A STUDY OF THE RELATIONSHIP BETWEEN PERSONALITY TYPES AND THE ACCEPTANCE OF TECHNICAL KNOWLEDGE MANAGEMENT SYSTEMS (TKMS)

by

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Abstract

Technical knowledge management systems (TKMSs) are not achieving the usage (acceptance) and the benefits that have been forecasted and are therefore, not enhancing competitive advantage and profits in organizations (Comb, 2004, *Assessing customer relationship management strategies for creating competitive advantage in electronic business*). Therefore, hardware and software must discover ways to ensure that the TKMSs are accepted and used by all customers. This research investigated the relationship of personality (through the Five-Factor Personality Model) to technology acceptance of TKMS (using the Technology Acceptance Model - TAM). This study tested the relationship between the major personality types and the intent to accept or fail to accept TKMSs, using an integrative model that combines the TAM (Davis, 1989, *Perceived usefulness, perceived ease of use, and user acceptance of information technology*) and the Five-Factor Model (FFM; personality). Members of IT, KM, Academia and Psychology LinkedIn Groups, the SIKMLeaders Groups and IEEE were administered a survey that measured their personality traits and their perceived usefulness and perceived ease of use for TKMSs. Results of study showed that TKMS users exhibiting the openness personality trait were more accepting of the TKMSs (based on perceived ease of use and perceived usefulness). The results also showed that TKMS users exhibiting the extraversion personality trait were more accepting of the TKMSs (based on perceived ease of use). Consequently, it is recommended that organizations and companies that research and distribute TKMSs consider the personality traits of users when researching and designing these TKMSs. The potential benefits could bolster

competitive advantage in the information technology arena and forward the study of personality trait relationships in information technology–related fields.

Dedication

I would like to dedicate this dissertation to my late parents. They have instilled in me the drive to persevere, even when times get tough, and to see things through to the finish. Their quest for knowledge inspired me to always seek knowledge, for knowledge is power. I would also like to dedicate this to my daughter, Maya. She has shown me that with hard work, any obstacles can be removed. Lastly, but not least, I'd like to dedicate this to God, for without Him, none of this would have been possible.

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CHAPTER 1. INTRODUCTION

Introduction to the Problem

Organizations are facing challenges of global competitiveness due to the current changing business environment. Neto and Loureiro (2009) stated, "the quest for competitiveness and sustainability has led to recognition of the efficient use of information and communication technologies as a vital ingredient for survival and profitability in this knowledge-based economy" (p. 211). In a competitive economy, organizations face challenges like high market volatility, shortened product lifecycle, rapid technological changes, and downsizing (Neto & Loureiro, 2009). To meet these challenges, organizations must learn to manage knowledge. This is crucial to creating and maintaining a competitive advantage and innovation (Neto & Loureiro, 2009). Edvinsson and Malone (1997) indicated that to meet these challenges and to improve business processes, organizations must identify pertinent knowledge in an organization. Therefore, company organizational knowledge is a key asset in organizations and it must be protected to ensure success.

Efficient use of internal organizational knowledge can prove to be an asset to organizations and help organizations achieve a competitive advantage. Smuts, Van der Merwe, Loock, and Kotze (2009) assert that a knowledge management system (KMS) can enable increased knowledge sharing, both externally and internally towards an organizational goal such as gaining a competitive advantage. However, KMSs must be successfully implemented to achieve organizational goals, such as gaining a competitive

advantage. A potential factor in this success is related to the personality types of KMS users.

This research addresses a subset of knowledge management systems that supports the technical aspects and users of a KMS. Technical KMSs (TKMSs), technical subsets of KMS, are knowledge management systems that store technical information about various software and hardware systems. Software and hardware manufacturers have developed and distributed TKMSs to its customers without examining the personality types that contribute to the acceptance of these systems (Telvent, 2010). System user satisfaction and effectiveness may be affected by individual differences (personality types) of its users and may affect the organization's competitive advantage (Devaraj, Easley, & Crant, 2008).

Despite the extensive past research (e.g., Alavi & Leidner, 2001) in knowledge management (KM) related initiatives and the large financial investment in developing and implementing TKMSs-both externally and internally, not much research has been conducted to determine the actual acceptance of TKMSs and their relationship to personality types of its users (Ong & Lai, 2007). Information systems (IS) literature has not outlined the individual differences as they relate to personality types (Devaraj, Easley, & Crant, 2008). This issue was studied by determining what the relationship was between acceptance of technical knowledge management systems and user personality types.

Background of the Study

Organizations today are focusing on obtaining and maintaining a competitive advantage via the use knowledge management. Knowledge management has been defined as "a practice that finds valuable information and transforms it into necessary knowledge critical to decision making and action" (Van Beveren, 2002, p. 18). Organizations have used technology to implement their knowledge management goals resulting in various forms of knowledge management systems (KMSs), including technical knowledge management systems (TKMS). Additionally, a competitive advantage can be realized when customers and employees effectively and continually use the KMSs.

Researchers in the last two decades have concentrated on theory-based research of information systems usage that included investigating the variables around technology acceptance and how systems are used (Venkatesh & Davis, 1996; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis & Davis, 2003). One variable, user initial acceptance of any information systems is a key first step to achieving IS success. However, Bhattacherjee (2001) notes information system (IS) continued usage, another variable, directly affects the potential success of the information system. Accordingly, continued usage of an IS, directly relates to the success of an information system. In fact, some corporate failures can often be attributed to occasional and improper long-term use of these business critical information systems (Lyytinen & Hirschheim, 1987). Accordingly, continued usage of an IS, directly relates to the success of an information system.

The theory of continuance is not new in the information systems (IS) research arena. The IS implementation literature has noted the theory of continuance in various forms. For instance, Zmud (1982) researched the continuance theory of implementation. In addition, Kwon and Zmud (1987) discussed the continuance theory of incorporation. Moreover, Cooper and Zmud (1990) studied the continuance theory of routinization. Essentially, these studies outline the post-acceptance stage of information systems when IS usage was part of a user's normal routine. However, Bhattacherjee (2001) asserts, "these studies view continuance as an extension of acceptance behaviors (i.e., they employ the same set of pre-acceptance variables to explain both acceptance and continuance decisions), implicitly assume that continuance covaries with acceptance (e.g., Davis et al. 1989; Karahanna et al. 1999) and are, therefore, unable to explain why some users discontinue IS use after accepting it initially (the "acceptance-discontinuance anomaly")" (p. 352). Equally important, prior research does not detail the reason behind a user's initial acceptance that may have bearing on a user's reason for continuing to use a KMS. Hence, current technology acceptance models lack details on the observed continuance behaviors Bhattacherjee (2001).

Past research studies have focused on system performance, usefulness, or on how the system aligns with the organizational business strategy (Chua & Lam, 2005b). Some of these studies report the failures and major setbacks organizations have experienced with such systems (Lucier & Torsiliera, 1997). These failures are often a result of resistance from employees during implementation of new systems or from the lack of continued system usage (Lin & Ong, 2010).

Since users have become consumers and make decisions on whether to accept or to continue using the system, increased attention should be paid to each user and their differences. These differences can be distinguished by a user's personality. Due to its ability to determine human conduct in many types of situations, personality is more applicable to individual differences (Eysenck & Eysenck, 1985), and should have implications in IS-related activities (Devaraj, Easley, & Crant, 2008). While this is true, little research exists that address a user's inner personality during the post-adoption continued usage context that has become more important to the success of IS in organizations.

The issue of the relationships between personality types and technical knowledge management systems (TKMS) acceptance is addressed in this dissertation. The key factors in this dissertation research are personality types (independent variables) of the users, as measured by the Five Factor Model (FFM) and their acceptance of technical knowledge management systems as measured by technology acceptance model (TAM; dependent variable). The current body of literature includes information about knowledge management systems (a type of information system) acceptance and the correlation of behavior factors and acceptance of IS systems. However, the current body of research does not detail the relationship of the acceptance of knowledge management systems and the personality types of users. Alavi and Leidner (2001) indicated that in order for KMS research and development (R&D) to be reliable, it should continue to build on existing literature in similar fields.

Statement of the Problem

TKMSs are not achieving the usage (acceptance) and the benefits that have been forecasted and are therefore, not enhancing competitive advantage and profits in organizations (Comb, 2004). Akhavan, Jafari, and Fathian (2005) mention that many knowledge management system efforts (like TKMSs) are costly, doomed, and mention that the failure rate of KM has been listed at 50% by some researchers. However, "Daniel Morehead, director of organizational research at British Telecommunications PLC in Reston, says the failure rate is closer to 70%" (Akhavan et al., 2005, para. 2). Liam Fahey, Babson College adjunct professor, indicates that the reliance on technology has caused the high failure rates in KM initiatives (Akhavan et al., 2005). The desired benefits of technical knowledge management systems, as measured by acceptance, are not being consistently attained. Realizing their potential requires additional management knowledge concerning user personality factors that affect and contribute to its acceptance.

Purpose of the Study

This research investigated the relationship of personality (through the Five-Factor Personality Model) to technology acceptance of TKMS (using the Technology Acceptance Model-TAM). The behavioral factors involved in the adoption of TKMSs may be consistent with similar factors in a study conducted on grid computing technology (Udoh, 2010), like perceived usefulness and perceived ease of use. Furthermore, this study can potentially reveal the problems of TKMS acceptance and factors preventing users from its acceptance. Equally important, the results of this

research can assist in drafting the strategies and marketing policies that organizations can pursue to ensure the acceptance of TKMSs, potentially, reaping the benefits of TKMSs.

Data to achieve this was collected with a quantitative survey administered to knowledge management technical professionals, academia professionals, psychology professionals and information technology professionals who have used TKMSs in the past one year. This research study to measure these relationships, using a quantitative method, was built upon the research conducted by Devaraj et al. (2008) and on the research conducted by Lin and Ong (2010), who conducted a study that explored and proposed a model to connect personality traits to information system usage through the introduction of the five-factor personality model into information system continuance model. Devaraj et al. (2008, p. 102) performed a study "to examine the effect of the big five personality characteristics on the TAM constructs of usefulness, subjective norms, and intention to use."

Technology adoption is affected by the following construct associations: (a) controlling the correlation of subjective norms with technology use intention, (b) direct influence on subjective norms, and (c) direct impact on perceived usefulness (Devaraj et al. 2008). Devaraj et al. (2008) found these associations to be statistically sound and found similarities between the technology acceptance and the big five dimensions. Similarly, this research study investigated the relationship of personality traits on the technology acceptance model after the extended use of a TKMS and studied the FFM factors that affected the technology adoption of TKMS.

Many prior studies on TAM have used surveys using the Likert scale that are frequently used as attitude scales in circumstances in which established prediction criteria

does not exist (Flamer 1983; Likert 1932). Moreover, "quantitative case studies rely heavily on questionnaires of key constructs, frequency counts of observed phenomena, or surveys (whether through interview or questionnaire) of critical respondents in a given case" (Swanson & Holton, 2005, p. 340). Consequently, the survey method was used to gather data from users of technical knowledge management systems.

Rationale

This study tested the relationship between the major personality types and the intent to accept or fail to accept TKMSs, using an integrative model that combines the TAM (Davis, 1989) and the Five-Factor Model (FFM; personality). Increasing globalization and competition are causing many companies and organizations to find ways to increase revenue and effectively compete in the global market. Essentially, these companies and organizations must find innovative ways to use the knowledge and information technology to increase revenues and to remain afloat in this failing economy. For instance, technology companies that manufacture hardware or software can possibly realize increased revenues by providing effective assistance with their products (via technical knowledge management systems), thereby increasing user information satisfaction, additional purchases, and renewed licenses. Additionally, a study that ascertains the relationship between TKMS acceptance and the personality types of its users can lead to improved decision-making in this critical area and potentially increase revenue. As important, this study provided researchers with a better understanding of which personality types predict technology acceptance and furthered the research in the area of TAM.

Research Questions

The research problem was addressed with the following research questions:

RQ 1: Among users of technical knowledge management systems (TKMS), does neuroticism (personality type) as measured by the five-factor model (FFM), correlate to the acceptance of TKMSs as measured by the Technology Acceptance Model (TAM)?

RQ 2: Is there a relationship between the extraversion personality type and the acceptance of TKMSs?

RQ 3: Is there a relationship between the openness personality type and the acceptance of TKMSs?

RQ 4: Is there a relationship between the conscientiousness personality type and the acceptance of TKMSs?

RQ 5: Is there a relationship between the agreeableness personality type and the acceptance of TKMSs?

Significance of the Study

The nature of this study was to determine which personality types relate to the acceptance of technical knowledge management systems (also known as knowledge bases). This studied helped to quantify how certain personality types relate to TKMS user acceptance as measured by TAM. Essentially, this research study measured the relationships between the personality types of TKMS users and their acceptance of TKMSs using the quantitative method. This research study also expanded the Devaraj's et al. (2008) research in integrating the technology acceptance model (TAM) and the five-factor model (FFM).

Organizational (company) success is measured by how organizations and companies effectively manage organizational knowledge (Malhotra, 1996). This has become an important issue in this era of technological advances and implementation. These technological advances have included the transformation of this knowledge into technical knowledge management systems that help both internal and external customers effectively use software. The results of this study can be used to enable companies (e.g., software vendors) who have already distributed technical knowledge management systems (KMSs; knowledge bases) to their customers and effectively determine if the personality types of users that have accepted and have used the TKMSs, are related to their acceptance. Consequently, this will allow these organizations and companies to effectively market, the TKMS for maximum usage and to construct strategies that focus on the successful acceptance of TKMS. The success of these TKMSs can result in a competitive advantage for companies and potentially provide increased revenue due to increased user satisfaction with the software. Additionally, organizations that use TKMSs can potentially see increased productivity based on acceptance and continued usage. Moreover, practitioners and researchers can use the study results, to better understand, the relationship between personality types and technology acceptance using TAM and to improve the design of TKMSs.

Implications For Practitioners

The practical implications of the findings of this study are that customer technology acceptance can be altered based on developing a KMS that addresses the various personality types of its users, which may increase their likelihood of a new or renewal of technology purchase.

Implications For Researchers

Incorporating the FFM into TAM may benefit information systems (IS) research. Devaraj et al. (2008, p. 94) notes that the "theory of reasoned action, which is the basis for technology acceptance models, explicitly incorporates personality as an external variable affecting an individual's beliefs." Primarily, this study provides insight on the integration of information systems (IS) theory and the FFM through the examination of the relationship of personality – to technology acceptance.

Definition of Terms

Competitive Advantage. "Most forms of competitive advantage mean either that a firm can produce some service or product that its customers value than those produced by competitors or that it can produce its service or product at a lower cost than its competitors" (Saloner, Shepard, & Podolny, 2001, p. 10).

Five-Factor Model (FFM). "A parsimonious and comprehensive framework of personality. The FFM collapses all personality traits into five broad factors and, as such, presents a concise yet comprehensive framework for studying personality" (Devaraj et al., 2008, p. 93).

Knowledge Management. "KM is managing the corporation's knowledge through a systematically and organizationally specified process for acquiring, organizing, sustaining, applying, sharing and renewing both the tacit and explicit knowledge of employees to enhance organizational performance and create value" (Alavi & Leidner, 2001, p. 110).

Knowledge Management Systems. "Knowledge management systems refer to a class of information systems (IS) applied to managing organization knowledge, which is

an IT-based system developed to support the organizational knowledge management behavior" (Alavi & Leidner, 2001, p. 107).

Technology Acceptance Model (TAM). Applied model of user acceptance and usage (Venkatesh, Morris, Davis, & Davis, 2003).

Technical Knowledge Base or technical knowledge management system. A knowledge management system, created by hardware and software vendors, containing technical knowledge on how to perform certain technical operations and resolve technical software or hardware problems.

Tacit knowledge. "The know-how that is difficult to document and emerges from experiences" (Sambamurthy & Subramani, 2005, p. 1).

Assumptions and Limitations

Before performing the study, it was important to recognize the assumptions and limitations that could affect the accuracy of the research results. One limitation is presented by the voluntary nature of survey responses, subjecting the study results to self-selection biases. Self-selection biases may occur because the users who are interested in using or have used technical TKMSs were more likely to respond. Additional biases can result from self-reporting biases that can occur from participants expressing their feelings, attitudes, and behaviors. Another limitation can be due to the sampling method chosen (purposive sampling) which may not be representative of the population due to the potential subjectivity of this researcher. Moreover, taking the survey at one point in time in a field that is witnessing rapid change limits the survey results. In addition, the perspectives about KMS, evaluated in this study, could be affected by press reports and

other similar reports. Limitations due to purposive sampling may not be representative of the population due to potential subjectivity of this researcher.

Several assumptions have also been made regarding this study. For instance, one assumption was that participants had access to technical knowledge bases and were familiar with the terms presented in the survey. Another assumption was that participants would answer the survey questions truthfully and completely. It was further assumed that this researcher would receive enough survey returns to effectively measure the desired outcomes.

Nature of the Study

The nature of this study was to determine which personality types related to the acceptance of technical knowledge management systems (knowledge bases). This assisted with quantifying how certain personality types related to TKMS user acceptance as measured by TAM. Essentially, this research study helped to measure the relationships between the personality types of TKMS users and their acceptance of TKMSs using the quantitative method and added to the research in the areas IS theory (TAM) integration and the five-factor model (FFM) as conducted by Devaraj et al. (2008).

Organization of the Remainder of the Study

The subsequent chapters in this document are organized into four chapters. The second chapter provides a literature review of knowledge management systems, the technology acceptance model (TAM), personality types and the Five-Factor model (FFM) Moreover, it expounds on the broader theoretical research of personality

classification and information systems (IS) acceptance theories. Additionally, the second chapter attempts to describe the gaps in the literature that integrates the IS theory and personality classifications (FFM). The third chapter details the methodology used in performing this study. Chapter 4 outlines the results of the entire study. Finally, chapter 5 discusses the results and implications of the study as well as the recommendations for future research.

CHAPTER 2. LITERATURE REVIEW

Brooking (1999) defined knowledge "as information in context with understanding how to use it" (p. 5). Sunassee and Sewry (2002) stated that knowledge is related an individual's emotions, values, and beliefs. To ensure that knowledge is a contribution to the performance of an organization, organizations must determine how its various forms of knowledge can be used (Pemberton & Stonehouse, 2000). Moreover, at the organizational, individual, and group levels, there are various forms of knowledge, including systemic, explicit, tacit, and implicit (Davenport & Prusak, 2000; Dixon, 2000; Inkpen, 1996; Nonaka & Takeuchi, 1995; Polanyi, 1958).

Explicit knowledge can be easily captured, codified, and communicated whereas tacit knowledge is associated with beliefs, values, intuition, expertise, experiences, and emotions (Firestone, 2000). Therefore, it is essential to understand the difference between tacit and explicit knowledge because different management initiatives are required to manage both types of knowledge (Neto & Loureiro, 2009).

Technical solutions to implement various knowledge processes include knowledge creation, representation, storage, and sharing (Neto & Loureiro, 2009). Although, these technical solutions make knowledge management (KM) implementation easier, organizations must still investigate what factors (e.g., motivation) influence an individual's acceptance of a knowledge management system (KMS). This investigation could include reviewing the motivational factors related to age and educational background gaps and determining if the expected benefits of KM implementation are realized (Neto & Loureiro, 2009).

Knowledge Management

The race to remain competitive has sparked many organizations to create knowledge management (KM) initiatives. First, defining what KM is important to further the understanding of the initiatives created by organizations. O'Leary (2002) defined *knowledge management* as the

> "Organizational efforts designed to: (a) capture knowledge; (b) convert personal knowledge to group-available knowledge; (c) connect people to people, people to knowledge, knowledge to people, and knowledge to knowledge; and (d) measure that knowledge to facilitate management of resources and help understand its evolution" (p. 101).

Various types of global organizations and companies are investigating KM initiatives and implementing them into their business strategies (Ribière, Bechina Arntzen, & Worasinchai, 2007). These KM initiatives include successful implementations of social software deployment and knowledge-based repositories (Neto & Loureiro, 2009). In fact, quite a few researchers have detailed the benefits of these successful KM implementations in various journals (Alavi & Leidner, 2001; Becerra-Fernandez, Gonzalez, & Sabherwal, 2004; Coleman, 1998; Jennex & Olfman, 2004).

Information communication technology was the focus in earlier KM implementations. However, today, the importance of flexibility in KM initiatives is recognized by researchers and practitioners (Anantatmula, 2005; Gee-Woo, Zmud, Young-Gul, & Jae-Nam, 2005; Ribière, 2005). Although there are many research studies outlining the importance of information communication technology usage as an enabler for KM practices, there are socio-technical issues related to KM implementation success (Chua & Lam, 2005a; Kaweevisultrakul & Chan, 2007; Neto & Loureiro, 2009).

Neto and Loureiro (2009) stated that “despite the fact that many current implementations of KM initiatives are based on highly advanced information technologies, there are still challenges to cope with in order to ensure the effectiveness and efficiency of such KM initiatives” (p. 212). These challenges can lead to failures in KM implementation. Failures in KM implementation have been caused by organizational culture and other psychosocial factors, even though organizational culture and other psychosocial factors serve an important job in KM success (Neto & Loureiro, 2009). Moreover, studies and surveys discussing these KM implementation failures have been documented by various researchers (E&Y, 1996; KMR, 2001; Tuggle & Shaw, 2000).

History of knowledge management. The history of knowledge management is brief because it is a relatively new discipline, starting around the 1970s. Knowledge management came about in the 1970s because of papers published by management theorists and practitioners like Peter Drucker and Paul Strassman. These papers focus around how information and knowledge could be used as valuable organizational resources. Another management expert, "Dorothy Leonard-Barton of Harvard Business School contributed significantly to the development of the theory of knowledge management and the growth of its practice by examining in their various works and publications the many facets of managing knowledge" (Uriarte, 2008, p. 32). In fact, in 1995, Leonard-Burton documented, via a case study, the effectiveness of the Chaparral Steel Company knowledge management strategy which had be in place since the 1970s (Uriarte, 2008).

In the late 1970s, Everett Rogers at Stanford and Thomas Allen at MIT, pioneered

studies on information and technology transfer that led to a better understanding of the many facets of organizational knowledge and the usage of computer technology to store this knowledge (knowledge management systems; Uriarte, 2008). One knowledge management system (KMS) that was introduced in 1978 by Doug Engelbert was named Augment, an early hypertext/groupware application system that interfaced with other applications and systems (Uriarte, 2008). Another KMS introduced by Rob Acksyn and Don McCraken, in the 1970s and before the world wide web, was called the Knowledge Management System (an open distributed hypermedia tool; Uriarte, 2008).

The 1980s brought about an increased understanding of the how knowledge served as a competitive organizational asset. However, many organizations had not modified their organizational strategies to incorporate the knowledge concepts and how to effectively manage organizational knowledge. Additionally, theorists like Peter Drucker, Matsuda and Sveiby wrote a lot about the knowledge worker, resulting in the concepts of knowledge acquisition, knowledge engineering, and knowledge-based systems (Uriarte, 2008). Furthermore, the building of these concepts resulted in the usages of systems for managing knowledge and publishing of many knowledge management related journal articles.

Knowledge management in the 1990s grew to become a major focus in many local and global companies. Initially, there was not a great deal of interest in knowledge management amongst business executives, however after the publishing of the book by Nonaka and Hirotaka Takeuchi titled The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation (Uriarte, 2008), knowledge management was given more attention. In fact, by the mid-1990s, many companies began to realize a

competitive edge due to increased company knowledge assets (Uriarte, 2008). The end of the 1990s saw the phasing out of the total quality management (TQM) and business process re-engineering initiatives and the implementation of knowledge management solutions (Uriarte, 2008).

Current trends in knowledge management. Current trends in knowledge management (KM) are tied to the acceptance of KM for competitive advantage. Knowledge is the key to success and competitive advantage for most organizations. KM is ensuring that the process of distributing and applying knowledge is effectively managed. "Competitive advantage is achieved through developing and implementing both creative and timely business solutions that reuse applicable knowledge and that use newly created knowledge, which is commonly called innovation" (The Provider's Edge, 2003, para. 3).

To effectively compete in the current and future economy, organizations must improve their knowledge process efficiency in the knowledge management lifecycle and recognize that its people are the key source of knowledge. Figure 1 shows the activities involved in the knowledge management lifecycle: identifying -> creating -> transferring -> storing -> re-using -> unlearning knowledge (Rosemann & Chan, 2000). First, important and essential knowledge in the organization must be identified. Second, new knowledge must be created by organizational employees and successfully transferred to others in the organization. Third, this information must be stored in a knowledge repository for access by everyone in the organization. Fourth, it's key to transfer knowledge back into the organization for reuse by the organization. Fifth, obsolete knowledge must be unlearned to make room for new knowledge (McGill & Slocum,

1993). The key to this KM life cycle model is that organizations must understand and optimize KM processes to give them a competitive advantage, despite their market segment.

The knowledge production and integration process can be achieved by an organization by promoting sharing among all individuals and inputting gathered knowledge into a knowledge database for access by all. As a result, management will be able to deliver knowledge to the individuals that need it. "With this knowledge, people are empowered to effectively solve problems, make decisions, respond to customer queries, and create new products and services tailored to the needs of clients" (Leitch & Rosen, 2001, p. 11).

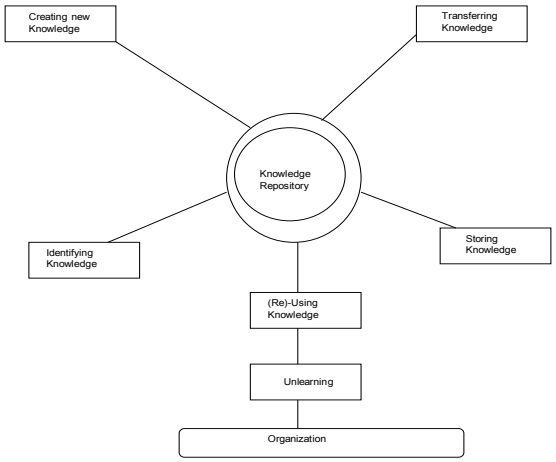

Figure 1. The knowledge management lifecycle. From "Structuring and modeling knowledge in the context of enterprise resource planning", by M. Rosemann and R. Chan, 2000, *Proceedings of the 4th Pacific Asia Conference on Information Systems (PACIS 2000), Paper 48,* p. 630. Copyright 2000 by Association for Information Systems Electronic Library. Adapted with permission.

Naming a chief knowledge officer (CKO) has become the latest trend in many organizations. The CKO has the executive responsibility to make the KM process work for the advantage of the company. The complex mission that the CKO must carry out requires that the CKO be very knowledgeable in the KM profession, preferably possessing a PhD. "Included in the CKO's responsibilities are:

[1.] Creating a knowledge management vision
[2.] Integrating knowledge management into the strategic plans of the enterprise
[3.] Selling knowledge management to senior managers and creating a shared vision
[4.] Getting buy-in from competing initiatives and advocates
[5.] Mentoring knowledge management initiative leaders
[6.] Managing multiple projects, vendors, and consultants
[7.] Delivering measurable knowledge management benefits that significantly contributes to the success of the enterprise" (Leitch & Rosen, 2001, p. 11).

Implications of knowledge management. Implementing knowledge management (KM) allows many companies to gain a competitive advantage over their competitors. However, many KM initiatives and projects have failed, causing many organizations to lose a significant amount of money.

Often, to gain competitiveness and improve business processes, many organizations have included KM as a business strategy (Chua & Lam, 2005a). Chua and Lam (2005a) noted that reports of successful KM implementations have resulted in financial savings, increased revenues, and increased level of user acceptance. For example, the implementation of the Eureka database (KM database), in 1996, saved Xerox and estimated $100 million (Brown & Duguid, 2000). In 2000, sharing knowledge about packaging improvements allowed Hill's Pet Nutrition to reduce pet food wastage, and another KM implementation allowed Hewlett-Packard to successfully establish and standardize consistent pricing schemes and sales processes (Wenger & Snyder, 2000).

Moreover, Holder and Fitzgerald (1997) reported that in June 1996, the Center for Army Lessons Learned knowledge base received almost 100,000 weekly hits, showing strong acceptance of the knowledge base.

Lucier and Torsiliera (1997) asserted that although 84% of KM programs show no considerable impact on the adopting organizations, reported cases of KM project failures are negligible. The media rarely mentions the names of organizations experiencing KM project failures whereas the names of organizations with KM project success stories are widely distributed. Although the modern economy highlights organizational learning and active experimentation as corporate values, failures are unmentionable. As Norton (2003) specified, a *failed information technology (IT) project* can be defined as a project that has missed the deadline by more than 30% and the final information system of which does not meet the users' requirements.

In fact, Peters (1987) said that failures are difficult for people to digest. However, Thorne (2000) asserted that the beliefs of organizational learning and continuous improvements should supersede the fear of and intolerance for failure. That is, if failure is suppressed, ignored, or denied, users will not be able to learn from past mistakes. However, Thorne (2000) stated that success could be achieved when a key part of learning and development includes the acceptance of failure. Starting knowledge groups, creating best practices internally, developing technical libraries, discussion databases, and lessons-learned databases are part of many KM projects (Chua & Lam, 2005b). However, reasons for KM project failure or success are rarely discussed in these groups or discussions. The results of this study could, potentially be included in organizational best practices and discussion groups.

Many organizations implement KM initiatives based on other KM success stories and with the view that having success factors and their best efforts will increase the use of their knowledge assets and produce better management (Chua & Lam, 2005b). Dixon (2000) indicates that KM project success factors are linked to an organization's knowledge and goals as well as their focus on employees who require a specific knowledge. Moreover, Trussler (1998) stated that KM project success factors relate to comprehensive communication and commitment to KM by companies and organizations. Furthermore, Davenport and Prusak (2000) list nine factors that contribute to KM project success:

> [a] knowledge-oriented culture, [b] organizational and technical infrastructure, [c] senior management support, [d] link to industry or economics value, [e] modicum of process orientation, [f]clarity of vision and language, [g] nontrivial motivational aids, [h] some level of knowledge structure, and [i] multiple channels for knowledge transfer. (p. 153)

Acknowledging these success factors and incorporating them into organizational initiatives are important to organization operations.

Chua and Lam's (2005b) review of KM projects showed many success factors. For example, in a manufacturing company, KM projects were constructed with the objective to cut corporate costs. In addition, a global company developed a KM project with top management approval and a focused population of users that caused a reorganization of the company's structure (Chua & Lam, 2005b). However, these KM projects failed because they experienced difficulties related to culture, project management, technology, and content. Consequently, Chua and Lam (2005b) stated, "the success of a KM project is not only contingent on the presence of success factors, but also on the absence of failure factors" (p. 16).

As a result of KM not being defined properly in industry, many organizations, and companies have mistakenly separated critical IT infrastructure needs such as change management, e-learning, process improvement, performance support, reengineering, and KM. In an effort to increase performance, leaders of the organization KM initiative sometimes compete for valuable few resources in a knowledge arena full of other strategic efforts. More importantly, most employees and managers are lacking in knowledge about KM. KM can only enhance organizational performance when understood and intelligently applied, including integration with other improvement initiatives. Understanding basic knowledge process allows researchers to understand KM (Weidner, 2002).

Research in knowledge management. The study of knowledge has been around for centuries. In fact, the study of knowledge dates back to the ancient philosophers. However, in the 1950s, the scientific study of knowledge was generated by the great progress in the cognitive sciences. Davenport and Grover (2001) asserted, "to the cognitivist, knowledge was explicit, capable of being coded and stored, and easy to transfer. Significant research in artificial intelligence stems from this vantage point, with many of the resulting systems being currently used in business" (p. 11).

Nonaka and Takeuchi (1995) presented a more contemporary but complementary view that placed importance on the tacit and personal nature of knowledge as an important source of innovation. This view resulted in the development of a conversion process, ignored by cognitivists, which lead to explicit knowledge or, eventually, a new product or service. This conversion process involves more social activities than knowledge technologies. Despite the research strides in the social and psychological

sciences pertaining to knowledge use and transfer, business emphasis on the topic has been more recent.

Knowledge management in business strategy. Managing organizational knowledge has increasingly become the focus in business and economic theory, and has the potential to affect an entire organization's business, especially its processes and information systems. In fact, Nonaka and Takeuchi (1995) declared that the main strategic concern for many organizations is KM and it has become the latest strategy in increasing organizational competitiveness (Bell & Jackson, 2001). Therefore, organizations must integrate knowledge areas of processes, strategy, technology, and structure to successfully implement KM in an organization. Firms and organizations that fail to understand the importance of KM as a strategy, may not survive (Frappaolo & Koulopoulos, 2000).

KM involves acquiring knowledge from internal and external organizational sources and utilizing that KM to assist with accomplishing their organizational missions. Specifically, KM is a set of organizational measures designed to meet specific organizational tasks (Jafari, Akhavan, & Nouraniour, 2009). Drew (1999) performed various case studies in KM and found that some companies implement KM by combining KM with their organizational objectives and forming tasks to successfully implement KM. Another researcher, Michael H. Zack, discovered that based on its strategic mission, a company will adopt different administrative procedures to help implement KM into a company (Malhotra, 1998). Although Zack's and Drew's findings point toward using KM as a tool for company strategic operations, scholars have not distinctly

classified KM as a business strategy and linked KM to literature focused on corporate strategies.

Strategy and knowledge are dynamic in organizations and may involve the organization's current or future strategy plan (Jafari et al., 2009). How knowledge is effectively created and managed, can create a strategic and competitive advantage for an organization. On the whole, "an organization managing knowledge well has the potential to create significant value, but only if it is linked to its overall strategy and strategic decisions" (Jafari et al., 2009, p. 4).

Evolution and role of information technology in knowledge management. In the 1990s, technologies that supported KM projects were distinct and only performed one function of a KM initiative. Therefore, users would have to log into many systems to accomplish various work tasks. Essentially, there was little to no integration between the systems.

Technologies in support of KM initiatives began to evolve in the early 2000s to have the abilities to exchange information and be less platform-dependent. This was a direct result of advancement in open standards for technology. Consequently, these technologies represent various components and can be easily incorporated into other enterprise applications (Tsui, 2005). Additionally, vendors of commercial KM technologies are now bundling these technologies with other technology solutions that allow users to work and collaborate on a variety of business functions in one KM system. These changes were created from vendor consolidation in the market and the understanding that critical success factors in KM initiatives rely on the integration of knowledge processes (Eppler, Siefried, & Ropnack, 1999; Seely, 2002).

Many recent KM projects have been successful in leveraging the benefits from their KMSs. However, a fair amount of KM projects have failed. Moreover, Tsui (2005) asserts that many past KM projects were driven by technologies such as "e-collaboration tools, content management systems, search engines, and retrieval and classification tools" (p. 3). These failures show that to have a successful KM project implementation, organizations must integrate the use of technology, people, process, and content. These failures also show successful KM project implementations are not solely driven by technology. Tsui (2005) pointed out that

> Technology, however, can act as a catalyst (i.e., an accelerator) for the introduction and initial buy-in of a KM program, but in order to be successful, this accelerated adoption has to be aligned with a defined KM strategy and supported by a change program. (p. 3)

KM technologies in the future will continue to improve on aligning with organizational project management tools to support organization business process management initiatives. To support personal knowledge capture and sharing, organizations will have to coordinate the various organizational resources, like social networks and personal applications (Tsui, 2005). Moreover, to support inter-organizational collaborations and the need for rapid application tool development, Tsui (2005) predicted that KM technologies would become more of an on-demand technology.

Knowledge Management Systems

Knowledge management systems (KMSs) are used as a part of the knowledge management initiative to share data and information. Many companies have developed and implemented KMSs to effectively share information amongst internal and external customers. "Knowledge management systems share many similarities with information systems, and many tools and techniques of knowledge management are related to

information systems" (Gallupe, 2001, p. 62). Moreover, KMSs, as with information systems (ISs), help in facilitating organizational learning by collecting important knowledge and making it available to employees as needed (Damodaran & Olphert, 2000). Additionally, KMSs are seen as a way to help organizations create, share, and use knowledge (Gallupe, 2001). Technically, KMSs are no different from traditional information systems (ISs), but they can extend past traditional ISs by providing context for the information presented in an information system (Gallupe, 2001). Additionally, the key parts of KMSs are the knowledge and the knowledge workers (Damodaran & Olphert, 2000; Gallupe, 2001).

The key critical component in ensuring success of KMSs is that organizations must foster a culture that encourages knowledge sharing among its employees. Consequently, the measurement of KMS success will have to involve not only the features of information technology (IT)-enabled ISs but also the social aspects of people and culture within organizations. The DeLone and McLean (2003) information system (IS) success model, a model used to measure information system success, can be used as the foundation to develop a KMS success model.

Gallupe's (2001) study included a literature review of major research into the uses of KMSs that indicated the lack of range of research in this area. Consequently, Gallupe suggested that "if KMSs are to continue to have a positive impact on organizations, more study will be needed to assess the effects of these systems on the organization as a whole" (p. 72). Researchers must determine and understand how KMSs affect people and organizational strategy. In addition, Gallupe asserted that researchers must review the best practices in determination of the benefits of KMSs. In the past 10 years, many

KM projects have come and gone. "Many of these projects were successful and organizations are still leveraging benefits from their KM systems" (Tsui, 2005, p. 3).

Technical Knowledge Management Systems

A *technical knowledge management system (TKMS)* can be defined as a knowledge management system created by hardware and software vendors containing technical knowledge on how to perform certain technical operations and resolve technical software or hardware problems. The research on measurement of TKMSs is important in the understanding of the benefits of using and accepting these systems. The research on acceptance is vital to understanding the elements to accepting technology, like TKMSs.

Research on measurement. Various researchers have approached the issue of linking business performance with KM and IT (Papoutsakis & Vallès, 2006). The approach has included classifying the issue into five categories: "(a) quantitative measures studies; (b) accounts and/or audit types of studies; (c) studies of the causal relations between KM and business performance with or without the involvement of IT; (d) studies based on the balanced scorecard; and (e) studies that evaluate and measure the impact" (Papoutsakis & Vallès, 2006, para. 10). Using quantitative measures to determine TKMS's return on investment (ROI) is probably the most used method of measurement in organizations (Papoutsakis & Vallès, 2006). The main goal of organizations that distribute TKMSs is ROI. "Using proven measurement methodology (Phillips, 1997), the model estimates the annualized cost of knowledge management and the financial benefits produced in five areas: personal productivity, the productivity of others, speed of problem resolution, cost savings, and quality" (Papoutsakis & Vallès, 2006, p. 1). Based on the resulting ROI (50%), Anderson provided recommendations to

assist in increasing the business benefits of KM. ROI has been one method to measure the benefit of KMSs and could be one way to measure the benefit of TKMSs.

To measure KMS success, more specifically, TKMSs, the DeLone and McLean (2003) model has been used in many studies and has served as a framework for conceptualizing and operationalizing IS success. In the DeLone and McLean "IS success model, *systems quality* measures technical success; *information quality* measures semantic success; and *use, user satisfaction, individual impacts,* and *organizational impacts* measure effectiveness success" (p. 10). In 2006, Wu and Wang conducted a study that re-specified the DeLone and McLean model to measure KMS success and its validation in empirical surveys about KMS. Wu and Wang conducted a quantitative study that use a questionnaire survey administered to fifty top Taiwanese companies using KMSs. A contact person was established at each company and that person distributed the self-administered questionnaires to KMS users. The data was analyzed using composite scores to measure the reliability and validity. Wu and Wang's study "indicated that user perceived KMS benefits played a significant role in KMS success, but it is necessary to understand the relationship between user perceptions of KMS benefits in order to generalize our findings" (Wu & Wang, 2006, p. 737). This researcher's study expands Wu and Wang's suggestions to study the relationship between user perceptions and TKMSs. The outcome of this study was a validated KMS success model that introduced new KMS measures: knowledge/information quality as a KMS success measure and system use in the KMS context (Wu & Wang, 2006). Although, many studies have been conducted that measure ROI and KMS success, there is a shortage of literature on the measurement of TKMSs.

Research on acceptance. Recently, KM issues have included the development of a research agenda (Davenport & Grover, 2001) and the use of IT to improve organizational knowledge (Bourdreau & Couillard, 1999). However, the IT implementation in support KM initiatives has been missing in this research. To date, the factors affecting individual acceptance and use of IT in the form of KMSs, more specifically, TKMSs have produced little research.

To combat this lack of research in this area, researchers Money and Turner (2004) conducted a study to assess the relationships among the technology acceptance model's (TAM's) "two primary belief constructs: (a) perceived usefulness and perceived ease of use, and (b) users' intention to use, and their usage of the target" (p. 1) KMS. The results of this study indicated that previous acceptance research in IT, more specifically TAM, could serve as the groundwork for KMS user acceptance research (Money & Turner, 2004). Moreover, relationships between the two primary belief constructs in Money's and Turner's study are mostly consistent with constructs found in previous TAM research (Money & Turner, 2004).

Predictive Behavior Models

Predictive behavior models are used by researchers to understand the beliefs, attitudes, and intentions towards technology adoption (acceptance), usage, and aversion. Three common models used in the research of technology acceptance are the theory of reasoned action (Fishbein & Ajzen, 1975), the theory of planned behavior (Ajzen, 2005; Ajzen & Fishbein, 1980), and the technology acceptance model (TAM; Davis, 1989).

Theory of Reasoned Action. The technology acceptance model (TAM) originated from Fishbein and Ajzen's (1975) theory of reasoned action (TRA) and Ajzen

and Fishbein's (1980) theory of planned behavior (TPB). TRA shows that intentions of an individual's attitude and their subjective norms are the best prediction of the individual's actual behavior (Chan & Lu, 2004; Luarn & Lin, 2005). Furthermore, a *subjective norm* is the overall perception that others have regarding the relevance of what the individual should or should not do (Chan & Lu, 2004; Luarn & Lin, 2005). In short, TRA is a predictive behavior model that is used to examine the factors that affect a person's intentions to perform or not to perform an action. Figure 2 shows the relationships of the TRA constructs. TRA can be applied in general settings to explain and predict behavioral intentions.

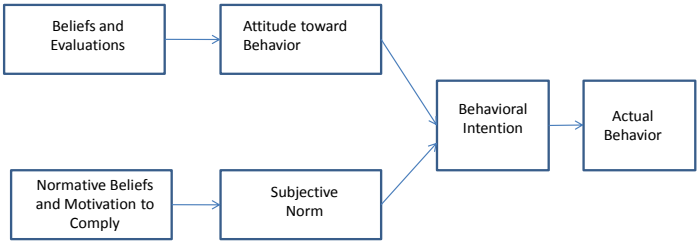

Figure 2. Theory of reasoned action (TRA). Adapted from "Why Do People Use Information Technology? A Critical Review of the Technology Acceptance Model," by P. Legris, J. Ingham, and P. Collerette, 2003, *Information & Management, 40*(3), p. 191. Copyright 2003 by the Association for Information Systems. Reprinted with permission.

The three components that make up the TRA model are behavioral intention, attitude toward behavior, and subjective norm. *Behavioral intention* is the measurement of an individual's intention to perform a specific behavior (Chan & Lu, 2004). *Attitude toward behavior* relates to an individual's feelings about performing a particular behavior (Chan & Lu, 2004). *Subjective norm* is what an individual thinks about how others, that are important to them, think about the individual's decision to perform a particular behavior (Chan & Lu, 2004; Wang et al., 2003). Overall, TRA hypothesizes that an

individual's intention to perform or not to perform a behavior is based on an individual's attitude and subjective norm (Chan & Lu, 2004; Wang et al., 2003).

Theory of Planned Behavior. The theory of planned behavior (TPB) expands TRA by including another construct called *perceived behavior control* that was developed by Ajzen (1991) to account for a limitation found in the TRA that does not account for behaviors over which an individual has no voluntary control. Essentially, *perceived behavior control* is a behavior that an individual has no control over (Luarn & Lin, 2005). Furthermore, Luarn and Lin (2005) posited that the TPB says that an individual's attitude, subjective norms, and perceived behavior control directly influences that individual's behavioral intention to perform a particular behavior. Overall, in TPB, "*behavior* is a weighted function of intention and perceived behavior control, and *intention* is the weighted sum of the attitude, subjective norm, and perceived behavior control component" (Taylor & Todd, 1995, p. 149).

Overview of Technology Acceptance Model (TAM)

Davis's (1989) original research in the area of the technology acceptance model (TAM), resulted in the theory that the principal determinants of the intention to use computer systems are perceived effectiveness and perceived ease of use. Davis (1993) conducted additional research in TAM to address the determinants of behavioral intention in accepting and using technology and derived the latest TAM from the TRA model. Thus, TAM is specific to IS behavior whereas TRA and TPB examine human behavior in general (Luarn & Lin, 2005). Information system researchers have examined, in support of TAM, the background utilization of perceived usefulness (PU) and perceived ease of use (PEOU), employing computer self-efficacy, perceived risk, training, and prior use

(Chan & Lu, 2004; Gefen, Karahanna, & Straub, 2003; Legris et al., 2003; Lu, Yao, & Yu, 2005; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003; Wang et al., 2003).

Davis's (1993) TAM model "did not include TRA's subjective norm as a determinant of behavioral intention because the subjective norm is one of the least understood aspects of TRA" (Fishbein & Ajzen, 1975, p. 304). As a result, the subjective norm was not included in TAM because of its indeterminate abstract and psychometric status (Davis, Bagozzi, & Warshaw, 1989).

Despite proving to be an effective tool for determining behavioral intentions to use IS, there are several limitations to the classical TAM model (Legris et al., 2003). In fact, because of these limitations, several researchers modified and extended Davis's (1993) TAM model (Adams, Nelson, & Todd, 1992; Jackson, Chow, & Leitch, 1997; Venkatesh & Davis, 1996). Many past TAM studies involving student participants using automation software or systems development applications and the resulting measurements reflected the differences in self-reported use and outlined a limitation in TAM (Legris et al., 2003). Consequently, Legris et al. (2003) reported that researchers, like Lucas and Spitler (1999), believed that better results could be realized if the TAM processes were carried out in a business environment using business professionals or real customers as participants as well as using business process applications. Another limitation of the classical TAM, as described by Legris et al., was that information systems (IS) are a separate issue in organizational activities. However, researchers Orlikowski and Debra-Hofman (1997) believed that, to be effective, the IS change

process should rely on the relationship of the following: (a) the model used to manage the change, (b) technology, and (c) the organizational context.

In summary, past research has proven that the classical TAM is a useful theoretical model that can help to explain user behavior in IS implementation (Gefen et al., 2003; Legris et al., 2003). In fact, past empirical tests performed on TAM have proven that the tools used in these tests were found to be statistically reliable (Adams et al., 1992; Davis et al., 1989; Legris et al., 2003; Venkatesh & Davis, 1996; Venkatesh et al., 2003). Overall, many researchers assert that TAM will continue to be an effective robust model and theoretical framework to predict IS usage (Davis et al., 1989; Gefen et al., 2003; King & He, 2006; Legris et al., 2003; Venkatesh et al., 2003).

Extended TAM model (TAM2). An extension to TAM was developed by Venkatesh and Davis that outlined perceived usefulness and usage intentions as it related to the processes of social influence and cognitive instrumental (Venkatesh & Davis, 2000). Venkatesh and Davis reported that perceived usefulness is based on usage intentions in many empirical TAMs. It is important to understand the determinants of the perceived usefulness construct because it drives usage intentions and how these determinants influence changes over time, with increasing system usage. Although the original TAM model was based on the determinants of perceived ease of use (Venkatesh & Davis, 1996), the determinants of perceived usefulness enabled organizations to design organizational interventions that would increase user acceptance and usage of new systems (Venkatesh & Davis, 2000). For this reason, Venkatesh and Davis (2000) conducted a study to extend TAM that studied how the perceived usefulness and usage intention constructs change with continued IS usage. Figure 3 shows a graphic overview

of Venkatesh and Davis's (2000) proposed model, referred to as *TAM2*. The TAM2 model added, "theoretical constructs involving social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use)" (Venkatesh & Davis, 2000, p. 187).

TAM2 incorporates the subjective norm, voluntariness, and image, which are three interrelated social forms. These forms help to determine if an individual will adopt or reject a new system (Venkatesh & Davis, 2000). In addition to these three forms, Venkatesh and Davis (2000) indicated that the cognitive determinants of perceived usefulness in TAM2 could be described as perceived ease of use, output, output quality, and job relevance. These instrumental determinants are defined in Table 1.

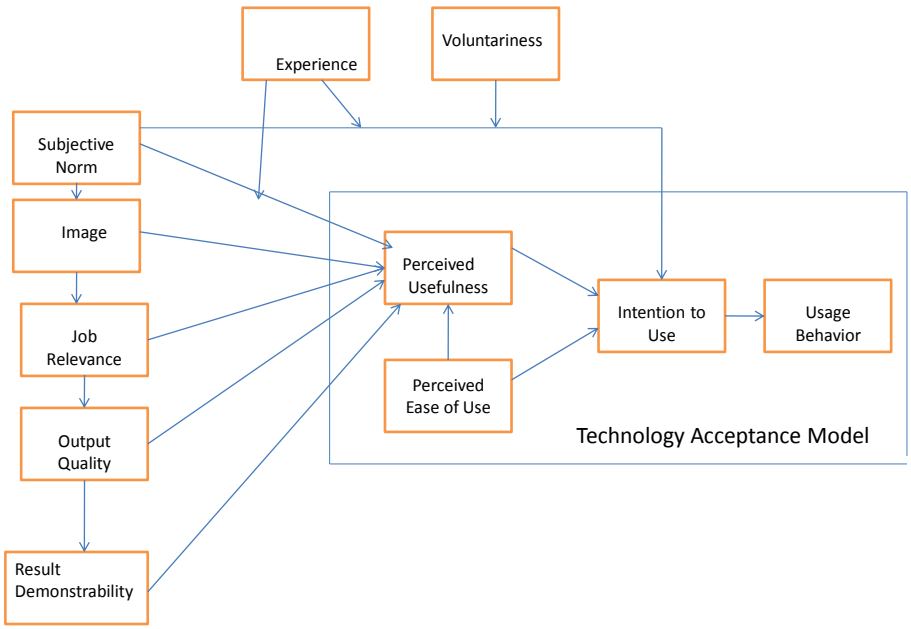

Figure 3. TAM2 model. From "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies," by V. Venkatesh and F. D. Davis, 2000, *Management Science, 46*(2), p. 188. Copyright 2000 by Informs. Adapted with permission.

Table 1

TAM2 Instrumental Determinants

Process	Variable	Definition of variable
Social influence	Subjective norm	"A person's perception that most people who are important to him/her think he/she should or should not perform the behavior in questions" (Fishbein & Ajzen, 1975, p. 302).
	Voluntariness	"Extent to which potential adopters perceive the adoption decision to be non-mandatory" (Venkatesh & Davis, 2000, p. 188).
	Image	"The degree to which use of an innovation perceived to enhance one's status in one's social system" (Moore & Benbasat, 1991, p. 195).
	Experience	"The direct effect of subjective norm on intentions may subside over time with increased system experience" (Venkatesh & Davis, 2000, p. 189)
Cognitive instrumental	Job relevance	"An individual's perception regarding the degree to which the target system is applicable to the individual's job. Job relevance is a function of the important within one's job of the set of tasks the system is capable of supporting" (Venkatesh & Davis, 2000, p. 191).
	Output quality	"In perceptions of output quality, users will take into consideration how well the system performs the tasks that match their job relevance" (Davis, Bagozzi, & Warshaw, 1992, p. 985).
	Result demonstrability	"Tangibility of the results of using the innovation will directly influence perceived usefulness" (Moore & Benbasat, 1991, p. 203).

Consistent with TRA, *subjective norm* is what other individuals, important to the subject, think about the subject performing or not performing a particular behavior (Venkatesh & Davis, 2000). TAM2 indicates that, "in a computer usage context, the direct compliance-based effect of subjective norm on intention over and above perceived use (PU) and perceived ease of use (PEOU) will occur in mandatory, but not voluntary, system usage settings" (Venkatesh & Davis, 2000, p. 188). In TAM2, voluntariness is, therefore shown as a moderating variable. TAM2 suggests that the subjective norm

positively influences image because, if an individual's work group considers it important to perform a task (e.g., using a system), performing the task elevates the individual's image in the group (Venkatesh & Davis, 2000). Additionally,

> "TAM2 theorizes that direct effect of subjective norm on intentions for mandatory usage contexts will be strong prior to implementation and during early usage, but will weaken over time as increasing direct experience with a system provides a growing basis for intentions toward ongoing use" (Venkatesh & Davis, 2000, p. 190).

Job relevance, output quality, result demonstrability, and perceived ease of use are a series of determinants of perceived usefulness in the TAM2 model (Venkatesh & Davis, 2000). Job relevance is based on the system ability to support an individual's job function (Venkatesh & Davis, 2000). Venkatesh and Davis (2000) described "*output quality* as an individual's perception of how well the system performs a specific task" (p. 191). Result demonstrability implies that individuals will have a more positive attitude about the system's usefulness if the differences between usage and positive results can be easily observed (Venkatesh & Davis, 2000). Moreover, perceived ease of use examines how easy or effortless a system is to use. Venkatesh and Davis asserted that TAM2 proposes that all cognitive instrumental processes positively influence perceived usefulness and, ultimately, an individual's intention to use an information system. Overall, once the adoption of a system moves beyond an individual decision to a team decision, social influence processes must expand beyond TAM2.

Unified Theory of Acceptance and Use of Technology (UTAUT). Users of TKMSs' willingness to adopt the systems directly relates to their level of acceptance of the new technology. The technology acceptance model (TAM) outlines two issues of individual acceptance: usefulness and ease of use. As a result, researchers developed

several different models by studying these issues from various dimensions. Researchers Venkatesh and Davis (2000) believed that the perceived usefulness of an information system is affected by users' perception of their personal image and job importance. Consequently, Venkatesh and Davis revised the TAM to include social influence as a new construct and called the revised model *TAM2*. Thompson, Higgins, and Howell (1991) observed users' behaviors while they were using PCs and added two more variables to TAM2 that included the long-term effects of new technology and facilitating conditions. TAM and TAM2 models were created to assist companies and organizations with understanding reaction to new technology by customers and employees. In addition, these models help companies focus on how employees would respond to new technology. Conversely, due to limitations in some of the TAM and TAM dimensions and constructs, companies and organizations were prevented from fully listing the reasons why new technology was not accepted by customers or employees. Venkatesh et al. (2003) proposed an integrated model called the unified theory of acceptance and use of technology (UTAUT) after examining eight well-known models. UTAUT consists of four constructs: facilitation conditions, efforts expectancy, performance expectancy, and social influence. These constructs were derived from the eight well-known models and directly addresses the intention of behavior to use technology. Figure 4 demonstrates this theory.

The four constructs of UTAUT defined by Venkatesh et al. (2003) are

1. Performance expectancy—The level a person considers that the use of a new technology would help to improve their work performance. This construct is included as *perceived usefulness* in TAM.

2. Effort expectancy—The degree to which the user perceives the system as easy to use. This construct includes scale items from TAM.

3. Social influence—The degree to which the user perceives that others who are important to the user believe that the user should use the system. The construct includes scales from subjective norms in TAM.

4. Facilitating conditions—The degree to which the user believes that conditions are adequate for effective use of the system, including organizational readiness and infrastructure adequacy. This construct encompasses perceived behavior control, TAM and other variants.

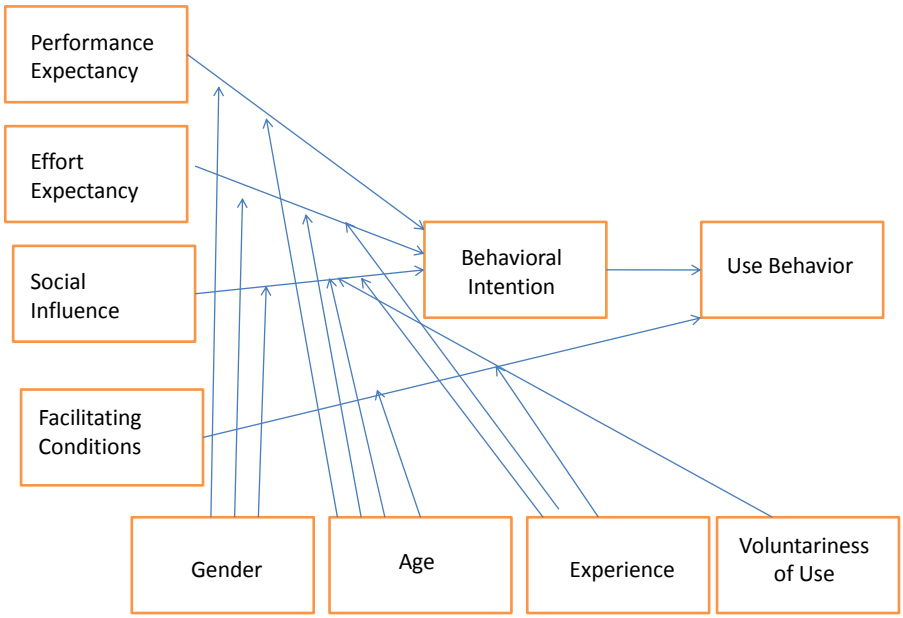

Figure 4. UTAUT Model. From "User Acceptance of Information Technology: Toward a Unified View," by V. Venkatesh et al., 2003, *MIS Quarterly*, *27*(3), p. 447. Copyright 2003 by the Regents of the University of Minnesota. Adapted with permission.

Past research studies have used the UTAUT model to test a variety of areas involving the acceptance of technology. For instance, Robinson (2006) applied the UTAUT model to a study of students' adoption of technology in marketing education. Additionally, several researchers have performed studies that have validated the UTAUT

model in Internet technologies and virtual communities (Anderson, Schwager, & Kerns, 2006; Chieh-Peng & Anol, 2008; Debuse, Lawley, & Shibl, 2008; Hennington & Janz, 2007; Lin & Lee, 2006; Loke, 2008; Pappas & Volk, 2007; Park, Yang, & Lehto, 2007; Wang, Hung, & Chou, 2006). Further, Koivumaki, Ristola, and Kesti (2008) used the UTAUT model to study the adoption of mobile technology thereby adding to the literature on technology acceptance. This study added to the literature through the study of mobile technology.

Further studies added more dimensions to the UTAUT that reflected the flexibility of the model. For instance, Wang, Wu, and Wang (2009) conducted a research study that included an additional dimension of self-management and perceived playfulness as independent variables moderated by age and gender. The study investigated age and gender as significant determinants to the adoption of mobile learning technology.

Despite its usefulness in studying the acceptance of technology, the UTAUT model is limited in that it does not include the task-technology fit (TTF). Venkatesh et al. (2003) noted that this was not included in the UTAUT model and that it warranted further research. Essentially, the models that underlie the UTAUT model fail to include task constructs. Typically, users intend to use information technology if it meets their task requirements. Dishaw, Strong, and Bandy (2004) conducted a study that added TTF constructs to the UTAUT with the goal of determining whether this addition produced an improvement in explanatory power, similar to that reported by Dishaw and Strong (1999). The results of their study produced a new model that combined the TTF and UTAUT models.

Personality Types

Allport (1961) indicated that distinctive thinking and behavioral patterns of an individual could be determined by the individual's personality. However, individual personality traits emerge when an individual is studied from different aspects. In fact, many psychologists agree that individual behavior is related to personality traits and the context of these traits (Allport, 1961; Endler & Magnusson, 1976). Eysenc's (1991) study suggested five principles related to personality traits: efforts expectancy, replicability, external correlates, and comprehensiveness. These principles were later identified as the Big Five Factors, or the five-factor model (FFM; Wang & Yang, 2005).

Generational differences. Much research has been conducted in the area of observing generational differences in work values (Smola & Sutton, 2002; Yu & Miller, 2003). However, this research is limited in that little exists on the examination of generational differences in personality and workplace motivational drivers. Despite past research studies that examined the motivational drivers of generational differences in personality (e.g., Twenge, 2000, 2001a, 2001b), these studies concentrated more on the larger generational differences and not specifically on the workplace.

Generational differences research at work has focused on work values. For instance, Brown (1976), George and Jones (1999) stated that "work values refer to an employee's attitudes regarding what is right, as well as attitudes about what an individual should expect in the workplace" (Wong, Gardiner, Lang, & Coulon, 2008, p. 880). Although there may be relationship between an individual's personality preferences and motivational drivers as influenced by their work values (Ashley, Bartram, & Schoonman, 2001), it is important to understand the difference between these concepts.

Software vendors must develop TKMSs to ensure that all generations of users can effectively use the systems and perceive the systems as useful. Prensky (2001) described the different generations of digital technology users as *digital natives* and *digital immigrants*. *Digital natives* are young people who grew up with the use of digital technology in every facet of life, whereas *digital immigrants* are people "who were not born into the digital world but have later in life become fascinated by and adopted many or most aspects of digital technology" (Prensky, 2001, p. 1). Prensky asserted,

> "The importance of the distinction is this: As digital immigrants learn—like all immigrants, some better than others—to adapt to their environment, they always retain, to some degree, their accent, that is, their foot in the past. The digital immigrant accent can be seen in such things as turning to the Internet for information second rather than first, or in reading the manual for a program rather than assuming that the program itself will teach us to use it" (p. 3).

These generational differences may influence the successful adoption of TKMSs, and developers must incorporate generational differences in the design and functionality of the TKMSs.

Personality Type Models.

Myers-Briggs. Carl Jung's theory of psychological types (extroversion, introversion, sensing, and intuition) asserts that random behavior in individuals is actually quite orderly and normal, and is caused by differences in how individuals receive information and make decisions (Myers, McCaulley, Quenk, & Hammer, 1998). However, this notion has caused much debate among psychologists.

Theorist, Jung, described the orientations of personality type's extroversion and introversion (EI) as follows: "Some people are oriented to a breadth-of-knowledge approach with quick action; others are oriented to a depth-of-knowledge approach

reflecting on concepts and ideas" (Capretz, 2003, p. 207). Additionally, Jung described the information gathering styles and perception as sensing and intuition (SN) as follows: "With sensing and intuition, some people are attuned to the practical, hands-on, common-sense view of events, intuition—while others are more attuned to the complex interactions, theoretical implications or new possibilities of events" (p. 207). Two styles of decision making, thinking and feeling (TF), were also discussed by Jung. Capretz (2003) said that "through thinking and feeling, some people typically draw conclusions or make judgments objectively, dispassionately, and analytically; others weigh the human factors or societal import, and make judgments with personal conviction as to their value"(p. 207). Lastly, Jung described two other personality styles as judgment and perception (JP).

> "Using judgment and perception, some people prefer to collect only enough data to make judgments before setting on a direct path to a goal, and typically stay on that path. Others are finely attuned to changing situations, alert to new developments that may require a change of strategy, or even a change of goals" (Capretz, 2003, p. 208).

Myers et al. (1998) described the Myers-Briggs Type Indicator (MBTI) as 16 personality types that are a result of the relationship among four preferences—EI, JP, TF, JP, and SN, and types are represented by the letters of preferred orientations (such as INTP, ISTJ, ENFP, etc.). As a note, personality types in individuals use all eight preferences, not just the four that are preferred. Essentially, the MBTI describes 16 distinct ways of being *normal*. Capretz (2003) asserted that

> No preference is superior over any other preference, and no type is superior over any other type (though in a given situation, the preferences of one type may match the demands of the situation better than those of a different type). (p. 208)

The MBTI was evaluated from Jung's theory of psychological types and is considered atypical among personality assessment tests for a variety of reasons (Capretz, 2003). For instance,

> The MBTI is based on one of the classic statements of personality theory; it claims to measure personality types rather than personality traits and it is widely used to explain individuals' personality characteristics not only to professionals but also to the individuals themselves and their friends, families, and coworkers. (McCrae & Costa, 1989, p, 18)

Consequently, the MBTI has risen in popularity as a personality instrument for organizational and industrial psychologists, and for people attempting to understand more about themselves.

Despite MBTI's popularity, some personality psychologists have not been that enthusiastic about using the instrument. Personality psychologists reference a study conducted by Stricker and Ross (1964a, 1964b), who performed a detailed analyses of the MBTI that resulted in a critical evaluation of the MBTI typology and scales. Theorists Coan (1978) and Comrey (1983) complained that the Jungian concepts, motivated by the MBTI, have been altered. Other psychologists, like Mendelsohn, Weiss, and Feimer (1982) were concerned about the discovery of psychological types and the limitation of the MBTI measurements to measure other personality traits other than quasi-normally distributed personality traits (DeVito, 1985; Hicks, 1984). Despite the problems noted with the MBTI, its continued popularity shows that it must be effective on some levels and in some environments.

Five-Factor. The personality traits of the five-factor model (FFM) are sorted into *extraversion* (E), *conscientiousness* (C), *agreeableness* (A), *neuroticism* (N), and *openness* (O). Wang and Yang (2005) explained that "high extraversion persons are

mostly positive, optimistic, are willing to take risks, like to be around crowds, have more social activities, and tend to look for amazement" (p. 70). In contrast, Wang and Yang described conscientious persons as being more commanding, thorough, reliable, and resilient. Furthermore, Wang and Yang mentioned that people who are more agreeable are enthusiastic, empathetic, and cordial, and are likely to help others. "High nervousness persons are relatively unstable, easily to be frightened, rash, depressive, and angry" (Wang & Yang, 2005, p. 70). Additionally, social pressure theoretically causes a person with the neuroticism type to exhibit a certain behavior. Equally important, persons exhibiting the personality trait of openness are imaginative, express their curiosity, and tend readily accept various arrays of experiences and culture (Wang & Yang, 2005).

Use of FFM in technology acceptance. Many software and hardware users make purchase decisions based on their effective use of the respective products and their associated TKMSs. Users' level of new technology acceptance determines whether users are willing to adopt TKMSs (Wang & Yang, 2005). For instance, Thompson et al. (1991) observed users' behaviors while they were using PCs and added two more variables to TAM2 that include the long-term effects of new technology and facilitating conditions. This research was conducted to help companies understand the potential reactions to the introduction of new technology by employees and consumers. However, most past research focused on certain dimensions or constructs that prevented organizations and companies from completely understanding the reasons why customers or employees resisted accepting new technology. Consequently, Venkatesh et al. (2003) created an integrated model based on eight prominent models.

This integrated model, the unified theory of acceptance and use of technology (UTAUT), addresses the intention of behavior and is comprised of four constructs: social influence, facilitation conditions, performance expectancy, and efforts expectancy (Wang & Yang, 2005). Moreover, prior research investigated the relationship between each of the four constructs and personality traits. For instance, Wang and Yang (2005) conducted a study that examined the relationship of personality traits with the UTAUT model based on online stock investment use. These researchers used the quantitative research method by distributing questionnaires to a contact person at eight major Taiwanese security companies who in turn distributed the questionnaires to their clients. Although the questionnaires were meant for clients with some investment experience, no specific filtering was applied upon distribution. Similar to this researcher's study, the source of questionnaires included the Venkatesh et. al (2003) instrument that measured UTAUT constructs, Costa and McCrae (1992) NEO-PI (form S) instrument and an Internet survey to measure Internet experience (Wang & Yang, 2005). One result of this study suggested that the extraversion personality trait affected the investor's intention to use online investing systems (Wang & Yang, 2005). The other personality traits had varying results on the intention to use. "Data analyses suggest that personality traits play more important roles as moderators than as external variables" (Wang & Yang, 2005, p. 80). Wang and Yang suggested that future research should include broader audiences (other countries). As a result, this research was distributed globally to reduce the limitations found in the Wang and Yang study.

Other past studies conducted by Connolly and Viswesvaran (2000), DeNeve and Cooper (1998), and Judge, Bono, and Locke (2000) found that the variables' personality

traits and performances were positively correlated (Wang & Yang, 2005). Another study, performed by Gellatly (1996), studied the effect 'conscientiousness' had on job performance that resulted in the determination that performance expectancy was the conciliator between personality trait and job performance. As a result, Gellatly's (1996) study determined that persons exhibiting the conscientious personality trait set higher work goals and work harder to achieve their goals based on their belief that they can perform well at their jobs. In contrast, Barrick and Mount's (1991) research was limited due to their inability to observe job performance characteristics because persons exhibiting the neuroticism personality trait were easily removed from their jobs. Moreover, classifying personality traits through FFM has allowed researchers to apply FFM to medical research, allowing researchers and doctors to predict human behaviors (Courneya, Friedenreich, Sela, Quinney, & Rhodes, 2002; Hough, 1992). Consequently, this past research supports the exploration of the role of personality traits in UTAUT.

Research of Measurements of Personality Types.

Personality tests are used to determine an individual's values, skills, personality types, and interests. A person's aptitude for a certain type of occupation or career can be ascertained with these tests. Personality tests include tests that measure personality types by selected colors and tests such as the Myers-Briggs Type Indicator, which determines an individual's personality type for employment and career options.

Myers-Briggs studies. Many studies have been performed that center around the use of the Myers-Briggs Type Indicator (MBTI) in industry to measure the personality types of workers and managers types. More specifically, some researchers have begun to investigate the influence of personality types on IS use in organizations. Moreover, the

MBTI is the primary instrument used to capture Carl Jung's concepts on personality types (Wheeler, Hunton, & Bryant, 2004).

Ludford and Terveen (2003) demonstrated the use of the MBTI in IS use by conducting a study that showed that a small sample of 20 individuals used various task-oriented technologies differently depending on their MBTI type. The results of this study indicated that *perceivers* were more likely to save task-related e-mail once a project was complete, and *judgers* were more likely to delete them. Additionally, the study indicated that *thinkers* were more likely to use editorial reviews in evaluating CDs on Amazon.com, and *feelers* were more likely to rely on their own listening experience.

Taylor (2004) conducted a larger study using the MBTI in IS use that involved 257 software development employees. The study found that cognitive style affected use of the company's KM infrastructure. For instance, analytical people were more likely than intuitive people to use the company's data mining, knowledge repository, and Lotus Notes features. Overall, these cognitive style studies in personality research provide further support for a dispositional view of personal factors as a determinant of information system adoption, and suggest that the way people process information and make judgments affects their Internet use (McElroy, Hendrickson, Townsend, & DeMarie, 2007).

Five-Factor model studies. In the past, IS literature has excluded information about individual characteristics issues and, specifically, the issue of personality. In fact, research performed by Huber in 1983, opposed the study of cognitive style as a source for decision support systems. Additionally, not much has been written in the IS literature about personality as an area of individual difference. However, the progress of

personality psychology has produced different ways to incorporate individual traits into IS models. For instance, the latest theories in personality psychology suggest adopting the five-factor model in studying personality in IS system use (Devaraj, Easley, & Crant, 2008). As a result, researchers are beginning to conduct studies in the relationship of personality traits to IS system use and acceptance.

Devaraj et al. (2008) performed a study to provide an example of the combination of FFM and IS theory by examining the relationship of technology acceptance to personality. The study examined how the acceptance and technology use are affected by the relationship of user personality with perceived usefulness of and subjective norms. The data collected in the study supported the hypotheses that indicated how FFM personality dimensions could be used to predict users' attitudes and beliefs and the relationship between intention to use and actual system use (Devaraj et al., 2008). "Recent personality research has emphasized the relationship of personality variables to established, well-understood models" (Devaraj et al., 2008, p. 103). Meanwhile, IS research scholars have suggested that future IS research should progress beyond the technology acceptance model (TAM; Devaraj et al., 2008). Consequently, this study addresses these directives by discovering that the TAM constructs are affected by the personality body of literature.

Devaraj's et al. (2008) study shows that an important role in IS research is the integration of individual differences in personality. Furthermore, Devaraj et al. suggested that future research include the examination of the effect of personality on TAM after the systems have been used extensively. Similarly, this study assisted in determining, using

TAM, if there are any relationships to the personality types of users in their acceptance of TKMSs.

Research Concerning Personality Types and Learning

Five-Factor Model Research.

Factors. Carver and Scheier (2000) provided a contemporary definition for personality: "Personality is a dynamic organization, inside the person, of psychophysical systems that create a person's characteristic patterns of behavior, thoughts, and feelings" (p. 5). However, individual personality traits emerge when an individual is studied from different aspects. The personality traits of the five-factor model (FFM) are sorted into neuroticism (N), conscientiousness (C), openness (O), agreeableness (A), and extraversion (E); (Wang & Yang, 2005).

Neuroticism. "Neuroticism (N) is unstable, easily to be frightened, rash, depressive, and angry. It is measured by the degrees of anxiety, angry, depression, and vulnerability" (Wang & Yang, 2005, p. 75).

Extraversion. "Extraversion is positive, optimistic, excited, willing to take risks, and likes to be around crowds. It is measured by the degrees of positive effect, gregariousness, activity, and assertiveness" (Wang & Yang, 2005, p. 75).

Openness. "Openness (O) [easily accepts] various experiences [and] cultures, always express[s] curiosity, and [has] much more imagination. Measurements include the degrees of fantasy, feelings, ideas, values, aesthetics, and action" (Wang & Yang, 2005, p. 75).

Conscientiousness. "Conscientiousness (C) refers to authoritative, meticulous, responsible, and tough [traits]. Measurements include the degrees of order, dutifulness, achievement-striving, [and] self-discipline" (Wang & Yang, 2005, p. 75).

Agreeableness. "Agreeableness (A) refers to [being] cordial, enthusiastic, will sympathize with or help others, and is measured by the degrees of trust, straightforwardness, altruism, compliance, and tender-mindedness" (Wang & Yang, 2005, p. 75).

Measurement. The FFM has replaced the label *Big Five* and generated numerous inventories to measure the Big Five. In fact, the Big Five Inventory (BFI) measures the Big Five dimensions via a self-report inventory. The BFI is a 44-item multidimensional personality inventory that contains an extensive vocabulary and short phrases (IPIP, 2001). However, BFI is not the only instrument for measuring the Big Five. The Big Five Aspect Scales (BFAS), published by Colin DeYoung in 2007, is a 100-item measurement tool that scores the Big Five factors and two facets of each scale. Permission to use the BFAS is not required because it is a part of the public domain. Additionally, in 1996, Lewis Goldberg developed the International Personality Item Pool (IPIP), which has scales designed to work as analogs to the Neuroticism-Extroversion-Openness Personal Inventory-Revised (NEO PI-R) and Neuroticism-Extroversion-Openness Five-Factor Inventory (NEO-FFI) scales (Srivastava, 2010). Permission is also not required to use the IPIP scales instrument because they are a part of the public domain. This researcher will use the IPIP NEO PI-R instrument for this study. Both the NEO PI-R and NEO-FFI are commercial products and require permission and sometimes payment for its use.

Costa and McCrae (1992) developed a 240-item inventory called the NEO PI-R Inventory. The NEO PI-R measures the six facets of each dimension of the Big Five. Costa and McCrae also created a 60-item truncated version of NEO PI-R that only measures the five factors.

Effectiveness. The FFM is very effective in measuring personality traits of individuals. In fact, McCrae and John (1992) indicated that the appeal of the FFM is threefold:

> "It integrates a wide array of personality constructions, thus facilitating communication among researchers of many different orientations; it is comprehensive, giving a basis for systematic exploration of the relations between personality and other phenomena; and it is efficient, providing at least a global description of personality with as few as five scores" (p. 206).

Numerous studies have been successfully performed using FFM by practitioners and researchers and the results have been applied to industrial and organizational psychology. Costa (1991) wrote a series of articles describing the use of FFM for clinical psychologists, and McCrae and Costa (1991) wrote several articles that discussed FFM's application in counseling. Thus, the FFM has proven to be effective to researchers and practitioners in many industries.

Research of Personality Type and TAM

Barrick and Mount (1991) asserted that researchers found that context matters in IS research as the interests on moderated relationship increases. In fact, past research shows that the hidden relationship between personality traits and new technology acceptance was explicitly excluded from the TAM model. Essentially, conclusions about the effect of personality traits on intention to accept a new technology are ongoing. This research focuses mainly on the usage of TKMSs, exploring the role that personality traits

play on the unified theory of acceptance and Use of Technology (UTAUT) model as it relates to technology acceptance, either indirect or intervening.

Conceptual Framework

The five key factors of FFM have been noted as influencing technology acceptance (Devaraj et al., 2008). Figure 5 incorporates this notion and system use and related control variable measurements.

Conclusion

Many studies have been completed studying various themes such as organizational knowledge management, knowledge management systems, knowledge reuse, user satisfaction with information technology systems, and user satisfaction measurement. Although there is a wealth of theories on knowledge management, and an even greater wealth of studies on personality variables, few empirical studies have been performed that look at the interrelationship between these two areas. This leaves a major gap in the KMS body of literature.

In the past, the five-factor model of personality has been widely used and applied to researches in the field of management and psychology, but rarely has it been discussed in the IS field. In fact, Devaraj et al. (2008) noted, "personality has been largely ignored in the [management information systems] literature over the past two decades. However, the field of personality psychology has significantly advanced since that time, and the FFM has sparked renewed theory and empirical investigation in other disciplines" (p. 104). This research integrates the constructs of the FFM into the technology acceptance of TKMSs by examining how personality constructs influence perceived usefulness and ease of use and potential acceptance of TKMSs.

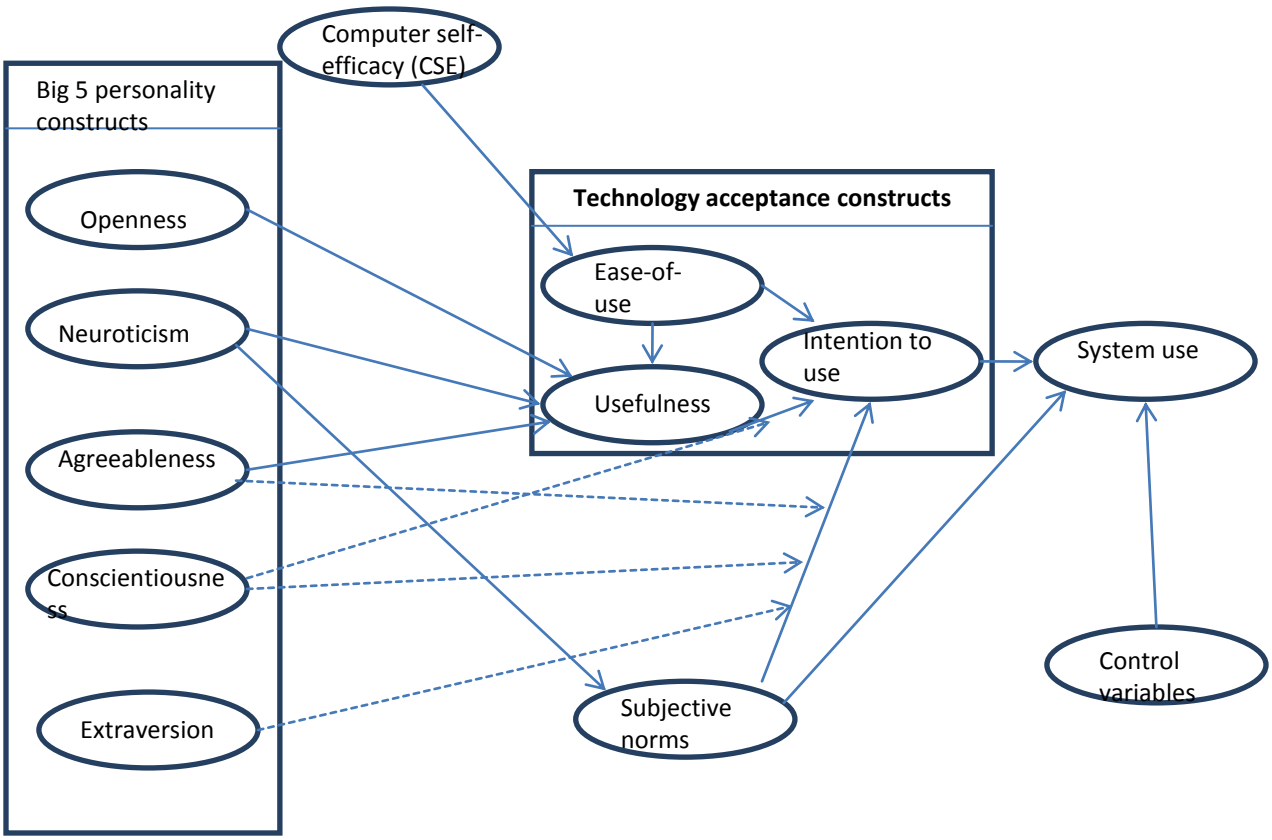

Figure 5. Conceptual framework. From "How Does Personality Matter? Relating the Five-Factor Model to Technology Acceptance and Use," by S. Devaraj et al., 2008, *Information Systems Research, 19*(1), p. 93. Copyright 2008 by Institute for Operations Research and the Management Sciences. Adapted with permission.

This research will prove to play an important role in the academic arena and highlight how the varying personality traits of TKMS users can play a vital role in the acceptance of a TKMS. Additionally, practitioners can use the results of this study to design and implement new TKMSs that focus on the personality traits of the potential users, thereby increasing the chances of technology acceptance. On a different note, practitioners can plan educational training courses and reward programs that may focus on personality types that are resistant to new technology.

CHAPTER 3. METHODOLOGY

Introduction

This chapter details the research framework and methodology used in this research study. Quantifying how user personality types relate to their acceptance or non-acceptance of TKMS was studied by determining correlations between personality types as measured by the five-factor model (FFM) and the acceptance of technical knowledge management systems (TKMS) as measured by the Technology Acceptance Model (TAM). The research expanded the research conducted by Lin and Ong (2010) who conducted a study that explored and proposed a model to connect personality traits to information system usage through the introduction of the five-factor personality model into information system continuance model and on the research conducted by Devaraj et al. (2008). Lin and Ong (2010) used questionnaires to gather data on the usage of a system at a Taiwanese University. Similarly, Devaraj et al. performed a study to determine how the TAM constructs (subjective norms, intention to use, and usefulness) are affected by the big five personality characteristics. Moreover, "quantitative case studies rely heavily on questionnaires of key constructs, frequency counts of observed phenomena, or surveys (whether through interview or questionnaire) of critical respondents in a given case" (Swanson & Holton, 2005, p. 340). Consequently, the survey method was used to gather data from users of technical knowledge management systems.

Theoretical Framework

This study broadens Venkatesh et al. (2003) UTAUT model by proposing that the Big-5 personality factors as outlined in the five-factor model (FFM) are positively correlated to the behavioral intention to use and accept TKMSs. Figure 6 illustrates the research model for this study.

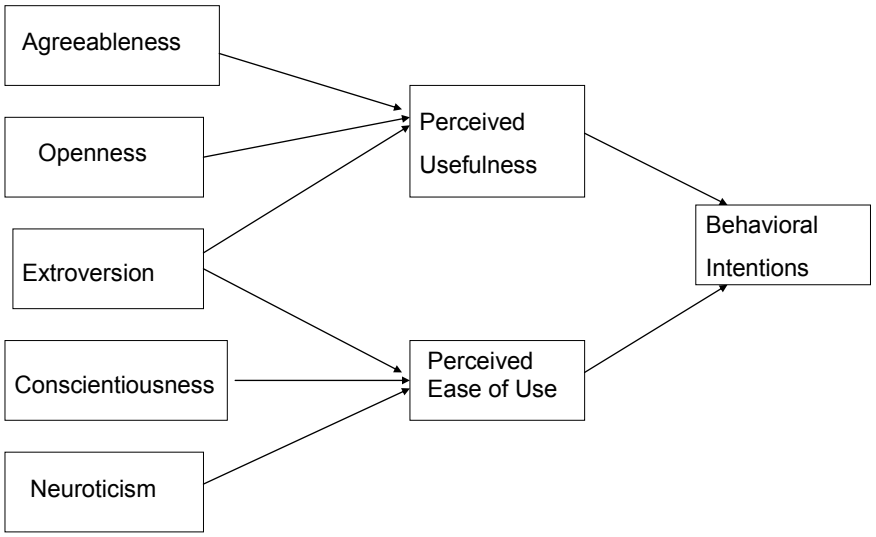

Figure 6. Research model for study. Adapted from "The impact of the big five personality traits on the acceptance of social networking website", by P. A. Rosen, D. H. Kluemper, 2008, *Proceedings of the Fourteenth Americas Conference on Information Systems,* p. 3. Adapted with permission of the authors.

The unified theory of acceptance and use of technology (UTAUT; Venkatesh, et al., 2003) were formulated by combining and eliminating some elements of prior technology acceptance models. For instance, UTAUT describes four principle constructs of the intention to use and the usage of IT: facilitating conditions (UTFC), effort expectancy (UTEE), performance expectancy (UTPE), and social influences (UTSI;

defined in Table 2) and blends the elements of eight different models of acceptance. The perceived usefulness construct shown in Figure 6 encompasses the UTAUT constructs of performance expectancy and the behavioral intentions to use the system. The behavioral intentions to use the system are also related to the attitude toward using technology, self-efficacy and anxiety (Venkatesh et al., 2003). The perceived ease of use shown in Figure 6 encompasses the UTAUT construct of effort expectancy. Accordingly, UTAUT is a more comprehensive model and formed the base model of this study.

Table 2

Definitions Independent Constructs UTAUT Model

UTAUT Independent Constructs	Definitions (Venkatesh et al., 2003)
Performance Expectancy (Perceived usefulness)	"Degree to which an individual believes that using the system will help job performance" (p. 447).
Effort Expectancy (Perceived ease of use)	"Degree of ease associated with system use" (p. 450).
Social Influence	"Degree to which an individual perceives that important others believe that he/she uses the system" (p. 451).
Facilitating Conditions	"Degree to which an individual believes that organizational and technical infrastructure exists to support system use" (p. 453).

The accumulation of prior research on personality measures suggests that almost all personality measures and specific traits can be categorized under the five-factor model of personality (called the Big-5; Barrick & Mount, 1991). Costa and McCrae (1988) asserted that these five constructs can be generalizable across many cultures and have been found to be fairly stable over time. These five traits are defined in Table 3.

Table 3

Definition Traits of Personality Dimensions

Big-5 Personality Dimensions	Definitions as represented by traits (Barrick & Mount, 1991; Moon, 2001; Judge et al., 2000)
Extraversion	"Tendency to be outgoing, assertive, active and excitement seeking" (Barrick & Mount, 1991, p. 3)
Agreeableness	"Tendencies to be kind, gentle, trusting and trustworthy" (Barrick & Mount, 1991, p. 4)
Conscientiousness	"Tendency to be thorough, responsible, organized, hardworking, achievement oriented and persevering" (Barrick & Mount, 1991, p. 4)
Neuroticism	"Tendency to be anxious, fearful, depressed and moody" (Barrick & Mount, 1991, p. 4)
Openness to Experience	"Tendency to be creative, imaginative, non-conforming, experimentative, perceptive, and thoughtful" (Barrick & Mount, 1991, p. 5)

Research Questions and Hypotheses

The research problem was addressed with the following research questions:

Research Question 1: Among users of technical knowledge management systems (TKMS), does neuroticism (personality type) as measured by the five-factor model (FFM), correlate to the acceptance of TKMSs as measured by the Technology Acceptance Model (TAM)? H_A1: Measures of the personality type, neuroticism, have a positive linear relationship ship with the perceived usefulness of TKMSs as measured by TAM.

H_B1: Measures of the personality type, neuroticism, have a positive linear relationship to the perceived ease of use of TKMSs as measured by TAM.

$H_{A0}1$: Measures of the personality type, neuroticism, do not have a positive linear relationship to the perceived usefulness of TKMSs as measured by TAM.

$H_{B0}1$: Measures of the personality type, neuroticism, do not have a positive linear relationship to the perceived ease of use of TKMSs as measured by TAM.

Research Question 2: Is there a relationship between the extraversion personality type and the acceptance of TKMSs?

H_A2: Measures of personality type, extraversion, have a positive linear relationship with the perceived usefulness of TKMSs as measured by TAM.

H_B2: Measures of personality type, extraversion, have a positive linear relationship with the perceived ease of use of TKMSs as measured by TAM.

$H_{A0}2$: Measures of personality type, extraversion, do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by TAM.

$H_{B0}2$: Measures of personality type, extraversion, do not have a positive linear relationship with the perceived ease of use of TKMSs as measured by TAM.

Research Question 3: Is there a relationship between the openness personality type and the acceptance of TKMSs?

H_A3: Measures of personality type, openness have a positive linear relationship with the perceived usefulness of TKMSs as measured by TAM.

H_B3: Measures of personality type, openness, have a positive linear relationship with the perceived ease of use of TKMSs as measured by TAM.

$H_{A0}3$: Measures of personality type, openness, do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by TAM.

$H_{B0}3$: Measures of personality type, openness, do not have a positive linear relationship with the perceived ease of use of TKMSs as measured by TAM.

Research Question 4: Is there a relationship between the conscientiousness personality type and the acceptance of TKMSs?

H_A4: Measures of personality type, conscientiousness, have a positive linear relationship with the perceived usefulness of TKMSs as measured by TAM.

H_B4: Measures of personality type, conscientiousness, have a positive linear relationship with the perceived ease of use of TKMSs as measured by TAM

$H_{A0}4$: Measures of personality type, conscientiousness, do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by TAM.

$H_{B0}4$: Measures of personality type, conscientiousness, do not have a positive linear relationship with the perceived ease of use of TKMSs as measured by TAM.

Research Question 5: Is there a relationship between the agreeableness personality type and the acceptance of TKMSs?

H_A5: Measures of personality type, agreeableness, have a positive linear relationship with the perceived usefulness of TKMSs as measured by TAM.

H_B5: Measures of personality type, agreeableness, have a positive linear relationship with the perceived ease of use of TKMSs as measured by TAM.

$H_{A0}5$: Measures of personality type, agreeableness, do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by TAM.

$H_{B0}5$: Measures of personality type, agreeableness, do not have a positive linear relationship with the perceived ease of use of TKMSs as measured by TAM.

Quantitative Research Design

This research is based on quantitative research methods. Researchers use the quantitative research design to determine what the relationship, if any, between measured variables. Quantitative research methods are effective at studying large groups of people and making generalizations from a sample (Swanson & Holton, 2005). Quantitative research process involves five main steps:

> (a) determining basic questions to be answered by study, (b) determining participants in the study (population and sample), (c) selecting the methods needed to answer questions: (1) variables, (2) measures of the variables, (3) overall design, (d) selecting analysis tools, and (e) understanding and interpreting the results. (Swanson & Holton, 2005, p. 32)

One advantage of quantitative methods is their "ability to use smaller groups of people (samples) to make inferences about larger groups (populations) that would be too expensive to study" (Swanson & Holton, 2005, p. 33). Consequently, the quantitative research design is suitable for this research study because it allows for the collection of data generalization of data to large groups with a smaller sample size. A correlational research design allowed the researcher to determine if there was a relationship between groups and to evaluate that relationship.

Sample

The target population of interest for this study was technical knowledge management system (TKMS) users in various government, academia, professional and commercial organizations. The study was accessible to those users of technical KMSs. The large nature of this target population requires that specific criteria to the target population to achieve a more accurate sampling frame (Trochim, 2001).

The sample frame must meet the following criteria: (a) be consultants, researchers, employees or managers that directly use technical KMSs in their daily work, and (b) be at least 18 years of age or older and (c) having used a technical KMS with the past one year. The sample frame must also be members of approximately twenty-six online networking groups and professional knowledge management systems, academia and IS groups. To meet these criteria, this researcher considered the use of social networking sites to obtain the required sample.

There are three criteria that were used to narrow the population to manageable and qualified sample size: (a) selecting members of professional organizations that have members that specialize in knowledge management, psychology, IT, academia and business, (b) selecting members of LinkedIn network site, and (c) selecting members of specific groups in LinkedIn related to knowledge management, psychology, IT, academia and business. The first and third criterion narrows the potential sample to those individuals associated with knowledge management, psychology, IT, academia and business. The second criterion provides a potential sample that is able to take an online survey. Based on the third criterion, 27 groups were selected from LinkedIn for this study (see Table 4). Additionally, based on the first criterion, two professional organizations, IEEE and SIKMLeaders were chosen for this study. Focusing on the 27 LinkedIn groups provides a qualified sample of over 36,000 KM, psychology, IT, academic and business professionals and students. Moreover, posting a link to a survey in the LinkedIn groups did not require approval from the LinkedIn Legal Department (see Appendix G for correspondence with LinkedIn Officials). Consequently, the sampling frame was obtained from records of registered members of the twenty-six online

networking groups and professional knowledge management system groups, academia and IS groups.

Social networking websites have increasing become more popular as a method of communicating with other people who share common interests, fields of study or occupations. In fact, a key part of research planning and development is formed by social networks and social media. “Increasingly, social media sites are being used as the direct source of a research sample” (Guest Author, 2011, para. 1). There are several advantages to using social networking websites for research samples. One advantage is that study participant’s identity and truthfulness in traditional research is surpassed by using social networks. Users of social networks are usually friends or coworkers, causing them to be more truthful in their responses to survey questions (Guest Author, 2011). Additionally, survey research on social network websites allows participants to forward the survey to more people and to spread the survey virally. Another advantage of social network websites is that the potential sample is larger than traditional research platforms because of the capability to reach more people. “Even if a fraction of people respond, you attain a much larger sample size with relatively little expenditure of time and effort in ensuring sample size (Guest Author, 2011, para. 3).

IEEE is a professional organization focused on advancing technological innovation and excellence to benefit the global community (IEEE, 2011). A short article describing the survey was written and submitted to the editor of the IEEE Washington, DC Section Area Scanner Newsletter. The article also invited IEEE members to participate in the survey and included a hyperlink to the survey posted to the SurveyMonkey Internet site (SurveyMonkey, 2010). The interest in technological

innovation linked coupled with the technology advancement posed in this study allowed IEEE members to meet the qualifications of the survey participants and to understand many of the concepts posed in the study.

SIKMLeaders Yahoo Group is community of Knowledge Management leaders from global firms and the group's goal is to share experiences and insights on implementing KM programs. Potential survey participants from the SIKMLeaders Yahoo Group were contacted through a discussion posting to the group that described the purpose of the survey and posted a hyperlink to the survey posted to the SurveyMonkey Internet Site (SurveyMonkey, 2010). Through their KM experiences and insights, the SIKMLeaders Yahoo Group members provided the necessary knowledge of KM to provide important insights with the survey questions.

In this study, the sampling approach will involve a non-probabilistic method, called purposive sampling. Purposive sampling (judgment sampling) method is where "judgment sampling occurs when a researcher selects sample members to conform to some criterion" Cooper and Schindler (2006, p. 424). Additionally, purposive sampling is useful when a researcher needs to reach a targeted sample quickly and the primary concern for sampling is not proportionality (Trochim, 2006). Consequently, purposive sampling was used to target individuals that met the criteria of this study.

To obtain study participants, the link to the online survey was posted to the Systems Integration KM Leaders (SIKMLeaders) Yahoo Group, the Institute of Electric and Electronics Engineers (IEEE) Washington Section newsletter, and approximately twenty-six (26) LinkedIn groups consisting of over thirty thousand (30,000) members. Three methods were used to invite potential study participants to participate in the

survey. For each method, a short description of the research was given and a link was provided to access the survey. First, an e-mail was sent directly to the individuals known to work in organizations that use knowledge management system through the SIKMLeaders Yahoo Group. Second, a brief description was posted in the IEEE newsletter with a link to the survey. Third, messages were posted to the various LinkedIn groups with a link to the survey. In each scenario, survey participants were asked to forward the e-mail to additional potential participants.

Creswell (2003) suggested that correlational studies that relate variables require a minimum of 30 participants for quantitative studies. Scientific knowledge can be advanced by the use of survey research (Forza, 2002). In survey research, the response rate can affect the results of the survey. To help in preventing low response rate, this researcher requested assistance from survey respondents by using the snowball sampling process (subset of purposive sampling) and by providing a detailed summary in the survey. "A snowball sample is achieved by asking a participant to suggest someone else who might be willing or appropriate for the study "("Types of Samples", n.d., para. 9). The detailed summary stated the purpose of the study and ensure that respondents are not harmed or threatened by the data collected (Fowler, 2002). Given the size of the potential survey population, this survey would be redistributed in the event the minimum 30 responses are not received. The results were generalized to measure the relationship between technology acceptance of technical knowledge management systems and the personality types of its users.

For LinkedIn members, a discussion question was posted to each group that asked the selected members to participate in the survey by selecting a hyperlink to the

SurveyMonkey Internet site (SurveyMonkey, 2010). Posting the survey link to the specialized LinkedIn groups, IEEE members and SIKMLeaders group, increased the validity of the survey data by surveying people who were familiar with the knowledge management, information technology and psychology terms. Each member of each group had an equal probability of being represented in this study.

Table 4

Qualified Target Populations (as of September 8, 2011)

ID	LinkedIn Group	Owner/Manager	Members
1	Best Practice Transfer	David Hamilton	255
2	Business Her Way	Gayley K.	708
3	Capella Business Ph.D - Alumni	Blake Escudier Ph.D.	34
4	Capella PhD'ers in the Washington, DC Area	Tre`Sina Steger	9
5	Capella University	Erin Reichelt	2,323
6	Capella University Alumni	Christopher Akins	1,606
7	Capella University Learners	John Cafagna	1,539
8	Certified Knowledge Manager Alumni - A Knowledge Management…	Eric Weidner	347
9	Information Management Systems Association	Chas Yen	37
10	ITIL - Infrastructure Management	Vineet Kumar Agrawal	713
11	KM Edge	Tommy Higdon	2,000
12	KM Practitioners Group	Judi Sandrock	1,891
13	KM-Forum	Arumugam Pitchai	932
14	KM4Dev	Peter J. Bury	516
15	Knowledge Management Consultants Group	Venkata 'Venky' Vadlamani	653
16	Knowledge Management	Andrés Novoa	2,843

Table 4

Continued

ID	LinkedIn Group	Owner/Manager	Members
17	Knowledge Management Experts	Rakesh Rajora	3,493
18	Knowledge Management Group of Philadelphia	Michael Dieterle	200
19	Knowledge Management Systems (KMS) Alumni	Martin P. Lee	20
20	Knowledge Managers	Marc Dronen, CKM	1,461
21	Oracle Certified Associates, Professionals, Experts & Masters...	Mohan Dutt	10,964
22	Research and MIS	Ganesh Sharma	15
23	The Braintrust: Knowledge Management Group	Jose Rodriguez	1,578
24	The Institute for Knowledge and Innovation	Francesco de Leo	472
25	The MBA Association	Nick Osinski	579
26	TOPdesk - Service Management Professionals	Patrick Mackaaij	402
27	Washington DC Chapter of the Knowledge Management Institute	Eric Weidner	444

Instrumentation/Measures

This study used the Five-Factor Model (FFM) of Personality combined with the Theory of Acceptance and Use of Technology (UTAUT) model to examine the relationship of acceptance of technical knowledge management systems to the personality characteristics of users of TKMSs. The items selected to measure the core constructs and the dependent variables were selected from the UTAUT model items (Venkatesh et al.,

2003). The personality measures were selected from the fifty (50) International Personality Pool (2001) items and helped to measure the independent variables (personality types). Demographic constructs as external variables were collected (i.e., age, gender, education and race) to see if these variables influenced the relationship of personality types to TKMS acceptance. Overall, a three-part survey to measure independent constructs and personality dimensions as well as demographic information were distributed to the study sample. From the data collected, each hypothesis was tested using linear regression modeling for proof of the proposed moderation effects.

Measurement of Personality Factors

The International Personality Item Pool Big Five (IPIP-B5) was used to measure personality factors. The IPIP-B5 is a public-domain personality measure and was first introduced during the eighth annual European Conference on Personality in 1996 (Goldberg, 1999). IPIP was created because researchers observed that little research on the science of personality assessment had been created since the initial personality inventories, developed over 75 years ago (Goldberg, 1999). As a result, Goldberg suggested using a public domain to list a set of personality items. This would eliminate the constraints placed on copyrighted personality inventories and allow researchers to use the inventory for free and with any type of research. The items can be readily accessed from the IPIP web site at http://ipip.ori.org/.

The initial set of IPIP had 1252 items and has grown to over 2,000 items. Each year, new sets of items added (Goldberg et al., 2006). In fact, the item pool in IPIP has been translated into 28 different languages and formatted using short verbal phrases (more appropriate than single trait adjectives). Examples of the short verbal phrases are:

"Dislike being the center of attention; enjoy the beauty of nature; Get upset easily" (Goldberg et al., 2006, p. 87).

Costa and McCrae's (1992) revised NEO personality inventory (NEO-PI-R), a 50-item IPIP-B5 representation of the domain constructs of the Five Factor Model, was selected for use in this study for a variance of reasons. One reason is that the NEO-PI-R is an extensively used inventory and the broad literature review on the constructs related to various behavioral criteria. In fact, the scales of the NEO-PI-R have been helpful in other applied fields. "The IPIP contains scales that have been shown to correlate highly with the corresponding NEO-PI-R domain scores, with correlations ranging from .54 to .92 when corrected for unreliability" (IPIP, 2001, Table 2). Additionally, the IPIP-B5 scales also scored higher that the NEO-PI-R versions of the same constructs as forecasters of self-reported behavioral acts (Buchanan, Johnson, & Goldberg, 2005). The IPIP-B5 representation is available for free and can be accessed in the public domain (Goldberg, 1999). Finally, besides being free, the instrument is not lengthy like many other personality instruments.

Surveys submitted via the web, subject to high dropout rates, are sometimes caused by the ease of leaving a web survey than one leaving an in-person survey (Musch & Reips, 2000). Knapp and Heidingsfelder (2001) emphasized that it is likely that a large amount of people may abandon the survey if longer questionnaires with a long personality inventory and other types of questions are administered. The abandoning of the survey may lead to selective drop out and those who drop out early differ from those who complete the survey on the personality traits of conscientiousness and patience (Knapp & Heidingsfelder, 2001). Consequently, this results in the inability to generalize

the findings of this study and thereby biasing the study results. Due to this issue, short scales are more desirable for online use (Buchanan, Johnson, & Goldberg, 2005). In summary, the IPIP instrument, developed by Goldberg (1999), was used for the assessment of the Five-Factor Model of Personality.

Measurement of Technology Acceptance (UTAUT)

The technology acceptance instrument from Venkatesh et al. (2003) UTAUT instrument was used for this study. UTAUT consists of four constructs: performance expectancy, efforts expectancy, social influence and facilitation conditions (Venkatesh et. al, 2003). This instrument has been used in many other studies that measured the relationship between personality traits and some of the four constructs in UTAUT. These studies are discussed in the section titled "Use of FFM in Technology Acceptance". Similar to these studies, this study seeks to measure the relationship, if any, between the personality traits of a TKMS user and the technology acceptance of the TKMS technology. Consequently, the use of the UTAUT instrument was used to measure this relationship.

Variables. Variables are items in a study that can be measured and can be identified as dependent or independent variables. The independent variables are personality traits as measured by FFM and acceptance as measured by the TAM (perceived ease of use and perceived usefulness). The dependent variables for this study are perceived usefulness and perceived ease of use of technical knowledge management systems. The dependent variables were measured using a combination of validated personality and TAM instruments (via on-line survey).

Data Collection

The target population was administered a survey via an Internet survey tool and given twenty (20) days to complete the survey. A description of the study and the survey link was posted on LinkedIn, IEEE newsletter and SIKMLeaders Yahoo group pages for potential participants. This participant selection strategy allowed the researcher to obtain responses from a variance of IT, KM, academia and psychology professionals. Participants were selected based on the criteria based on the following criteria: (a) be consultants, researchers, employees or managers that directly use technical KMSs in their daily work, and (b) be at least 18 years of age or older and (c) having used a technical KMS with the past one year. Participants must have also been members of approximately twenty-six online networking groups and professional knowledge management systems, academia and IS groups. Participants were given the option to access the survey twenty-four hours per day and advised to complete the survey during non-business hours. In addition, informed consent information was distributed to participants upon requesting their participation in the study. Once the data was retrieved from the Internet survey tool, it was entered into SPSS for analysis and reporting. If the number of participants was not sufficient, the process would have been repeated.

Data Analysis

The data analysis process included the coding and cleaning of the data collected from the survey. Statistical calculations were then performed to analyze the data collected.

Coding. The survey instrument measuring personality traits, used a five-point Likert scale, with anchors ranging from *very inaccurate* to *very accurate*. Similarly, the

survey instrument portion measuring technology acceptance (UTAUT) used a five point Likert scale with anchors ranging from *strong disagreement* to *strong agreement*. Each point was assigned a numerical value and this numerical value was used to record the responses to each survey question. Each survey question was given a variable name. Additionally, each respondent was given a unique ID. All of this information was entered into a spreadsheet for loading into SPSS.

Cleaning. The data from the spreadsheet was loaded into SPSS. Frequencies on all of the variables were run. Based on the selected variables, the mean, median, mode, and standard deviation were determined. These tasks allowed the researcher to validate the data and eliminate any surveys that were not valid (e.g., missing data or incorrect data entry.

Statistical Procedures. Once the data was cleaned or fixed, and then other frequencies tests were performed. Additional examinations of the output included the review of the descriptive statistics. The technology acceptance factors in the IPIP-B5 and the UTAUT identified in this research were captured in a Likert scale (1 to 5). The overall scores for each of these factors were calculated by averaging the scores from each item. Linear regression was performed to address each null hypothesis using the testing procedures defined by Howell, (2011) and Stevens (2002). First, the participants' data were screened for outliers. The participants' residuals were standardized, and the resulting z-scores were utilized to identify outliers in the data. A participant is considered an outlier when $|\text{standardized residual}|$ is greater than 3. The next step was to assess model linearity and homoscedasticity using a plot of standardized

residuals. Finally, the regression coefficients statistics were calculated to determine if the variable was a significant predictor of perceived usefulness.

Reliability

Reliability describes the quality of measurement can be assessed by determining the internal consistency of items using Cronbach's alpha (α). Cooper and Schindler (2006) states, "reliability is concerned with estimates of the degree to which a measurement is free of random or unstable error" (p. 321). When Venkatesh et al. (2003) performed reliability assessment on their survey instrument, they found it to be internally stable; specifically, they found that all the internal consistency reliability coefficients were greater than .70.

Validity

The content validity of a questionnaire relates to the extent to which measurement scales provide sufficient coverage of the investigative questions (Cooper & Schindler, 2006). When Venkatesh et al. (2003) performed a validity assessment on their survey instrument they found that "the square roots of the shared variance between the constructs and their measures were higher than the correlations across constructs, thus supporting both convergent and discriminate validity" (p. 457). When they assessed construct validity via confirmatory factor analysis, they found that all path coefficients were greater than 0.70, except for eight loadings. When they conducted reliability tests across multiple periods, they found that the results confirmed the original findings.

Klenke (1992) defined construct validity as "the degree to which the test measures a theoretical construct" (Ong & Lai, 2007, p. 1338). To establish construct validity an item-to-total correlation (Doll & Torkzadeh, 1988; Ives, Olson, & Baroudi, 1983) was

included and convergent/discriminant validity (Straub, 1989; Doll & Torkzadeh, 1988; Campbell & Fiske, 1959; Churchill, 1979; Palvia, 1996) was examined as noted in prior studies. Prior studies also noted that the construct validity included finding the concurrent and predictive validity (Mitchell, 1985).

In this study, construct validity (convergent and discriminant validity), was studied, using a correlation matrix approach (Hu, Chau, Sheng, & Tam, 1999; Doll & Torkzadeh, 1988). Aladwani & Palvia (2002) indicates that convergent validity determines if associations exist between scales of the same factor are higher than zero and if met, researchers will continue with discriminant validity tests. Discriminant validity was "examined by counting the number of times an item correlates higher with items of other variables than with items of its own variable" (Aladwani & Palvia, 2002, p. 467). Table 5 shows the questionnaire's sources and their associated validities and reliabilities.

Table 5

Sources of Questionnaires

Variables	Source of Questionnaire	Reliability	Validity
UTAUT Constructs	Venkatesh et al. (2003)	➢ 0.7	Acceptable convergent and discriminant validity (Venkatesh et al., 2003)
Extraversion	IPIP Five-Factor Personality Inventory (Goldberg, 1999)	0.88	Acceptable convergent and discriminant validity (Barrick & Mount, 1991; Costa & McCrae, 1995; Eysenck, 1991; Narayanan, Menon & Levine, 1995)

Table 5

Continued

Variables	Source of Questionnaire	Reliability	Validity
Openness	IPIP Five-Factor Personality Inventory (Goldberg, 1999)	0.74	Acceptable convergent and discriminant validity (Barrick & Mount, 1991; Costa & McCrae, 1995; Eysenck, 1991; Narayanan, Menon & Levine, 1995)
Agreeableness	IPIP Five-Factor Personality Inventory (Goldberg, 1999)	0.76	Acceptable convergent and discriminant validity (Barrick & Mount, 1991; Costa & McCrae, 1995; Eysenck, 1991; Narayanan, Menon & Levine, 1995)
Conscientiousness	IPIP Five-Factor Personality Inventory (Goldberg, 1999)	0.84	Acceptable convergent and discriminant validity (Barrick & Mount, 1991; Costa & McCrae, 1995; Eysenck, 1991; Narayanan, Menon & Levine, 1995)
Neuroticism	IPIP Five-Factor Personality Inventory (Goldberg, 1999)	0.83	Acceptable convergent and discriminant validity (Barrick & Mount, 1991; Costa & McCrae, 1995; Eysenck, 1991; Narayanan, Menon & Levine, 1995)

Ethical Considerations

Researchers must include ethical considerations when performing research within organizations on human subjects.

> Three basic principles, among those generally accepted in our cultural tradition, are particularly relevant to the ethics of research involving human subjects: the principles of respect of persons, beneficence, and justice (National Commission for the Protection of Human Subjects, 1979; Swanson & Holton, 2005, p. 430).

The principle respect of person indicates that each person should be treated as independent agents with the ability of making decisions and choices or as persons who are not independent, and are in need of special protection. In addition, beneficence relates to the researcher's obligation to protect human subjects from any harm. Moreover, "the principle of justice requires that equality be operative in determining who will bear the burden of human subjects' research" (Swanson & Holton, 2005, p. 431). These three basic principles were used in obtaining informed consent, and ensuring the privacy and confidentiality of potential human subjects.

Researchers must follow the principle of respect in the informed consent process to provide potential human subjects (participants) with information about the study that is easily understood and that gives them a chance to opt out of the study. Consequently, this researcher provided a "Consent Form for Survey" to all potential participants prior to administering the survey and after receiving IRB approval to proceed that outlines the statements found in the Appendix (*Capella University Dissertation Manual*, 2009, p. 50). This study involves minimal risk with no direct benefits to its participants. Participating in this study may provide knowledge and help to the knowledge management and information technology communities, organizations, management, and researchers. Additionally, future college students might benefit from this study through an understanding and interest in the integration of the knowledge management and psychology (personality traits) fields.

Confidentiality and privacy required this researcher to conduct the study to ensure that the participants' identities would not be disclosed during the study and during the distribution of the study results. Subsequently, during the informed consent process,

participants were informed about the confidentiality of their responses and given the choice to determine the type and amount of personal information to release. Moreover, no specific identifying information was requested of participants to ensure confidentiality and privacy of survey answers.

The data will be stored in a locked file cabinet at the researcher's home for the required time (seven years) allotted by the IRB. Only the researcher will be allowed to access the data. The media device will be stored for a minimum of seven years. Upon the designated time, the data will then be shredded. To ensure the privacy and anonymity of the research participants, the information will be held by the researcher with the Capella University IRB receiving only the summary results of the study. The individual surveys will not be available to anyone other than the researcher.

Limitations

Data collection using e-mail and the Internet created some challenges in obtaining informed consent, collecting anonymous data, and ensuring that participants are of the appropriate age to give informed consent. To help mitigate these challenges, this researcher provided information to potential participants about the purpose of the study and nature of their participation, potential risks, the voluntary nature of the study and the participant's right to withdrawal from the study at any time.

CHAPTER 4. RESULTS

Technical knowledge management systems (TKMSs) are not consistently attaining user acceptance. TKMSs are not providing the benefits that have been forecasted and are therefore not enhancing competitive advantage and profits in organizations (Comb, 2004). Realizing their potential requires additional management knowledge concerning user personality factors that affect and contribute to their acceptance. This research investigated the relationship of personality (through the five-factor personality model [FFM]) to technology acceptance of TKMSs (using the technology acceptance model [TAM]). This study can potentially reveal the problems of TKMS acceptance and factors preventing users from its acceptance. Equally important, the results of this research can assist in drafting strategies and marketing policies that organizations can pursue to ensure the acceptance of TKMSs and potentially reap the benefits of TKMSs. Consequently, this research was conducted to determine if there are correlations between the personality factors of users and their acceptance of TKMSs.

The research questions that guided this research used the five personality types as the independent variables of neuroticism, extraversion, openness, conscientiousness, and agreeableness and were measured by the International Personality Item Pool-Big 5 (IPIP-B5; IPIP, 2001) personality traits instrument. The two dependent variables were the perceived usefulness and perceived ease of use of TKMSs as measured by the TAM. Each research question addressed a personality variable and included a hypothesis for each of the two dependent variables.

The intention of the research instrument was to determine the correlation between TKMS users' personality traits and their technology acceptance of TKMSs. These

surveys were based on the unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003), which measured perceived usefulness and perceived ease of use using a 7-point Likert scale as well as the IPIP-B5 (Goldberg, 1999). Additionally, based on the suggestion of other experienced researchers additional follow-up communications were distributed as a reminder until the survey instrument was closed.

The survey was closed on Friday, February 17, 2012; 21 days after the survey began. The answers were imported into Statistical Package for Social Science SPSS 15.00 software for further analysis.

- Research Question 1: Among users of technical knowledge management systems (TKMSs), does neuroticism (personality type) as measured by the five-factor model (FFM), correlate to the acceptance of TKMSs as measured by the Technology Acceptance Model (TAM)?
- Research Question 2: Is there a relationship between the extraversion personality type and the acceptance of TKMSs?
- Research Question 3: Is there a relationship between the openness personality type and the acceptance of TKMSs?
- Research Question 4: Is there a relationship between the conscientiousness personality type and the acceptance of TKMSs?
- Research Question 5: Is there a relationship between the agreeableness personality type and the acceptance of TKMSs?

Data Collection and Analysis

This quantitative research involved purposive sampling (snowball sampling) via LinkedIn groups, Systems Integration KM Leaders (SIKMLeaders) Yahoo group, and IEEE member groups comprising the demographics of the sample, and performing a statistical analysis. Each of these areas is discussed as follows with further discussion of the hypotheses used to investigate the research questions.

Data Collection

Data collection for the study was performed through an online survey with invitations to study participants. A purposive (snowball) sampling method was used for the study to target individuals that met the criteria of this study. A link to the online survey was posted to the SIKMLeaders Yahoo group, the IEEE Washington section newsletter, and approximately 26 LinkedIn groups consisting of over 30,000 LinkedIn members.

Three methods were used to invite potential study subjects to participate in the survey. Each method consisted of a short description of the research with a link to access the survey. The first method consisted of sending an e-mail directly to the individuals known to work in organizations that use knowledge management systems through the SIKMLeaders Yahoo group. The second method consisted of posting a brief description in the IEEE newsletter with a link to the survey. The third method consisted of posting messages to various LinkedIn group discussion areas with a link to the survey. The link to the survey connected to the SurveyMonkey Internet site. In each scenario, survey participants were asked to forward the study information and survey link to additional potential participants that met the study's criteria.

The anonymous survey was first posted on January 27, 2012.

The survey was separated into three parts: (a) the IPIP-B5 personality traits instrument, (b) the UTAUT instrument, and (c) a demographics instrument. Data for the IPIP-B6 and UTAUT were collected through survey questions asking participants to rate their personality traits and technology acceptance respectively on 5-point ordinal Likert-

type scales. Demographic data were also gathered through survey questions requesting a selection be made from a list of alternatives for age, gender, education, and race.

Participant Demographics

Survey questions used for demographic data were derived from other studies to potentially use for future studies in an effort to compare the results relating to demographics (Udoh, 2010). The number of subjects who participated in the study was 251. The descriptive statistics for the participants' demographics are listed in Table 6. Approximately half (118; 56.7%) of the participants were between the ages of 30 and 49. One hundred and twelve (54.1%) of the participants identified themselves as being female and 95 (45.9%) male. A majority of the participants were either White/European American (117; 57.1%) or Black/African American (62; 30.2%). The respondents' education was reported as follows: two had (1.0%) some high school education, one (0.5%) had a high school diploma, seven (3.3%) had some college education, two (1.0%) had associate's degree, 44 (21.1%) had a bachelor's degree, and 153 (73.2%) completed postgraduate work.

Table 6

Descriptive Statistics for Participant Demographics

Variable	*n*	%
Age (in years)		
18–29	10	4.8
30–49	118	56.7
50+	80	38.5
Gender		
Female	112	54.1
Male	95	45.9
Race		
American Indian/Alaskan Native	1	0.5
Asian	12	5.9
Black/African American	62	30.2
Hawaiian/Pacific Islander	2	1.0
Hispanic	4	2.0
Other	7	3.4
White/European American	117	57.1
Education		
Some high school	2	1.0
High school diploma	1	0.5
Some college	7	3.3
Associate's degree	2	1.0
Bachelor's degree	44	21.1
Postgraduate	153	73.2

Data Analysis

The participants completed the 50-item IPIP-B5 and UTAUT surveys. The descriptive statistics for the IPIP-B5 are listed in Table I1 (see Appendix D). The descriptive statistics for the UTAUT are listed in Table I2 (see Appendix D). The technology acceptance factors in the IPIP-B5 the UTAUT identified in this research were captured in a Likert scale (1 to 5). The overall scores for each of these factors were calculated by averaging the scores from each item. The mean IPIP-B5 scores shown in Table I1 vary widely from 1.0 to 5.0, indicating that study participants' answers varied

from very inaccurate to very accurate in describing their personality traits. For the UTAUT, a higher average score for any of the factors indicated more acceptance of TKMSs. Table I2 summarizes the distributions and averages of the scores for the UTAUT. The descriptive statistics for IPIP-B5 and UTAUT subscales as displayed in Table 7 show that the highest average value was that of *agreeableness*, with a mean of 4.12 (*SD* = 0.56), whereas the lowest average value was that of *neuroticism*, with a mean of 2.47 (*SD* = 0.76). The scores for perceived usefulness, perceived ease of use, behavioral intentions, openness, conscientiousness, and extraversion were observed to lie in between the values for *agreeableness* and *neuroticism*.

Table 7

Descriptive Statistics for IPIP-B5 and UTAUT Subscales

Subscale	*n*	Min.	Max.	*M*	*SD*
Perceived usefulness	211	1.00	5.00	3.66	0.73
Perceived ease of use	211	2.00	5.00	3.89	0.62
Behavioral intentions	211	1.00	5.00	3.56	1.05
Openness	251	2.40	5.00	4.03	0.55
Conscientiousness	251	1.80	5.00	3.88	0.58
Extraversion	251	1.20	5.00	3.32	0.76
Agreeableness	251	2.10	5.00	4.12	0.56
Neuroticism	251	1.00	4.80	2.47	0.76

Hypothesis Testing

This section provides a discussion and interpretation of the results of the hypothesis testing for each research question. Linear regression was performed to address

each null hypothesis using the testing procedures defined by Howell (2011) and Stevens (2002). First, the participants' data were screened for outliers. The participants' residuals were standardized, and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. The next step was to assess model linearity and homoscedasticity using a plot of standardized residuals. Finally, the regression coefficients statistics were calculated to determine if the variable was a significant predictor of perceived usefulness and perceived ease of use.

Research Question 1

The first research question was, Among users of technical knowledge management systems (TKMSs), does neuroticism (personality type) as measured by the five-factor model (FFM), correlate to the acceptance of TKMSs as measured by the Technology Acceptance Model (TAM)? Two sets of hypotheses were used with this research question. The first set of hypotheses was

- $H1a_0$: Measures of the personality type *neuroticism* do not have a positive linear relationship to the perceived usefulness of TKMSs as measured by the TAM.

- $H1a_A$: Measures of the personality type *neuroticism* have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. This process revealed two outliers for Hypotheses 1a that were removed.

The scatterplot for the perceived usefulness model is displayed in Figure 7 and the regression coefficients are listed in Table 8. These indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion. Also, the coefficients indicated that neuroticism was not a significant predictor of perceived usefulness, F (1, 207) = 0.10, $p > .05$ (β = -.02, R^2 = .00).

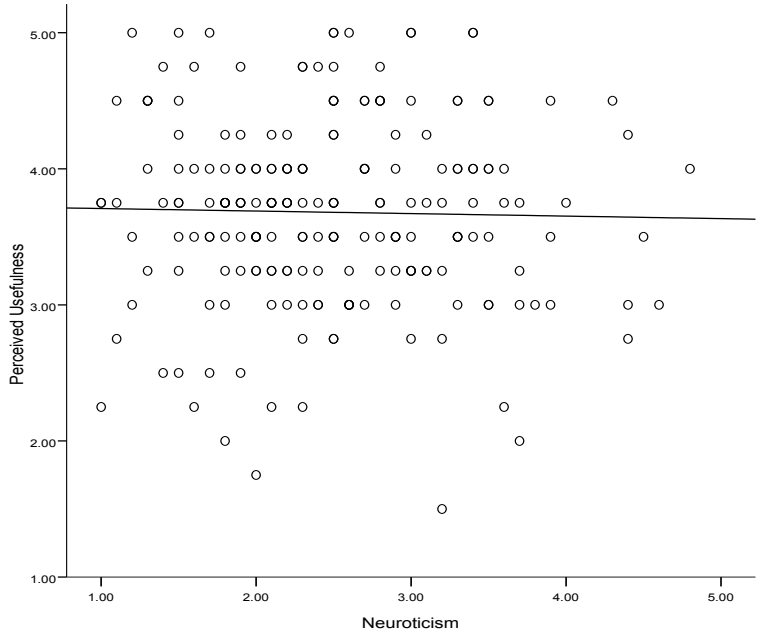

Figure 7. Scatterplot for Research Question 1 Hypotheses 1a.

Table 8

Regression Coefficients for Research Question 1 Hypotheses 1a

Predictor	*b*	*SE*	β	*t*	Sig.
Neuroticism	-0.02	0.60	-0.02	-0.31	.757

Consequently, the significance of .757 indicated a failure to reject Hypothesis $H1a_0$ in Research Question 1. Therefore, this study did not show that the personality type *neuroticism* has a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The second set of hypotheses was

- $H1b_0$: Measures of the personality type *neuroticism* do not have a positive linear relationship to the perceived ease of use of TKMSs as measured by the TAM.

- $H1b_A$: Measures of the personality type *neuroticism* have a positive linear relationship to the perceived ease of use of TKMSs as measured by the TAM.

First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. This process revealed one outlier for Hypotheses 1b.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived ease of use models is displayed in Figure 8. The regression coefficients are listed in Table 9. The coefficients also indicated that neuroticism was not a significant predictor of perceived ease of use, F (1, 207) = 3.23, $p > .05$ ($\beta = -.12$, $R^2 = .02$).

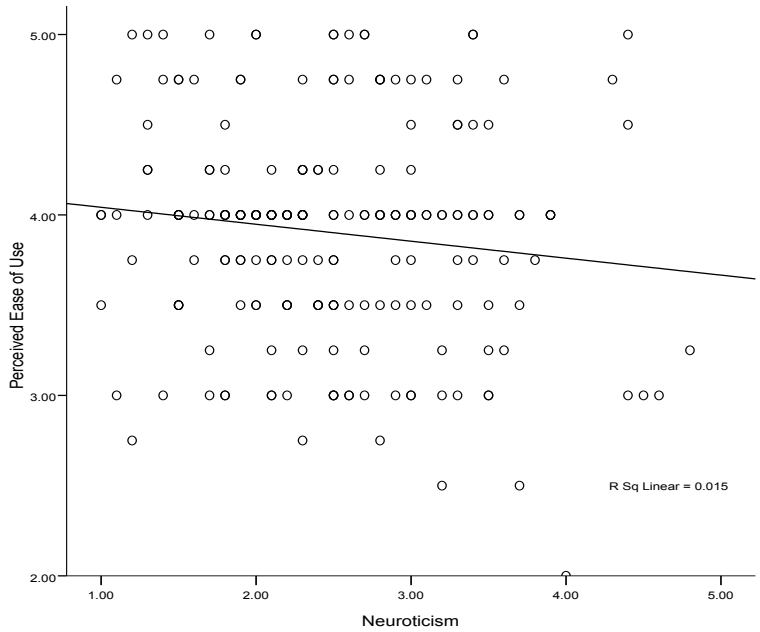

Figure 8. Scatterplot for Research Question 1 Hypotheses 1b.

Table 9

Regression Coefficients for Research Question 1 Hypotheses 1b

Predictor	*b*	*SE*	β	*t*	Sig.
Neuroticism	-0.09	0.05	-0.12	-1.80	.074

The results revealed a negative trend effect (i.e., *p*-value between .05 and .10). This suggests that perceived ease of use decreased with increasing levels of neuroticism; however, the effect failed to reach conventional levels of significance. Consequently, the significance of .074 indicated a failure to reject Hypothesis $H1b_0$ in Research Question 1. Therefore, this study did not show that the personality type *neuroticism* has a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

Research Question 2

The second research question was, *Is there a relationship between the extraversion personality type and the acceptance of TKMSs?* Two sets of hypotheses were used with this research question. The first set of hypotheses was,

- $H2a_{0:}$ Measures of the personality type *extraversion* do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

- $H2a_A$: Measures of the personality type *extraversion* have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The second set of regression models involved extraversion as a potential predictor of perceived usefulness. First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. This process revealed one outlier for Hypotheses 2a.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived usefulness model is displayed in Figure 9. The regression coefficients are listed in Table 10. The coefficients indicated that extraversion was not a significant predictor of perceived usefulness, F (1, 207) = 0.03, $p > .05$ (β = -.01, R^2 = .00).

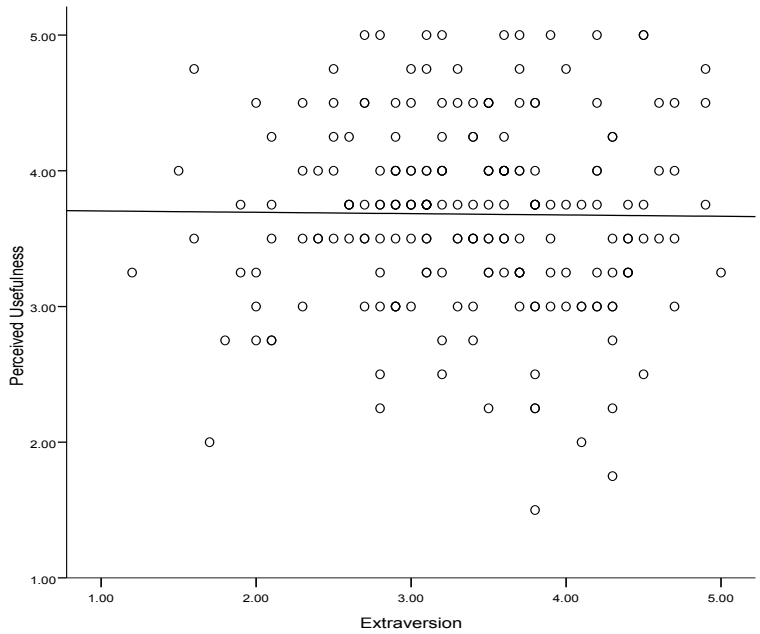

Figure 9. Scatterplot for Research Question 2 Hypotheses 2a.

Table 10

Regression Coefficients for Research Question 2 Hypotheses 2a

Predictor	*b*	*SE*	β	*t*	Sig.
Extraversion	-0.01	0.06	-0.01	-0.16	.875

Consequently, the significance of .875 indicated a failure to reject Hypothesis $H2a_0$ in Research Question 2. Therefore, this study did not show that the personality type *extraversion* has a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The second set of hypotheses was

- $H2b_{0:}$ Measures of personality type *extraversion* do not have a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

- $H2b_A$: Measures of personality type *extraversion* have a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

The second set of regression models involved extraversion as a potential predictor of perceived ease of use. First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. This process revealed one outlier for Hypotheses 2b.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity, and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships, and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived ease of use model is displayed in Figure 10. The regression coefficients are listed in Table 11. The coefficients indicated that extraversion was a significant positive predictor of perceived ease of use, $F(1, 208) = 6.69$, $p < .05$ ($\beta = 0.18$, $R^2 = .03$). This indicated that perceived ease of use increased with increasing levels of extraversion.

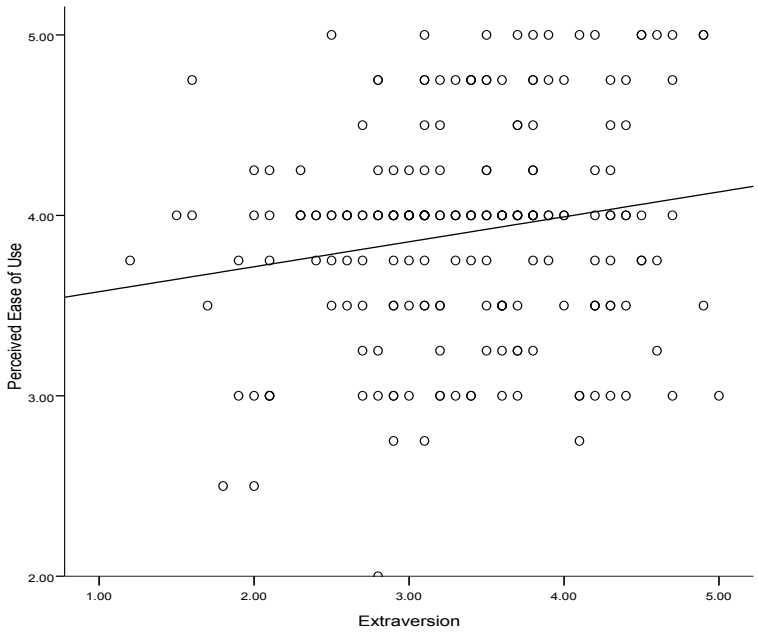

Figure 10. Scatterplot for Research Question 2 Hypotheses 2b.

Table 11

Regression Coefficients for Research Question 2 Hypotheses 2b

Predictor	*b*	*SE*	β	*t*	Sig.
Extraversion	0.14	0.05	0.18	2.59	.010

Consequently, the significance of .010 indicated a rejection of $H2b_0$ in Research Question 2. Therefore, this study showed that the personality type *extraversion* has a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

Research Question 3

The third research question was, *Is there a relationship between the openness personality type and the acceptance of TKMS?* Two sets of hypotheses were used with this research question. The first set of hypotheses was

- $H3a_0$: Measures of personality type *openness* do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

- $H3a_A$: Measures of personality type *openness* have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The third set of regression models involved openness as a potential predictor of perceived usefulness. First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. Two outliers were identified in the screening process for Hypotheses 3a.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived usefulness is displayed in Figure 11. The regression coefficients are listed in Table 12. The coefficients indicated that openness was a significant positive predictor of perceived usefulness, F (1, 207) = 10.41, $p < .01$ (β

= 0.22, R^2 = .05). This indicates that perceived usefulness increased with increasing levels of openness.

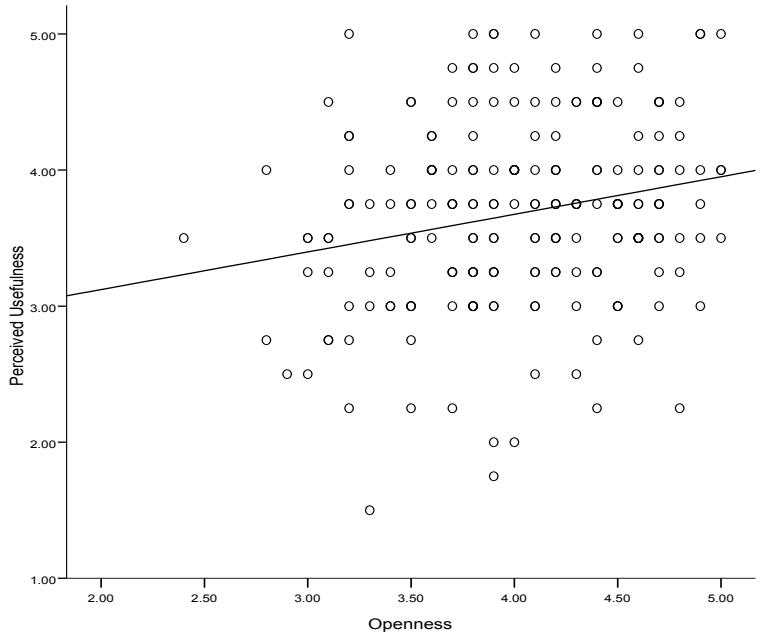

Figure 11. Scatterplot for Research Question 3 Hypotheses 3a.

Table 12

Regression Coefficients for Research Question 3 Hypotheses 3a

Predictor	*b*	*SE*	β	*t*	Sig.
Openness	0.28	0.09	0.22	3.23	.001

Consequently, the significance of .001 indicated a rejection of Hypothesis $H3a_0$ in Research Question 3. Therefore, this study showed that the personality type *openness* has a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The second set of hypotheses was

- $H3b_0$: Measures of personality type *openness* do not have a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

- $H3b_A$: Measures of personality type *openness* have a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

The third set of regression models involved openness as a potential predictor of perceived ease of use. First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. One outlier was identified in the screening process for Hypotheses 3b.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived ease of use is displayed in Figure 12. The regression coefficients are listed in Table 13. The coefficients indicated that openness was a significant positive predictor of perceived ease of use, $F(1, 208) = 21.81$, $p < .01$ ($\beta = 0.31$, $R^2 = .10$). This indicated that perceived ease of use increased with increasing levels of openness.

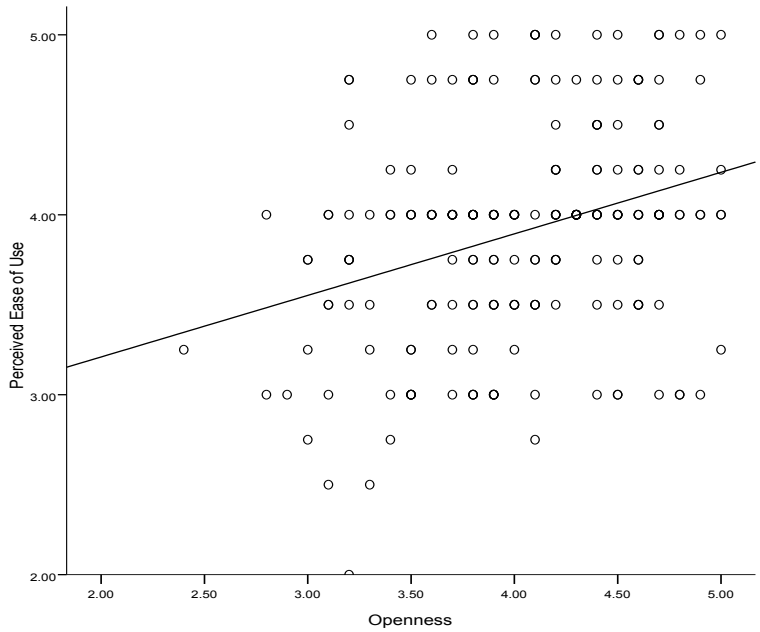

Figure 12. Scatterplot for Research Question 3 Hypotheses 3b.

Table 13

Regression Coefficients for Research Question 3 Hypotheses 3b

Predictor	*b*	*SE*	β	*t*	Sig.
Openness	0.34	0.07	0.31	4.67	.000

Consequently, the significance of .000 indicated a rejection of Hypothesis $H3b_0$ in Research Question 3. Therefore, this study showed that the personality type *openness* has a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

Research Question 4

The fourth research question was, *Is there a relationship between the conscientiousness personality type and the acceptance of TKMSs*? Two sets of hypotheses were used with this research question. The first set of hypotheses was

- $H4a_0$: Measures of personality type *conscientiousness* do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

- $H4a_A$: Measures of personality type *conscientiousness* have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The fourth set of regression models involved conscientiousness as a potential predictor of perceived usefulness. First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. Two outliers were identified in the screening process for Hypotheses 4a.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived usefulness model is displayed in Figure 13. The regression coefficients are listed in Table 14. The coefficients indicated that

conscientiousness was not a significant predictor of perceived usefulness, F (1, 207) = 0.37, $p > .05$ ($\beta = -0.04$, $R^2 = .00$).

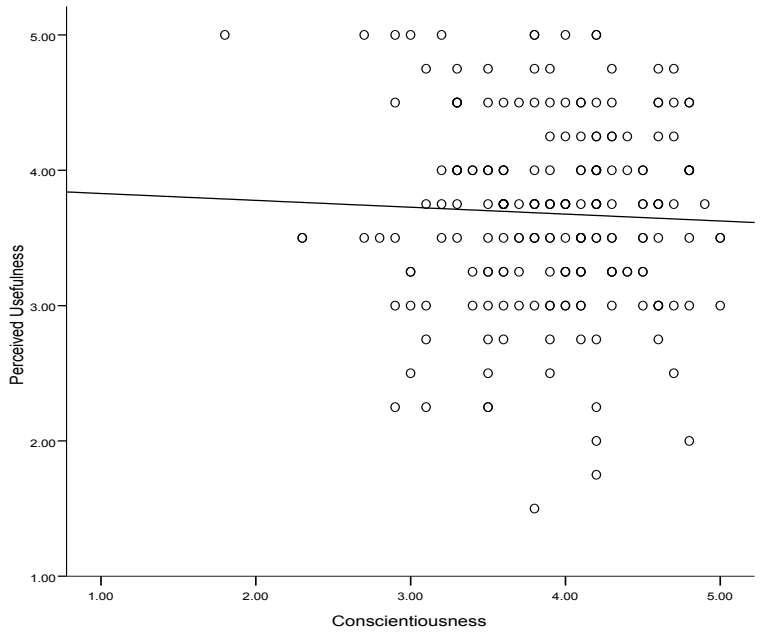

Figure 13. Scatterplot for Research Question 4 Hypotheses 4a.

Table 14

Regression Coefficients for Research Question 4 Hypotheses 4a

Predictor	*b*	*SE*	β	*t*	Sig.
Conscientiousness	-0.05	0.08	-0.04	-0.61	.545

Consequently, the significance of .545 indicated a failure to reject Hypothesis $H4a_0$ in Research Question 4. Therefore, this study did not show that the personality type *conscientiousness* has a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The second set of hypotheses was

- $H4b_0$: Measures of personality type *conscientiousness* do not have a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.
- $H4b_A$: Measures of personality type *conscientiousness* have a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

The fourth set of regression models involved conscientiousness as a potential predictor of perceived ease of use. First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. Two outliers were identified in the screening process for Hypotheses 4b.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived ease of use model is displayed in Figure 14. The regression coefficients are listed in Table 15. The coefficients indicated that conscientiousness was not a significant predictor of perceived ease of use, F (1, 207) = 0.21, $p > .05$ ($\beta = 0.32$, $R^2 = .00$).

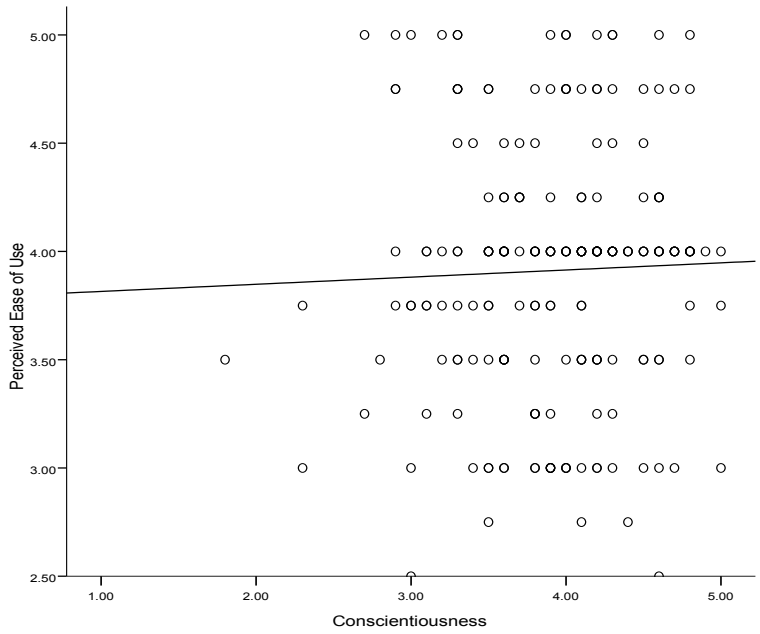

Figure 14. Scatterplot for Research Question 4 Hypotheses 4b.

Table 15

Regression Coefficients for Research Question 4 Hypotheses 4b

Predictor	*b*	*SE*	β	*t*	Sig.
Conscientiousness	0.03	0.07	0.03	0.46	.646

Consequently, the significance of .646 indicated a failure to reject Hypothesis $H4b_0$ in Research Question 4. Therefore, this study did not show that the personality type *conscientiousness* has a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

Research Question 5

The fifth research question was, *Is there a relationship between the agreeableness personality type and the acceptance of TKMSs?* Two sets of hypotheses were used with this research question. The first set of hypotheses was

- $H5a_0$: Measures of personality type *agreeableness* do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

- $H5a_A$: Measures of personality type *agreeableness* have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The final set of regression models involved agreeableness as a potential predictor of perceived usefulness. First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. Two outliers were identified in the screening process for Hypotheses 5a.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived usefulness model is displayed in Figure 15. The regression coefficients are listed in Table 16. The coefficients indicated that agreeableness was not a significant predictor of perceived usefulness, F (1, 207) = 0.07, p > .05 (β = 0.02, R^2 = .00).

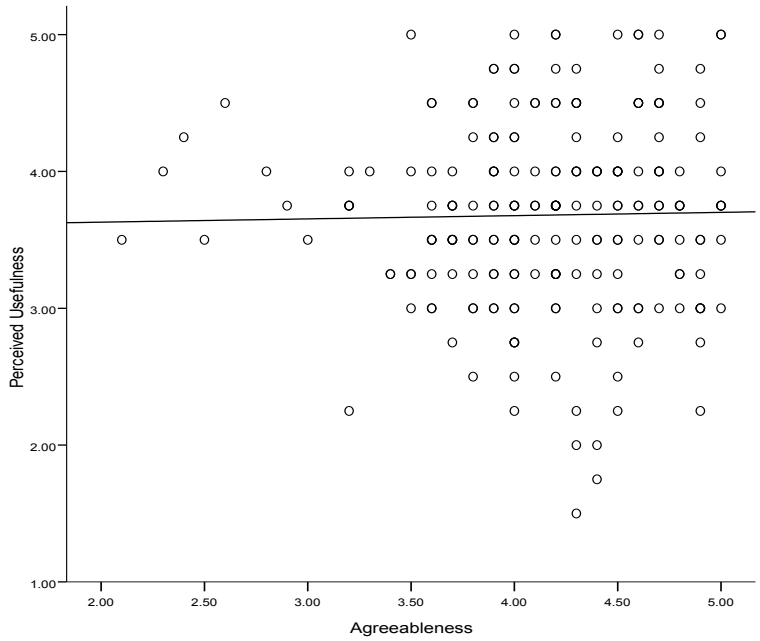

Figure 15. Scatterplot for Research Question 5 Hypotheses 5a.

Table 16

Regression Coefficients for Research Question 5 Hypotheses 5a

Predictor	*b*	*SE*	β	*t*	Sig.
Agreeableness	0.02	0.09	0.02	0.27	.785

Consequently, the significance of .785 indicated a failure to reject Hypothesis $H5a_0$ in Research Question 5. Therefore, this study did not show that the personality type

agreeableness has a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.

The second set of hypotheses was

- $H5b_0$: Measures of personality type *agreeableness* do not have a positive linear relationship with the perceived usefulness of TKMSs as measured by the TAM.
- $H5b_A$: Measures of personality type *agreeableness* have a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

The final set of regression models involved agreeableness as a potential predictor of perceived ease of use. First, the participants' data were screened for outliers. The participants' residuals were standardized and the resulting *z*-scores were utilized to identify outliers in the data. A participant was considered an outlier when the standardized residual was greater than 3. Two outliers were identified in the screening process for Hypotheses 5b.

The next step involved assessing model linearity and homoscedasticity for these hypotheses. A plot of standardized residuals indicated linearity and failed to reveal any evidence of model heteroscedasticity. This indicated that a straight line could adequately model the relationships and the sizes of the residuals (i.e., errors) were consistent across levels of the criterion.

The scatterplot for the perceived ease of use model is displayed in Figure 16. The regression coefficients are listed in Table 17. The coefficients indicated that agreeableness was not a significant predictor of perceived ease of use, F (1, 207) = 0.14, $p > .05$ ($\beta = -0.03$, $R^2 = .00$).

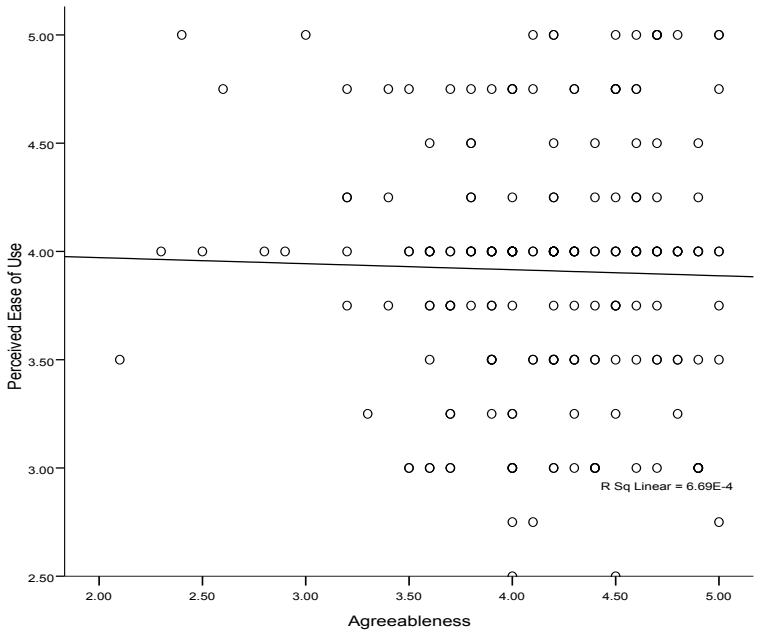

Figure 16. Scatterplot for Research Question 5 Hypotheses 5b.

Table 17

Regression Coefficients for Research Question 5 Hypotheses 5b

Predictor	*b*	*SE*	β	*t*	Sig.
Agreeableness	-0.03	0.08	-0.03	-0.37	.710

Consequently, the significance of .710 indicated a failure to reject Hypothesis $H5b_0$in Research Question 5. Therefore, this study did not show that the personality type *agreeableness* has a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM.

Hypothesis Testing Summary

Figure 17 displays the path diagram for the study hypotheses. Table 18 presents the hypothesis testing decisions for each research question. Null Hypotheses 2b, 3a, and 3b were rejected. The research failed to reject the remaining null hypotheses.

Table 18

Hypotheses Testing Decisions

Hypotheses	Sig.	H_0 decision	Independent variable	Dependent variable
H1a	.757	Fail to reject	Neuroticism	Perceived usefulness
H1b	.074	Fail to reject	Neuroticism	Perceived ease of use
H2a	.875	Fail to reject	Extraversion	Perceived usefulness
H2b	.010	Reject	Extraversion	Perceived ease of use
H3a	.001	Reject	Openness	Perceived usefulness
H3b	.000	Reject	Openness	Perceived ease of use
H4a	.545	Fail to reject	Conscientiousness	Perceived usefulness
H4b	.646	Fail to reject	Conscientiousness	Perceived ease of use
H5a	.785	Fail to reject	Agreeableness	Perceived usefulness
H5b	.710	Fail to reject	Agreeableness	Perceived ease of use

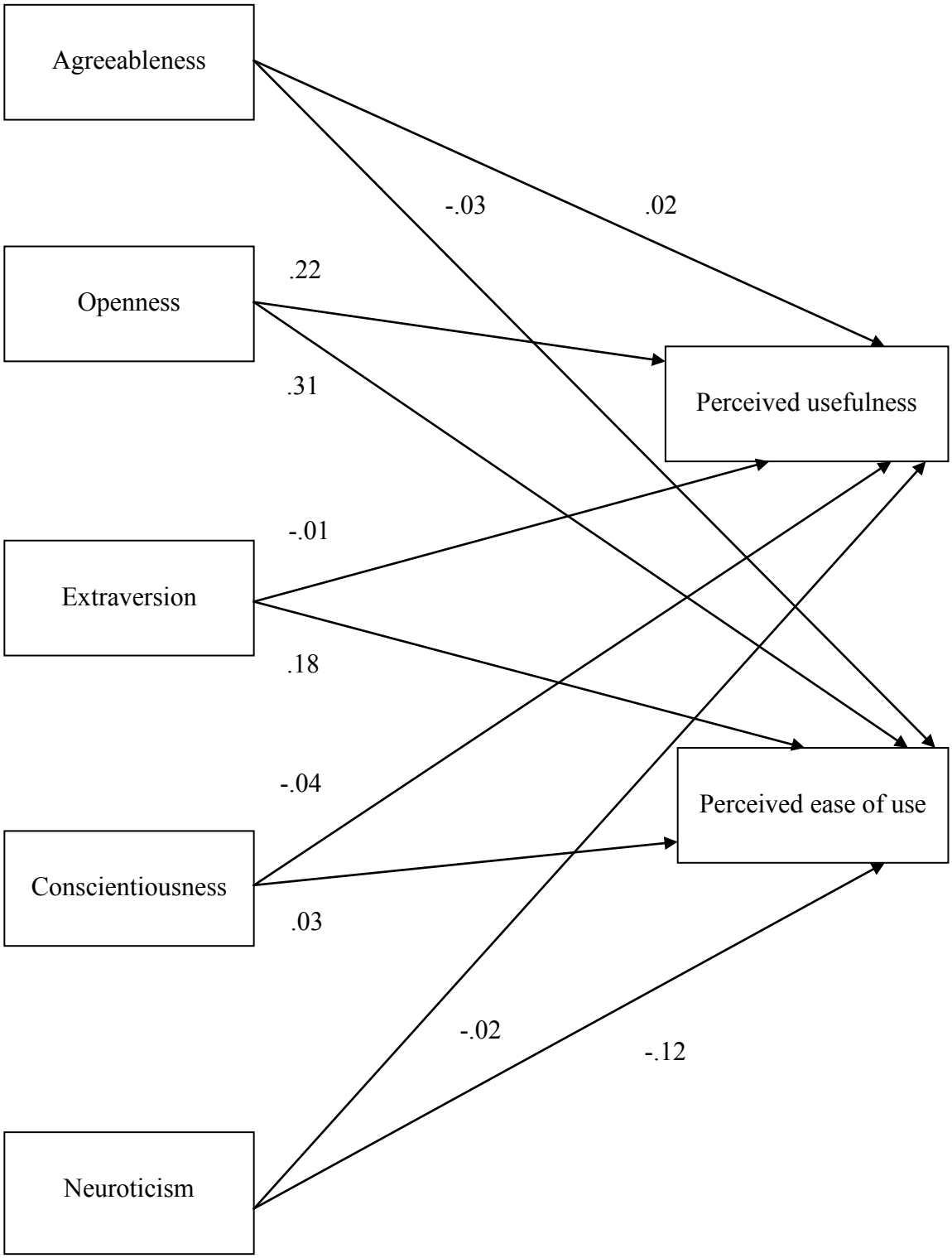

Figure 17. Path diagram for study hypotheses.

Conclusion

The results of this study indicate that the specific personality types of openness and extraversion positively affect the acceptance of TKMSs as they relate to perceived ease of use and perceived usefulness. More specifically, the personality type *extraversion* proved to have a positive linear relationship with the perceived ease of use of TKMSs as measured by the TAM. Also, the personality type *openness* proved to have a positive linear relationship with the perceived usefulness and perceived ease of use of TKMSs as measured by the TAM.

Other studies of personality type/traits and the correlation of the TAM resulted in similar results. For instance, Wang and Yang's (2005) study of the role of personality traits in the UTAUT model in online stock investment participation resulted in the extraversion and openness personality traits significantly affecting the intent to participate in online stock investment. These results are similar to this study in that the extraversion and openness personality traits also significantly affect the perceived usefulness and perceived ease of use of TKMSs. Chapter 5 relates the findings of the research questions to the research problem and offers interpretations, conclusions, complications, and limitations.

CHAPTER 5. DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

This study researched the problem of technical knowledge management systems (TKMSs) not achieving usage (acceptance) and the benefits that have been forecasted and are therefore not enhancing competitive advantage and profits in organizations. Chapter 4 reported the statistical conclusions from the analysis of the collected data. This chapter discusses implications for practitioners regarding the research problem and presents needs for further academic research.

Discussion of Results

This research study investigated the relationship of personality (through the five-factor model [FFM]) to technology acceptance of TKMS (using the technology acceptance model [TAM]). The results of this study reveal probable problems of TKMS acceptance and the factors preventing users from its acceptance. Equally important, the results of this research can assist in drafting business strategies and marketing policies that organizations can pursue to ensure the acceptance of TKMSs and potentially reap TKMS benefits.

This research study builds on the research conducted by Devaraj et al. (2008) and Lin and Ong (2010). Lin and Ong (2010) conducted a study that explored and proposed a model to connect personality traits to information system usage through the introduction of the FFM into the information system continuance model. The study by Devaraj et al. was "to examine the effect of the Big Five personality characteristics on the TAM constructs of usefulness, subjective norms, and intention to use" (p. 102). The research of this dissertation focused on determining the relationship of personality traits to the TAM

after extended use of a TKMS and studied the FFM factors that affect the technology adoption of TKMSs.

The model of this research broadened the model proposed by Venkatesh et al. (2003) by determining the correlation of each of the Big Five personality factors (Goldberg, 1999) with both perceived usefulness and perceived ease of use (see Figure 18). Table 19 provides a summary of the findings based on this research model. In this chapter, the implications of the study are discussed in the context of the five research questions that guided this research.

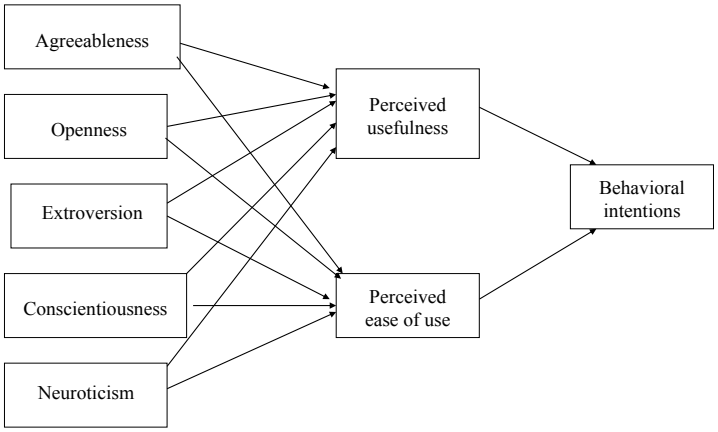

Figure 18. Modified study research model.

Table 19

Summary of Significant Findings Based on the Study Research Model

Research question	Sig.	Independent variable	Dependent variable	Explanation
1	.757	Neuroticism	Perceived usefulness	No relationship
	.074	Neuroticism	Perceived ease of use	No relationship
2	.875	Extraversion	Perceived usefulness	No relationship
	.010	Extraversion	Perceived ease of use	Relationship

Table 19

Continued

Research question	Sig.	Independent variable	Dependent variable	Explanation
3	.001	Openness	Perceived usefulness	Relationship
	.000	Openness	Perceived ease of use	Relationship
4	.545	Conscientiousness	Perceived usefulness	No relationship
	.646	Conscientiousness	Perceived ease of use	No relationship
5	.785	Agreeableness	Perceived usefulness	No relationship
	.710	Agreeableness	Perceived ease of use	No relationship

Implications for Practitioners

The implications of this study for practitioners are discussed in the context of the five research questions that guided this research. Both statistically significant and weaker indications are explained. The results offer perspectives both on the type of individual that finds TKMSs useful and on the type of individual that perceives TKMSs as easy to use.

Research Question 1

Research Question 1 asked,

Among users of technical knowledge management systems (TKMS), does neuroticism (personality type) as measured by the five-factor model (FFM), correlate to the acceptance of TKMS as measured by the Technology Acceptance Model (TAM)?

This research question evaluated the correlation of the neuroticism personality type as measured by the FFM with the acceptance of TKMSs as measured by the TAM. The statistical analysis in Chapter 4, although not quite statically significant, did indicate a negative trend effect. This suggests moderate evidence that participants exhibiting the

neuroticism personality type perceived that TKMSs had lower ease of use and usefulness. Barrick and Mount (1991) defined the neuroticism personality dimension as having a "tendency to be anxious, fearful, depressed and moody" (p. 4). Consequently, it is logical that individuals indicating higher neuroticism would be less accepting of TKMSs based on either its perceived usefulness or its perceived not very complex. If employers incorporate evaluations and rewards ease of use.

The lack of a correlation between the neuroticism personality type and TKMS acceptance should not prevent employers from hiring individuals high in neuroticism. Researchers Raja, Johns, and Ntalianis (2004) found that employees high in neuroticism tended to focus on short-term and economic exchanges with their employers related to performance, especially on tasks that did not require high initiative and were with successfully completing tasks, such as accepting and actively using TKMSs, then employees high in neuroticism will focus on these tasks becoming a significant part of their transactional contracts with their employers (Wang, Noe, & Wang, 2011). Therefore, to avoid negative evaluations and potential financial losses, employees high in neuroticism will be more likely to engage in greater TKMS usage when management practices stress accountability for TKMS usage (Wang et al., 2011).

Research Question 2

Research Question 2 asked,

Is there a relationship between the extraversion personality type and the acceptance of TKMSs?

This research question evaluated the correlation of the extraversion personality type as measured by the FFM with the acceptance of TKMSs as measured by the TAM.

The statistical analysis in Chapter 4 showed that the correlation of the extraversion personality type with the acceptance of TKMSs based on perceived usefulness was not statistically significant. In contrast, the statistical analysis showed the correlation of the extraversion personality type with the acceptance of TKMS based on perceived ease of use as statistically significant and that as extroversion rose, so did the level of perceived ease of use.

Wang and Yang (2005) conducted a study that examined the relationship of personality traits with the unified theory of acceptance and use of technology model based on online stock investment participation. One result of the study suggested that the extraversion personality trait affected investors' intention to use online investing systems (Wang & Yang, 2005). Wang and Yang explained that "high extraversion persons are mostly positive, optimistic, are willing to take risks, like to be around crowds, have more social activities, and tend to look for amazement" (p. 70). Similarly, the evidence in this research study suggests that the difference in significance between the perceived usefulness and perceived ease of use of TKMSs can be attributed to extraverts' tendency to take risks, thereby perceiving TKMSs as easier to use versus being useful. Overall, this research study showed that the variance in extrovert traits can be directly attributed in the variance of acceptance of TKMSs based on perceived usefulness and perceived ease of use. Future research may explore more deeply this specific trait and the variances in TAM.

Research Question 3

Research Question3 asked,

Is there a relationship between the openness personality type and the acceptance of TKMSs?

This research question evaluated the correlation of the openness personality type as measured by the FFM with the acceptance of TKMSs as measured by the TAM. The statistical analysis in Chapter 4 showed that the correlation of the openness personality type with the acceptance of TKMSs based on perceived usefulness and perceived ease of use was statistically significant and consistent with this study's prediction. "Openness (O) [easily accepts] various experiences [and] cultures, always express[s] curiosity, and [has] much more imagination. Measurements include the degrees of fantasy, feelings, ideas, values, aesthetics, and action" (Wang & Yang, 2005, p. 75).

Wang and Yang (2005) conducted a study to examine the roles that personality traits play in the unified theory of acceptance and use of technology model based on online stock investment participation. The results of the study showed that extraversion and openness significantly affected the study subjects' intention to participate in online stock investment. Similarly, this research study showed evidence that study participants exhibiting the openness personality type were more likely to perceive TKMSs as useful tools in researching and resolving technical issues and as tools that can be easily used by those with all levels of technical experience.

Research Question 4

Research Question 4 asked,

Is there a relationship between the conscientiousness personality type and the acceptance of TKMSs?

This research question evaluated the correlation of the conscientiousness personality type as measured by the FFM with the acceptance of TKMSs as measured by the TAM. The statistical analysis in Chapter 4 showed that the correlation of the conscientiousness personality type with the acceptance of TKMSs based on perceived usefulness and perceived ease of use was not statistically significant. These results are inconsistent with the traits normally exhibited by a person with the conscientiousness personality type. Barrick and Mount (1991) stated that persons exhibiting the conscientiousness personality trait have a "tendency to be thorough, responsible, organized, hardworking, achievement-oriented and persevering" (p. 4), and that once they make a decision, they are more likely to follow through regarding the decision. Once TKMSs were perceived to be not easy to use (perceived ease of use), then the conscientiousness trait may have resulted in a decision that TKMSs were not useful (perceived usefulness).

Gellatly (1996) studied the effect that conscientiousness had on job performance. The study resulted in the determination that performance expectancy was the conciliator between personality trait and job performance. As a result, Gellatly's study determined that persons exhibiting the conscientious personality trait set higher work goals and worked harder to achieve their goals based on their belief that they could perform well at their jobs. This suggests that if the usage of TKMSs was tied to job performance, then individuals exhibiting the conscientiousness personality trait would possibly perceive TKMSs as useful and ease to use. Future research in this area could include the investigation of any moderating factors that could influence a person exhibiting the conscientiousness personality trait to make the decision to not accept TKMSs.

Research Question 5

Research Question 5 asked,

Is there a relationship between the agreeableness personality type and the acceptance of TKMSs?

This research question evaluated the correlation of the agreeableness personality type as measured by the FFM with the acceptance of TKMSs as measured by the TAM. The statistical analysis in Chapter 4 showed that the correlation of the agreeableness personality type with the acceptance of TKMSs based on perceived usefulness and perceived ease of use was not statistically significant. This suggests moderate evidence that individuals exhibiting the agreeableness personality type perceived that TKMSs had lower ease of use and usefulness. Wang and Yang (2005) stated that "agreeableness refers to [being] cordial, enthusiastic, [and] sympathiz[ing] with or help[ing] others, and is measured by the degrees of trust, straightforwardness, altruism, compliance, and tender-mindedness" (p. 75). The degree of trust in this study might have negatively influenced the study participants who exhibited the agreeableness personality trait. These study participants might have been agreeable about completing the study but might not have been very trusting of the study's measurements.

The study conducted by Wang and Yang (2005) showed that agreeableness with Internet experience moderates the social influence intention relationship with positive effect. "Social influence is the degree an individual perceives influence on him from other persons of importance" (Wang & Yang, 2005, p. 80). The results of this research study did not show any significance with the agreeableness personality trait. However, the data from this study could be analyzed to see if social influence positively correlated

with participants' intention to use TKMSs. Future research is warranted in this area to determine if any other moderating effects, such as social influence, could influence the results of a study.

Implication Summary

The implications of this study are based on the findings and conclusions of this study. This study examined the relationships of personality types as measured by the FFM with TKMSs as measured by the TAM. Many organizations and companies can benefit from the results of this research. Overall, it is recommended that organizations and companies that research and distribute TKMSs consider the personality traits of users when researching and designing these TKMSs. The potential benefits could bolster competitive advantage in the information technology arena and forward the study of personality trait relationships in information technology–related fields.

Organizations could use the results of this study to implement quite a few business practices in their efforts to achieve and maintain competitive advantages. For instance, software and hardware vendors that distribute TKMSs could use these results in designing the TKMSs to effectively support not only the personality types that accepted TKMS but also the personality types that were less accepting of TKMSs in this study. Based on knowledge of what certain personality types are interested in, software and hardware vendors can design TKMSs to ensure that users continue to perceive the systems as useful and easy to use. As important, software and hardware vendors would benefit from fully understanding the traits of the personality types that were not accepting of TKMSs in this study and designing their TKMSs to accommodate these traits. As a

result, software and hardware vendors would achieve more acceptances of TKMSs and gain competitive advantage in the technology market.

Organizations can also use the results of this study to determine which personality types to hire if the acceptance of TKMSs is required. The International Personality Item Pool-5 could be administered to potential job candidates to determine their personality types. Based on the results, organizations could determine if a candidate is more suitable for a job that requires the acceptance of TKMSs. As important, these results could be used in technical and nontechnical organizations to determine candidates' suitability for certain jobs. Based on the results of this study, organizations could ensure that candidates exhibiting the extraversion or openness personality types are hired for jobs requiring the acceptance of TKMSs.

Implications for Researchers

Many researchers have investigated the acceptance of various information technology systems, including knowledge management systems (Ong & Lai, 2007). Researchers have also investigated the relationship of personality traits with certain jobs in the information systems arena (Devaraj et al., 2008). Additionally, researchers in the last two decades have concentrated on theory-based research of information systems usage that included investigating the variables around technology acceptance and how systems are used (Venkatesh & Davis, 1996, 2000; Venkatesh et al., 2003). Moreover, past research studies have focused on system performance, usefulness, or how the system aligns with organizational business strategy (Chua & Lam, 2005a).

The results of this study expand the research in how the Big Five personality traits influence behavior by examining their relationship with technology acceptance as it relates to knowledge management systems and TKMSs. This research study also broadens the research on extraversion and extends the understanding of openness to experience. Although neuroticism, conscientiousness, and agreeableness are the Big Five traits with the fewest significant relationships with TAM, it was discovered that these traits seem to be important for the relationship to TAM with TKMSs.

> More important, the results support theoretical perspectives such as interactional psychology and person-situation interactionism (Schneider, 1983; Tett & Guterman, 2000), which emphasize that we can gain a greater understanding of behaviors such as knowledge sharing by developing and testing theories of personality-situation interactions rather than focusing exclusively on trait-based theories that tend to highlight the inherent positive or negative aspects of personality traits (George & Zhou, 2001; Tett & Burnett, 2003). (Wang et al., 2011, p. 23)

In the past, the FFM of personality has been widely used and applied to research in the field of management and psychology, but rarely has it been discussed in the information systems field. In fact, Devaraj et al. (2008) noted,

> Personality has been largely ignored in the [management information systems] literature over the past two decades. However, the field of personality psychology has significantly advanced since that time, and the FFM has sparked renewed theory and empirical investigation in other disciplines. (p. 104)

This research integrates the constructs of the FFM into the technology acceptance of TKMSs by examining how personality constructs influence perceived usefulness and ease of use and potential acceptance of TKMSs. Therefore, conducting a study that connects the area of personality traits with the design of TKMSs adds to the body of knowledge and confirms its acceptability and possible future uses in not only software and hardware manufacture companies but also commercial and governmental

organizations. Information technology and psychology researchers should evaluate the potential of this correlation and continue to research the potential uses of these relationships.

Recommendations for Future Research

Various recommendations for future research and practice can be cited based on the results of this study. The lack of research in the area of correlating personality traits with technology acceptance sparked this study and research should be continued to ascertain how personality traits can contribute to technology acceptance. Moreover, organizations, technical and nontechnical, should continue to use the results of these types of studies in implementing business strategies for competitive advantage. Specific recommendations for future research are discussed in the following paragraphs.

The area of correlating personality types or traits with technology acceptance has been limited; however, the future of this research is vast. For instance, this study could be repeated by determining the correlation of technology acceptance, if any, with the combination of all five personality types together. The research model for this study evaluated the personality types separately. Realistically, most people have a combination of personality types and an evaluation of a combination of personality types may achieve different results for the acceptance of TKMSs.

The results of the study were evaluated using linear regression methods, limiting the ability to obtain additional data on the relationships between the variables. Researchers evaluate the results of this study using multiple regression methods. Using the multiple regression method may allow researchers to find out what multiple indicators

best predict whether a relationship exists between personality types and the acceptance of TKMSs.

This research study was limited in that it did not investigate the relationship of demographics with personality traits and the acceptance of TKMSs. Demographic data collected in this study could be used to determine if demographics affect the outcome of the research. For instance, researchers could determine if the age of the study participant affected the results of this study. Additionally, educational level could be used to see if the data for the TAM would change based on increasing levels of education. Moreover, demographic data could be used to add a different dimension to the relationship of personality types to acceptance of TKMSs.

This research study was generalized to the usage of any TKMS. Researchers could modify this study to evaluate the technology acceptance of a specific TKMS. This study was limited in that it did not specify a particular TKMS. Therefore, the study participants answered questions based on a variety of experiences with different TKMSs. Future researchers could submit their results to industry to assist organizations in determining which persons (of a specific personality type) to hire for acceptance and usage of specific TKMSs.

This research study was also limited in that it did not ask questions regarding study participants' level of usage with TKMSs. Researchers could conduct this study and request that study participants enter their level of usage with TKMSs. The level of usage and experience with TKMSs may produce different results in the level of technology acceptance despite the personality type of the study participant. The preceding are just a

few recommendations for future research in the area of relating personality types to technology acceptance of TKMSs.

Conclusion

The purpose of this research study was to study the relationship between the personality types of users of TKMSs and their acceptance of these systems as measured by the TAM. Approximately 251 study participants answered a variety of questions relating to their personality traits and their acceptance of TKMSs. The literature review provided details on theoretical and practical applications of knowledge management systems and personality trait tests. Software and hardware manufacturers have developed and distributed TKMSs to their customers without examining the personality types that contribute to the acceptance of these systems (Telvent, n.d.). System user satisfaction and effectiveness may be affected by individual differences in personality types of its users and may affect organizations' competitive advantage (Devaraj et al., 2008). This research study contributed data aimed at understanding the personality types of TKMS users and how that may be used to effectively design and implement TKMSs for user acceptance. Without this data, the design and development of TKMSs will be ineffective in ensuring full technology acceptance by users of varying personality types, potentially resulting in lost revenue.

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APPENDIX A. UTAUT INSTRUMENT

Scales: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree

Performance Expectancy

PE1: I would find the TKMS useful in my job.

PE2: Using the TKMS enables me to accomplish tasks more quickly

PE3: Using the TKMS increases my productivity.

PE4: If I use the TKMS, I will increase my chances of getting a raise.

Effort Expectancy

EE1: My interaction with the TKMS would be clear and understandable.

EE2: It would be easy for me to become skillful at using the TKMS.

EE3: I would find the TKMS easy to use.

EE4: Learning to operate the TKMS is easy for me.

Behavioral Intention to Use the System

BI1: I intend to use the TKMS in the next <n> months.

BI2: I predict I would use the TKMS in the net <n> months.

BI3: I plan to use the TKMS in the next <n> months.

Attitude Toward Using Technology

AT1: Using the TKMS is a bad/good idea.

AT2: The TKMS make work more interesting.

AT3: Working with the TKMS is fun.

Social Influence

SI1: People who influence my behavior think that I should use the TKMS.

SI2: People who are important to me think that I should use the TKMS.

SI3: The senior management of this business has been helpful in the use of the TKMSs.

SI4: In general, the organization has supported the use of the TKMS.

Facilitating Conditions

FC1: I have the resources necessary to use the TKMS.

FC2: I have the knowledge necessary to use the TKMS.

FC3: The TKMS is not compatible with other systems I use.

FC4: A specific person (or group) is available for assistance with TKMS difficulties.

Self-Efficacy

I could complete a job or task using the TKMS…

SE1: If there was no one around to tell me what to do as I go.

SE2: If I could call someone for help if I got stuck.

SE3: If I had a lot of time to complete the job for which the software was provided.

SE4: If I had just the built-in help facility for assistance.

Anxiety

ANX1: I feel apprehensive about using the TKMS.

ANX2: It scares me to think that I could lose a lot of information using the TKMS by hitting the wrong key.

ANX3: I hesitate to use the TKMS for fear of making mistakes I cannot correct.

ANX4: The TKMS is somewhat intimidating to me.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (September 2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27(3),* 425-478.

APPENDIX B. IPIP BIG 5 (50-ITEM) INSTRUMENT

Table B1

IPIP Big 5 (50-Item) Instrument

Item #		Very Inaccurate	Moderately Inaccurate	Neither Accurate Nor Inaccurate	Moderately Accurate	Very Accurate
1	Am the life of the party.					
2	Feel little concern for others.					
3	Am always prepared.					
4	Get stressed out easily.					
5	Have a rich vocabulary.					
6	Don't talk a lot.					
7	Am interested in people.					
8	Leave my belongings around.					
9	Am relaxed most of the time.					
10	Have difficulty understanding abstract ideas.					
11	Feel comfortable around people.					
12	Insult people.					
13	Pay attention to details.					
14	Worry about things.					
15	Have a vivid imagination.					
16	Keep in the background.					
17	Sympathize with others' feelings.					
18	Make a mess of things.					
19	Seldom feel blue.					
20	Am not interested in abstract ideas.					
21	Start conversations.					
22	Am not interested					

	in other people's problems.					
23	Get chores done right away.					
24	Am easily disturbed.					
25	Have excellent ideas.					
26	Have little to say.					
27	Have a soft heart.					
28	Often forget to put things back in their proper place.					
29	Get upset easily.					
30	Do not have a good imagination.					
31	Talk to a lot of different people at parties.					
32	Am not really interested in others.					
33	Like order.					
34	Change my mood a lot.					
35	Am quick to understand things.					
36	Don't like to draw attention to myself.					
37	Take time out for others.					
38	Shirk my duties.					
39	Have frequent mood swings.					
40	Use difficult words.					
41	Don't mind being the center of attention.					
42	Feel others' emotions.					
43	Follow a schedule.					
44	Get irritated easily.					
45	Spend time reflecting on things.					
46	Am quiet around strangers.					
47	Make people feel at ease.					

48	Am exacting in my work.					
49	Often feel blue.					
50	Am full of ideas.					

APPENDIX C. DEMOGRAPHICS QUESTIONNAIRE

Table C1

Demographics Questionnaire

Age Range	_ 18-29 _ 30-49 _ 50 and up
Gender	_ Female _ Male
Race	_American Indian or Alaskan Native _Asian _ Black or African American _ Hawaiian or Pacific Islander _ White _ Hispanic _ Native American _ Other _____
Education	_ Some High School _ High School Diploma _ Some College _ Associate's Degree __ Bachelor's Degree _ Postgraduate

APPENDIX D. DESCRIPTIVE STATISTICS

Table D1

Descriptive Statistics for IPIP-B5 Survey Items

Item	*n*	Min.	Max.	*M*	*SD*
Am the life of the party.	251	1.00	5.00	2.94	1.06
Feel little concern for others.	251	1.00	5.00	1.65	1.08
Am always prepared.	251	1.00	5.00	3.88	0.91
Get stressed out easily.	251	1.00	5.00	2.48	1.17
Have a rich vocabulary.	251	1.00	5.00	4.06	0.94
Don't talk a lot.	251	1.00	5.00	2.67	1.23
Am interested in people.	251	1.00	5.00	4.14	1.01
Leave my belongings around.	251	1.00	5.00	2.36	1.23
Am relaxed most of the time.	251	1.00	5.00	3.46	1.12
Have difficulty understanding abstract ideas.	251	1.00	5.00	1.82	0.97
Feel comfortable around people.	251	1.00	5.00	4.00	1.01
Insult people.	251	1.00	5.00	1.51	0.83
Pay attention to details.	251	1.00	5.00	4.12	0.88
Worry about things.	251	1.00	5.00	3.27	1.20
Have a vivid imagination.	251	1.00	5.00	3.93	1.02
Keep in the background.	251	1.00	5.00	2.86	1.13
Sympathize with others' feelings.	251	1.00	5.00	4.27	0.80
Make a mess of things.	251	1.00	5.00	1.82	0.93
Talk to a lot of different people at parties.	251	1.00	5.00	3.33	1.25
Am not really interested in others.	251	1.00	5.00	1.94	0.98
Like order.	251	1.00	5.00	4.03	0.95
Change my mood a lot.	251	1.00	5.00	2.33	1.08

Table D1

Continued

Item	*n*	Min.	Max.	*M*	*SD*
Am quick to understand things.	251	2.00	5.00	4.27	0.76
Don't like to draw attention to myself.	251	1.00	5.00	3.35	1.07
Take time out for others.	251	1.00	5.00	4.04	0.90
Shirk my duties.	251	1.00	4.00	1.55	0.82
Have frequent mood swings.	251	1.00	5.00	2.02	1.08
Use difficult words.	251	1.00	5.00	3.22	1.16
Don't mind being the center of attention.	251	1.00	5.00	3.10	1.20
Feel others' emotions.	251	1.00	5.00	4.05	0.87
Follow a schedule.	251	1.00	5.00	3.82	0.96
Get irritated easily.	251	1.00	5.00	2.50	1.16
Spend time reflecting on things.	251	1.00	5.00	4.18	0.84
Am quiet around strangers.	251	1.00	5.00	3.03	1.17
Make people feel at ease.	251	1.00	5.00	4.00	0.85
Am exacting in my work.	251	2.00	5.00	4.02	0.79
Often feel blue.	251	1.00	5.00	2.06	1.12
Am full of ideas.	251	1.00	5.00	4.20	0.85

Table D2

Descriptive Statistics for UTAUT Survey Items

Item	*n*	Min.	Max.	*M*	*SD*
I would find a TKMS useful in my job.	211	1.00	5.00	4.06	0.89
Using a TKMS enable me to accomplish tasks more quickly.	211	1.00	5.00	3.92	0.81
Using a TKMS increases my productivity.	211	1.00	5.00	3.87	0.83
If I use a TKMS, I will increase my chances of getting a raise.	211	1.00	5.00	2.78	1.06
My interaction with a TKMS would be clear and understandable.	211	1.00	5.00	3.68	0.76
It would be easy for me to become skillful at using a TKMS.	211	2.00	5.00	4.09	0.75
I would find a TKMS easy to use.	211	2.00	5.00	3.91	0.74
Learning to operate a TKMS is easy for me.	211	2.00	5.00	3.90	0.76
I intend to use a TKMS in the next few months.	211	1.00	5.00	3.55	1.10
I predict I would use a TKMS in the next few months.	211	1.00	5.00	3.63	1.07
I plan to use a TKMS in the next few months.	211	1.00	5.00	3.51	1.10
Using a TKMS is a bad/good idea.	211	1.00	5.00	3.40	0.91
A TKMS make work more interesting.	211	1.00	5.00	3.42	0.88
Working with the TKMS is fun.	211	1.00	5.00	3.33	0.79
People who influence my behavior think that I should use the TKMS.	211	1.00	5.00	3.13	0.97
People who are important to me think that I should use the TKMS.	211	1.00	5.00	3.13	0.97
The senior management of this business has been helpful in the use of the TKMSs.	211	1.00	5.00	3.01	1.08
In general, the organization has supported the use of the TKMS.	211	1.00	5.00	3.32	1.06
I have the resources necessary to use the TKMS.	211	1.00	5.00	3.48	1.09
I have the knowledge necessary to use the TKMS.	211	1.00	5.00	3.83	0.98
The TKMS is not compatible with other systems I use.	211	1.00	5.00	2.71	0.87
A specific person (or group) is available for assistance with TKMS difficulties.	211	1.00	5.00	3.23	1.08

Table D2

Continued

Item	*n*	Min.	Max.	*M*	*SD*
I could complete a job or task using the TKMS . . . If there was no one around to tell me what to do.	211	1.00	5.00	3.82	0.79
I could complete a job or task using the TKMS . . . If I could call someone for help if I got stuck.	211	1.00	5.00	3.82	0.79
I could complete a job or task using the TKMS . . . If I had a lot of time to complete the job for which the software was provided.	211	1.00	5.00	3.58	0.83
I could complete a job or task using the TKMS . . . If I had just the built-in help facility for assistance.	211	1.00	5.00	3.62	0.80
I feel apprehensive about using the TKMS.	211	1.00	5.00	2.14	1.02
It scares me to think that I could lose a lot of information using the TKMS by hitting the wrong key.	211	1.00	5.00	2.18	1.09
I hesitate to use the TKMS for fear of making mistakes I cannot correct.	211	1.00	5.00	1.98	0.96
The TKMS is somewhat intimidating to me.	211	1.00	5.00	1.92	0.90