) also support this view in their research of brokers using a workstation. One broker may use the workstation to access the accounts of five customers in an hour due



to the nature of their cases, whereas another may only access one in the same hour because of a more complex situation. Yet the issue remains that the importance of using a technology in order to benefit from its implementation in an organization is logical and the gap that results from having a system available and not using it results in wasted resources. From an organizational standpoint, measuring IT use must be accomplished after the initial expenditures associated with IT implementation have been completed, resulting in feedback that is too late to be of use. It is important for organizations to be able to better understand the antecedents of IT use in order to be well equipped to act in a manner that can increase IT acceptance, as well as use at a point in time when the organization is not overly committed into the implementation process. For this reason, it could be beneficial to focus on gaining an understanding of user acceptance by measuring whether or not an individual intends to use the new IT, while allowing for the possibility of pulling out of the implementation if users respond negatively. This measurement of user intentions in terms of using a new IT is discussed in terms of the construct of behavioral intention in the next section.

### **Behavioral intention**

Due to the importance associated with the use of a technology in order to reap its benefits, there is considerable support that has emerged for the study of an individual's behavioral intention to use (BI) a new system. Many studies using a wide array of samples and technologies have examined this construct. Table 1.1 summarizes several studies having used various samples and technologies in order to provide an indication of the widespread applicability of this construct. BI is a construct that captures an individual's intention to use the new technology for the analysis of technology acceptance because of its effectiveness in predicting the actual use of a system, based on the system's need. The work of Venkatesh and Morris (2000) which examined

gender, social influence, and their role in data and information retrieval technology acceptance as well as that of Chau and Hu (2001) focusing on individual professionals' acceptance of telemedicine technology studied behavioral intention as opposed to actual use, because of the strong causal link that has been reported between the two. Venkatesh et al. (2002) examined the continued use of a technology by studying a relationship linking the behavioral intention to use a technology to its short and long term use. They found that the intention to use a technology was significantly related not only to short term but also to long term use. In fact, the original TAM (Davis, 1989) was successful in showing that BI is related to actual use. Taylor and Todd (1995) also determined that BI was related and vital in determining students' actual use of a computer resource center. Since that time, there is considerable and growing evidence in the literature suggesting that BI does in fact lead to predicting actual use or the desired behavior, and that BI is the main and essentially the most crucial determinant of actual use (Venkatesh et al., 2003; Legris et al., 2003). It has also been shown that ignoring BI by excluding it from the technology acceptance model as a mediator of the relationship to actual behavior substantially decreased the power of the model to predict the behavior (Taylor & Todd, 1995).

**Table 1.1**

**Examining Behavioral Intention**

Sample of studies examining BI as a dependent variable			
Author	Technology	Respondents	Results
Taylor and Todd (1995)	Computer Resource Center	786 students	R <sup>2</sup> : TAM = 52% TPB = 57% dTPB = 60%
Szajna (1996)	E-mail	61 students	PEOU not significant for BI BI better predictor of acceptance than use R <sup>2</sup> Intentions: 52% pre-implementation
Agarwal and Prasad (1999)	Graphical User Interface	230 business Professionals	Attitude and PU = 26% of BI Workforce tenure not significant
Agarwal and Prasad (2000)	COBOL, C language	52 programmers	PEOU significant for BI Organizational tenure, Job insecurity, Training and Experience not significant
Chau and Hu (2001)	Telemedicine	408 business Professionals	PU most significant for BI R <sup>2</sup> : TAM = 40% TPB = 32% dTPB = 42%
Riemenschneider et al. (2003)	Website	156 small business executives	TAM and TPB effective Collected model provides best results
Hong et al. (2001/2002)	Digital Libraries	585 students	Individual and system characteristics significant in model R <sup>2</sup> Intentions: 52%

BI has been studied with a variety of sample characteristics throughout the literature in order to receive the support it has gained. Several studies have examined BI as the dependant variable in samples that consisted of students (Taylor & Todd, 1995; Szajna, 1996; Hong, Thong, Wong & Tam, 2001/2002). For instance, Taylor and Todd (1995) found that BI was significantly related to the actual use of a computer resource center by students. Szajna (1996) studied BI and also found support for this construct as the indicator of acceptance of an electronic mail system by students. Similarly, Hong et al. (2001/2002) also supported the use of BI as their dependant

variable and found it to be significant in their model assessing students' acceptance of digital libraries. In fact, Legris et al. (2003) reviewed the major journals in the MIS field and found that a limitation associated to many studies was the use of students as the research subjects. Samples of business professionals have also been studied for the purpose of investigating BI and its antecedents (Chau & Hu, 2001; Agarwal & Prasad, 1999) as well as that of specialized workers such as programmers (Agarwal & Prasad, 2000).

BI has also been examined in various studies spanning different technologies. Studying BI with various technologies, ranging from simple to complex ones helps support the robustness of TAM when examined with a wide array of technologies. Riemenschneider, Harrison, and Mykytyn (2003) investigated BI in order to gain an understanding of the acceptance of a website for use by business professionals. Their results indicated that both TAM and TPB predicted the BI of business professionals towards the use of a website successfully and increasingly more effectively as the models were incorporated together. It is important to study the acceptance of such simple technologies as well as the complex ones because simple technologies can replace daily tasks in order to make them automated or more efficient, yet these simple technologies must still be accepted in order to produce the desired benefits. BI has therefore also been studied with technologies such as electronic mail systems (Szajna, 1996), and graphical user interfaces (Agarwal & Prasad, 1999). In the work of Agarwal and Prasad (1999), they were successful in predicting only 26% of the variance in BI through the constructs of PU and individuals' attitudes towards using the technology. Still, the relationships hypothesized between the attitudes of technology literate individuals from a fortune 100 technology vendor towards using a graphical user interface and how useful they perceived the interface to be were significantly related to the BI of using it. The reasons for accepting certain technologies vary as much as the

technologies themselves and studies have therefore aimed at examining a wide range of these technologies. For example, BI has been examined with the use of digital libraries (Hong et al., 2001/2002), a technology that is of use in a variety of disciplines and by a wide range of individuals, all the while on the other side of the spectrum telemedicine technology specific to medical professionals only has also been investigated (Chau & Hu, 2001). Hong et al. (2001/2002) supported TAM in that perceived usefulness and perceived ease of use were significant in predicting BI with the digital libraries similarly to Chau and Hu (2001), who found PU to be the most influential factor in predicting BI with the telemedicine technology. In terms of specific and complex technologies, BI has also been investigated on computer professionals such as programming specialists in programming languages such as COBOL and C (Agarwal & Prasad, 2000). The results of this study indicate that BI was in fact directly influenced not only by individuals' attitudes, but also by how easy they thought the system would be to use.

### **Perceived usefulness and perceived ease of use**

TAM's main constructs consist of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). The reasoning for PU is based on the action theory, work motivation theory and behavior decision theory which claim that the impetus for engaging in certain behaviors stems from mental representation linking instrumental behavior to higher level goals or purposes (Venkatesh & Davis, 2000). Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). Throughout the literature, PU and PEOU have been examined in a variety of different contexts based on the type of technology, the sample, and a diverse combination of other constructs (Venkatesh et al., 2003). It has repeatedly been shown

that, as was originally proposed by Davis (1989), the constructs of PU and PEOU are of considerable significance when examining an individual's BI or actual use of a technology. For instance, Agarwal and Prasad (1999) found that PU and PEOU were both significant in the influencing of BI of technology literate individuals towards the use of a graphical user interface. PU and PEOU have also emerged as significant contributors for employees in manufacturing and engineering fields in predicting their acceptance of personal computing technologies (Igbaria et al., 1997). Venkatesh and Morris (2000) similarly found strong support for the relationship between PU and PEOU towards the BI of using a data and information retrieval technology from employees in five different organizations. However, according to TAM, all variables that are present in an environment that can potentially influence the intentions of an individual to accept and use a technology are to do so through influencing PU and PEOU (Agarwal & Prasad, 1999). This assumption has led to some of the TAM based models to examine constructs and their impact on usage intentions only when mediated by the constructs of PU and PEOU (Davis, 1989; Karahanna & Straub, 1999).

TAM and the constructs of PU and PEOU have been examined at various stages of IT implementation initiatives. Venkatesh & Davis (2000) examined PU and PEOU through the use of a longitudinal design study by collecting data at three points in time beginning with pre-implementation, one month after implementation and three months post-implementation. Due to this method of data collection, the varying effects on the constructs within TAM can be seen at different time periods. For instance, the decreasing influence of individuals' beliefs of what their associates or supervisors would like them to do, also referred to as subjective norm on the perceived usefulness of a technology with increasing first-hand experience, or even the decreasing effects of subjective norm on the behavioral intention itself to use the technology as time passes. Specifically, the results indicated that acceptance was successfully predicted by TAM at

all three time periods. The results from Venkatesh and Davis (2000) ranged from 37% to 52% in explaining the variance in acceptance at the pre-implementation stage, from 34% to 47% one month after the implementation had taken place, and from 39% to 42% once three months had elapsed since the implementation of the system. Based on these results, it can be seen that the time at which the study is conducted can possibly be a factor that can affect the results obtained. Szajna (1996) measured graduate students' actual use of an electronic mail system at two points in time, the pre-implementation and post-implementation stages of the technology. The results of this study indicated that the difference between the pre-implementation and the post-implementation stages does not have an effect on the relationships or their direction in the acceptance of the technology, whereas it may affect their strengths (Szajna, 1996). For instance, in the pre-implementation phase, the effects of PEOU on PU were not as pronounced as for the post-implementation phase. Also, Venkatesh et al. (2002) employed a different method of examining the continued use of a technology and included in his model a relationship that examined the behavioral intention to use a technology as it affects short term use, and eventually to long term use. This examination appeared to support the fundamental relationships in TAM as they are related to not only short term but also to long term use.

Considering the vast and diverse amount of studies examining TAM, it is interesting to note that a large amount of them tend to conduct their investigations after the initial introduction of the technology and after users have had some degree of familiarity of use with the technology. This can result in these same individuals having already formed their intentions about the use of the given technology (Venkatesh et al., 2003; Mathieson, 1991; Plouffe, Hulland & Vandenbosch, 2001). From a practical standpoint for organizations, this also results in investments having been made for the implementation of the new system when the level of acceptance is being measured. It is

important to be able to measure individuals' acceptance before having implemented the technology through their intentions towards using it.

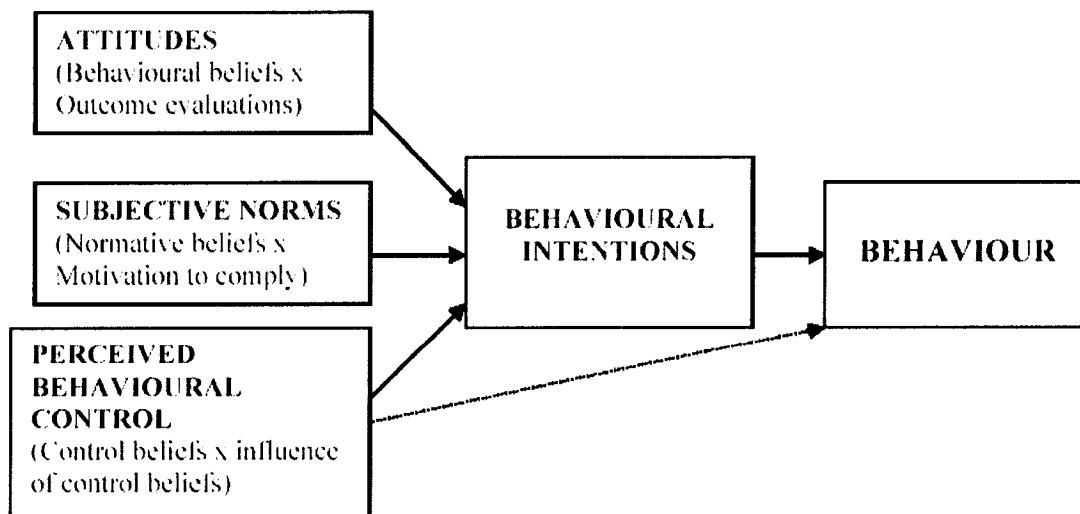
## Model comparisons

Considering TAM centers heavily around users' perceptions, authors have evaluated the effectiveness of TAM by comparing it to other well established theories in the realm of acceptance. Some of these models such as TRA and the Theory of Planned Behavior (TPB) are not as specialized to the field of information technology and systems acceptance but have been successfully used in this area as well.

TPB, presented in Figure 1.2, examines the phenomenon of acceptance by aiming to predict an individual's intentions based on their attitude, their beliefs of what their associates or superiors would like them to do (subjective norms), and their perceived behavioral control.

**Figure 1.2**

### ***Theory of Planned Behavior (Ajzen, 1991)***





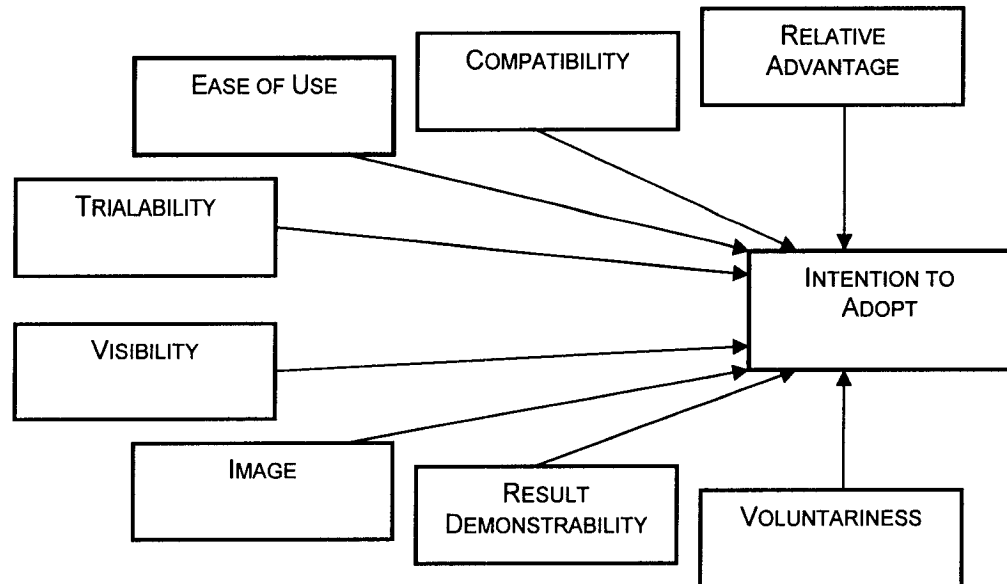
TAM has been compared to TPB and variations of it on several occasions (Chau & Hu, 2001, Taylor & Todd, 1995, Riemenschneider et al., 2003). In the work of Chau and Hu (2001) with hospital professionals, PU emerged as the most significant factor in explaining the behavioral intention of individuals towards the use of telemedicine technology. The models on the whole appeared to be satisfactory in explaining the acceptance of a technology. TAM is compared to TPB and a decomposed TPB with student users of a computer center in the work of Taylor and Todd (1995). The decomposed TPB incorporates the core constructs of perceived ease of use and perceived usefulness with TPB. An interesting conclusion expressed by the authors is that the choice of model used is dependent on the reasoning behind the research being conducted. It is claimed that based on its simplicity, parsimony and robustness, TAM may prove to be a better model than TPB or the decomposed TPB in predicting system usage but in order to understand the process, the decomposed TPB provides better insight and detail that can be more suited to helping managers. Therefore, though parsimony is important, if it was all that mattered, then the most suited model would involve only behavioral intention leading to use (Taylor and Todd, 1995). TAM is also compared to TPB and a “collected model” (Riemenschneider et al., 2003). This “collected model” incorporates constructs from both TAM and TPB as well as the constructs of anticipated satisfaction, social approval and expected difficulty. In this study, the “collected model” does in fact provide the best results when compared to either of the other two models alone, considering it incorporates a wider array of constructs (Riemenschneider et al., 2003). In fact, according to the literature reviewed by Venkatesh and Davis (2000), TAM compares favorably to TRA and TPB as being a robust, powerful and parsimonious model for predicting user acceptance.

TAM has also been compared to the Perceived Characteristics of Innovating Theory (PCI) (Plouffe et al., 2001). PCI, presented in Figure 1.3, is a theory proposed

by Moore and Benbasat (1991) which consisted of eight constructs that were hypothesized to predict an individual's intention to adopt an innovation.

**Figure 1.3**

***Perceived Characteristics of Innovating (Moore and Benbasat, 1991)***



This model consists of the construct of relative advantage which addresses if the innovation is superior to the one it is replacing. The construct of compatibility examines if the innovation meshes with the user's current habits and trialability judges if there is adequate opportunity to try the innovation before it is adopted. Visibility, assessing the degree to which an innovation is visible during its diffusion through a user community is also examined while image determines whether the user feels the use of the new innovation bestows prestige. Result demonstrability addresses if the benefits and utility of the new system are apparent. The perception of whether the use of the system is voluntary and the system's ease of use are also included as constructs in this model. Plouffe et al. (2001) found that PCI was more effective than TAM in explaining individuals' intentions to use an electronic payment system by explaining approximately

12% more of the variance in the dependant variable than TAM. Still, PU from TAM and relative advantage from PCI, two similar constructs appeared to be the most significant factors influencing the intention to adopt. Other significant constructs from PCI were those of Compatibility, Image, Visibility, Trialability, and Voluntariness. Interestingly, complexity (similar to PEOU) appeared not to be significant in the Plouffe et al. (2001) study.

### **Model's effectiveness**

Considering TAM is one of the fundamental theories with which researchers examine the complex phenomenon of technology acceptance, it is natural to be concerned with the performance of the model. The total variance explained by the model in various studies is a tool with which researchers can understand the effectiveness of the model used. This measure of total variance referred to as the R squared explains the variation in the behavioral intention to use the technology studied and gives an indication of what percentage of the dependent variable is accounted for by the model presented. In essence, a value of 100% would imply that the model explains perfectly an individuals' intention to use the technology.

In terms of the studies that have already examined TAM and extensions of TAM, the R squared values have been fairly consistent throughout the literature. Based on a review of the literature, TAM typically explains approximately 40% of the variation in usage intentions and behavior (Venkatesh & Davis, 2000). For instance, Taylor and Todd (1995) conducted a study which compared three models of importance in technology acceptance, namely TAM, TPB and a decomposed TPB and found that when predicting the behavioral intention of business students to use a computer resource center, the performance of the three models varied slightly. The R squared values were

52% for TAM, 57% TPB and 60% for the decomposed TPB model. Dishaw and Strong (1998) conducted a study in which they investigated programmer analysts who were completing maintenance projects in three fortune 50 firms. The authors investigated TAM in conjunction with the Task-Technology Fit model and found that the prediction power of their combined model resulted in explaining 51% of the analysts' actual use of the maintenance software tools. In a comparison study where TAM was analyzed in conjunction with the Perceived Characteristics of Innovating Theory (PCI) in order to study retailers and merchants as they implemented the technology of a smart-card based electronic payment system, the results indicated that TAM only accounted for 32.7% of the variation in acceptance, whereas PCI was successful in accounting for 45% of it (Plouffe et al., 2001). In fact, according to the work of Agarwal and Prasad (1999), the R squared explained only 26% of the variation in the intention to use a new graphical user interface by technology literate individuals from a fortune 100 technology vendor was accounted for by the model studied, and more specifically PU and attitude. The relatively low value of R squared in fact lead the authors to question whether other constructs are directly involved in influencing intentions as opposed to always being mediated through the constructs of PU and PEOU and to suggest the investigation of direct influences in future research.

### **Extensions of TAM**

Many authors have aimed to study extensions of TAM by focusing on PU and PEOU and testing them in conjunction with selected constructs as well as with other popular theories (Venkatesh et al., 2003). Table 1.2 provides a summary of some significant works that have studied extensions of TAM to better explain the acceptance of new information technologies. The constructs used in the extensions of TAM have

been grouped together by categories in order to provide a better understanding of the characteristics that have been studied in the past.

**Table 1.2**  
**Extensions of TAM**

Constructs by Category				
Author	Individual Characteristics	Task Characteristics	Technology Characteristics	Social Characteristics
Taylor and Todd (1995)	<ul style="list-style-type: none"> <li>• Perceived behavioral control</li> </ul>			<ul style="list-style-type: none"> <li>• Subjective norm</li> </ul>
Dishaw and Strong (1998)	<ul style="list-style-type: none"> <li>• Tool experience</li> </ul>	<ul style="list-style-type: none"> <li>• Task characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Tool functionality</li> </ul>	
Agarwal and Prasad (2000)	<ul style="list-style-type: none"> <li>• Voluntariness</li> </ul>			
Venkatesh and Davis (2000)	<ul style="list-style-type: none"> <li>• Voluntariness</li> </ul>	<ul style="list-style-type: none"> <li>• Job relevance</li> </ul>	<ul style="list-style-type: none"> <li>• Output quality</li> <li>• Result demonstrability</li> </ul>	<ul style="list-style-type: none"> <li>• Subjective norm</li> <li>• Image</li> </ul>
Venkatesh and Morris (2000)	<ul style="list-style-type: none"> <li>• Gender Differences</li> </ul>			<ul style="list-style-type: none"> <li>• Subjective norm</li> </ul>
Chau and Hu (2001)	<ul style="list-style-type: none"> <li>• Perceived behavioral control</li> </ul>			<ul style="list-style-type: none"> <li>• Subjective norm</li> </ul>
Moon and Kim (2001)	<ul style="list-style-type: none"> <li>• Perceived playfulness</li> </ul>			
Riemenschneider, Harrison, Mykytyn (2003)	<ul style="list-style-type: none"> <li>• Anticipated satisfaction</li> <li>• Expected difficulty</li> </ul>			<ul style="list-style-type: none"> <li>• Social approval</li> </ul>
Hong, Thong, Wong and Tam (2001/2002)	<ul style="list-style-type: none"> <li>• Computer self efficacy</li> <li>• Knowledge of the search domain</li> </ul>		<ul style="list-style-type: none"> <li>• Relevance</li> <li>• Terminology</li> <li>• Screen design</li> </ul>	
Chen, Gillenson, Sherrell (2002)		<ul style="list-style-type: none"> <li>• Compatibility</li> </ul>		

TAM has been extended by a model that has been named TAM2 (Venkatesh & Davis, 2000). This model extends TAM in conjunction with social influence processes as well as cognitive instrumental processes. The constructs included are those of subjective norm, voluntariness, image, job relevance, output quality and result

demonstrability. Venkatesh and Davis (2000) support the relationships originally proposed in TAM, all the while successfully predicting use and intention to use through TAM2 up until a maximum R squared value of 52%. Of the constructs mentioned above, some have also been tested in conjunction with TAM in repeated studies such as subjective norm (Venkatesh & Morris, 2000) and voluntariness (Agarwal & Prasad, 2000). The results however do not always appear to be consistent for constructs that are so widely used when testing technology acceptance, such as with the construct of subjective norm. For instance, Venkatesh and Morris (2000) found subjective norm to be significantly related to BI when working with employees from an organization adopting a data and information technology whereas the work of Chau and Hu (2001) found no significant relationship between subjective norm and behavioral intention of professionals in a public tertiary hospital in Hong Kong for the use of telemedicine technology.

Moon and Kim (2001) provide an example of a study that has investigated an extension of TAM simply by including the construct of perceived playfulness to the beliefs and attitude construct already included in the original TAM. The construct of playfulness, consisting of concentration, enjoyment and curiosity proved to be a significant contributor to the behavioral intention of graduate students towards the use of the World Wide Web. TAM has also been expanded with the construct of compatibility and studied for its effect on attitudes in the context of online consumers (Chen, Gillenson & Sherrell, 2002). Once again, it appears that TAM is validated in this online context and support is provided for the expansion of this model using the construct of compatibility as a significant antecedent of intentions. Venkatesh and Morris (2000) extended TAM by examining the influence of gender differences as well as that of subjective norms. Their results suggest that PU is more significant for men whereas PEOU and subjective norm are constructs more significant for women. The work of

Hong et al. (2001/2002) also studied several constructs in an effort to expand TAM. These included constructs related to individual differences such as computer self efficacy and knowledge of the search domain, as well as system characteristics such as relevance, terminology and screen design as they influence PU and PEOU and BI. The results once again supported the expansion of TAM using both individual difference variables as well as most of the system characteristics variables tested. The system characteristics of terminology and screen design however were not significant towards PEOU.

TAM has not only been examined in conjunction with specifically chosen constructs, but has also been combined and extended with other theories all together. Dishaw and Strong (1998) combined TAM with the Task-Technology Fit Model (TTF), originally proposed by Goodhue and Thompson (1995). The construct of task-technology fit measures the matching of the capabilities of the technology to the demands of the task to be performed, and hypothesizes that the technology will be used only if the functions of the technology fit the activities of the user (Dishaw & Strong, 1998). The model also comprises the construct of tool functionality which examines the perceptions the user may have regarding the functionalities available in the tool, as well as tool experience and task characteristics. Tool experience examines the prior experience of the user with a tool and the task characteristics looks at the task itself. Dishaw and Strong (1998) found that tool functionality was significantly and negatively related to perceived ease of use (-0.35,  $p < 0.001$ ) and that tool experience was related to both perceived ease of use (0.44,  $p < 0.001$ ) and perceived usefulness (0.30,  $p < 0.001$ ). The integrated model in this study is capable of better explaining the acceptance of a technology through analyzing the actual use of the technology. According to Dishaw and Strong (1998), TAM is excellent and sound alone but does have the weakness of not incorporating the technology and task characteristics that may become especially

apparent in more complex technologies, due to TAM's focus specifically on individual perceptions.

It is not surprising to note that many extensions of TAM have been examined in studies throughout the literature. According to Venkatesh et al. (2003), it appears that extensions enhance the predictive validity of the model. This view is supported in the work of Riemenschneider et al., (2003) where the acceptance of a website for use by business professionals was better predicted with a model referred to as a "collected model" which included constructs from TAM in addition to anticipated satisfaction, social approval and expected difficulty as compared to TAM alone. Similar results can be seen in the works of Taylor and Todd (1995) who studied students' use of a computer resource center and of Chau and Hu (2001) studying medical professionals' acceptance of telemedicine technology who also found that the decomposed TPB, a model consisting of the perception constructs of TAM in conjunction with subjective norm and perceived behavioral control appeared to better predict intention than TAM alone.

### **Future issues**

TAM has been investigated in such a diverse range of situations and settings that much of the research that is conducted using it is considered as simple validation of an already well established model. Since the introduction of TAM by Davis (1989), work has continued in the area of technology acceptance and has not relented to this day. There is still much research that is conducted on TAM currently, and studies that investigate this model consistently suggest continued work with this model. Many papers suggest continued investigation of expanded versions of TAM in general (Venkatesh & Davis, 2000; Chen et al., 2002), while some studies have encouraged TAM studies with specific attention placed on expansion with factors related to social



influence that may directly influence BI (Agarwal & Prasad, 1999) or with constructs related to human and social change processes (Legris et al., 2003). Also, contrary to the underlying assumption of TAM which proclaims that all relationships influencing individuals' behavioral intention are mediated through PU and PEOU, certain authors have promoted the analysis of other constructs that may have direct influences on behavioral intention (Szajna, 1996; Agarwal & Prasad, 1999; Venkatesh & Davis, 2000). For instance, Lewis et al., (2003) suggest that managers need to exhibit commitment towards a new technology in order to influence adoption decisions. This idea could be further studied by examining the direct effects of constructs related to commitment or managerial behaviors that may directly influence the adoption or acceptance intentions of individuals. However, it is all the while suggested that TAM, and specifically PU and PEOU be included in future models in order to benefit from their consistent reliability and significance as well as their proven robustness as predictors of behavioral intention to use a technology (Legris et al., 2003; Chau & Hu, 2001). Reliance on the empirical soundness of TAM and the belief constructs (PU and PEOU) is also suggested in studies that address the major limitations that have been found in the area of IT acceptance, such as the use of students as subjects, simple technologies, the late data collection timing, the cross-sectional measurement design and the emphasis on voluntary usage settings (Venkatesh et al., 2003). Lucas and Spitler (1999) also suggest that the investigation of TAM should be conducted in real life field settings that incorporate the complexities and the uncontrolled scenarios that arise in everyday life. Taking into considerations the many suggestions for future directions of research provided by the existing literature, it becomes clear that continued research of technology acceptance should continue focus on TAM all the while aiming to increase its power and effectiveness by incorporating constructs of importance that can address the gaps and limitations that have been enumerated for TAM. Since papers such as Dishaw

and Strong (1999) have suggested the importance of the specific technology characteristics and Lucas and Spitler (1999) have claimed that complex technologies can affect the significance of TAM, the following section discusses the construct of tool functionality. Lucas and Spitler (1999), and Agarwal and Prasad (1999) have also advocated the examination of social influences for their impact on the acceptance process of a technology. These suggestions lead to the introduction of additional constructs included in this study in order to expand on TAM.

### ***Additional Antecedents***

In an effort to increase the predictive power, and to increase the scope of TAM beyond solely that of user perceptions, additional antecedents to the construct of BI are suggested. Tool functionality is addressed based on its ability to incorporate characteristics more specifically related to the new IT, as well as the constructs of IT strategy commitment and perceived supervisor support.

### **Tool functionality**

The construct of tool functionality is defined as the subject's anticipated functionalities available in the technology to complete his/her required tasks (Dishaw & Strong, 1998). This construct is one that is specific to the technology that is being investigated for implementation in the setting of interest. Tool functionality arises from the Task-Technology Fit model, originally proposed by Goodhue and Thompson (1995). This model has been used by Dishaw and Strong (1998) in conjunction with TAM in order to promote the use of both individual models, as well as to better predict the acceptance of a technology. TAM's examination of perceptions and attitudes toward an IT overlooks the focus on the task involved, the characteristics of the technology and their fit as addressed in the Task-Technology Fit model. The constructs associated with

the Task-Technology Fit model therefore have the potential to expand on TAM by incorporating a wider base of constructs.

The advantage of incorporating aspects of a technology such as tool functionality with TAM is the addition of a construct that examines the employees' expectations about the technology to be implemented. The technology and its characteristics are aspects that are not considered directly in TAM but are only assumed to contribute to user intentions through mediation by the constructs of PU and PEOU.

Tool functionality was shown to have a significant relationship with PEOU, a critical component of TAM when examined with programmer analysts completing maintenance projects in the contexts of finance, aerospace and manufacturing (Dishaw & Strong, 1998). In addition, it has been suggested that future research also consider re-examining tool functionality as a factor that influences PEOU because much of the work done with TAM tends to focus on the relationships affecting individuals' intentions to use as opposed to the precursors of TAM itself (Brown, Massey, Montoya-Weiss & Burkman, 2002). Furthermore, the work of Lucas and Spitler (1999) on brokers and sales assistants in the private client group of a major investment bank studied an extension of TAM where the basic constructs and relationships between PEOU, PU and intention to use were not supported. One of the reasons provided for these results was that the nature of the system, being a windowed interfaced and networked workstation. This resulted in a technology that was more complex and multifunctional making it different from the more simple technologies such as graphical user interfaces (Agarwal & Prasad, 1999), the acceptance of the World Wide Web (WWW) (Moon & Kim, 2001; Agarwal & Prasad, 1997), and the actual use of the internet (Cheung, Chang & Lai, 2000) that have been studied with TAM in other research. This interpretation suggests that the nature of the system or its functionalities may in fact influence the relationships observed in the constructs fundamental to TAM.

## **Strategy commitment**

Strategy commitment is defined as a person's willingness to put forth effort to pursue the direction of the firm for a given strategy (Ford, Weissbein & Plamondon, 2003). This is a construct that has not previously received much attention in the IS literature. Neither an individual's commitment to their organization on the whole, nor to the strategy implemented by the organization have been points of focus in terms of studying the relationship that may exist with the intention of individuals to accept or use a specific IT initiative. The investigation of the commitment level of an individual can however be insightful to the decision of using or not using a technology. According to Ford et al. (2003), organizational commitment, which refers to the level of commitment individuals have towards the organization on the whole by which they are employed has been a point of focus in the domain of acceptance. On the other hand, according to Larsen (2003), when creating a taxonomy for constructs used in the field of information systems, organizational commitment has been appended to the broader concept of job satisfaction when considering individuals and their association with their employing organization. Still, strategy commitment has not been specifically examined as it relates to individual initiatives that the organization may be considering.

Strategy commitment can arise due to the identification of the individual with the values or goals of the strategy or the calculated costs and benefits of committing to the given strategy. Ford et al. (2003) have shown that commitment to an organization and commitment to the strategy at hand are in fact two distinct constructs. This is based on the argument that employees may remain committed to the organization, while at the same time resisting the implementation of a new strategy. Organizational commitment has been shown to be closely related to the level of job satisfaction of employees and

only very mildly related to specific strategy related behaviors (Ford et al., 2003). The fact that employees may be satisfied and committed to the organization does not imply that they will necessarily be committed to supporting and accepting the given strategy that the organization is presently considering to implement. It appears that individuals must become committed to the strategy in order to influence specific behaviors related to it. BI towards using a specific new IT should therefore not be drastically influenced by employees' general or organizational commitment to overall behaviors, but instead more closely related to their specific commitment level to the new IT and its implementation. Consequently, when determining the acceptance of a given strategy, it seems more interesting to look at the commitment towards the IT strategy itself.

## **Support**

According to Helgeson (2003), most taxonomies regarding support from various sources (family, friends, coworkers, supervisors, etc.) describe three basic functions: emotional support, instrumental support, and informational support. Emotional support, also referred to by LaRocco, House and French (1980) as emotional empathy and understanding, refers to having people available to listen, to care, to sympathize, to provide reassurance and to make one feel valued, loved and cared for. Instrumental support, or tangible support, refers to tangible or concrete assistance such as lending money or running errands. Informational support involves the provision of information or guidance (Helgeson, 2003).

According to Helgeson (2003), researchers have additionally suggested the matching hypothesis which implies that the kind of support needed depends on the given situation. For example, if support was to be applied to a technology implementation project, it is suggested that in the early phases of this stressing situation also known as

the crisis phase when the new project is simply introduced, emotional support is of the greatest importance. This allows the individual to know that he/she will have available help when needed. In the second phase of this stressor, or the transition phase, when an individual is beginning to use the technology, informational support becomes increasingly more important allowing the user to acquire the tools, skills and information necessary to cope with the change. In the last phase, or the deficit phase, when the user is now completing his/her daily responsibilities using the new technology, instrumental support can be of importance if the user finds that he/she is overwhelmed by the new tasks at hand.

Support can be presented from a variety of sources in a person's environment. It can arise among others, from family, friends and coworkers. The constructs of management support and supervisor support refer to the provision of support from a specific influential source. This is not to diminish the importance of support originating from the other social contacts present in an individual's environment but these constructs focus on the organizational area in which the implementation of a new IT is taking place. Also, by studying management or supervisor support, it is possible to further the benefits that can be gained by an organization in that these are variables that can potentially be controlled and are in the grasp of individual managers and supervisors.

### **Management support**

In IS, management support is defined as the extent to which top and mid-level management allocate sufficient resources to the implementation effort and are willing to accept the risks, while encouraging and promoting the implementation effort (Larsen, 2003). Management support has in fact been studied in conjunction with TAM and has

appeared to be of importance in an individual's decision process on whether or not to accept a technology (Igarria et al. 1997; Ford et al. 2003).

Karahanna and Straub (1999), studied the acceptance of an e-mail system in Fortune 500 companies involved in the transportation industry and incorporated a construct called social influence of supervisors. Interestingly, this construct appeared as the one of most importance in influencing PU, followed by PEOU. However, even under the specific terminology of management support, this concept has not always been described in a consistent manner. Igarria et al. (1997) examined management support in conjunction with internal support and internal training as components of intra-organizational factors that impact the personal computing acceptance of upper and lower managers as well as non-supervisory employees in small firms from the manufacturing and engineering fields. Management support was defined as sufficiently allocating resources and acting as a change agent while providing general support. Of the intra-organizational factors, management support emerged as the most significant towards PEOU and PU as well as indirectly towards personal computing acceptance. On the other hand, in the work of Ford et al. (2003), the construct of management support is described as a complex variable that consists of behaviors such as framing and clarifying the change, creating a climate for the change, establishing practices that facilitate the change, expecting the desired behavior, rewarding the behavior, supporting the individuals, allowing the employees to have input, and providing adequate training. For the construct of management support, Ford et al. (2003) found a direct and significant relationship to strategy commitment and an indirect relationship to the actual behavior.

According to Agarwal and Prasad (2000), in the past literature management support has often been investigated in terms of the training provided to individuals on the new IT. However, Agarwal and Prasad (2000) also suggest that the attitudes of top

management are also likely to affect the perceptions of workers. In fact, top management commitment and support can help shape individual's beliefs that an IT is useful and instrumentally rewarding (Purvis, Sambamurthy & Zmud, 2001). The results from the work of Lewis et al. (2003) indicate that institutional factors that consist of top and local management commitment are significant towards PEOU and PU. In the work of Igbaria, Guimares and Davis (1995), management support was included in the construct of organizational support and was defined solely as providing encouragement and the allocation of resources. The results indicated that management support was significantly related to usage, whereas it was not significant towards PU.

Another construct that incorporates the influence management can have is that of subjective norm (SN). Taylor and Todd (1995) believe that there can be other factors that may also influence BI and therefore present the decomposed TPB model which includes SN and perceived behavioral control for their direct effects on BI. The concept of SN is further decomposed into three referent groups that are superiors, peers, and subordinates. The importance of decomposition into three referent groups was performed considering were there to be no decomposition, circumstances in which supervisors were to support a technology while peers resisted it could suggest that SN was not an influential construct. In the case of this study, only the referent groups of superiors and peers were used due to the nature of the subjects, which happened to be students making use of a computer resource center, removing the need for the referent group of subordinates. Taylor and Todd's (1995) results indicate that superior influence and peer influence are significantly related to BI. Lucas and Spitler (1999) studied the relationship between a construct called "norms", which referred to social norms established by peers and managers. They found that this construct was the most important in directly influencing the use and intended use of workstations by private client brokers. The rationale behind SN as a construct is that people may perform a



behavior even if they themselves are not favorable to it. The belief that one or more referents think they should perform a given behavior and are showing it in the form of encouragement or positive attitudes can lead directly to the performing of that behavior (Venkatesh & Davis, 2000).

In IS, management support has been studied in relation to BI, yet the results have not always proven to be easily comparable due to the differences in the definition of the construct and the measurement items used by the authors (Igbaria et al., 1997; Agarwal & Prasad, 2000). For this reason, it may be more appropriate to turn to a field where the concept of support has been more widely studied and a more commonly used definition has been established in order to better understand this construct.

**Perceived supervisor support** is one type of support that has often been studied in psychology and in the management literature (Kottke & Sharafinski, 1988; Mowday, Steers & Porter, 1979). This construct, similarly to management support, is the investigation of support provided from a specific source. Perceived supervisor support (PSS) refers to the perceptions and views of employees regarding the degree to which their supervisors value their contributions and care about their well being. Kottke and Sharafinski (1988) have suggested that employees value feedback most from those closest to them and rely on supervisors more than either their co-workers or the organization for information about their work.

In the psychology and management literature, the importance of PSS has been suggested in relation to various stresses that employees face in their professional careers, as well as their work related behaviors such as absenteeism and turnover (LaRocco et al., 1980; Helgeson, 2003; Cohen & Wills, 1985; Eisenberger, Stinglhamber, Vandenberghe, Sucharski, & Rhoades, 2002). However, PSS as defined in management has not been studied in relation with the behavioral intentions to use a new IT.

As it stands, though there is a large amount of research that has examined the various aspects of TAM, tool functionalities, perceived supervisor support and various forms of commitment, the above mentioned constructs have not as of yet been looked at together in order to assess their effectiveness in predicting intention to use. Also, with the vast research in this area, it appears that the majority of researchers are unanimous in suggesting the continued investigation in this area of study.

The following chapter discusses the research model that is suggested for the study of technology acceptance in an effort to bring together the suggestions of previous researchers, in order to better understand the antecedents of individual's intention to use a new information technology.

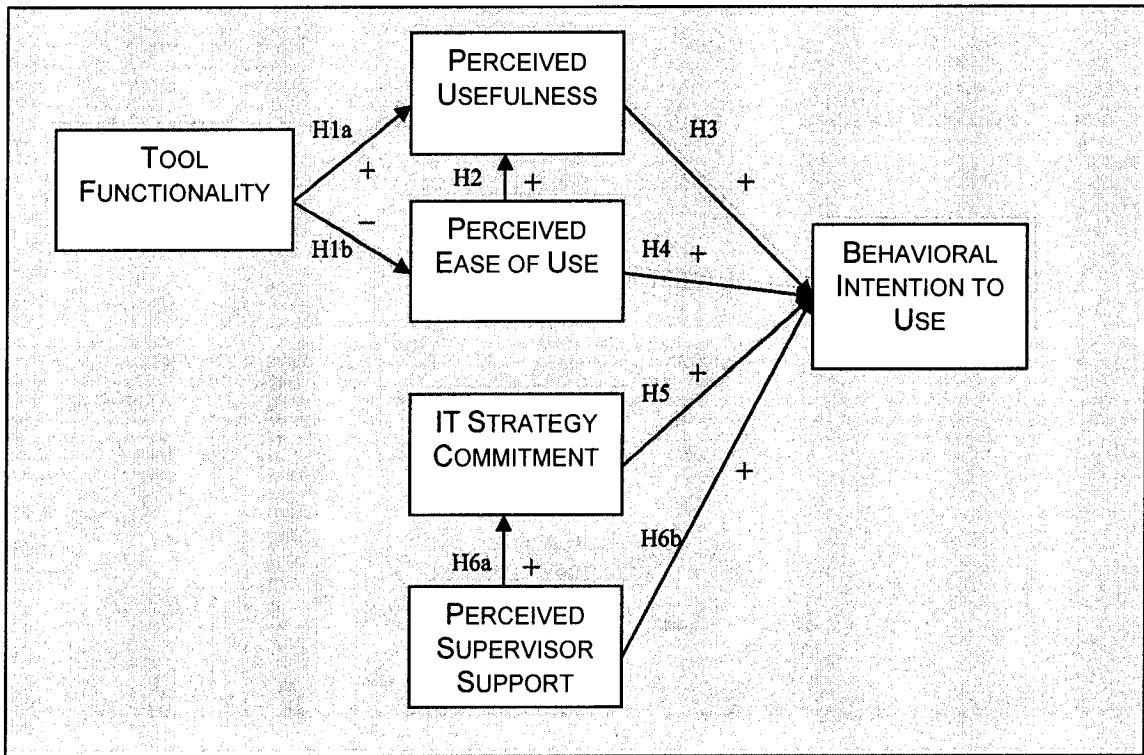
## CHAPTER 2- RESEARCH MODEL AND HYPOTHESES

In this chapter, the research model is introduced and explained. The research hypotheses proposed for testing are then presented and discussed.

### ***Research Model***

The present research investigates the phenomenon of IT acceptance using a model that is grounded in TAM and the empirical IS literature. Based on previous recommendations by researchers in this domain to continue work on TAM and extensions of it (Venkatesh & Davis, 2000; Chen et al., 2002), this work presents an extension of TAM that incorporates the aspect of user perception about supervisor support, individual commitment to the implementation strategy, and their anticipated functionality of the IT to be implemented. The proposed research model as proposed is presented in Figure 2.1.

**Figure 2.1**  
**Research Model**



The research model comprises two main TAM constructs of perceived usefulness and perceived ease of use. These are expected to be influenced by the construct of tool functionality. It is proposed that tool functionality is positively related to perceived usefulness and negatively related to perceived ease of use. The construct of perceived supervisor support is hypothesized to be positively related to both the IT strategy commitment as well as the behavioral intention of using a new IT. Perceived usefulness, perceived ease of use and strategy commitment are all proposed as positively related to behavioral intention to use. The specific research hypotheses are presented in the next section.

## ***Research Hypotheses***

The research hypotheses as shown in Figure 2.1 are presented below.

Tool functionality is hypothesized to be positively related to perceived usefulness. It is therefore assumed that in an individual's view, the greater the tasks accomplishable by the new IT and the more capabilities it possesses to help with or complete his/her job requirements, the more useful it will be perceived. This is expressed in the following hypothesis:

H1a: The greater the anticipated tool functionality in the new IT, the more useful it is perceived.

Prior work suggests that tool functionality is negatively related to perceived ease of use of the IT (Dishaw & Strong 1999). This implies that the broader the range of capabilities and the functionalities perceived to be offered by the technology, the more difficult to use it will be perceived. This suggests the following hypothesis:

H1b: The greater the anticipated tool functionality in the new IT, the less easy to use it is perceived.

Originally proposed by Davis (1989) in TAM, a positive relationship is suggested between perceived ease of use and perceived usefulness. This relationship has subsequently gained empirical support (Szajna, 1996, Agarwal & Prasad, 1997, Igbaria et al., 1997, Karahanna & Straub, 1999, Venkatesh & Morris, 2000). It is proposed that the easier a user perceives an IT to use, the more useful it will be perceived. This suggests the following hypothesis:

H2: The greater the perceived ease of use of a new IT, the greater its perceived usefulness.

Suggested by Davis (1989), perceived usefulness is proposed to have a positive relationship to an individual's behavioral intention to use a technology. There has been considerable support provided for this relationship (Venkatesh & Morris, 2000, Hong et al., 2002, Venkatesh et al., 2002). It is suggested based on the results of these previous studies that an individual's perceptions as to how useful a technology will be in their job will influence their intentions to use that technology. This leads to the following hypothesis:

H3: The greater the perceived usefulness of a new IT, the greater the behavioral intention to use it.

Similarly Davis (1989) has suggested a positive relationship between perceived ease of use of an IT and an individual's behavioral intention to use it. This relationship has been further supported, generally in the same studies and in conjunction with perceived usefulness considering both constructs are critical contributors to TAM (Venkatesh & Morris, 2000, Hong et al., 2002, Venkatesh et al., 2002). It is therefore suggested that the perceived ease of use of a new IT will influence an individual's intentions to use it. The resulting hypothesis is the following:

H4: The greater the perceived ease of use of a new IT, the greater the intention to use it.

Based on the work of Hartline and Ferrell (1996) suggesting that those who are committed to a strategy are more likely to perform behaviors associated with the strategy, Ford et al., (2003) hypothesized and found strategy commitment to be significantly related to police officers' acceptance of the concept of community policing. This construct has not yet been studied with the acceptance of an IT. In following with the observations of Ford et al., (2003) that support the view that strategy commitment is related to individual behaviors, it is proposed here that the more committed one is to the implementation of a given project they have been informed about, the more inclined they will be in their intentions to use that specific innovation. This suggests the following hypothesis:

H5: The greater one's IT strategy commitment, the greater one's intention to use the new IT.

Ford et al. (2003) suggest that support provided by supervisors is positively related to strategy commitment. This implies that the increasing degree to which employees feel their supervisors value their contributions and care about their well being, while supporting them in terms of the new IT initiative to be implemented, should lead to a greater level of commitment to the IT implementation strategy. This suggests the following:

H6a: The greater the perceived supervisor support, the greater one's level of IT strategy commitment.

According to Lucas and Spitler (1999), the construct of norms which included social norms established by peers as well as supervisors proved significant towards the

construct of behavioral intention to use an IT. Various other forms of support have been studied as in the work of Igbaria et al. (1995) who found a direct effect of organizational support on IT usage. Management support for instance has been studied in past research and has fairly consistently emerged as a significant factor indirectly influencing acceptance through PU and PEOU (Taylor & Todd, 1995, Igbaria et al., 1997). However, supervisor support has not often been investigated for its direct effect on intention to use as it is proposed here. The rationale behind this hypothesis is that people may perform a behavior even if they themselves are not favorable to it but if they believe that their supervisor thinks they should. This rationale has been suggested by Kottke and Sharafinski (1988) who suggest that employees value feedback from those closest to them, and rely on supervisors more than either co-workers or the organization regarding their work. Therefore the following hypothesis is proposed:

H6b: The greater the perceived supervisor support, the greater one's intention to use the new IT.

The research hypotheses presented above are brought together in order to better understand the phenomenon of technology acceptance. The following chapter presents the research design for gathering the necessary and relevant data to test the research hypotheses.



## CHAPTER 3- RESEARCH METHOD

This chapter discusses the research method followed in this research. The research settings are described as well as the method used for data collection. The operational definitions and measurement instruments used for each construct are then explained. Lastly, the procedures of data analysis as well as the results obtained are presented.

### *Research Settings*

This research is conducted based on the analysis of multiple sites. The sites are three organizations in three different industries that were preparing to implement a new IT. The first company, a large financial firm, was in the process of implementing new personal computers (PC) in one of their customer service departments. The new PCs provided more current hardware and increased memory so as to run faster and smoother. Though the applications used were the same, the menus used for setup and system characteristics followed different paths. The new PC was to replace the existing ones therefore by providing a more current technology that could be used for daily job related tasks. The implementation had not yet been carried out on a large scale and was introduced as a preliminary step to a few users only, while the large scale transition to new PCs was to take place at a later date.

The second organization, a small firm in the food distribution sector was implementing the use of laptops in the department of sales. The salespeople were to use the new technology to record and process information, as well as submit orders in their daily business processes. Presently, most of the salespeople were using their individual methods for their order taking process. Many of them were using paper based order forms that they would use for record keeping while others would re-enter the paper

information into databases in their personal PCs. One of the salespeople was using a PDA in his dealings with customers and for recording their information on site. However, all orders when submitted to other departments in the organization were ultimately submitted on paper based forms. The use of the new technology was suggested as a tool to help perform or replace the methods used by the salespeople in the tasks already completed by them in their daily routine.

The third company is a medium size organization in the hydraulics industry and was in the planning stage of implementing an inventory management system. Due to a recent merger in the company, the company inventory was stored in two different systems. Each system allowed for the tracking of current inventory that was manually monitored and updated according to changing situations. Orders placed from suppliers were handled via telephone by designated employees. The new system was to replace both existing systems that allowed for the tracking of inventory by merging the stock of both systems that were previously in use, as well as the capability for on-line ordering of new inventory through direct communication with suppliers.

### ***Data Collection***

In order to test the research hypotheses, the collection of data was conducted through the use of a cross-sectional survey, gathering the responses of the sample at one point in time. The survey used is based on self-report measures. In the context of research, the value of responses originating from self-report measures has sometimes been questioned in comparison to that of objective measures. However, when measuring user perceptions and not a direct behavior, it becomes necessary to delve into the intangible and gain insight into the views of the respondents. For this form of research, self-report measures have not only been justified, but appear to be the most

feasible method (Szajna, 1996). In order to gain further insight into the acceptance of a technology, this research is targeted towards individual employees that are to have direct use of a new technology. A survey-based method in the form of a questionnaire is common for the collection of self-report measures as is needed for the constructs studied here.

The data was collected through the administration of the questionnaire to the employees of the three organizations directly affected by the new technology initiatives. The questionnaires were distributed with a letter explaining the research (see Appendix 2) and contained an envelope with return postage provided in order to ensure complete confidentiality of responses. Respondents were encouraged to reply honestly and promptly return the completed surveys in the prepaid postage envelopes provided through the means of a champion that was internally related to the organization. This greatly aided in providing a reminder for the completion of the surveys, allowing for the highest possible response rate. In total, 20 questionnaires were distributed to the financial firm, 20 to the food distribution company and 45 to the hydraulics company. Of these 85 questionnaires, a total of 81 were completed and returned, representing all 20 questionnaires from the financial firm and the food distribution company, and 41 from the hydraulics company, resulting in a total response rate of 95%.

### ***Operational Definitions***

In order to better understand each of the constructs included in the research model, it is important to understand the operational definitions of each. The dependant variable of behavioral intention to use a new IT is the construct that is used to explain the acceptance of the technology initiative. This concept is based on previous researchers' suggestions that BI is a critical predictor of actual use of a technology

(Taylor and Todd, 1995). Also, examining BI as opposed directly studying actual use is suggested by Szajna (1996) and Legris et al. (2003) in order to accurately capture the acceptance of a technology. This concept is therefore included in the research model presented.

Specific to this research, perceived ease of use and perceived usefulness are constructs taken from the original TAM (Davis, 1989). **Perceived usefulness** (PU) is defined as *the extent to which an individual believes that using a particular technology will enhance his or her job performance*. **Perceived ease of use** (PEOU) is defined as *the degree to which an individual believes that using a system will be free from effort* (Davis, 1989). Previous authors have suggested that future research specifically include PU and PEOU in models in order to benefit from their consistent reliability and significance as well as their proven robustness as predictors of behavioral intention to use a technology (Legris et al., 2003; Chau & Hu, 2001). Both constructs are useful in explaining the perceptions of individuals towards the technology to be implemented (Davis, 1989). A relationship between PEOU and PU has also been proposed in the original TAM (Davis, 1989). It suggests that PEOU also has an indirect effect on user intentions through the influence it has on the perceptions of usefulness.

**Tool functionality** (TF) is defined as *the subject's anticipated functionalities available in the technology to complete their required tasks* (Dishaw and Strong, 1998). This is a construct that has been incorporated in the model in order to reply to the limitations put forth in studies examining TAM that state that the model overlooks aspects related to the technology itself and bases all of its power simply on the perceptions of the users (Dishaw & Strong, 1998; Lucas & Spitler, 1999). By including the construct of tool functionality, the research model can examine not only the perceptions towards the technology of users in general, but also perceptions of specific characteristics of the technology itself.

The construct of **IT strategy commitment (SC)** is based on the work of Ford et al., (2003) and is defined as *an individual's willingness to put forth effort to pursue the strategic direction of the organization as it relates to the implementation of the new IT in question*. The reasons for this commitment can range anywhere from the individual's identification with the values or goals of the strategy to the calculated costs and benefits of committing to the strategy. Following Ford et al., (2003), IT strategy commitment is distinct from an individual's overall commitment to the organization.

The construct of **perceived supervisor support (PSS)** is included in the model as a social variable that can have an influence on the concept BI. PSS refers to *an individual's perceptions of the degree to which their supervisor values their contributions and cares about their well being* (Kottke & Sharafinski, 1988). The focus and emphasis in this research is placed on the emotional as well as informational aspects of the support provided. Based on the suggestion of Helgeson (2003), these would be of greatest importance at the initial stages of a technology implementation initiative. The study of social constructs in conjunction with TAM has previously been suggested in terms of future avenues to follow (Legris et al., 2003). Agarwal and Prasad (1999) have also suggested the investigation of factors related to social influence as they directly influence BI. Venkatesh et al., (2003) have also suggested in their research that social influences do in fact matter, especially in the early stages of an initiative. In the context of organizations, one form of social support that is often present and that has been investigated for its effects emerges from managers and supervisors. Considering therefore that management support has been suggested to influence PU, PEOU as well as actual use, it is interesting to question if there can be a direct effect on BI, before widespread use has in fact begun. Based on the suggestion of Agarwal and Prasad (1999) who recommend that specific attention be placed on the impact of social influences such as management support on BI, as well as in an effort to gain a deeper

understanding of a wider range of the effects of management support on an individual's behavioral intention to use, it is proposed to investigate perceived supervisor support and its direct influence on BI. In terms of the influence of management support on the construct of strategy commitment, this relationship has been tested and supported in the field of policing and the acceptance of a community policing strategy, and has never been examined in the context of information technologies (Ford et al., 2003).

### ***Measurement Instruments***

The measures for the constructs adopted from the original TAM have been tested for validity and reliability on multiple occasions and are therefore taken as is and adapted solely for the purpose of the study at hand.

#### **Behavioral Intention to Use**

The measure for BI was adapted from both Chau and Hu (2001) and Venkatesh et al. (2003). It consists of 5 items that are assessed using a 7 point Likert scale anchored from "strongly disagree" to "strongly agree".

#### **Perceived Usefulness**

The measure for PU assesses the degree to which a person believes that using a particular system would enhance his or her job performance is taken from Davis (1989). It is evaluated using 6 items on a 7 point Likert scale ranging from "strongly disagree" to "strongly agree".

### **Perceived Ease Of Use**

PEOU also adapted from Davis (1989) measures the degree to which a person believes that using a particular system would be free of effort. The instrument has 6 items ranging from “strongly disagree” to “strongly agree” on a 7-point Likert scale.

### **Tool Functionality**

Tool functionality, which delves into the participant’s anticipated functionalities available in the technology to complete his/her required tasks is measured based on an adaptation of the TTF model (Goodhue & Thompson, 1995) and from the work of Dishaw and Strong (1999). The measures used in the aforementioned papers were suited specifically to the functionalities available in the technology being tested. The measures in this paper are based on the same foundation of examining the functionalities of a technology but are higher level and in a more general form in order to assess the anticipated functionalities in a variety of technologies. Tool functionality is assessed using 7 items, based on a 7 point Likert scale ranging from “strongly disagree” to “strongly agree”.

### **Perceived Supervisor Support**

The investigation of perceived supervisor support is performed based on the framework of the well established Survey of Perceived Organizational Support measures (SPOS). The measures used for this research however assess the support provided by supervisors by replacing the term “organization” by that of “supervisor”. This method has been utilized and supported in the past in terms of adequately examining the main forms of support provided by supervisors in the workplace (Eisenberger et al., 2002; Rhoades & Eisenberger, 2002; Kottke & Sharafinski, 1988). The measures used are

based on the short version of the questionnaire proposed by Kottke and Sharafinski (1988) which utilizes 16 items instead of the original and complete version of 36. The individual items are assessed based on a 7-point Likert scale with anchors "strongly disagree" to "strongly agree".

### **IT Strategy Commitment**

The IT strategy commitment measure had to be developed specifically for the present study. It is based on the work of Ford et al., (2003) and measures the participant's willingness to put forth effort to pursue the strategic direction of the firm for a given strategy. This instrument consists of 6 items. Ford et al. (2003) developed and used the measure in their work on community policing that have influenced the first two items in the present scenario. The remainder of the items, from 3 through to 6 in this research are based on the well established Organizational Commitment Questionnaire (OCQ). The original OCQ measure is used to study the commitment that employees feel towards their individual organizations. The aim of the construct of IT strategy commitment is to gain insight into employees' commitment to a specific technology initiative and therefore required validation as appropriately measuring the correct construct. The items to be used and their wordings were established through the use of a card sorting exercise. In order to complete the card sorting exercise, the procedure followed was that outlined by Moore and Benbasat (1991) and Pinsonneault and Heppel (1997/1998). The exercise involved the participation of ten experts consisting of professors as well as M.Sc. students that were capable of analytically examining 20 items that were provided based on the work of Ford et al. (2003), OCQ as well as established items for the measure of BI (Davis, 1989). The BI items from Davis (1989) were also included in the card sorting exercise in order to confirm the validity of the responses provided. By using the well established items of BI, it was possible to ensure



that the respondents were in fact analyzing and responding to the exercise as opposed to randomly completing the task.

The ten experts who participated were provided with three different envelopes, two with the operational definitions of IT Strategy Commitment and Behavioral Intention to Use, and the third marked “unclear”. IT Strategy Commitment was defined as “An individual’s willingness to put forth effort to pursue the strategic direction of the organization as it relates to the IT implementation project in question” while the construct of Behavioral Intention to Use an IT was defined as “An individual’s degree to which they intend to use the new technology”. The participants were also provided with 20 separate cards with one item printed on each of the cards. They were then requested to read the definitions of the constructs on the envelopes as well as each of the individual items. Once this was completed, they were to associate each item to the construct with which it fit best. They were finally requested to insert and seal the items in the envelopes with which they were associated. Any item that appeared vague, unclear or related to both constructs simultaneously was to be associated with the construct marked “unclear”. Only those items that best measured the construct of IT strategy commitment based on the responses of the ten experts were included in the questionnaire.

The results of the card sorting exercise are provided in Table 3.1. In the table, the rows A through J indicate the 10 individual experts that completed the card sorting exercise, while columns 1 through 20 indicate the items that were to be classified. The five BI items are shown in Table 3.1 in the columns 14 through 18 inclusively. The results of each expert’s classification for every item is provided along the row indicating if they felt each of the items was associated with IT strategy commitment (SC), behavioral intention to use an IT (BI) or if the item was unclear as to its association (U). The last column labelled “Total” indicates the number of items that were classified by each of the experts, resulting in a total of twenty for each. This indicates that all of the items were in

fact associated with a construct and were not lost in the process. The row "Total SC" indicates how many experts classified each item as a measure of IT strategy commitment and the row labelled "%" gives the percentage of experts that found the item to be associated with IT strategy commitment.

Table 3.1  
Card Sorting Results

Proposed	SC												BI						SC	Total		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			19	20
Experts	SC	SC	U	SC	SC	SC	BI	U	SC	SC	BI	SC	U	BI	BI	BI	SC	BI	BI	SC	20	
A	SC	SC	U	U	SC	SC	BI	BI	BI	SC	SC	SC	SC	BI	BI	BI	BI	BI	BI	BI	SC	20
B	SC	SC	U	U	SC	U	BI	SC	U	U	U	SC	U	BI	BI	BI	BI	BI	BI	BI	SC	20
C	SC	SC	U	U	SC	U	SC	SC	U	SC	U	SC	U	BI	BI	BI	BI	BI	BI	BI	SC	20
D	SC	SC	U	U	SC	U	BI	SC	U	SC	BI	SC	U	BI	BI	BI	BI	U	U	U	SC	20
E	SC	SC	U	U	SC	BI	BI	SC	BI	SC	BI	SC	U	BI	BI	BI	BI	BI	BI	BI	SC	20
F	SC	SC	U	SC	SC	U	BI	U	BI	U	SC	SC	U	BI	BI	BI	BI	BI	BI	BI	SC	20
G	BI	SC	U	SC	SC	BI	BI	U	BI	SC	BI	BI	SC	BI	BI	BI	BI	BI	BI	BI	SC	20
H	U	SC	BI	SC	BI	BI	SC	SC	BI	SC	SC	SC	BI	BI	SC	BI	U	U	SC	SC	20	
I	SC	SC	U	U	SC	SC	BI	U	BI	SC	SC	SC	U	BI	BI	BI	BI	BI	BI	BI	SC	20
J	SC	SC	U	SC	SC	U	SC	SC	BI	SC	U	SC	SC	BI	BI	BI	BI	BI	BI	BI	SC	20
Total	8	10	0	5	9	3	2	5	1	8	4	9	3	0	1	0	1	0	2	10	n/a	
SC	80	100	0	50	90	30	20	50	10	80	40	90	30	0	10	0	10	0	20	100	n/a	

SC = IT Strategy Commitment  
 BI = Behavioral Intention To Use an IT  
 U = Unclear

The highlighted columns indicate the items that were consistently chosen by eighty percent or more of the experts as correctly measuring IT strategy commitment, and only these were selected for inclusion in the questionnaire. The entire list of the 20 items included in the card sorting exercise is provided in Appendix 1. As a result of the card sorting exercise, IT strategy commitment was measured by 6 items on a 7 point Likert scale with anchors ranging from strongly disagree to strongly agree. Examples of a few of the items included “I am committed to [new system]”, “I think we should increase the emphasis placed on implementing the [new system]”, and “I am willing to do what it takes to support the [new system]”.

The cover letter that accompanied the final questionnaire and the final questionnaire itself are provided in Appendix 2 and Appendix 3 respectively. It is noteworthy that the items differed from one organization to another only to reflect the specific technology being studied. For this purpose, the term “new system” was replaced by the name of the technology where appropriate (ex: “new PC”).

## ***Data Analysis and Results***

### **Mean differences**

The data analysis was performed through the use of SPSS statistical software. Before discussing the analyses performed, it should be mentioned that the samples from all three organizations studied were pooled for the data analysis. Before pooling, t-tests were used in order to ensure that the responses from the individuals surveyed from three organizations were not significantly different from one another. The need for t-tests arises in order to confirm that between samples, the responses are not complete opposites therefore cancelling each others extreme values when pooled. The response

means between the financial firm and the food distribution company appeared to have means that were significantly different on a few items pertaining to supervisor support, strategy commitment and behavioral intention to use only. For all other constructs, there was no significant difference. There were no significant differences between the financial firm and the hydraulics company on any of the constructs and only 2 items of supervisor support appeared different between the food distribution and hydraulics companies.

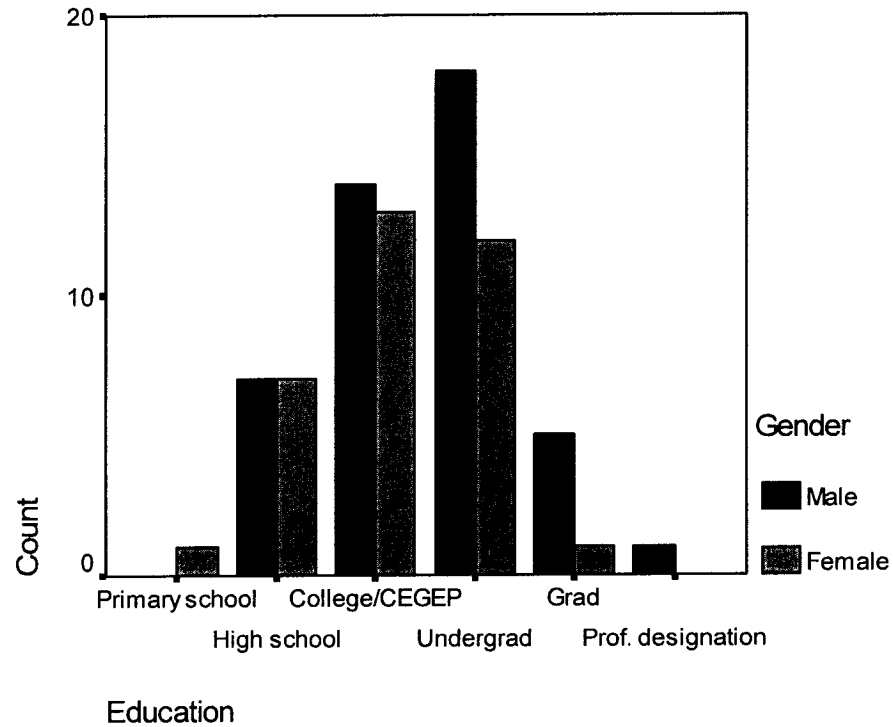
Considering the financial firm and the hydraulics company had no significant differences and the food distribution company was different from the other samples on only the few items mentioned above, there was an inclination to pool the responses. Also, it is noteworthy that this is an exploratory study examining constructs in a new context, and that there was no significant difference between the samples on the TAM constructs of perceived usefulness and perceived ease of use. Thirdly, due to the limited number of responses constituting the individual samples, it would not have been feasible to separate the food distribution company from the remaining samples. This would result in a sample size of twenty respondents, not sufficient to be of statistical value from which to make any claims or draw any conclusions. For these reasons, all analyses were performed with the pooled data of the three organizations.

### **Descriptive statistics**

The majority of the respondents (55%) were male and most respondents had a college or undergraduate education. The general distribution of respondent education level within the genders is provided in Figure 3.1.

**Figure 3.1**

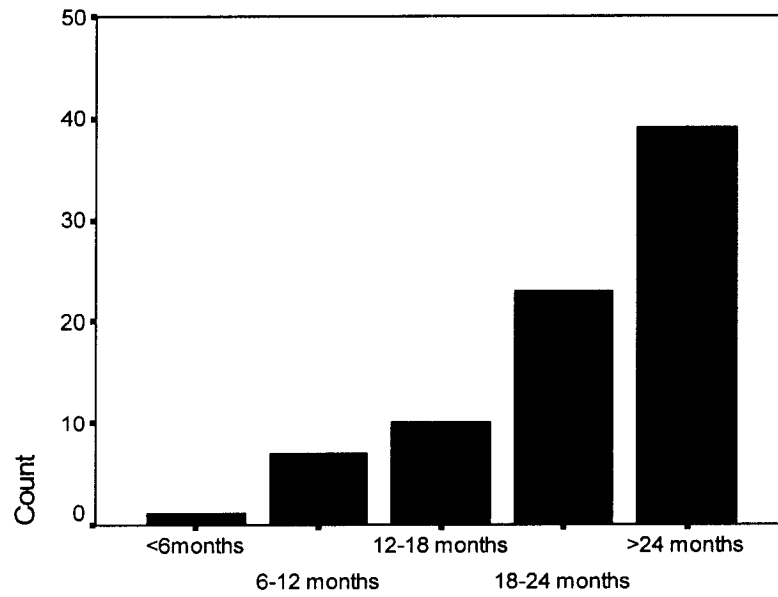
***Distribution of Education for Men and Women***



Of the respondents, 87% were full time employees and the entire sample had previously used computers in some form or other. Almost 50% of the sample had been working with their organization for over two years. Of these respondents, 37 of them representing approximately 45% had also been at their current position for over two years. Descriptions of respondent tenure and experience are provided in Figure 3.2 and Figure 3.3 respectively.

**Figure 3.2**

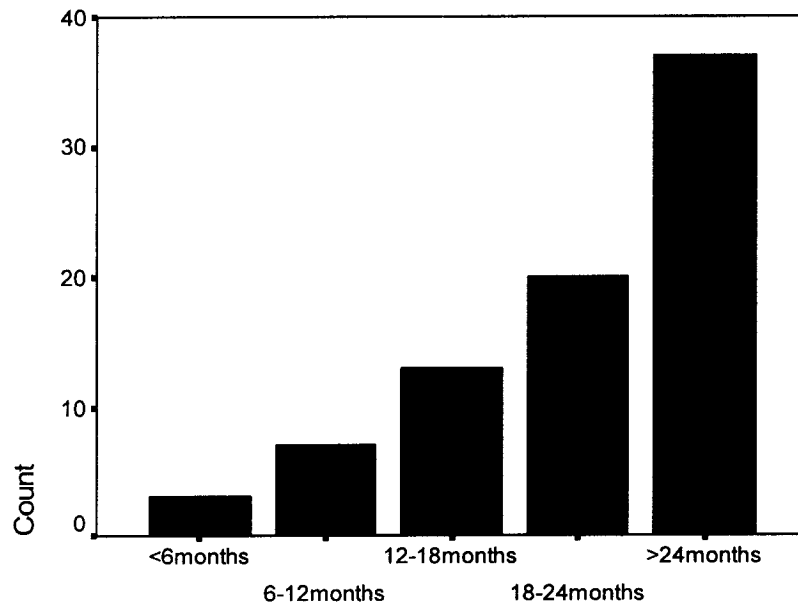
**Tenure in company**



Tenure in Cie.

**Figure 3.3**

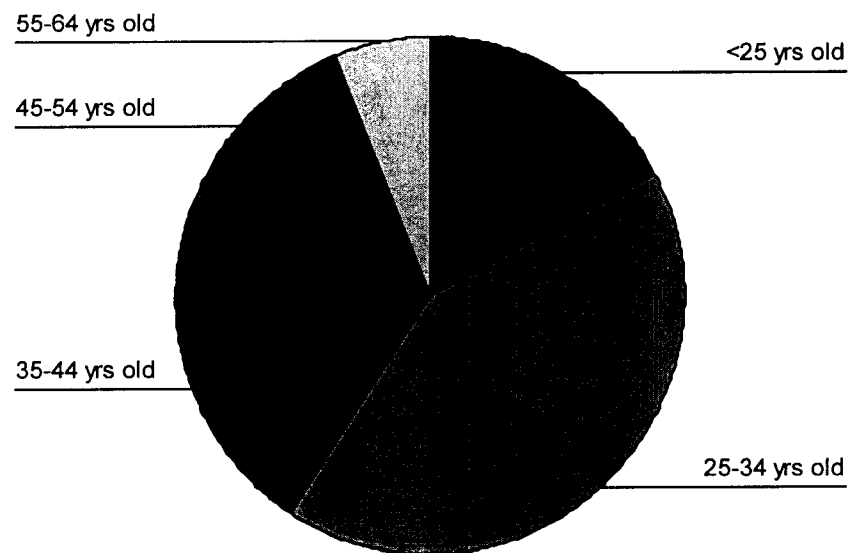
**Tenure in current position**



Experience

The majority of the respondents were in the 25-34 years of age range but were fairly evenly distributed for the other age groups of under 25 and over 35 years of age. The sample age distribution is provided in figure 11.3.

**Figure 3.4**  
**Age Distribution**



### **Reliability and validity assessment**

Of the data collected, some of the items were discovered to have missing values and therefore these items had a total response size of 80 instead of 81. Of the items containing missing values, one appeared in the perceived usefulness construct, two of the items in the perceived ease of use construct and two in the supervisor support



construct. Also, at first glance, for each of the items, the response range was most often throughout the entire range from 1-7 on the Likert scales. However, 12 out of the total 46 items did not span the entire range. Eleven of these had a minimum of 2, and one had a maximum of 6. The distribution of the responses in terms of range missing values is provided in Appendix 4.

Factor analysis is a method used to assess whether the items used are measuring the same underlying construct, and whether they are adequately different from other items concerned with different themes. As such, it provides an evaluation of the divergent/convergent validity (Neter, Kutner, Wasserman & Nachtsheim, 1996). This allows for the removal of items that are not specific to or ideal for each construct. The constructs of PU, PEOU, BI and SS were examined together in a confirmatory factor analysis because these constructs consisted of items that have repeatedly been used in past research and have all been well established in the field of IS (Davis, 1989; Venkatesh et al., 2003) or management (Kottke & Sharafinski, 1988). The confirmatory factor analysis produced four distinctive factors which were to be expected considering the four constructs involved. Items that loaded with a value of more than 0.4 for more than one factor were eliminated because this implied that they were not in fact distinctly belonging to one single factor exclusively. In total, four items were dropped (SS12, PEOU4, BI1, BI2) leaving a final item count of 15 items for supervisor support, 6 items for perceived usefulness, 5 items for perceived ease of use and 3 items for behavioral intention to use. The tabular results of this analysis with the final item count are presented in Table 3.2. Also included are the Eigen and R squared values. Finally, a measure of the internal consistency of the construct as indicated by the inter-item correlation is provided as the Cronbach alpha values. In other words, the items in a construct should be measuring the same thing and hence be correlated with each other.

Notably in Table 3.2, the commonly used lower threshold of 0.7 for the alpha values (Neter et al., 1996) is greatly exceeded for all four of the constructs involved.

**Table 3.2**  
**Confirmatory Factor Analysis**

	Component			
	Supervisor Support	Perceived Usefulness	Perceived Ease of Use	Trust
SS14	.909	.117	.032	.238
SS4	.869	.122	.090	.088
SS11	.864	.070	.088	.156
SS8	.847	.171	-.067	.219
SS13	.830	.159	.075	.119
SS5	.828	.117	-.035	.047
SS6	.791	.234	-.080	.224
SS15	.776	.038	.124	.036
SS9	.773	.262	-.032	.089
SS7	.758	.009	.012	.247
SS16	.721	.285	.028	.246
SS10	.695	.198	-.036	.229
SS3	.687	.128	.272	-.202
SS1	.684	.225	.133	-.131
SS2	.494	-.164	-.043	-.280
PU2	.181	.926	.030	.167
PU3	.155	.899	.098	.197
PU4	.162	.870	.066	.229
PU5	.124	.809	.213	.119
PU1	.193	.785	.248	.120
PU6	.234	.760	.184	.306
PE1016	-.040	.026		.151
PE1011	.032	.035		.075
PE1015	.100	.135		.105
PE1017	.026	.220		.010
PE1018	.093	.419		-.089
	.285	.328	.077	
	.224	.400	.145	
	.254	.394	.118	
Eigen value	9.417	5.378	4.052	2.934
R <sup>2</sup>	32.474	18.543	13.972	10.117
Cronbach Alpha	0.96	0.95	0.93	0.98

**Rotated Component Matrix (a)**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. A Rotation converged in 5 iterations.

For each of the factors determined above, the correlations are presented in Table 3.3. As it can be seen, the values on the diagonal are the highest, indicating that the factors are in fact distinct from one another and closely measuring the construct they are intended to, thus providing further evidence of their validity as constructs.

**Table 3.3**  
**Component Matrix (PU, PEOU, BI, SS)**

Component	Supervisor Support	Perceived Usefulness	Perceived Ease of Use	Behavioral Intention to Use
Supervisor Support	.799			
Perceived Usefulness	-.560	.561		
Perceived Ease of Use	.211	-.455	.791	
Behavioral Intention to Use	.056	.499	-.108	.858

**Component Transformation Matrix**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

The constructs of strategy commitment and tool functionality were examined through an exploratory factor analysis. This was done because these were new measures being introduced and the items for these constructs had not been previously tested in the form in which they appeared in this research. The goal was to establish how many factors were being investigated based on all of the items entered in the analysis. Once again, using the cut off threshold of 0.4, a total of 7 items were dropped (SC1, SC4, SC5, TF1, TF4, TF5, TF7). The results indicated two distinct factors and allowed for the final usage of 3 items for IT strategy commitment and 3 items for tool functionality. The Cronbach alpha values again provide evidence of acceptable inter item correlation by exceeding the threshold of 0.7. The results are provided in Table 3.4.

**Table 3.4**  
**Exploratory Factor Analysis**

	Factor	
	IT Strategy Commitment	Tool Functionality
SC6	.911	.149
SC3	.817	.258
SC2	.658	.369
TF2	.387	.790
TF3	.240	.733
TF6	.093	.529
Eigen value	2.148	1.742
R <sup>2</sup>	35.804	29.029
Cronbach Alpha	0.87	0.78

**Rotated Factor Matrix(a)**

Extraction Method: Maximum Likelihood. Rotation Method: Varimax with Kaiser Normalization.  
a. Rotation converged in 3 iterations.

Table 3.5 provides support for the validity of the constructs of strategy commitment and tool functionality.

**Table 3.5**  
**Component Matrix (SC and TF)**

Factor	Strategy Commitment	Tool Functionality
Strategy Commitment	.850	
Tool Functionality	-.526	.850

**Factor Transformation Matrix**

Extraction Method: Maximum Likelihood. Rotation Method: Varimax with Kaiser Normalization.

**Correlations**

One method of getting a better understanding of the data and how the constructs may relate to each other is through the use of a correlation matrix. The matrix is presented in Table 3.6 and as expected, the constructs of TAM appear to be significantly

correlated with one another. Interestingly, the only constructs not to be significantly correlated appear to be those of supervisor support with perceived ease of use. This is not alarming however because in terms of the research model, these two constructs were not assumed to be related to one another. Also displayed through the correlation matrix is the fact that all the constructs are in fact distinct from one another in that for each construct, only when coupled with itself is there a correlation of 1. The mean and standard deviation of the constructs are also provided.

**Table 3.6**

**Correlation Matrix**

	●	MEAN	STANDARD DEVIATION		SC	TF	SS	PU	PEOU	BI
SC	0.87	13.22	4.24	PC	1					
				N	81					
TF	0.78	14.51	2.78	PC	.498(**)	1				
				N	81	81				
SS	0.96	68.48	16.39	PC	.235(*)	.309(**)	1			
				N	79	79	79			
PU	0.95	24.44	7.86	PC	.724(**)	.704(**)	.360(**)	1		
				N	80	80	79	80		
PEOU	0.93	25.50	5.12	PC	.246(*)	.235(*)	.136	.344(**)	1	
				N	80	80	78	79	80	
BI	0.98	15.25	4.57	PC	.569(**)	.367(**)	.397(**)	.607(**)	.235(*)	1
				N	81	81	79	80	80	81

● - Cronbach Alpha

PC - Pearson Correlation

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Regressions**

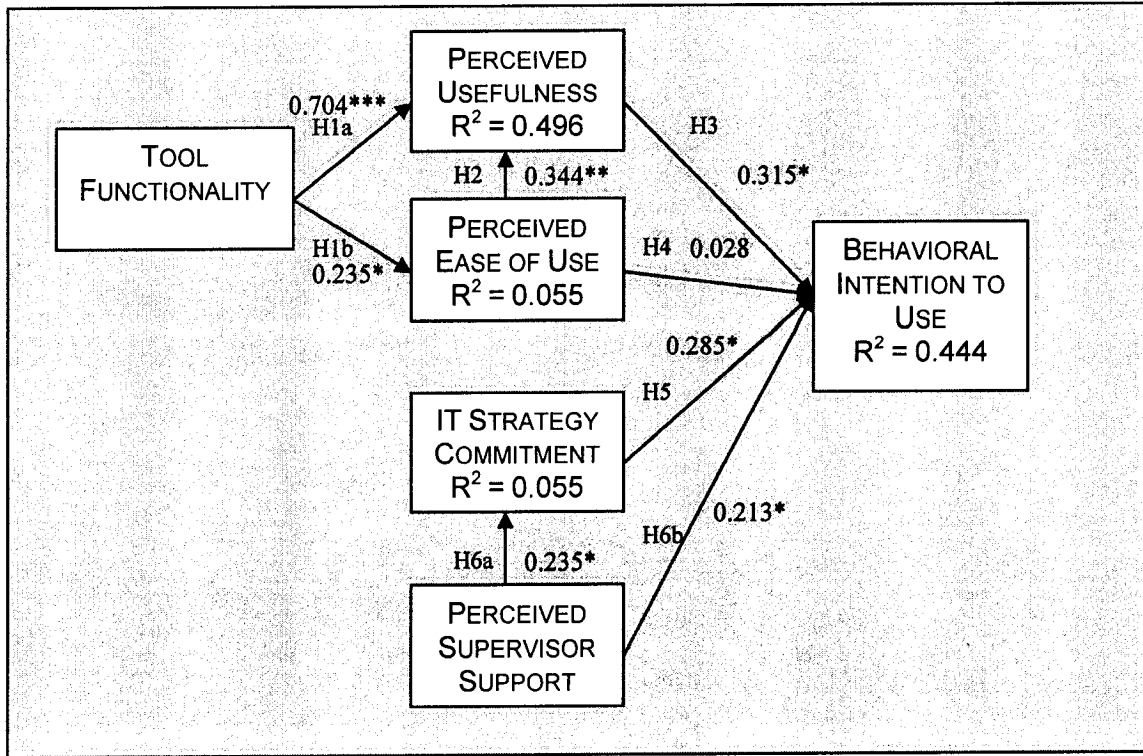
In order to examine the hypotheses, a choice had to be made in order to determine the statistical tests that would be used. The method of analysis was chosen based on the type of data that was gathered. When testing constructs' relationships in which the independent and dependent variables are both interval type data, the method of choice for initial analysis is generally that of simple or multiple regressions (Neter et

al., 1996). Therefore, regression analysis was performed in order to test the hypotheses proposed. Simple regression was used for testing hypotheses H1a, H1b, H2 and H6a while H3, H4, H5 and H6b were tested in a multiple regression for their relationship with the dependent variable. The research model with the resulting relationships, as well as the final  $R^2$  value is provided in Figure 3.5.

The regression analysis provided support of H1a suggesting a positive relationship between tool functionality and perceived usefulness. Contrary to H1b, results indicate a significant positive relationship between tool functionality and perceived ease of use. As expected, H2 and H3 are both supported, providing further evidence of the relationships suggested in TAM between perceived ease of use and perceived usefulness as well as between perceived usefulness and intention to use. Contrary to expectations, H4, the hypothesis relating perceived ease of use and behavioral intention to use did not emerge as a significant relationship with this sample. Support was provided for H5, the hypothesis proposing a positive relationship between IT strategy commitment and intention to use as well as for H6a and H6b, which stated that there is a positive relationship between perceived supervisor support and IT strategy commitment as well as between perceived supervisor support and intention to use. The data was also assessed to determine if respondent gender or age would have an effect on the relationships suggested. In fact, both gender and age did not have any significant effect on the relationships observed and were therefore not factors of importance in the analyses performed.

Figure 3.5

Model Path Coefficients and Significance



\*\*\*:  $p < 0.001$ ; \*\*:  $p < 0.01$ ; \*:  $p < 0.05$

## CHAPTER 4- DISCUSSION

This chapter begins with a discussion of the results obtained from the analysis of the data. The contributions provided by this research in terms of research and practice are then emphasized. Subsequently, the limitations of this research are outlined and recommendations for future work are provided.

### *Discussion of Results*

The results of this investigation provide insight into the acceptance phenomenon of a new IT in the workplace. The hypotheses that were proposed consisted of some fundamental relationships prevalent in TAM that have been tested repeatedly, as well as some that delve into expansions of TAM, specifically with socially related constructs that have been suggested for further research on this topic (Agarwal & Prasad, 1999; Legris et al., 2003).

Tool functionality is a construct that is tested for its relationship on the constructs of perceived usefulness and perceived ease of use. It has been suggested by Lucas and Spitler (1999) that the complexity of a tool can affect the relationships normally observed in TAM. In this research, the tools observed included hardware (PCs and laptops) as well as software (inventory management system). It appears through analysis of the data, that the anticipated functionalities by the users in the system can influence the users' perceptions of its usefulness and ease of use. More specifically, the results suggest a high and strong relationship between the tool's functionalities and the perception of its usefulness (0.704,  $p < 0.001$ ). The more functionalities inherent in a system that are relevant to the user's job will suggest a higher level of perceived usefulness of that system by employees.

It was originally proposed that the more functionalities present in the system would result in the perception of a less easy to use system based on the work of Dishaw



and Strong, (1999). However the results suggest that in fact the more relevant functionalities that are present in the system, the more this will actually increase the perception of ease of use, although not as strongly as the influence on the perception of usefulness. This can be understood however considering that the users that anticipated the system to be able to perform several of their required tasks might understand the system well enough and therefore would not find it as a more complicated system to use. Also, the tool functionalities measured in this research are measured on a higher level than those in Dishaw and Strong (1999) and therefore did not investigate specific functionalities present in the system but moreover how the system's functionalities relate to the user's tasks.

As suggested in prior TAM studies (Davis, 1989; Karahanna & Straub, 1999), perceived ease of use of a system suggests that it will also be perceived as more useful. This appears once again to be supported in that the users that found the new technologies as easy to use also found them more useful compared to their counterparts who found the technologies to be more difficult to use.

As the users found the technology more and more useful, they were generally more inclined to have greater intentions of using it, as is expected based on TAM. Furthermore, this research confirms the findings of previous research as described in works such as Plouffe et al. (2001), Chau and Hu (2001), and Agarwal and Prasad (1997) in that the construct of perceived usefulness of a new IT appears to not only be significant towards the intention to use it, but is the single most influential construct in this regard. Once again, perceived usefulness emerged as the most effective predictor of the respondents' intention to use the new IT.

Another relationship suggested by TAM that was tested in this paper is that the greater the perceived ease of use of a new IT, the greater the intention to use it. Though supported in the past (Davis, 1989; Venkatesh & Morris, 2000), the results of this study

indicate that there was not a significant relationship between perceived ease of use and intention to use the system for the respondents involved. Though this may appear questionable, according to Taylor and Todd (1995) and Davis et al. (1989), it is suggested that experience can influence the strengths of the relationships in TAM. Lewis et al., (2003) also found in their work performed in the early stage of implementation, that the low level of experience of users with a system lessened the significance of some relationships in TAM. Similarly, Szajna (1996) found no significant relationship between PEOU and BI for business graduate students using an electronic mail system, though did find one between PEOU and PU. Lucas and Spitler (1999), when studying brokers and sales assistants in the private client group of a major investment bank found PEOU not to be significant towards BI. The justification for this non – significance was the complexity of the system, the uncontrollable nature of a field environment and the fact that the implementation of the new system was considered by the authors as less voluntary than other implementation projects. Croteau and Vieru (2002) also found a similar non-significant relationship between perceived ease of use and intention to use telemedicine technology by physicians in Nova Scotia, Canada. As it stands, in this research, the technologies had not been fully implemented in the organizations. Employees had been advised of the characteristics of the technologies as well as having been shown demonstrations of them in use; however they had not begun full fledged use of the system. It is understandable then that since they had not had full access to hands on usage, the ease of use of the system in terms of their intentions to use it might not necessarily be influential. However, since demonstrations regarding the features of the system had been made, it is likely that the construct of ease of use could still affect their perceptions of usefulness, and thus indirectly affecting their intentions to use the technology, as the results suggest.

The impact of IT strategy commitment in the role of technology acceptance was proposed to suggest that the more committed an individual is to the implementation of the new technology, the more one will intend to use it. The results of this study do in fact lend support to this suggestion in that this appeared to be an influential factor in the respondents' usage intentions. This also supports the work of Ford et al. (2003) and yet applies it in the field of IS, since the strategy under investigation was the implementation of a technology. Since Ford et al. (2003) tested this relationship in the context of police work, the results achieved here suggest that this relationship can also be applied to other forms of strategy, namely information technology implementation initiatives.

Perceived supervisor support was hypothesized to influence one's IT strategy commitment in that the more support from a supervisor that an employee perceives to be receiving will in fact increase their commitment to the initiative that is being proposed by the organization. The results support this hypothesis in terms of implying that supervisors can influence their employees' level of IT strategy commitment.

It has been suggested in previous studies and in prior literature that an individual's decision process regarding the use of a new technology may in fact be influenced by social factors (Agarwal & Prasad, 1999) and more specifically in the workplace, by the support of managers or superiors (Igbaria et al. 1997, Ford et al. 2003). Also, social influences seem to be especially influential early in the implementation stages (Venkatesh et al., 2003). The results of this study support these views in that it appears there is a significant relationship between perceived supervisor support and one's intention to use the new IT. As expected, the more support that is perceived as being provided by a supervisor, the more the users will intend to use the new IT.

The entire model appears to account for and explain 44.4% of the variation in users' intentions to use an IT that is being implemented in the workplace. Typically, in

terms of previous studies on TAM, the effectiveness of the models studied lies at approximately 40% (Venkatesh & Davis, 2000). Though this model falls in the typical range for TAM studies, the constructs studied here incorporate certain characteristics from the field of management that have not previously been extensively examined. This does help to realize that simply using the basic TAM model, in conjunction with management aspects can not only improve the prediction power of a user's intentions in regards to new technologies, but also help with understanding how individuals form their intention to using a new IT.

### **Contributions for research**

Through the process of this research, TAM and its relationships have once again been validated in terms of users' intentions to adopt a new technology. Though the relationship of perceived ease of use was not supported in this specific study, this is still in the context of what was expected from TAM in the certain cases where it is still early in the implementation stage. At the same time, the impact of strategy commitment as well as supervisor support as antecedents of BI have been introduced and seem to be significant factors in this phenomenon.

This research also unites well established definitions and measures from IS and from management, that have been well validated in their respective fields in order to promote a unified research method using strengths from both fields. This helps in order to have agreed upon definitions and established measures that can be used repeatedly in order to have better possibilities for research replication and comparison of results.

In the case of IT strategy commitment and tool functionality, new measures have been developed and validated. These measures are now available for use in future research that may further examine these constructs.

## **Contributions for practice**

The practical contributions of the research performed here are paramount for managers and organizations that are planning on implementing a new IT. The results can provide insights to managers as to what factors can potentially be instrumental in facilitating technology acceptance based on an understanding of the variables leading up to employees' intentions to use a new IT. The advantage of studying the effects of supervisor support is one that can also have considerable impact for organizations. The suggestion that supervisor support, a factor that can be restructured by modifying behaviors of supervisors in the workplace can be of significant influence on user intentions, can give valuable insight for the methods of increasing employees' IT acceptance. Knowing what techniques to use and the influence that these can have in order to help employees be more accepting to an IT initiative that is to be realized gives supervisors considerable power and control towards taking a step in the success of an implementation project. This is not to say that supervisors should be able to manipulate employees by making them better accept technologies in an organization, but if they can have insight into how to make employees willingly accept the initiative by catering to the needs of the employees during this period of change, the benefit is not limited only to the supervisors and the organization, but to the employees as well. Also, considering the settings are those where the technology has not already been fully implemented, managers can also obtain a preliminary idea of the intentions of the employees towards the new technology before many resources have been invested.

More specifically, most organizations that have derived benefit from research already done on technology adoption through the many models suggested in prior studies (TAM, TRA, TPB...) can now examine other factors that appear to be important such as tool functionality, IT strategy commitment and perceived supervisor support

which have not been extensively focused on in the past. The constructs studied can also allow managers to use a two-pronged approach towards their implementation initiatives in that they can propose the idea of the new strategy to users and assess these users' intentions towards using it prior to full implementation. Also, managers can focus not only on the specific technology and its functionalities and the users' perceptions towards it, but on user specific constructs such as IT strategy commitment as well as social aspects such as perceived supervisor support.

### **Limitations**

There are certain limitations that have arisen through the course of this research that need to be addressed. The interpretations of the results obtained are also made in light of these limitations. First and foremost, this research by nature is measuring user perceptions and therefore required self reported measures for the purpose of data collection. It has been proposed that actual behavioral measures can be used for measuring actual technology usage (Agarwal & Prasad, 1997), but considering the early stage in adoption of the technology, and the strong link established between behavioral intention to use and actual use (Davis, 1989; Taylor & Todd, 1995), the users intentions were measured here.

The respondents in this study can be considered as constituting a convenience sample. A total of 81 usable responses for the analysis provided acceptable results, however a larger sample size would allow for a greater depth in analysis.

The convenience sample also raises the issue of response bias in that those who responded might somehow be related. Although, a high response rate of 95% indicates that the majority of those solicited did in fact send in their completed questionnaires.

Also, this response rate was greatly aided by the work of champions serving as frequent reminders for the return of completed surveys in each organization.

### ***Future Research Directions***

This research has proposed new measures for the evaluation of IT strategy commitment that can help assess individuals' commitment to a given managerial or organizational initiative. This is a construct that has not often been looked at in the IS context. It could be interesting to use these measures in future research to study different IT related phenomena, such as IT adoption and actual use, that can possibly be influenced by commitment levels.

The model proposed here combines aspects from the field of IS that have often been examined, as well as constructs well established in management. Using these well established constructs in conjunction with each other through the proposed model could be beneficial if tested with larger sample sizes than the one used in this research.

As has been suggested by previous research (Venkatesh & Davis, 2000; Chen et al., 2002), expansions of TAM can be of benefit in improving the predictive power of users' intention to use. Once again, testing the proposed model in conjunction with other constructs of interest can be of value in the future.

## CONCLUSION

At the outset of this research, the goal was to better understand the phenomenon of technology acceptance in the workplace by examining constructs involving the user perceptions included in TAM, tool functionalities, IT strategy commitment and social influences such as supervisor support. The importance of this research relied on the fact that technology implementation initiatives are largely influenced by the need for users to accept the technology being introduced. At the same time, it was important to provide a contribution to academia by examining this process through the expansion of TAM.

Employees from three organizations, one from the financial services sector, one from the food distribution industry and the last from the field of hydraulics, were surveyed. The respondents were the intended users of a new IT and were asked to respond in terms of their perceptions towards the new tool's functionalities, usefulness, ease of use, their commitment level to the IT implementation project, the perceived support provided by their supervisor as well as their intentions to use the new IT. The data was then analyzed to determine if any of the proposed relationships existed. It appeared that the users' anticipated functionalities of a new IT were positively related to higher perceptions of usefulness and ease of use of the technology. Also, the perceived support provided by supervisors was found to be related to higher commitment levels to the IT strategy. Also, the perceived usefulness, the IT strategy commitment level and the perceived supervisor support were positively related to individuals' intention to use the new IT.

These results provide a valuable stepping stone for the researchers studying in the field of IT acceptance. In addition to once again supporting the well known Technology Acceptance Model, new constructs of interest have been introduced as



potential factors involved in the technology acceptance phenomenon. IT strategy commitment, perceived supervisor support and tool functionality provide additional insight into this area in terms of incorporating a wider range of factors that can directly or indirectly influence users' behavioral intentions. Though future research is required to validate some of the relationships suggested in this study, this study also provides support for existing beliefs regarding technology acceptance. At the same time, it also serves as an advocate in suggesting the broadening of research scopes on technology acceptance through the study of a greater array of constructs.

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## **APPENDICES**

***APPENDIX 1***

**CARD SORTING EXERCISE**

### Complete list of items used for card sorting

1. I am committed to *the new system*
2. I think we should increase the emphasis placed on *implementing the new system*
3. *The implementation of the new system* is just a political move by management
4. There is no way that our department can make *the new system* effective
5. I am willing to put in a great deal of effort beyond that normally expected in order to help *the new system* be successful
6. I feel very little loyalty to *the new system*
7. I would accept almost any type of job assignment in order to *work with the new system*
8. I am proud to tell others *about the new system*
9. I could just as well continue working with the present system as compared to the new one
10. I am extremely glad that *this is the new system chosen for implementation*
11. There is not too much to be gained by sticking with the new system indefinitely
12. I really care about the fate of *the new system*
13. Deciding to work with *the new system* was a definite mistake
14. I intend to use the system for my job as often as needed
15. To the extent possible, I would use the system in my job frequently
16. I intend to use the system in the next \* months
17. I predict I would use the system in the next \* months
18. I plan to use the system in the next \* months
19. I am looking forward to working with the new system
20. I am willing to do what it takes to support the new system



***APPENDIX 2***

**GENERAL COVER LETTER FOR SURVEYS**

***APPENDIX 3***

**QUESTIONNAIRE**

Using the scale below, please indicate your level of agreement with each of the following statements by circling the number that best reflects your opinion:

	1	2	3	4	5	6	7
	Strongly disagree						Strongly agree
I am committed to the implementation of the new system	1	2	3	4	5	6	7
I think we should increase the emphasis placed on implementing the new system	1	2	3	4	5	6	7
I am willing to put in a great deal of effort beyond that normally expected in order to help the implementation of the new system be successful	1	2	3	4	5	6	7
I am extremely glad that this is the new system chosen for implementation	1	2	3	4	5	6	7
I really care about the fate of the new system	1	2	3	4	5	6	7
I am willing to do what it takes to support the new system implementation	1	2	3	4	5	6	7
I expect the new system to provide me with functionalities that will help me do my job	1	2	3	4	5	6	7
The new system is well equipped to help me complete my required tasks	1	2	3	4	5	6	7
The new system contains many functions that are fundamental for me to complete my tasks	1	2	3	4	5	6	7
The new system will provide me with more ways to complete my daily tasks	1	2	3	4	5	6	7
I do not expect the new system to provide me with more functionalities than those available to me presently	1	2	3	4	5	6	7
The new system does not contain enough functions to support all of the tasks that I am required to do	1	2	3	4	5	6	7
Compared to the old system, there are more functionalities present in the new system that are relevant to my job	1	2	3	4	5	6	7
Using the new system in my job would enable me to accomplish tasks more quickly	1	2	3	4	5	6	7
Using the new system would improve my job performance	1	2	3	4	5	6	7
Using the new system in my job would increase my productivity	1	2	3	4	5	6	7
Using the new system would enhance my effectiveness on the job	1	2	3	4	5	6	7

1	2	3	4	5	6	7
Strongly disagree						Strongly agree

Using the new system would make it easier to do my job	1	2	3	4	5	6	7
I would find the new system useful in my job	1	2	3	4	5	6	7
Learning to operate the new system would be easy for me	1	2	3	4	5	6	7
I would find it easy to get the new system to do what I want it to do	1	2	3	4	5	6	7
My interaction with the new system would be clear and understandable	1	2	3	4	5	6	7
I would find the new system to be flexible to interact with	1	2	3	4	5	6	7
It would be easy for me to become skilful at using the new system	1	2	3	4	5	6	7
I would find the new system easy to use	1	2	3	4	5	6	7
My supervisor values my contributions to the well-being of our department	1	2	3	4	5	6	7
If my supervisor could hire someone to replace me at a lower salary he/she would do so	1	2	3	4	5	6	7
My supervisor appreciates extra effort from me	1	2	3	4	5	6	7
My supervisor strongly considers my goals and values	1	2	3	4	5	6	7
My supervisor wants to know if I have any complaints	1	2	3	4	5	6	7
My supervisor takes my best interests into account when he/she makes decisions that affect me	1	2	3	4	5	6	7
Help is available from my supervisor when I have a problem	1	2	3	4	5	6	7
My supervisor really cares about my well-being	1	2	3	4	5	6	7
If I did the best job possible, my supervisor would be sure to notice	1	2	3	4	5	6	7
My supervisor is willing to help me when I need a special favour	1	2	3	4	5	6	7
My supervisor cares about my general satisfaction at work	1	2	3	4	5	6	7
If given the opportunity, my supervisor would take advantage of me at work	1	2	3	4	5	6	7
My supervisor shows a lot of concern for me	1	2	3	4	5	6	7
My supervisor cares about my opinions	1	2	3	4	5	6	7
My supervisor takes pride in my accomplishments	1	2	3	4	5	6	7
My supervisor tries to make my job as interesting as possible	1	2	3	4	5	6	7

1	2	3	4	5	6	7
Strongly disagree						Strongly agree

I intend to use the new system for my job as often as needed	1	2	3	4	5	6	7
To the extent possible, I would use the new system in my job frequently	1	2	3	4	5	6	7
I intend to use the new system in the next 3 months	1	2	3	4	5	6	7
I predict I would use the new system in the next 3 months	1	2	3	4	5	6	7
I plan to use the new system in the next 3 months	1	2	3	4	5	6	7

**GENERAL INFORMATION:**

- You are (please check one):             a part-time employee             a full-time employee

---

- Have you used a computer before using the new system?            yes             no

---

- How long have you been employed with this organization?  
 < 6 months             6-12 months             12-18 months             18-24 months             > 24 months

---

- How long have you been at you current position?  
 < 6 months             6-12 months             12-18 months             18-24 months             > 24 months

---

- What is your age?  
 under 25             25-34             35-44             45-54             55-64             65 or over

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- What is your gender?             male             female

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- What is the highest level of formal education that you have completed? (please check one):  
 Primary school             College/CEGEP             Graduate degree  
 High school             Undergraduate degree             Professional designation

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**THANK YOU VERY MUCH FOR YOUR PARTICIPATION!**

***APPENDIX 4***

**DESCRIPTIVE STATISTICS**

**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
ORG	81	1	3	2.26	.833
SC1	81	1	7	4.93	1.421
SC2	81	1	7	4.65	1.590
SC3	81	1	7	3.98	1.573
SC4	81	1	7	4.35	1.518
SC5	81	1	7	4.42	1.474
SC6	81	1	7	4.59	1.595
TF1	81	2	7	5.25	1.392
TF2	81	2	7	5.12	1.155
TF3	81	2	7	4.96	1.078
TF4	81	1	7	4.85	1.361
TF5	81	1	7	4.12	1.354
TF6	81	1	7	4.42	1.117
TF7	81	1	7	4.58	1.431
PU1	81	2	7	5.00	1.275
PU2	81	1	7	4.53	1.574
PU3	81	1	7	4.53	1.526
PU4	81	1	7	4.43	1.643
PU5	81	1	7	4.83	1.377
PU6	80	1	7	5.11	1.312
PEOU1	81	2	7	5.20	1.259
PEOU2	81	2	7	4.91	1.175
PEOU3	81	2	7	4.96	1.066
PEOU4	80	1	7	4.65	1.170
PEOU5	80	2	7	5.21	1.177
PEOU6	81	2	7	5.20	1.112
SS1	81	2	7	5.14	1.222
SS2	81	1	7	5.02	1.810
SS3	81	2	7	5.46	1.162
SS4	81	1	7	4.51	1.424
SS5	81	1	7	4.60	1.348
SS6	81	1	7	3.73	1.525
SS7	81	1	7	4.72	1.425
SS8	81	1	7	4.40	1.357
SS9	81	1	7	4.46	1.550
SS10	80	1	7	4.15	1.485
SS11	80	1	7	4.74	1.270
SS12	81	1	7	4.37	1.750
SS13	81	1	7	4.15	1.343
SS14	81	1	7	4.51	1.415
SS15	81	1	7	4.70	1.346
SS16	81	1	6	3.94	1.503
BI1	81	1	7	5.20	1.269
BI2	81	1	7	5.12	1.391

	N	Minimum	Maximum	Mean	Std. Deviation
BI3	81	1	7	5.00	1.533
BI4	81	1	7	5.16	1.585
BI5	81	1	7	5.09	1.535
JSTAT	80	1	2	1.89	.318
USED	80	1	1	1.00	.000
YRS_ORG	80	1	5	4.15	1.032
YRS_POS	80	1	5	4.01	1.153
AGE	81	1	5	2.51	1.131
SEX	79	1	2	1.43	.498
EDU	81	1	6	3.38	.956
Valid N (listwise)	74				