Indiana State University
Sycamore Scholars

All-Inclusive List of Electronic Theses and Dissertations

2015

Understanding The Intention To Use Pc Asset Management Tools Among Technology Leaders Using The Technology Acceptance Model

Michael G. Carper
Indiana State University

Follow this and additional works at: https://scholars.indianastate.edu/etds

Recommended Citation
Carper, Michael G., "Understanding The Intention To Use Pc Asset Management Tools Among Technology Leaders Using The Technology Acceptance Model" (2015). *All-Inclusive List of Electronic Theses and Dissertations*. 1801.
https://scholars.indianastate.edu/etds/1801

This Dissertation is brought to you for free and open access by Sycamore Scholars. It has been accepted for inclusion in All-Inclusive List of Electronic Theses and Dissertations by an authorized administrator of Sycamore Scholars. For more information, please contact dana.swinford@indstate.edu.

VITA
Michael G. Carper

EDUCATION

Ph.D.	Indiana State University, Technology Management, 2015.
MS	Ball State University, Information and Communication Science, 1992
BS	Purdue University, Electrical Engineering Technology, 1988

PROFESSIONAL EXPERIENCE

2014 – Present	RadioShack Corporation (Fort Worth, TX) SVP/Chief Information Officer (CIO)
2013 – 2014	JC Penney Corporation (Plano, TX) SVP/Information Technology
2008 – 2012	Dick's Sporting Goods (Pittsburgh, PA) VP/Information Technology
2004 – 2008	Coldwater Creek (Coeur d'Alene, ID) VP/Information Technology
2002 – 2004	Northwestern Memorial Hospital (Chicago, IL) Director/Information Technology
1998 – 2001	Charles Schwab & Co., Inc. (Indianapolis, IN) Managing Director/Information Technology
1988 – 1998	GTE Corporation/Verizon Area Manager/IT, various engineering and technical roles

SELECTED PRESENTATIONS

Review of Apple Pay Rollout, RetailTechX Conference, May, 2015
Review of IT Service Management at Dick's Sporting Goods, HDI Conference, March 2008
Overview of Asset Management at Dick's Sporting Goods, Gartner Asset Management Conference, June 2007

UNDERSTANDING THE INTENTION TO USE PC ASSET MANAGEMENT TOOLS AMONG TECHNOLOGY LEADERS USING THE TECHNOLOGY ACCEPTANCE MODEL

A Dissertation

Presented to

The College of Graduate and Professional Studies

The College of Technology

Indiana State University

Terre Haute, Indiana

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

---

by

Michael G. Carper

December 2015

© Michael G. Carper 2015

Keywords: PC asset management, technology acceptance model, technology management

ProQuest Number: 3739196

All rights reserved

INFORMATION TO ALL USERS
The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript
and there are missing pages, these will be noted. Also, if material had to be removed,
a note will indicate the deletion.

ProQuest 3739196

Published by ProQuest LLC (2015). Copyright of the Dissertation is held by the Author.

All rights reserved.
This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

COMMITTEE MEMBERS

Committee Chair: Patrick Appiah-Kubi, Ph.D.

Assistant Professor, Electronics and Computer Engineering Technology Department

Indiana State University, Terre Haute, Indiana

Committee Member: Gerald W. Cockrell, Ed.D.

Professor, Electronics and Computer Engineering Technology Department

Indiana State University, Terre Haute, Indiana

Committee Member: Charles E. Coddington, Ph.D.

Professor, Technology Systems Department

East Carolina University, Greenville, North Carolina

ABSTRACT

Technology vendors have developed personal computer (PC) asset management tools for managing the security and facilitating cyclical replacement lifecycle of PC hardware and software. Despite their commercial availability, PC asset management tools are sparsely implemented. Failure to adopt these tools drives up the cost, time, and disruption for managing the life-cycle of PC assets in a distributed computing environment. What affects the intention to use PC asset management tools among technology leaders is not understood. The purpose of this study was to investigate the perceptions that impact the acceptance of PC asset management tools among technology leaders in the retail industry using the technology acceptance model (TAM). In this empirical study, an online TAM survey collected data from members of the National Retail Federation's CIO Council about the use of PC asset management tools in their environment. Structural equation modeling was used to examine correlations between independent variables and the intention to use this technology. The results indicate that the perception that PC asset management tools are difficult to use is the primary barrier to the acceptance of these tools among technology leaders in the retail industry.

ACKNOWLEDGEMENTS

This project was completed during a very challenging personal and professional time of my life. I am thankful for the guidance, patience, and understanding of the following people:

- Dissertation Committee Members: Dr. Patrick Appiah-Kubi, Dr. Gerald W. Cockrell, and Dr. Charles E. Coddington;
- Advisors: Dr. Gerald W. Cockrell, Dr. Edward R. Kinley, and Dr. George R. Maughan;
- Mary (Mebby) Griffy for keeping us all on-track;
- All the fantastic instructors in this consortium program;
- The College of Graduate and Professional Studies at Indiana State University;
- The faculty of the CICS program at Ball State University;
- My wife, Tammy, and my children, Lindy, Bear, and Annie.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

There is an absence of IT asset management (ITAM) systems, even in large corporations (Kamal & Petree, 2006). Kamal and Petree's (2006) report, published in the *Review of Business Information Systems*, estimated that less than 25% of enterprises in the world have an asset management system that enables leaders to determine potential risks. Kamal and Petree (2006) cited Gartner estimated that 30% of organizational leaders do not know what they own, who has it, or where it is located. Another 45% of organizational leaders have their ITAM data in spreadsheets and have poorly followed processes and data quality.

Enterprise ITAM includes hardware and software through its useful life (Kamal & Petree, 2006). As company leaders endeavor to cut costs, the ability of an enterprise to manage IT assets effectively has become a major success factor. In particular, this applies to personal computers and their associated peripherals, installed software, and related maintenance costs.

Personal computers (PCs) and their associated operating systems and application software made their entry into the daily work environment, thus the number of fixed assets to track in an organization is virtually without limits (Mouritsen & Mano, 2007). Many company leaders are not effectively tracking technology assets.

Many company leaders struggle with managing PC assets in a cost effective and efficient manner, in spite of the commercially available tools that assist with this problem (Chen, 2002).

The difficulty of the issues increases with the quantity of computers in the computing environment. It is in these larger environments that the need to adopt PC management tools to assist in this process becomes very important.

According to J. Chen's (2002) study, published in *Industrial Management and Data Systems*, "companies often fail to take advantage of the available desktop asset management tools to handle inventory management, electronic software distribution, and help desk consolidation (p86)." Commercial tools are readily available for managing enterprise computing assets. It is not known what factors prevent technology leaders from adopting the technology that enables enterprises to manage computers in a business enterprise.

Background of the Study

To support the need for the current study, it is necessary to understand the context in which PC asset management tools are used. These products, also known as desktop asset management (DAM) tools, are used to satisfy at least three basic needs. They are used to perform electronic asset inventory management, automatic software distribution, and software metering and monitoring (Chen, 2002). Asset inventory provides for the electronic collection of data that identifies and counts information about hardware and software. Automated software distribution is used to enable the automatic installation, removal, and upgrade of software on the systems, which includes the operating system and its security patches. Software metering and monitoring are used to ensure compliance with license agreements. Using software metering and monitoring is used to ensure that software is not over-purchased, under-licensed, or unused.

In a study cited by J. Chen (2002), it was estimated that using these tools for these functions could save an organization of 1,000 to 3,500 users between $500,000 and $1,200,000 annually. The tools are central to the life-cycle management of hardware and software assets in an enterprise computing environment (Mouritsen & Mano, 2007). There are four phases in the desktop life-cycle. The *procurement phase* occurs when decisions are made regarding the products that are needed and whether to purchase, lease, or redeploy them from other areas of the organization. The *delivery phase* is the period when technicians configure PCs for the needed operating system and software. In the *support phase* technicians need to know where hardware and software assets are, who is using them, and that the software and patches are maintained. Finally, the *retirement phase* is when hardware or software assets must be taken out of the environment and decommissioned or replaced.

According to Mouritsen (2013), company leaders replace their computers every three to five years and many things factor into this decision. The failure rate may increase with the age of a computer. In some cases, computer replacements are needed to run the latest or supported versions of the operating system or business software. Since 2000, the prices of personal computers have decreased an average of 14.3% per year, which may increase the desire to consider a replacement project (Doms, 2004).

Gartner, formerly known as GartnerGroup, is a research firm that provides insight to member companies regarding information technologies. Gartner research analysts recommend a 4-year replacement cycle for desktop computers and a 3-year replacement cycle for laptop (notebook) computers (Heine & Fiering, 2007).

Computers sold today are complete with an operating system, but there is a variety of software applications, or assets, consumers may need to use. Examples of the applications include office productivity software, email programs, business applications, and countless others. Kamal and Petree (2006) stated that leaders in an estimated 30% of organizations do not know what it owns, who has it, or where it is located. Therefore, conducting computer replacements or upgrades becomes a significant endeavor of one-time manual discovery without ITAM.

Replacing or upgrading a computer involves a number of steps (Microsoft, 2009). Inventory must be taken of the software that was installed previously. If the original media for the software and the license keys are available, a significant amount of time is consumed by reinstalling them on the new computer—assuming the software is compatible with the new computer's operating system.

In the instance that a replacement project is initiated, users will not want to lose data files they have created. Therefore, the user data files must be moved from the old computer to the new computer during the hardware replacement and operating system upgrade effort (Spector, 2009). In the corporate environment, the users will have Microsoft® Office® documents, a large music and video library, and various other files that they have created during the use of the old computer. The process adds tedious complexity to the task. Likely, it will be necessary to search the entire computer to ensure that no files are lost.

International Data Corporation (IDC), a global provider of market intelligence, predicted in 2011, 249 million portable computers will be sold worldwide (IDC, 2010), which would be a 21.7% increase over the prior year. During the same time frame, laptop sales are projected to increase from 61.5% to 65.7% as a percentage of all computers sold worldwide. For laptops alone, applying the same 4-year hardware refresh yields over 62 million replacements annually. Applying the same replacement costs used in the Gartner example and the cost of performing replacements can be staggering.

Hardware lifecycle management is certainly a significant challenge (Mouritsen, 2013). Software and operating system lifecycle management is also a significant issue. In a 2010 online article on NetworkWorld.com, Brodkin (2010) cited a Forrester study that indicated that 75% of corporate computers are using Windows® XP. IT managers are deploying Windows® 7 on 31% of new computers, and Windows® 7 is running on 10% of deployed computers in North America and Europe. Within a year, Forrester expected an increase to 83% of new computers will be deployed with Windows® 7. Brodkin (2010) anticipated leaders of nearly 50% of firms will move to Windows® 7 during 2011. A Forrester study cited in the same article indicated that only 10% of companies have already completed a Windows® 7 migration (2010, as cited in Brodkin, 2010).

According to Pell (2010), replacing or upgrading a personal computer requires forethought and planning. According to Spector (2009), a checklist makes the transition to Windows® 7 easier. The checklists refer to steps that should be taken during the operating system upgrade process. The steps may include backing up user data, installing the operating system, and restoring user data. Though similar checklists and processes may be used for various operating systems, this study focused on computers based on the Microsoft® Windows® operating system.

According to Brodkin (2010), 40% of company leaders indicated that they will migrate to Windows® 7 as they replaced personal computers. Meanwhile, 39% of company leaders said they plan enterprise-wide migrations to avoid supporting multiple versions of the operating system. As such, the timing was right for a study used to examine the challenges associated with the common elements of hardware replacements and in-place operating system upgrades.

Technology Adoption Models

Research has been conducted to study technology adoption from an economic perspective. According to Au and Kauffman (2002), economic literature regarding technology adoption focused on postadoption benefits, technology costs, and network externalities. Au and Kauffman (2002) contended that little is known about the expectations that company leaders have regarding the economic value of a particular technology impacts its adoption.

Au and Kauffman (2002) cited a study that indicated that network externalities had increased the price of spreadsheet software products. Users were willing to pay more because they expected an increase in the value of the software as more users used the product. Au and Kauffman contended that it showed the influence of expectations, and network externalities in the development of theories of adoption. Au and Kauffman (2002) sought to use Muth's (1961, as cited in Au & Kauffman, 2002) rational expectations hypothesis (REH) to better understand the expectations of potential adopters. Rational expectations hypothesis (REH) had been used extensively in microeconomics and macroeconomics, but has not been used to study IT investments and adoption.

Au and Kauffman (2002) examined the following three research questions: (a) Why do companies with initial expectations that are heterogeneous eventually make contemporaneous decisions to adopt the same technology and create network externalities? (b) What model would represent the decision process that leads to broad adoption of a technology? (c) Are there conditions for which the REH theory is consistent with observed adoption of technology?

The adaption of REH to study IT adoption was intended to study a perspective over a longer time frame, which was reasonable given that IT adoptions are complex based on continuous development. As such, adopters need more time to observe the marketplace before making decisions to adopt. The approach proposed by Au and Kauffman (2002) was designed to accommodate these factors. The basis of the study by Au and Kauffman (2002) was largely related to the economic considerations of network externalities, or demand-side economies-of-scale, to study adoption. As such, Au and Kauffman (2002) concluded that technology manufacturers should adjust their selling practices based on the feedback of the potential adopters. Adjusting selling practices effectively moves the economic aspects of the decision to adopt technology to equilibrium. The study was, according Au and Kauffman (2002), the first step in applying REH to the problem of technology adoption. Based on the problem of technology adoption, the research project for the current study needed a more established model.

Yang (2009) produced a study titled, *Structural Models of Technology Adoption*. Yang (2009) reviewed two essays regarding technology adoption. One of the essays was used to consider the adoption of automated teller machine (ATM) card services by senior citizens. The other essay was used to examine the adoption of 56K modem by Internet Service Providers (ISPs) for customer access to the Internet. In each case, the study was used to focus on the monetary and economic aspects of adoption.

Technology Acceptance Model

Davis (1986) developed a model for technology acceptance that has been widely applied and cited. Davis (1986) referred to this as the technology acceptance model (TAM). Davis, Bagozzi, and Warshaw (1989) used the theory of reasoned action (TRA) developed by Fishbein and Ajzen in 1975 to create TAM (as cited in Davis, Bagozzi, and Warshaw, 1989, p. 983). Before examining TAM, it's helpful to understand TRA as a foundational component.

The TRA is a model used in social psychology (Davis et al., 1989). The TRA was designed to predict and explain human behavior and is well researched and widely cited. The TRA model is used to establish that a person's intent to perform a specific behavior is determined by behavioral intent (BI). As shown in Figure 1, BI is determined by two factors—the person's attitude (A) and subjective norm (SN), with respect to the behaviors in question.

The person's attitude (A) refers to an individual's feelings about performing a specific behavior and is the product of the person's beliefs about the consequences of performing the behavior and their evaluation of those consequences. Subjective norm (SN) is based on the person's perception of whether others, who are important to the person, think the person should perform the behavior. Subjective norm is the product of the person's normative beliefs, perceived expectations of referent persons or groups, and his motivation to comply with the expectations.

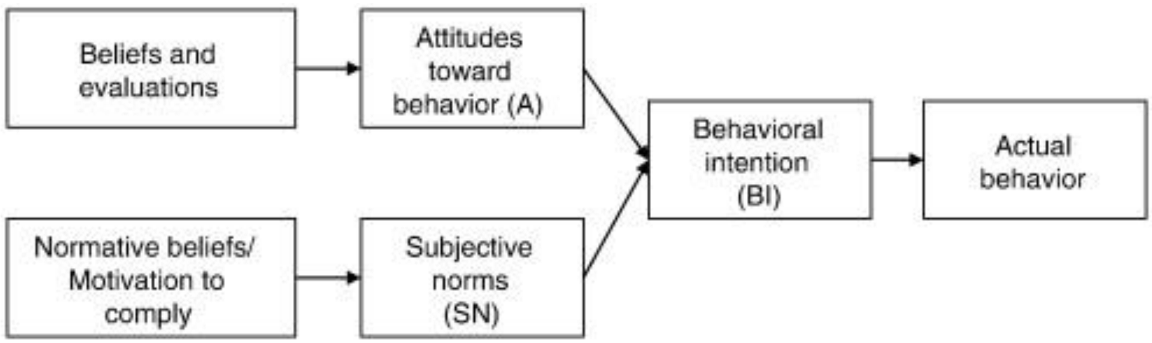

Figure 1. Theory of reasoned action (TRA)

Davis et al. (1989) adapted TRA to create TAM as a method for modeling user acceptance of computer technology in general. As shown in Figure 2, TAM was intended to provide a basis for linking the impact of external factors on internal actions, attitudes, and beliefs. The proponents of TAM asserted that perceived usefulness (U) and perceived ease of use (EOU) are the primary determining factors for the acceptance of technology. Perceived usefulness (U) is the person's subjective probability that using a particular technology will increase job performance. Perceived ease of use (EOU) refers to the degree that the person believes that the technology will be free of effort. Behavioral intention (BI) to use a technology is a product of the person's attitude (A) towards the technology and the perceived usefulness (U) of the technology.

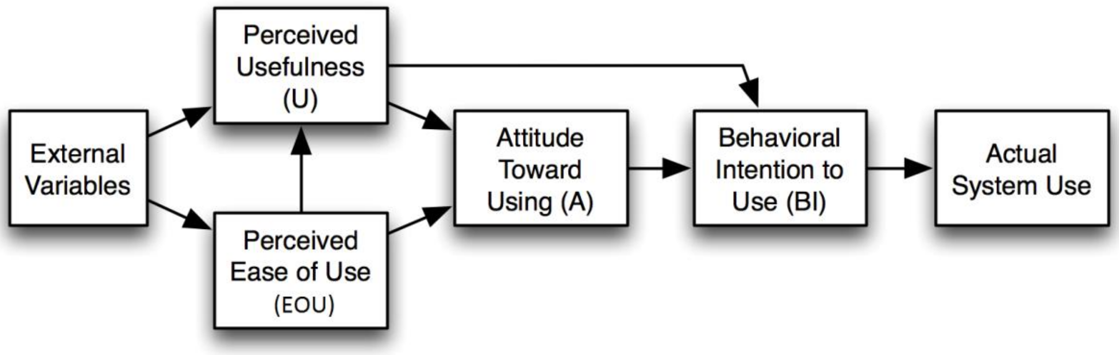

Figure 2. Technology acceptance model (TAM)

To collect data defined by the model, TAM questionnaires have been developed. As with TRA questionnaires, the questions are posed using a typical 7-point Likert scale using *agree* and *disagree* endpoints with anchor points of *strongly agree/disagree*, *somewhat,* and *neither* (Davis, et al., 1989). The current study adapted this research instrument, as it has already been tested for validity and reliability. The TAM has been widely used since 1986 as a means to assess the acceptance of many areas of technology.

Fathema and Sutton (2013) used TAM to study the factors that influenced the adoption of learning management systems, specifically, Blackboard® adoption among university faculty. Fathema and Sutton (2013) found that TAM was a practical method for conducting the study. Fathema and Sutton (2013) found that faculty members had difficulty working with Blackboard® based on browser compatibility issues and that they required more training in the use of Blackboard®. A significant number of faculty members indicated that they were using Blackboard® for “grading only” (p. 26).

Fathema and Sutton (2013) indicated that while other theories available to study technology adoption existed, TAM was used for a number of reasons. The TAM is empirically strong and is the most often applied model used to study the adoption of information technology. The TAM has been used to explain or predict the behavior of individuals across a wide range of end-user computing technology. The TAM is the most influential framework used to predict technology adoption.

Adedoja and Morakinyo (2014) released a study about the acceptance of a mobile learning platform by university teachers. Adedoja and Morakinyo (2014) validated the use of TAM in studying the acceptance of mobile technology among the target group of teachers. Adedoja and Morakinyo (2014) used a pretest and posttest application of TAM and found that self-efficacy is higher after treatment than before treatment. Treatment did not affect perceived ease-of-use, attitude, or peer influence.

The TAM model has gained popularity internationally. In a study published in India, James (2014) used TAM to evaluate the acceptance of nanotechnologies by managers. James (2014) determined that the perceived usefulness had the most significant impact on the acceptance of nanotechnologies.

Success in the use of TAM has led to expansions and variations of the model. Jaw, Yu, and Gehrt (2011) adapted TAM to include prior experience and perceived risk to study the acceptance of online payment services. The results supported the expansion of TAM to include additional factors (Jaw et al., 2011). Perceived risk was found to be a significant factor that impacted the acceptance of online payment services (Jaw et al., 2011).

The TAM is very popular within the healthcare industry where lives may depend upon effective use of technology. Ducey (2013) used TAM to predict tablet computer use among pediatricians. The results indicated that organizational, individual, and device characteristics influenced the adoption of tablet computers for this user group (Ducey, 2013).

Nkenke et al. (2012) used TAM to study the acceptance of virtual dental implant planning software among university undergraduates. Nkenke et al. (2012) found that perceived ease of use did not play a major role in the acceptance of the software. Perceived usefulness accounted for the most significant barrier to acceptance (Nkenke et al., 2012). Given the extensive and recent use of TAM in similar studies, TAM was selected as the model for the current research project.

Statement of the Problem

According to J. Chen (2002), PC asset management tools are not adopted widely. To better understand the challenges, first it is necessary to identify the nature of the issues that prevent the acceptance of such tools. Therefore, the problem of the current study was that the perceptions that influence the use of PC asset management tools among technology leaders is not understood. As such, the current research was used to answer the following general question: What affects the intention to use PC asset management tools among technology leaders?

Research Questions

1. Can a technology leader’s behavioral intention (BI) to use commercial PC asset management tools to manage computers running the Microsoft Windows operating system be predicted using an independent variable representing perceived ease-of-use (EOU)?
2. Can a technology leader’s behavioral intention (BI) to use commercial PC asset management tools to manage computers running the Microsoft Windows operating system be predicted using an independent variable representing perceived usefulness (U)?
3. Can a technology leader’s behavioral intention (BI) to use commercial PC asset management tools to manage computers running the Microsoft Windows operating system be predicted using an independent variable representing attitude (A)?

Null Hypotheses

1. Ho1: $\beta1=0$. There is no linear correlation between the perceived ease-of-use (EOU) and a technology leader's intention to use PC asset management tools to manage computers running the Microsoft Windows operating systems.
2. Ho2: $\beta2=0$. There is no linear correlation between the perceived usefulness (U) and a technology leader's intention to use PC asset management tools to manage computers running the Microsoft Windows operating systems.
3. Ho3: $\beta3=0$. There is no linear correlation between attitude (A) and a technology leader's intention to use PC asset management tools to manage computers running the Microsoft Windows® operating systems.

With the method, acceptance, represented as behavioral intent (BI), is the dependent variable. Attitude (A), perceived usefulness (U), and ease-of-use (EOU) are the independent variables.

Statement of Purpose

The purpose of the current study was to gain an understanding of the perceptions that impact the acceptance of PC asset management tools among technology leaders in the retail industry using the TAM. The findings of the current study are intended to contribute to the body of knowledge about the management of distributed computing assets.

The current study may have positive impacts on the information technology industry as a whole. It may lead to the development of a model that reduces or eliminates the barriers that inhibit the acceptance of PC asset management tools. Manufacturers of these tools may find more effective ways to market their products or train their customers. If the outcomes increase the acceptance of PC asset management tools, technology leaders will better understand the contributing barriers that increased the costs, time, and disruption experienced during hardware replacement and operating system upgrade projects. Future researchers can focus on specific areas identified in the current study. For example, it may be useful to investigate further what external variables influence perceived U and perceived EOU.

Assumptions

Peer-reviewed research studies have used the TAM survey. As a result, the validity and reliability of the TAM survey has been established. Therefore, the TAM survey has been accepted by the academic community as valid and reliable.

Limitations

Within the current study network components of a technology infrastructure were not considered, because these devices are static and are not typically allocated to users for individual use. The current study was confined to end-user devices that connect to a network.

Additionally, the current study was limited to involving tools that manage personal computers running the Microsoft® Windows® operating systems. The current study was not specific to any version of Microsoft® Windows®, because the tools available to perform such tasks support multiple versions. Other barriers may exist that were not studied here.

Future researchers may want to expand upon the current study beyond end-user PC hardware and consider tablets, smartphones, and similar hardware. To narrow the scope of the current study, these devices were eliminated from the study.

Study Overview

The research for the current study involved the perceptions that influence the acceptance of PC asset management tools among technology leaders in the retail industry in the United States. The tools are used to collect asset inventory, perform automatic software distribution, and software metering or monitoring of personal computers in a large corporate environment. Davis (1986) established the TAM, which was adapted for the purpose of the current survey. An online TAM survey was conducted to collect data for the purpose of analyzing the research questions. The survey was sent to technology leaders who are members of the National Retail Federation's CIO Council.

Summary of Methods

The National Retail Federation (NRF) is the largest trade organization for retailers in the United States (About NRF., 2014). The NRF includes a council composed of top technology leaders among its members. The list of NRF members includes both publicly and privately owned companies. A survey was sent to this population (see Appendix A).

One technology leader from each company in the population was chosen for prequalification for the survey. Prequalification ensured that the participants have purchasing and implementation authority for decisions related to PC asset management tools. Prequalified participants were selected to receive the survey. Collection of data was performed using an online survey delivered via email. The survey used a TAM instrument adapted for the current study. The TAM surveys used a 7-point Likert scale. Structural equation modeling and multiple regression analysis were used to examine correlations between perceived ease-of-use, perceived usefulness, and the intention to use the technology.

Definition of Terms

Terms used in the current study are defined in the context of the study as follows.

IT asset management (ITAM): ITAM is the process of managing hardware and software through its useful life so that organizational leaders know what is owned, who has it, or where it is located (Kamal & Petree, 2006).

Personal computer (PC) asset management tools: PC asset management tools are used to perform electronic asset inventory management, automatic software distribution, and software metering and monitoring (Chen, 2002).

CHAPTER 2

REVIEW OF RELATED LITERATURE

In Chapter 1, the topic for study was introduced and the scope of the problem to be researched was established. Chapter 2 presents and synthesizes relevant peer-reviewed and journal-published research related to the problem. As such, prior research is presented for critique and positions this study in its historical context, which provides the justification and conceptual framework for studying the topic. A review of related research models is presented to provide the context in which they have been applied in scholarly works.

Overview of PC Asset Management Tools

The ITAM discipline is just beginning to be understood and is expected to grow into a strong component of corporate IT (Kamal & Petree, 2006). Kamal and Petree (2006) cited IDC research that predicted that IT asset management tools would become a $1.2 billion business worldwide by 2005, which was a 42.1% increase from 2000. The business is still growing. By 2014, the same International Data Corporation sources reported that revenues had grown to $1.7 billion, which was a 6.3% increase over the prior year (IDC, 2015).

Galusha (2001) noted that many definitions are used for asset management. Galusha (2001) defined asset management as “a combination of tools and processes that proactively manage a company’s entire asset base from a cost, contractual, support, and inventory viewpoint” (p. 37). As such, the current study was used to apply that definition specifically to personal computers (PCs) in a distributed computing environment within a company or organization.

The foundation for the current study was that many company leaders fail to take advantage of PC asset management tools (Chen, 2002). Mouritsen and Mano (2007) noted that many company leaders are not tracking computer assets. To support the need for research in this area, Chapter 2 is involves a review of the usage context of these tools. The key purposes are described and the asset management phases are discussed. The financial benefits of using these tools to manage costs were investigated. Finally, a widely cited technology acceptance model was reviewed to demonstrate its application to similar studies.

Galusha (2001) identified the following four business benefits to asset management. Maintenance contracts can be better negotiated when needs and usage are accurate. Savings can be realized by redeploying assets rather than buying new ones. Accurate asset inventory enables savings by reducing the quantity and cost of software licenses. Asset management provides a means for accurately reconciling invoices.

The process of asset management of a PC environment is one used to assist technologists in the areas of hardware and software acquisition, track usage and license compliance, gather inventory, and automate software and configuration changes across a computing environment (Chen, 2002). The three primary functions of desktop asset management tools are: (a) inventory, (b) metering and monitoring, and (c) automatic software distribution. The areas are described in more detail later in the chapter.

To understand the availability and qualification of PC asset management tools, a 2013 Gartner study was reviewed. In this study, 12 companies that made PC asset management tools, as shown in Figure 3 (Cosgrove, 2013).

Source: Gartner (April 2013)

Figure 3.Gartner magic quadrant for PC asset management tools

To be included in Gartner's magic quadrant for client management tools, the products were required to support operating system deployment, asset inventory, automated software distribution, and patch management. Relevant functionality of the products noted by Gartner included data and settings migration, remote control, software metering, power management, and application virtualization. The tools that support power management can provide considerable enterprise benefit. A PC in an idle state draws 60 watts of power, while a PC in a low energy state draws only 5 watts of power, which equates to an estimated worldwide savings of $50 billion (Ruth, 2011).

Naik, Mohindra, and Bantz (2004) described PC asset management systems as "systems management services" (p. 78). The functions of the systems are to manage configuration, software distribution, support and troubleshooting, upgrades, and asset and license management. Naik et al. (2004) noted two widely used commercial platforms for these tools—Microsoft® Systems Management Server and Tivoli® Configuration Manager.

Asset Inventory

Mouritsen (2013) explained the importance of asset inventories. Inventory, also referred to as asset tracking, is a foundational component of functionality in these tools because an accurate inventory is essential to the financial accounting for these assets. Asset management has its roots in accounting. As such, inventory is rooted in well-established accounting practices of purchasing and depreciation, expensing of assets, leasing assets, and the acquisition of assets through donation. Mouritsen (2013) noted that some company leaders expense the costs of assets under a certain numeric value. While the purchasing department personnel may have a record of the purchase, and accounts payable personnel may have a record of the payment, many of the assets do not show on the balance sheet (Mouritsen, 2013). An asset tracking system should alert managers to what assets are due for retirement, where they reside, and what company data are stored on them (Mouritsen, 2013). Software licensing without accurate asset counts puts a company in a risky position as costly civil damages, fines, and criminal charges face those who violate software piracy laws (Mouritsen, 2013).

Mouritsen and Mano (2007) listed 13 benefits of maintaining an accurate PC asset inventory, which included the following (Mouritsen and Mano, 2007, p. 51):

1. Assists with redeploying unused hardware and software,
2. Prevents redundant purchases of assets already owned,
3. Prevents theft of assets,
4. Provides guidance for software purchases and maintenance,
5. Facilitate the after-market sale of assets,
6. Provides for savings on property taxes of idle hardware,
7. Reduces maintenance costs for unused assets,
8. Helps technicians identify company or confidential data to purge from assets being retired,
9. Accelerate end-of-lease process,
10. Helps to provide an accurate total cost of ownership (TCO),
11. Improved tracking of downtime,
12. Facilitates better help desk service value,
13. Enables a department-based allocation of costs.

Technology asset management tools automatically collect asset inventory and maintain the data in a centralized database. According to Thanjaivadivel, and Singh (2012), in a report published in the *International Journal on Computer Science and Engineering*, some organizational leaders take a manual approach to inventory by building out a hardware and software inventory spreadsheet. The Information Technology Infrastructure Library (ITIL) officials recommend using a configuration management database (CMDB) for automatically tracking inventories of technology assets. The CMDB is used to establish relationships between components of the technology environment, which aids in troubleshooting during system outages.

Khan and Valverde (2014) asserted that to run IT as a fiscally responsible business, IT experts must understand the use of IT assets and applications so that they can withstand regular audits on inventory and software compliance. Audits are necessary to meet compliance requirements, such as Sarbanes-Oxley. In addition to other benefits, proper use of IT assets and applications enable the organizational leaders to complete security audits, provide depreciation costs for assets, report on the end-of-life for assets, and manage leased assets through the end of lease. Conducting a manual inventory is costly, time consuming, and does not adapt well to the rate of change in technology environments.

Automated Software Distribution

Automated software distribution is the process of deployment and installation of software onto distributed PCs on an enterprise network with little or no human intervention (Fung, Low, & Ray, 2004). Software has been largely moved from centralized mainframe computers to distributed PCs; therefore, automated software distribution is essential to managing and maintaining software assets. The first automated software distribution tools became available in the early 1990s (Fung, Low, & Ray, 2004, p. 53). The general architecture of these platforms was that software was transferred from a central site server to remote intermediate servers. At a predetermined and scheduled time, the system installed software automatically on target computers.

Software distribution is part of the delivery phase of the PC life cycle (Mouritsen 2007). The tools are used to eliminate the in-person manual installations of software and force a standard installation configuration. Completion of the installation is electronically verified and this data becomes available to asset inventories.

Additionally, automated software distribution applies to the deployment of software security patches. Wirth (2011) contended that a key aspect of asset management is the ability to determine the security posture of network-connected devices, which enables the operating systems on devices to be maintained at the latest revision level.

Juve and Deelman (2011) reported the importance of automatic deployment of distributed applications was discussed. Distributed applications require complex environments; therefore, the deployment of the software must be automated to save time and reduce human error. The software should be automatically provisioned and configured on-demand using a simple and repeatable process (Juve and Deelman, 2011).

Matougui and Leriche (2012) defined software deployment as a “complex process that includes a number of inter-related activities” (p. 13). Matougui and Leriche (2012) contended that it is hard to accomplish the software deployment process manually. Therefore, it is necessary to automate the deployment process and the reconfiguration of software dynamically, with minimal human intervention (Matougui & Leriche, 2012).

Based on the tight relationship between hardware and software, each of the hundreds of thousands of PCs in a computing environment must be managed individually (Zhang & Zhou, 2011), which increases the total cost of ownership (TCO). Centralized storage and distribution can reduce the complexity, deployment time, application availability, and improve security.

Software Metering and Monitoring

Software piracy is described as one of the most significant threats to intellectual property (Xin et al., 2012). The Business Software Alliance (BSA) experts publish an annual report regarding software piracy (as cited in Xin et al., 2012). In 2009, the BSA experts estimated a

$51.4 billion loss from software counterfeiting and piracy. In response to the threat, software company leaders are combating piracy committed by corporations and organized crime.

In the BSA report (as cited in Xin et al., 2012), experts indicated that Microsoft® accused the Mexican drug cartel La Familia of pirating Office® 2007. La Familia earned an estimated $2.2 million dollars daily from counterfeiting. In an attempt to protect themselves, software makers have adopted a number of methods to protect intellectual property. The methods include software watermarking, tamper-proofing, a software birthmark, and obfuscation (Xin et al., 2012). Software birthmarks and watermarks are designed to prevent theft (Xin et al., 2012).

Based on concerns of software piracy, software makers are becoming more aggressive with subjecting organizations to software audits. In a 2012 study conducted by IDC, 334 companies were surveyed (2012 Key Trends in Software Pricing and Licensing Survey, 2012). The survey showed that 25% of companies with revenues greater than $1 billion were audited in 2012. Of the companies audited in 2012, 51% were audited by Microsoft, 27% by Oracle, 24% by IBM, 22% by SAP, and 19% by Adobe. "True-up" penalties ranged from $1 million to $10 million. A 12% increase occurred in the number of organizations reporting that a portion of annual software costs is related to true-up penalties.

Software assets can provide one of the largest opportunities for cost savings in an enterprise (Kamal & Petree, 2006). Kamal and Petree (2006) found that Halliburton realized a 70% savings in Adobe® software licensing costs by centralizing the management of software licenses and inventory. Additionally, they cited studies by officials at Meta Group and Gartner who expanded on the data. Meta Group officials estimated that software costs account for about 25% of the total IT budget for most organizations. Gartner officials estimated that organizations will spend $500 for every $100 spent on purchasing software over the two- to three-year useful life of the software. Company leaders who effectively manage software through its useful life can save 20-40% on their IT budgets.

PC Asset Management Phases

Four life cycle phases related to PC assets exist including: (a) procurement phase, (b) delivery phase, (c) support phase, and (d) retirement phase. Mouritsen and Mano (2007) described the life cycle phases of the PC, which are summarized in this section.

In the *procurement phase*, managers make decisions about what assets to purchase and how they will be purchased (Mouritsen & Mano, 2007). To make these decisions, it is necessary to know what assets the company already owns. Software license and maintenance are considered in this phase. Mouritsen and Mano (2007) noted that leaders at one company were able to reduce software maintenance on their email software by presenting the accurate count of deployed copies following a significant staff reduction. It is in this phase that technology standards ensure that the overall low TCO is managed (Mouritsen & Mano, 2007).

In the *delivery phase* technicians allocate hardware and software assets to those who need them. Given that these tools are able to target and automate the process of deploying software, the delivery phase eliminates the time-consuming task of manual software installations (Mouritsen & Mano, 2007).

The majority of an asset's life is spent in the *support phase*. With an effective asset management system in place, support staff can diagnose incidents more quickly and the help desk can resolve support calls during the initial contact (Mouritsen & Mano, 2007).

In the *retirement phase*, it is important to address what to do with assets that are taken out-of-service. If the equipment sits idle, accountants may continue to pay property taxes on hardware or software. The assets may have critical or confidential data stored on them that must be removed before disposal. Companies exist that offer services to clean and destroy retired PCs (Mouritsen & Mano, 2007).

Total Cost-of-Ownership

Personal computers are part of a larger context of technology known as information technology (IT). IT is a requisite component of the support infrastructure of a modern business. Information technology can be used to provide company leaders with a competitive advantage. That said, “IT is quite expensive” (Chen, 2002, p. 80), and many company leaders have complained that productivity was not substantially improved through the implementation of IT (Strassmann, 1997). Computer hardware and software costs have risen relative to other operating costs. The goal of PC asset management is to reduce costs, increase effectiveness, and increase the return on investment for such assets (Chen, 2002). Mouritsen (2013) cited Gartner’s estimated cost reduction of nearly 43% over the lifetime of the PC.

The cost of acquiring PC hardware and software represents approximately 20% of the cost of owning them (Mouritsen & Mano, 2007). The most significant costs of owning computing assets come from maintenance activities, downtime, security, help desk support, training, network connectivity, and disposal. In order to gain an understanding of the remaining 80% of the cost of ownership, it is necessary to track these assets (Mouritsen & Mano, 2007).

Chen (2002) noted that Gartner researchers introduced the total cost of ownership (TCO) model in 1998. The purpose of TCO was to identify “hidden costs” in addition to more traditional, well-documented costs of acquisition and procurement. As such, TCO includes capital costs, technical support costs, administrative costs, and operating costs attributed to the end-users of the technology. This provided a foundation for conducting “what if scenarios” that justify long-term IT investments and identify methodologies for the reduction of TCO (Chen, 2002).

Technology Acceptance Model

The background of the TAM was discussed in Chapter 1. In this section examples where TAM has been validated and an overview of recent studies that have reviewed or used TAM in scholarly works are given.

Adams, Nelson, and Todd (1992) set out to conduct a replication of the previous work of Fred Davis. In their research, two studies were conducted (Adams et al., 1992). In the first study, attitudes towards the use of voice and email messaging technologies were studied (Adams et al., 1992). Adams et al. (1992) replicated of the validation tests conducted by Davis. In the second study, ease of use and usefulness of three popular software packages were examined (Adams et al. 1992). The results, published in *MIS Quarterly*, demonstrated reliable results and valid scales for ease of use and usefulness (as cited in Adams et al., 1992). Structural equation modeling validated the relationships between ease of use, usefulness, and actual use. Both studies were found to have the same validity and reliability characteristics as the 1989 study by Davis.

Hendrickson, Massey, and Cronan (1993) published a report on the test-retest reliability of the perceived usefulness and perceived EOU scales in *MIS Quarterly*. Hendrickson et al. (1993) noted that the Davis study found an alpha coefficient of .98 for perceived usefulness and .94 for perceived ease of use. Hendrickson et al. (1993) found that the smallest alpha was .89, while the largest was .96. As a result, Hendrickson et al. (1993) concluded that the instrument is reliable and that the Davis instrument exhibits strong test-retest reliability.

Turner, Kitchenham, Brereton, Charters, and Budgen (2010) published a study that examined whether TAM is a predictor of subjective and objective measures of actual usage. Turner et al. (2010) performed an extensive literature review that included 79 empirical studies in 73 articles. The results indicated that behavioral intent (BI) is correlated with actual use. Turner et al. (2010) concluded that the use of TAM should be confined within the context for which it has been validated.

Shroff, Deneen, and Ng (2011) examined the behavioral intent of students to use an e-portfolio system. The empirical study surveyed 72 student participants. The results indicated that the perceived EOU had significant impact on the attitude (A). Perceived EOU also strongly influenced perceived usefulness (U). Shroff et al. (2011) concluded that TAM is a solid and valid model in the context of this problem.

Straub (2009) noted that TAM was used to excel in the applicability of theory that predicts individual adoption of technology. Straub (2009) noted that TAM does not consider prior experience, age, gender, or other characteristics that influence attitudes about technology. Successor models are relatively untested; therefore, TAM remains a relevant and contemporary method to predict the individual use of technology (Straub, 2009).

The TAM is often used in combination with other models. Chen, Shih, and Yu (2012) combined TAM with the “IS success model” (p. 1217) to study the adoption of virtual reality among a group of teachers. Participants in the study spent a semester in a virtual reality course. Chen et al. (2012) concluded that TAM is a useful theoretical model to help explain behavior intention to use virtual reality technology and was suitable for their study. The results indicated that TAM can be used to predict the user’s behavior in adopting technology (Chen et al., 2012).

Further, Chen et al. (2012) recommended using TAM for future studies related to the adoption of digital technologies.

Chuttur (2009) noted that TAM is a highly cited model and is the “only one that has captured the most attention of the Information Systems community” (p. 0). Chuttur (2009) conducted an extensive literature review regarding the historical evolution of TAM from 1985 to 2007. The report indicated that there have been 700 citations to the original TAM research by Davis. Topical examples where TAM has been used include the study of the adoption of email, voicemail, fax, eCommerce applications, groupware, spreadsheets, case tools, hospital IS, decision support systems, and telemedicine technology. Chuttur (2009) reported that all studies indicated strong evidence that TAM is useful in predicting usage behavior and a number of limitations were cited. Limitations included the use of self-reported data rather than actual use data. Additionally, TAM is a deterministic model and an individual’s act is determined by his intention to act. Chuttur (2009) concluded that future research may build upon and extend TAM to focus on these limitations.

The TAM was used in a study by Niehm, Tyner, Shelley, and Fitzgerald, (2010) who examined the adoption of technology in small, family-owned businesses. Over 14,000 family-owned businesses in the United States were screened, obtaining a sample size of 708. Niehm et al. (2010) supported established studies that link adoption of technology with perceived ease of use and usefulness. In the study, ease of use and decision to adopt technology accounted for more than 60% of the variance in usefulness of technology (Niehm et al., 2010).

Correa, Rondan-Cataluña, and Gaitán (2013) studied the adoption of social networking services (SNS) among members of Generation Y in Chile. Correa et al. (2013) added three antecedents of perceived usefulness to TAM, including social identity, telepresence, and altruism. Correa et al. (2013) concluded that this modified TAM model successfully explained the adoption of SNS by Generation Y in Chile.

Ma, Chao, and Cheng (2013), published a study in which TAM was used to predict the behavioral intention (BI) to use a blended e-learning system (BELS) among nurses. The empirical study surveyed 900 nurses and received a 72.2% response rate (Ma et al., 2013). Structural equation modeling (SEM) indicated that perceived usefulness is an important factor affecting BI (Ma et al., 2013).

In a published study in the *International Journal of Environmental Research and Public Health,* Liu, Tsai, and Jang (2013) examined the acceptance of a web-based personal health record system among patients. The TAM was used to examine the perceived ease of use and perceived usefulness to determine what limits the behavioral intent (BI) to use the system. The results indicated that perceived usefulness had significant impact on BI.

Summary

According to Chen (2002), company leaders fail to implement PC asset management tools for inventory, software metering and monitoring, and automatic software distribution. The benefits have been identified as improvements in cost management, increased efficiency, and reduced compliance risks. Given the benefits, it is necessary to understand the barriers to the intention to use PC asset management tools.

The TAM has been shown to be a valid predictor of the behavioral intent to use technology (Davis et al., 1989). Technology executives, business managers, and those who manufacture PC asset management tools would like to be able to evaluate the barriers to the use of these tools. The ability to identify these barriers provides an opportunity to take actions necessary to improve the likelihood of a successful implementation of PC asset management. As such, TAM has become a well-established method for evaluating the behavioral intent to use technologies and was used in this study.

CHAPTER 3

METHODOLOGY

This chapter involves the analytical methodology used in conducting the current empirical study regarding the stated problem. An online survey was used to collect data from the population of technology leaders who are members of the National Retail Federation's CIO Council. The survey results were collected, compiled, and analyzed.

Survey Research Methods

When a questionnaire is used to collect data subjects, it is referred to as a survey. In the current research project, a survey was conducted. One purpose for research studies is to describe situations and events (Babbie, 1986). Babbie (1986) said that surveys are used when people are the unit of analysis. Surveys are often used as a form of gathering information when it is the only way the information can be gathered (Alreck & Settle, 1994). According to Alreck and Settle (1994), a survey is used to enable the researcher to gain knowledge from people about what they know or believe about a topic. This survey provided greater understanding about what affects the intention to use PC asset management tools among technology leaders.

A survey process consists of a series of six linked steps (Alreck & Settle, 1994). These six steps are as follows (p. 26):

1. Specify information needs
2. Sampling design

3. Instrumentation
4. Data collection
5. Data processing
6. Report generation

The process described by Alreck and Settle (1994) was used as the foundation for the research methodology in the current study. The steps identified by Alreck and Settle (1994) were used in this study and are discussed further within this section.

Information Needs

The specific information needed is to learn from technology leaders about their perceptions that affect their use of PC asset management tools in managing personal computers in their distributed computing environments. This survey is focused on understanding technology acceptance as described by behavioral intent (BI). Alreck and Settle (1994) contended that attitudes are often the subject of surveys. Additionally, attitudes predispose people to act in a particular way. Therefore, attitudes precede behavior and affect a person's actions (Alreck & Settle, 1994), because of this, the TAM is well suited for this study. The information collected is consistent with the TAM as described by Davis (1986). Specific data elements collected are described in this chapter.

Sampling Design

The review of relevant literature described the significant challenges related to PC asset management, hardware replacement, operating-system upgrade, and inventory management of personal computers. It did not provide sufficient insight into what perceptional barriers might prevent commercially available PC management tools from being adopted to aid the process of managing the related personal computer hardware and software assets in a corporate environment.

The sampling design step focuses on defining the survey target group. For this online survey, the survey target group was technology leaders who are members of the National Retail Federation CIO Council. Specifically, the target roles for this survey were IT professionals who influence the use or decisions about PC asset management tools. This included those with the title of chief information officer (CIO), chief technology officer (CTO), vice president, director, and manager within an IT organization.

A list of individuals with these titles was obtained from the National Retail Federation. One technology leader from each company was identified for the survey. This ensured that the subjects were familiar with, and were responsible for, decisions regarding the acquisition and implementation of PC asset management tools. These subjects received the online TAM survey.

The response rate for an email or web survey—or electronically delivered surveys—differs from that of traditional mail surveys. Researchers have identified differences between traditional mail surveys and electronically delivered surveys. Griffis, Goldsby, and Cooper, (2003) published in the *Journal of Business Logistics* and verified that email-delivered web-based surveys yield a higher response rate than traditional mail-delivered paper surveys. They also noted that data were available more quickly with email-delivered web-based surveys.

Kittleson (1997), published in the *American Journal of Health Behavior*, and is often cited as an authority on response rate for email surveys. This study indicated that a response rate of at least 25% should be realized without reminders. Kittleson (1997) indicated that, while reminders can double the response rate of email surveys, a large number of reminders can cause a decrease in the response rate.

Instrumentation

The survey instrument in this study was administered using Qualtrics. Qualtrics was established in 2002 by Dr. Scott M. Smith, Ph.D. and is a commercial web-based survey platform for conducting statistical analysis (Qualtrics, 2011). The Qualtrics platform has been used to conduct over 100 million online surveys. It is used by a large number of research institutions, which established Qualtrics as a reliable platform for conducting this survey. In spring 2009, Qualtrics was selected by Indiana State University (ISU) as the standard survey research instrument. The effective use and validity of this instrument as a survey research tool has been well tested at ISU. In addition to being approved as ISU's web-based survey tool, Qualtrics also provides for the confidentiality, structure, and control of the survey. Control is necessary to insure that there is no interaction between survey participants.

The survey included a brief contextual description of the survey. The importance of the survey and the benefits to these companies were explained. The controls for the protection and disposal of the data in their responses were described. Participants were advised that a final copy of the study would be provided to participants. Informed consent was facilitated by asking the participant to read this information and agree to participate by clicking a button that begins the survey. The survey was expected to take a maximum of 15 minutes per respondent to complete.

Based on the established TAM questionnaires, the online survey posed questions related to (a) demographics, (b) attitude (A), (c) perceived ease of use (EOU), (d) perceived usefulness (U), and (e) behavioral intention to use (BI). The survey was made available for a specific period of time and the results were collected for analysis.

Survey data were secured in accordance with Qualtrics security and privacy policies. Responses to the survey were held within a secure Qualtrics server database and no personally identifiable information was collected. Qualtrics supplies access only to summary data. Only the researcher had access to this summary data. The survey data were deleted after approximately four weeks.

This is a quantitative empirical research study that employed an online survey (Beach & Alvager, 1992). Participants received an email inviting them to respond to the online survey. The email included a brief contextual summary of the study, a statement outlining the voluntary nature of this confidential survey, an estimate of the time required to take the survey, and information about how to receive the results of the survey.

The questionnaire format for surveys that use TAM is well established and noted in Appendix B. This survey questionnaire followed the established format. The survey was comprised of five sections (see Appendix B). The five sections are:

1. Demographic
2. Attitude (A)
3. Perceived ease of use (EOU)
4. Perceived usefulness (U)
5. Behavioral intention to use (BI)

There are five independent variables and one dependent variable, which are consistent with the application of TAM in other studies. Specifically, the variables are shown in Table 1.

Table 1

Variables

Variable	Variable type
Attitude (A)	Independent variable
Perceived Ease of Use (EOU)	Independent variable
Perceived Usefulness (U)	Independent variable
Behavioral Intention to Use (BI)	Dependent variable

The behavioral intention to use these tools is represented by the dependent variable (BI). The 7-point Likert scale was applied to the variables. Responses to questions regarding the use of PC asset management tools were assigned an ordinal value from one to seven. Respectively, these values corresponded to the responses referring to the extremes of “Agree” and “Disagree” with options of “Strongly”, “Agree/Disagree”, “Somewhat”, and “Neither.”

The validity and reliability of the TAM methodology has been established through many works, including those of Davis (1986), Cheng, Lam, and Yeung (2006), Ekufu (2012), Lai and Li (2005), and Wu and Chen (2005). The survey instrument is adapted from these studies to conform to a model that has already been successfully tested for validity and reliability.

A draft of the questionnaire was reviewed by the dissertation committee. Upon refining the survey in this step, it was submitted to the ISU Institutional Review Board (IRB) for approval. Five colleagues, willing to participate in a pilot, were identified. The survey was then administered to the pilot group in order to ensure that the mechanics of the survey were working properly and to model the statistical analysis. Statistical analysis was performed on the data obtained from the pilot survey and reviewed. Any revisions to the survey instrument were submitted for final approval to the dissertation committee and ISU IRB. Upon approval, the survey was administered to the population of the members of the National Retail Federation's CIO Council. The survey identified those companies that were included in the pilot group for comparison. Pilot responses were discarded and were not included in the final statistical analysis.

One question was used to verify that the participant had been advised of the purpose and confidentiality of the survey. It was intended that the survey be constructed so that it can be completed in less than 15 minutes to encourage participation.

Data Collection

Qualtrics was used as the means to collect the data. The participants received an email from the system that provided a link to the survey website and an overview of the survey. The link each participant received was unique, which enabled them to respond one time without the need to create unique credentials that could discourage participation. Two follow-up reminders were sent via email over the course of 14 days. The researcher was the only person with access to the survey questionnaire, list of participants, and results.

Data Processing

After providing ten days for participants to respond to the survey, the survey was closed to complete the analysis of the collected data. Structural equation modeling and multiple regression analysis were used to examine correlations between perceived EOU, perceived usefulness, and the intention to use this technology. Microsoft® Excel® and SPSS® were used to analyze the results.

Report Generation

SPSS and AMOS will be used to create the required graphs and tables. These tools have statistical algorithms that are well established in research. The report generation aspects of this study are presented in Chapter 4 in the context of the results.

Summary

This chapter was used to describe the survey methodology to be used for this research study. It was established that a survey is an appropriate means of collecting experiential information from human subjects. Qualtrics is approved by ISU as the web-based survey tool and is commonly used for similar research studies. The tools used to collect and analyze the data were identified.

CHAPTER 4

RESULTS

This chapter presents the results and statistical analysis of the survey results of this study. The survey, adapted from well-established TAM surveys, was conducted in January of 2015. A total of 95 technology executives, who are members of the National Retail Federation's (NRF) CIO Council, received the survey via email. There were 26 completed surveys, which rendered a return rate of 27%. The responses were screened for unengaged participants, outliers, and missing data. SPSS® was used to analyze the data for linearity, exploratory factor analysis, and structural equation modeling. Any anomalies that were found are discussed in this chapter.

Data Screening

The standard deviation of the participants' responses ranged from 0.400 to 1.802. Two participants submitted responses with a standard deviation of less than 0.5. A visual observation of those responses concluded that the participants had made an intentional effort to respond in that way. As such, no participation responses were discarded due to lack of engagement.

Descriptive Statistics

This section describes the descriptive statistics. Tables 2 and 3 show the demographic characteristics of the current study. The target participant was a technology executive. Among the 26 responses, 25 held roles at the VP level or higher.

Table 2

Role Demographics

Which title best describes your current role?		
Job Title	Frequency (*n*=26)	%
Chief information officer (CIO)	20	76.9
VP of information technology	4	15.4
Chief technology officer (CTO)	1	3.8
Director of information technology	1	3.8

The years of experience among the participants were almost evenly distributed among the first four experience categories. There were 3 of 26 participants who were in the 2 most experienced categories.

Table 3

Experience Demographics

Please select your years of experience in your current role		
Job Experience	Frequency (*n*=26)	%
Less than 5 years	7	26.9
Between 5 and 10 years	6	23.1
Between 10 and 15 years	5	19.2
Between 15 and 20 years	5	19.2
Between 20 and 25 years	1	3.8
More than 25 years	2	7.7

Variable Screening

The survey responses were reviewed for anomalies. There were no missing values. During the investigation, the standard deviation of two questions led to responses to three questions that appeared to be a mistake. The participants who related to these three responses had one response that was at the lowest end of the Likert scale, while all other responses were among the top end of the Likert scale. These three responses were changed to the average for all responses to those questions.

There were 20 survey questions specific to TAM. Descriptive statistics are depicted in Table 4. The resulting standard deviation values of the responses were approximately 1. There were 3 questions with an average response value of 6 (*Agree*), 11 with an average response value of 5 (*Somewhat Agree*), and 6 with an average response value of 4 (*Neither Agree or Disagree*). A kurtosis value greater than 3 was found in three questions. Given the commonality of role and experience of the participants, this is not an unreasonable observation.

Only one question, Q2_2, had a minimum response value of 1 (*Strongly Disagree*). This question had the lowest mean and highest standard deviation. The negative kurtosis value of -0.564 for this question reflects a flat distribution for this question’s responses.

Table 4

Descriptive Statistics for Variables–Exploratory Factor Analysis

	Statistics						
	N	Missing	Minimum	Maximum	Mean	Std. Deviation	Kurtosis
Q1_1	26	0	3	7	6.04	1.038	2.229
Q1_2	26	0	3	7	6.08	1.017	2.951
Q1_3	26	0	3	7	5.08	1.055	-1.249
Q1_4	26	0	3	7	6.19	1.021	2.986
Q2_1	26	0	3	7	4.96	1.148	-0.428
Q2_2	26	0	1	6	4.12	1.633	-0.564
Q2_3	26	0	2	7	4.73	1.151	0.184
Q2_4	26	0	2	6	4.85	1.008	1.178
Q2_5	26	0	2	7	4.92	1.262	0.692
Q2_6	26	0	2	6	5.04	1.076	1.065
Q3_1	26	0	3	7	5.19	1.167	-0.812
Q3_2	26	0	2	7	5.19	1.132	1.275
Q3_3	26	0	2	6	4.85	1.084	1.987
Q3_4	26	0	2	7	5.31	1.011	3.629
Q3_5	26	0	4	6	5.38	.697	-0.575
Q3_6	26	0	3	7	5.23	.908	0.139
Q3_7	26	0	2	7	5.81	1.021	7.401
Q4_1	26	0	2	7	5.58	1.172	2.095
Q4_2	26	0	2	7	5.19	1.234	1.701
Q4_3	26	0	2	7	5.42	1.027	3.824

An exploratory factor analysis was conducted with the data. During this iterative process, four questions were removed to facilitate acceptable factor loading with minimal cross-loading. The extraction method used was principal axis factoring. The rotation method used was promax with Kaiser Normalization.

The Kaiser-Meyer-Olkin (KMO) statistic is a measure of sampling adequacy. Values close to 1.0 indicate that the factor analysis may be useful with the data. Values less than 0.50 indicate that a factor analysis would not be useful. Bartlett's test of sphericity tests to ensure that the correlation matrix is suitable for factor analysis when the significance level is less than 0.05.

SPSS® calculates these values and populates the table. As such, it is not necessary to calculate them manually. For reference, the algorithms used by SPSS® are as follows (Norušis, 2007):

The Kaiser-Mayer-Olkin (KMO), a measure of sample adequacy, is calculated as follows:

$$KMO_j = \frac{\sum_{i \neq j} r_{ij}^2}{\sum_{i \neq j} r_{ij}^2 + \sum_{i \neq j} a_{ij}^{2*}} \qquad KMO = \frac{\sum_{i \neq j} \sum r_{ij}^2}{\sum_{i \neq j} \sum r_{ij}^2 + \sum_{i \neq j} \sum a_{ij}^{2*}}$$

where a*ij is the anti-image correlation coefficient.

The chi-square value for Bartlett's test of sphericity is calculated as follows:

$$\chi^2 = -\left(W - 1 - \frac{2p+5}{6} \right) \log |\mathbf{R}|$$

with $p(p-1)/2$ degrees of freedom.

Table 5 shows the results of a KMO and Bartlett's test. According to Gaskin (2015a), a KMO score greater than .7 is desirable. The survey results were higher at .769. Thus, the data were suitable for factor analysis. A significance less than .5 is needed to consider the result significant (Gaskin, J., 2015a). The survey results were significant at .000.

Table 5

KMO and Bartlett's Test

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy.		.769
Bartlett's Test of Sphericity	Approx. Chi-Square	317.730
	df	105
	Sig.	.000

Communalities for variables are shown in Table 6. SPSS® iterates to find a solution for communalities and factor loadings. With each iteration i, the communalities from the preceding iteration are placed on the diagonal of R, and the resulting R is denoted by Ri. Eigenanalysis is performed on Ri and the new communality of variable j is estimated by the following (Norušis, 2007):

$$h_{j(i)} = \sum_{j=1}^{m} |\gamma_{k(i)}| \, \omega^2_{jk(i)}$$

Factor loadings are obtained by the following:

$$\Lambda_{m(i)} = \Omega_{m(i)} \Gamma^{1/2}_{m(i)}$$

SPSS® continued iterations until the maximum number is reached or until the maximum change in the communality estimates is less than the convergence criterion. All communalities were above the desired threshold of 0.3, as shown in Table 6. Additionally, many of the values are approaching 1.0, which is an indication that the extracted components represent the variables well (Norušis, 2007).

Table 6

Communalities for Variables

	Initial	Extraction
Q1_1	0.956	0.911
Q1_2	0.946	0.883
Q1_4	0.933	0.926
Q2_1	0.759	0.591
Q2_2	0.761	0.516
Q2_3	0.729	0.595
Q2_4	0.892	0.862
Q2_5	0.772	0.775
Q2_6	0.886	0.827
Q3_1	0.782	0.796
Q3_3	0.630	0.443
Q3_4	0.884	0.730
Q3_6	0.637	0.733
Q4_2	0.677	0.502
Q4_3	0.890	0.870

Extraction method: Principal axis factoring.

Table 7 shows details about the total variance. Eigenvalues represent the explanation of the total variances of the factors. Generally, only eigenvalues greater than 1 should be considered factors. There are four factors with values greater than 1. Four factors were expected in this analysis. They are usefulness (U), ease-of-use (EOU), attitude (A), and behavioral intent (BI). The eigenvalues in Table 7 were computed by SPSS® using the QL method published by Wilkinson and Reinsch in 1971 (Norušis, 2007).

Table 7

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	7.334	48.894	48.894	7.099	47.323	47.323	6.380
2	2.150	14.335	63.228	1.899	12.661	59.985	4.786
3	1.368	9.122	72.351	1.106	7.375	67.360	3.203
4	1.104	7.361	79.711	0.856	5.709	73.069	3.634
5	0.818	5.455	85.166				
6	0.720	4.799	89.965				
7	0.409	2.725	92.690				
8	0.299	1.991	94.681				
9	0.241	1.605	96.285				
10	0.174	1.160	97.445				
11	0.150	0.997	98.442				
12	0.117	0.782	99.224				
13	0.054	0.358	99.583				
14	0.038	0.254	99.836				
15	0.025	0.164	100.000				

Extraction method: Principal axis factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

The Eigenvalues section of Table 7 shows the variance explained by the initial solution. Four factors in the initial solution have eigenvalues greater than 1. The eigenvalues account for

79.7% of the variability in the original variables. The “Extraction Sums of Squared Loadings” section shows the variance explained by the extracted factors before rotation. The cumulative variability explained by these four factors in the extracted solution is 73%, a difference of 6.7% from the initial solution. Therefore, 6.7% of the variation explained by the initial solution is lost due to latent factors. The latent factors are unique to the original variables and variability and cannot be explained by the factor model.

The “Rotation Sums of Squared Loadings” section of Table 7 shows the variance explained by the extracted factors after rotation. The rotated factor model made significant adjustments to the factors from the unrotated factors. The unrotated extraction matches more closely to the initial eigenvalues. As such, the unrotated factors indicated 73% of the variance is a better indicator of the variance associated with these factors.

SPSS® uses the following algorithm to calculate the factors in the pattern matrix, as shown in Table 8.:

$$\mathbf{F}_m = \mathbf{S}\Omega_m(\Lambda_m - I_m)\Lambda_m^{-1/2}$$

where Ωm and Λm correspond to the m eigenvalues greater than 1.

For convergent validity, it is desirable to find results above 0.5, as shown in Table 8. The values should average above 0.72 (Gaskin, J., 2015a). The results meet this criteria.

For discriminant validity, cross-loadings should be greater than the desired 0.2 (Gaskin, 2015a). The results met this criteria. However, the variables are not loading significantly to one factor. Therefore, the factor correlation matrix must be used to confirm discriminant validity (Gaskin, J., 2015b).

Table 8

Pattern Matrix

	Factor			
	1	2	3	4
Q2_5	1.060			
Q2_4	0.860			
Q2_6	0.823			
Q3_4	0.749			
Q2_3	0.665			
Q3_3	0.576			
Q4_2	0.551			
Q1_1		0.953		
Q1_4		0.937		
Q1_2		0.857		
Q2_2			0.812	
Q4_3			0.743	
Q2_1			0.650	
Q3_6				0.926
Q3_1				0.700

Extraction method: Principal axis factoring.

Rotation method: Promax with Kaiser normalization.

a. Rotation converged in 6 iterations.

To avoid shared variance, there should be no factor correlations greater than 0.7 (Gaskin, 2015b). The results in Table 9 show that the factor correlations are significantly lower than 0.7, which indicated that the factors are distinct and uncorrelated and meet the requirements of discriminant validity.

Table 9

Factor Correlation Matrix

Factor	1	2	3	4
1	1.000	0.534	0.483	0.528
2	0.534	1.000	0.186	0.481
3	0.483	0.186	1.000	0.239
4	0.528	0.481	0.239	1.000

Extraction method: Principal axis factoring.
Rotation method: Promax with Kaiser normalization.

Reliability Statistics

Reliability is related to the consistency of item-level errors within a single factor. This indicates that the set of variables will consistently load on the same factor (Gaskin, 2015b). An exploratory factor analysis was conducted to obtain the value of Cronbach's alpha for each factor. The values are above the required value of 0.7. Thus, the results are considered reliable (see Table 10).

SPSS® used the following algorithm to calculate Cronbach's alpha (Norušis, 2007):

Cronbach's alpha per dimension (s=1,...,p):

$$\alpha_s = m_w \left(\lambda_s^{1/2} - 1 \right) / \left(\lambda_s^{1/2} \left(m_w - 1 \right) \right)$$

Total Cronbach's alpha is

$$\alpha = m_w \left(\sum_s \lambda_s^{1/2} - 1 \right) / \sum_s \lambda_s^{1/2} \left(m_w - 1 \right)$$

with λs the sth diagonal element of Λ as computed in the orthonormalization step during the last iteration.

Table 10

Reliability Matrix

TAM Factor	Cronbach's alpha	*N* of Items
Attitude	0.905	4
Ease of use	0.792	6
Usefulness	0.880	7
Behavioral intent	0.767	3

In Table 11, the rotated component matrix is designed to help determine the correlation of the survey questions to the components. Each survey question has a relationship to one of the four components. Minor cross-loading was observed. While linearity will be established later in this chapter, the chart showed that improvements to the TAM survey would eliminate the cross-loading.

Table 11

Principal Component Analysis (PCA)–Rotated Component Matrix

	Component			
	1	2	3	4
R1.4 It is desirable to use PC asset management tools	.926			
R1.1 Using PC asset management tools is a good idea	.873			
R1.2 Implementing PC asset management tools in my organization's work environment is a wise idea	.872			
R3.7 Overall, using PC asset management tools is advantageous	.814			
R1.3 Using PC asset management tools would be unpleasant	.655			
R3.1 Using PC asset management tools would enable my organization to accomplish its tasks more quickly	.647			.497
R3.2 Using PC asset management tools would make it easier for my organization to carry out its tasks	.638			
R3.4 Using PC asset management tools would be cost effective	.594	.577		
R2.6 My organization would find PC asset management tools easy to use when performing its job functions		.815		
R2.4 My organization would find PC asset management tools easy to interact with during its job performance		.801		
R2.3 My organization's interaction with PC asset management tools would be clear and simple		.793		
R2.5 It would be easy for my organization to become more skillful and experienced with PC asset management tools	.434	.745		
R3.3 PC asset management tools would be resilient	.482	.484		
R4.1 My organization will use PC asset management tools for my computing needs	.454	.459	.422	

(continued)

	Component			
	1	2	3	4
R4.3 I would see my organization using PC asset management tools in performing its job functions			.941	
R2.2 My organization would find it easy to get PC asset management tools to perform its job functions			.849	
R2.1 Learning how to apply PC asset management tools would be easy for my organization		.534	.568	
R3.6 PC asset management tools would improve performance				.793
R3.5 PC asset management tools would be easily available				.720
R4.2 Using PC asset management tools in performing my organization's job tasks is something I would do		.562		.584

Extraction method: Principal component analysis.
Rotation method: Varimax with Kaiser normalization.
a. Rotation converged in 8 iterations.

Linear Correlation Statistics

The basis of the current study's hypothesis was to determine if there is a linear relationship between perceived usefulness, perceived ease of use, or attitude and the behavioral intent to use PC asset management tools. The linear relationships of other variables were also calculated for the purpose of observing the interactions for the entire model (see Table 18).

Statistical values of *R* square, *F* statistic, and *p* value are needed to establish linearity between two variables (Gaskin, 2015a). SPSS® was used to calculate these statistical values. As such, these values were not calculated manually. The SPSS® Statistical Procedures Companion provides detail about the descriptions and calculations for these statistics (Norušis, 2007). They are discussed here as reference.

R-squared is the statistical measure of how close the data are to the fitted regression line. It is calculated by squaring the sum of the difference between the estimated values of the dependent variable minus the mean of the dependent variable (the regression sum of squares), divided by the sum of the difference between the actual values of the dependent variable minus the mean of the dependent variable (the total sum of squares). Mathematically, the formula is as follows:

$$R2 = SSR / SST = \Sigma(\hat{y}i - \bar{y})2 / \Sigma(yi - \bar{y})2$$

The *F* statistic is the ratio of the two estimates of variance. A higher *F* statistic provides evidence against the null hypothesis. *F* statistic is calculated by dividing the between-groups mean square by the within-groups mean square. Mathematically, the formula is as follows:

$$F = (\text{mean square between groups})/(\text{mean square within groups})$$

Significance is determined by the *p* value. The *p* value represents the probability of the occurrence of a given event. A *p* value less than 0.05 is considered statistically significant. Mathematically, the formula is as follows:

$$p\text{-value} = 2 * P(TS > |ts| \; |H0 \text{ is true}) = 2*(1-cdf(|ts|))$$

Where:

P is the probability of a random variable having a range of values.

TS is the random variable associated with the assumed distribution.

ts is the test statistic calculated from the sample.

cdf() is the cumulative density function of the assumed distribution.

The relevant criteria for establishing linearity between two variables is that the *p* value (“Sig”) is less than .05 and that the *F* statistic is greater than the critical value of the *F* distribution (Gaskin, 2015a). In this case, the alpha is 0.10, df1=1, and df2=24; the critical value for the *F* statistic is 2.92712. If the *F* statistic is significantly greater than the critical value, then a strong linear relationship was suggested.

The relationship between perceived ease of use (EOU) and usefulness (U) is significant with a *p* value of 0.001 (see Table 12). The model indicates that 34.9% of the variance is explained by this model and the *F* statistic of 12.843 is greater than the critical value of the *F* statistic.

Table 12

Linear Correlation Statistics between EOU and U

Model Summary and Parameter Estimates							
	Model Summary					Parameter Estimates	
Equation	*R* square	*F*	*df1*	*df2*	*Sig.*	Constant	b1
Linear	.349	12.843	1	24	0.001	2.756	0.529

Independent variable: EOU.
Dependent Variable: usefulness

The relationship between EOU and attitude (A) is significant with a p value of 0.015 (see Table 13). The model indicated that 22.4% of the variance is explained by this model and the *F* statistic of 6.919 is greater than the critical value of the *F* statistic.

Table 13

Linear Correlation Statistics between EOU and A

Model Summary and Parameter Estimates							
	Model Summary					Parameter Estimates	
Equation	*R square*	*F*	*df1*	*df2*	*Sig.*	Constant	b1
Linear	.224	6.919	1	24	.015	3.460	.500

Independent variable: EOU.
Dependent variable: Attitude

The relationship between perceived usefulness (U) and attitude (A) is significant with a p value of 0.000 (see Table 14). The model indicated that 55.9% of the variance was explained by the model and the *F* statistic of 30.415 is greater than the critical value of the F statistic.

Table 14

Linear Correlation Statistics between U and A

Model Summary and Parameter Estimates							
	Model Summary					Parameter Estimates	
Equation	*R square*	*F*	*df1*	*df2*	*Sig.*	Constant	b1
Linear	.559	30.415	1	24	0.000	1.189	0.882

Independent variable: Usefulness.
Dependent variable: Attitude

The relationship between EOU and behavioral intent to use (BI) is significant with a *p* value of 0.000 (see Table 15). The model indicates that 60.6% of the variance is explained by the model and the *F* statistic of 36.852 is greater than the critical value of the *F* statistic.

Table 15

Linear Correlation Statistics between EUO and BI

Model Summary and Parameter Estimates							
	Model Summary					Parameter Estimates	
Equation	R Square	F	df1	df2	Sig.	Constant	b1
Linear	0.606	36.852	1	24	0.000	1.316	0.856

Independent variable: EOU.
Dependent Variable: BI

The relationship between perceived usefulness (U) and behavioral intent to use (BI) is significant with a *p* value of 0.002 (see Table 16). The model indicated that 32.5% of the variance is explained by this model and the *F* statistic of 11.573 is greater than the critical value of the *F* statistic.

Table 16

Linear Correlation Statistics between U and BI

Model Summary and Parameter Estimates							
	Model Summary					Parameter Estimates	
Equation	*R square*	*F*	*df1*	*df2*	*Sig.*	Constant	b1
Linear	.325	11.573	1	24	.002	1.703	.700

The independent variable is usefulness.
Dependent Variable: bi

The relationship between perceived attitude (A) and behavioral intent to use (BI) is significant with a *p* value of 0.010 (see Table 17). The model indicated that 24.8% of the variance is explained by this model and the *F* statistic of 7.926 is greater than the critical value of the *F* statistic.

Table 17

Linear Correlation Statistics between A and BI

Model Summary and Parameter Estimates							
	Model Summary					Parameter Estimates	
Equation	*R square*	*F*	*df1*	*df2*	*Sig.*	Constant	b1
Linear	.248	7.926	1	24	.010	2.368	.518

Independent variable: Attitude.
Dependent variable: BI

Figure 4 puts these results into a graphical format for easier viewing. A direct relationship between EOU and BI is not part of TAM, but it was added for additional context.

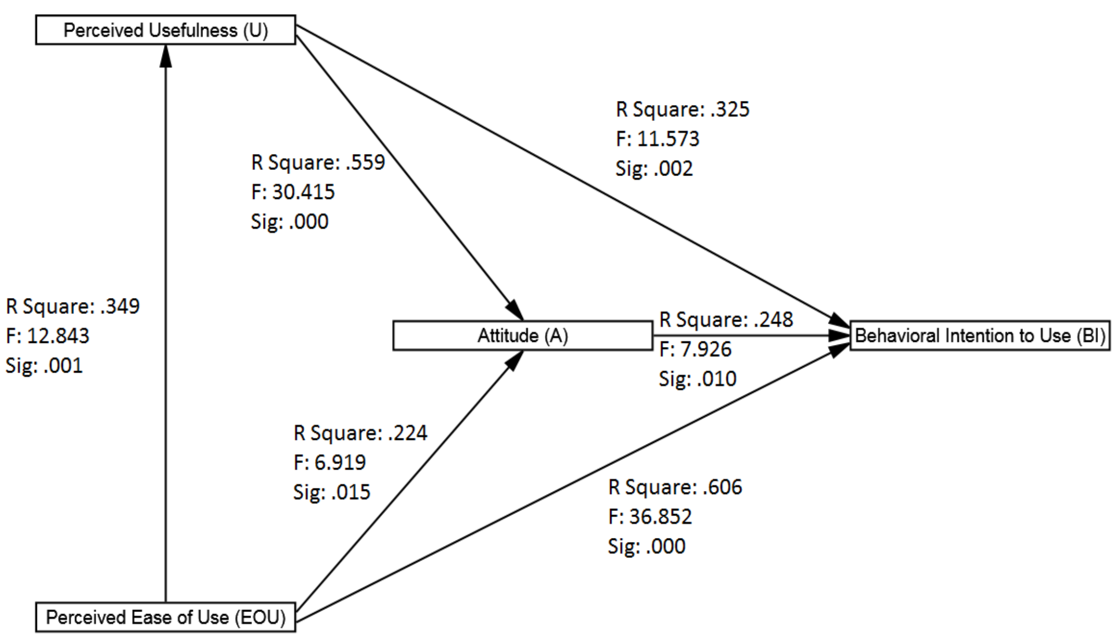

Figure 4. Linearity statistics in TAM graphical format.

Table 18

Correlation Statistics

		Attitude	Ease of Use	Usefulness	Behavioral Intent
Attitude	Pearson Correlation	1	0.432*	0.646**	0.459*
	Sig. (2-tailed)		0.028	0.000	0.018
	N	26	26	26	26
Ease of Use	Pearson Correlation	0.432*	1	0.561**	0.762**
	Sig. (2-tailed)	0.028		0.003	0.000
	N	26	26	26	26
Usefulness	Pearson Correlation	0.646**	0.561**	1	0.568**
	Sig. (2-tailed)	0.000	0.003		0.002
	N	26	26	26	26
Behavioral Intent	Pearson Correlation	0.459*	0.762**	0.568**	1
	Sig. (2-tailed)	0.018	0.000	0.002	
	N	26	26	26	26

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Structural Equation Model

In Figure 5, the final results are shown in a structural equation model. Again, a direct relationship between EOU and BI is not part of TAM, but it was added here for additional context.

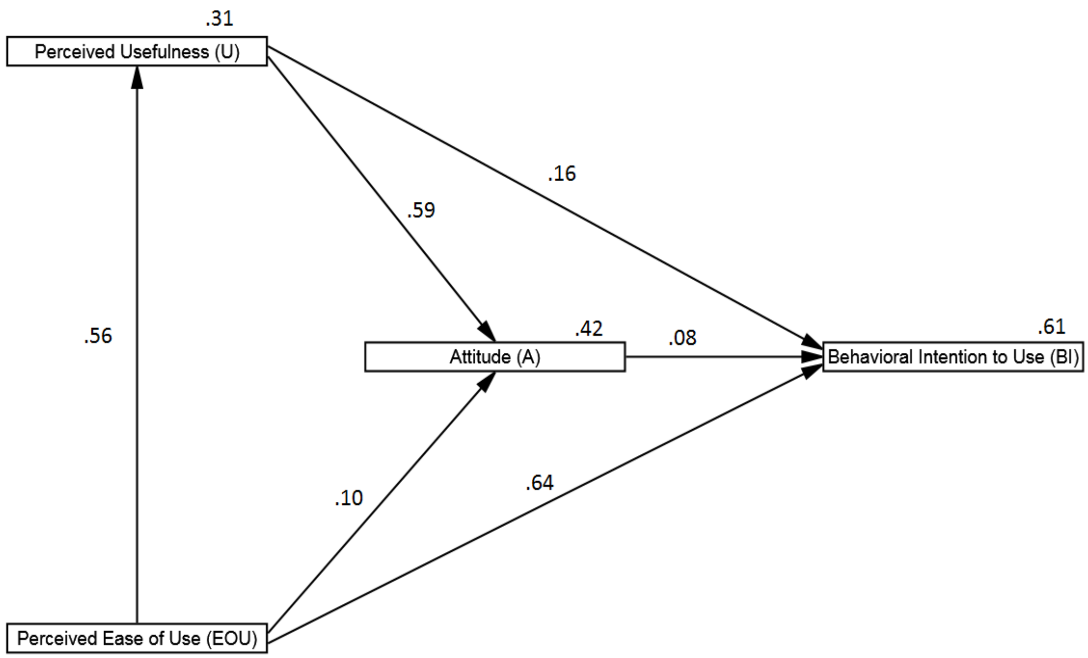

Figure 5. Results in structural equation model graphical format

As part of the confirmatory factor analysis (CFA), the regression weights (see Table 19) and standardized regression weights (see Table 20) were calculated. According to Gaskin (2015b), there should not be differences greater than 0.200 between the estimate values of the regression weights and the standardized regression weights. The results were within 0.200.

Table 19

Regression Weights: (Group number 1–Default model)

			Estimate	S.E.	C.R.	*p*	Label
Useful1	<---	EOU1	0.362	0.107	3.385	***	
Attitude1	<---	Useful1	0.525	0.164	3.214	0.001	
Attitude1	<---	EOU1	0.058	0.106	0.554	0.580	
BI1	<---	Useful1	0.095	0.108	0.878	0.380	
BI1	<---	Attitude1	0.056	0.111	0.502	0.616	
BI1	<---	EOU1	0.250	0.059	4.232	***	

Table 20

Standardized Regression Weights: (Group number 1-Default model)

			Estimate
Useful1	<---	EOU1	0.561
Attitude1	<---	Useful1	0.589
Attitude1	<---	EOU1	0.101
BI1	<---	Useful1	0.157
BI1	<---	Attitude1	0.082
BI1	<---	EOU1	0.639

Testing of Hypotheses

Table 21 shows the results in a hypothesis summary table. Based on the analysis of the data, each null hypothesis was rejected.

Table 21

Hypothesis Summary Table

Hypothesis	Evidence	Supported?
Ho1: β1=0. There is no linear correlation between the perceived ease-of-use (EOU) and a technology leader's intention to use PC asset management tools to manage computers running the Microsoft Windows operating systems.	*R* square: .606 *F*: 36.852 Sig: .000	Yes. 60.6% of the variance is explained, the *F* statistic is greater than the critical value of the *F* statistic, and the results are significant (<0.05).
Ho2: β2=0. There is no linear correlation between the perceived usefulness (U) and a technology leader's intention to use PC asset management tools to manage computers running the Microsoft Windows operating systems.	*R* square: .325 *F*: 11.573 Sig: .002	Yes. 32.5% of the variance is explained, the *F* statistic is greater than the critical value of the *F* statistic, and the results are significant (<0.05).
Ho3: β3=0. There is no linear correlation between attitude (A) and a technology leader's intention to use PC asset management tools to manage computers running the Microsoft Windows operating systems.	*R* square: .248 *F*: 7.926 Sig: .010	Yes. 24.8% of the variance is explained, the *F* statistic is greater than the critical value of the *F* statistic, and the results are significant (<0.05).

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents conclusions and recommendations about the current study. The chapter includes a restatement of the project's purpose, discussions and conclusions, implications, and recommendations.

Restatement of the Research Purpose

The purpose of the current study was to gain an understanding about what affects the intention to use PC asset management tools among technology leaders. The research questions, based on the TAM, were used to determine if a retail technology leader's behavioral intention to use commercial PC asset management tools to manage computers running the Microsoft® Windows® operating system could be predicted by understanding the tool's perceived EOU, perceived usefulness, and attitudes towards the tools.

Discussion and Conclusions

The results of the current research led to the conclusion that a strong linear relationship exists between EOU and the behavioral intent (BI) of retail technology executives to use PC asset management tools to manage computers in their business running the Microsoft® Windows® operating system. Usefulness (U) and Attitude (A) also had good linear relationships to behavioral intent (BI).

A review of literature on the topic of the use of asset management tools was used to establish that these tools were available, but not universally implemented. IDC researchers indicated that IT asset management tools became a $1.7 billion business worldwide by 2014 (International Data Corporation, 2015). Mouritsen and Mano (2007) indicated many company leaders are not tracking computer assets. The literature review did not indicate reasons why company leaders were not tracking PC assets. Therefore, the current research will add to the base of knowledge on this topic.

The current research used the TAM, a well-established research method for predicting the acceptance of technology. The survey instrument created by Davis (1986) for the TAM was adapted for the purpose of this survey, which has since been adapted by many researchers.

Executive technology leaders in retail companies were the target of this research. Among the participants, 76.9% were Chief Information Officers. Further, 96.2% of the participants held executive titles of Chief Information Officer, Chief Technology Officer, and Vice President of Information Technology. Therefore, the majority of the respondents were members of the target group.

Experience was almost evenly spread among 5-year increments of job experience. Of the participants, 26.9% had less than 5 years of experience;. 23.1% had between 5 and 10 years of experience; 19.2% had between 10 and 15 years of experience; and 19.2% had 15 to 20 years of experience. Participants with more than 20 years of experience represented 11.5% of the sample.

With regard to the first research question, the null hypothesis was rejected. The main predictor of the adoption of PC asset management tools among technology executives was EOU. The linear relationship between EOU and behavioral intention (BI) to use PC asset management tools was strong. The linear relationship between usefulness (U) and behavioral intent (BI) was very good. Therefore, the null hypothesis for the second research question was rejected. Based on the presence of a good linear relationship between attitude (A) and behavioral intent (BI), the null hypothesis for the third research question was rejected.

The EOU was the best predictor of behavioral intent (BI). One conclusion drawn about this was that the technology executives may have concluded that the tools are useful, but needed to see proof that they could be easily implemented and used. Another conclusion drawn was that executives have concluded that PC asset management tools are useful, but getting them deployed and getting value out of them was more difficult.

The survey questions with the strongest agreement, or lowest standard deviation, were Q3_5 and Q3_6. The questions gathered perceptions about whether PC asset management tools are "easily available" and "would improve performance," respectively. The mean of the responses were on the high side of "*somewhat agree*."

The survey question with the weakest agreement, or lowest standard deviation, was Q2_2. The question was used to gather perceptions about whether PC asset management tools would enable "job functions" to be "performed easily". The mean of these responses were in the "*neutral*" range.

There were cases of cross-loading of factors. As a result, discriminant validity could not be determined using a pattern matrix. A factor correlation matrix was used, which indicated a need to further examine and refine the survey questionnaire in an attempt to eliminate the cross-loadings and better align to the TAM factors.

The structure of the survey questions was such that they referred to a direct linear relationship between EOU, usefulness, and attitude on the behavioral intent to use the technology. However, the traditional TAM model does not consider a direct relationship between EOU and behavioral intent to use the technology. The traditional model considers an indirect relationship between these factors through attitude. Further, EOU was a stronger predictor of behavioral intent than it was of attitude, which indicated that future studies on this topic should also include the direct relationship, so that the results can be compared.

While it was not among the research questions, the data showed a strong linear relationship between usefulness and attitude. As a result, participants who felt that PC asset management tools were useful had a more positive attitude about them than those who did not feel so strongly about the usefulness of the tools.

There is a relationship between EOU and usefulness, which was shown in the results with minor cross-loading between these two factors. Again, the results showed that refining the questions would provide better distinction between ease-of-use and usefulness.

The results and findings in the current study have indicated that EOU, usefulness (U), and attitude (A) all have a linear relationship to the behavioral intent (BI) of retail technology executives to use PC asset management tools to manage PC assets running Microsoft® Windows®. The research questions were answered and all three null hypotheses were rejected. The TAM was a good choice for this research study. However, there are opportunities to improve the model with future research specific to the acceptance of asset management tools.

Implications

This study adds to what is known about technology adoption and acceptance in very specific ways. The results clearly indicated that the strongest factor that influences the acceptance of PC asset management tools is the perceptions about EOU. Makers of these tools must realize that technology leaders are unlikely to adopt such tools if they are difficult for their organization to use. In fact, EOU was a better predictor than usefulness. Investments of time in training could certainly improve the EOU. The study was used to identify the financial implications of the effective management of PC assets to technology leaders, given that the literature review indicated disconnects between physical asset management and financial access management.

Recommendations

Based on the results of the current study, the following recommendations are presented:

1. Similar studies should be conducted regarding the management of technology assets that are not PC based on the Microsoft® Windows® operating system. Examples of such studies included Apple computers, non-Windows® tablets, and Smartphones. These technologies are becoming more prevalent in the workplace.
2. The acceptance of PC asset management tools in other industries should be studied. The results could be compared to the current study to determine if similarities exist, which could lead to more streamlined training. Product developers might focus on out-of-the-box integration with financial asset management systems, if the influencing factors across industries are similar.
3. The implications for financial accounting for fixed assets should be investigated. PC hardware and software are purchased by companies. But, as the literature indicated, many company leaders do not know what the assets are, who uses them, and where they are located.
4. A study could compare specific PC asset management tools to compare the EOU and the corresponding adoption of those products.
5. The TAM survey needs to be refined, so that it lends itself more directly to structural equation modeling.

6. The results of the current survey could lead to the creation of “centers of excellence” in companies for the management of technology assets. These departments would be highly effective, based on the possibility of specialized training on these products and their daily use.

REFERENCES

2012 Key Trends in Software Pricing and Licensing Survey. (2012) Retrieved from http://www.flexerasoftware.com

About NRF. (2014). Retrieved from http://www.nrf.com

Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information technology: A replication. *MIS Quarterly,16*(2), 227-247. doi:10.2307/249577

Adedoja, G., & Morakinyo, D. A. (2014). Mobile learning platform programme and pre-service teachers' behaviour towards mobile instruction using technology acceptance model. *Journal of Educational Research and Reviews, 2*(2), 12-17. Retrieved from http://sciencewebpublishing.net/jerr/archive/2014/February/pdf/Gloria%20and%20Daniel.pdf

Alreck, P. L., & Settle, R. B. (1994). *The survey research handbook*. New York, NY: McGraw-Hill/Irwin.

Au, Y. A., & Kauffman, R. J. (2002). Rational Expectations and Information Technology Adoption. http://www.misrc.umn.edu/workshops/2002/fall/Au_120602.pdf

Babbie, E. R. (1986). *The practice of social research*. Belmont, CA: Wadsworth.

Beach, D. P., & Alvager, T. K. E. (1992). *Handbook for scientific and technical research*. Englewood Cliffs, NJ: Prentice Hall.

Brodkin, J. (2010). *Windows 7 will dominate corporate PC deployments, Forrester says*. Retrieved from http://www.networkworld.com/news/2010/110210-windows-7-corporate-deployment.html

Chen, C. Y., Shih, B. Y., & Yu, S. H. (2012). Disaster prevention and reduction for exploring teachers' technology acceptance using a virtual reality system and partial least squares techniques. *Natural Hazards, 62*(3), 1217-1231. doi:10.1007/s11069-012-0146-0

Chen, J. C. H. (2002). Enterprise computing asset management: a case study. *Industrial Management & Data Systems, 102*(2), 80-88.

Cheng, T., Lam, D. and Yeung, A. (2006), Adoption of Internet banking: An empirical study in Hong Kong, *Decision Support Systems, 42*(3), 1558-72. doi:10.1016/j.dss.2006.01.002

Chuttur, M. Y. (2009). Overview of the technology acceptance model: Origins, developments and future directions. *All Sprouts Content 9*(37), Paper 290. Retrieved from http://wiki.commres.org/pds/TechnologyAcceptanceModel/TAMReview.pdf.

Correa, P. R., Rondan-Cataluña, F. J., & Gaitán, J. A. (2013). Exploration of the factors that affect the adoption of social networking services by generation in Chile. *Interciencia, 38*(9), 628-633.

Cosgrove, T. (2013). *Magic quadrant for client management tools*. Stamford, CT: Gartner.

Davis, F. D., Jr. (1986). *A technology acceptance model for testing new end-user information systems: theory and results* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses.(Order No. 0374529).

Davis, F. D., Jr., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982-1003. doi:10.1287/mnsc.35.8.982

Doms, M. (2004). *The boom and bust in information technology investment**. *FRBSF Economic Review* 19-33. Retrieved from http://www.frbsf.org/economic-research/files/er19-34bk.pdf

Ducey, A. (2013). *Predicting tablet computer use: An extended technology acceptance model* (Master's thesis, University of South Florida). Retrieved from http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=5668&context=etd

Ekufu, T. K. (2012). Predicting cloud computing technology adoption by organizations: An empirical integration of technology acceptance model and theory of planned behavior. (Doctoral dissertation). Retrieved from ProQuest ddatabase. (Order No.1143076636.)

Fathema, N., & Sutton, K. L. (2013). Factors influencing faculty members' learning management systems adoption behavior: An analysis using the technology acceptance model. *International Journal of Trends in Economics Management and Technology, 2*(6), 20-28. Retrieved from http://www.ijtemt.org/proceedings_vol2_issue6/4_Factors_ Influencing_Faculty.pdf

Fung, K. H., Low, G., & Ray, P. K. (2004). Embracing dynamic evolution in distributed systems. *IEEE Software*, *21*(2), 49-55. doi:10.1109/MS.2004.1270762

Galusha, C. (2001). Getting started with IT asset management. *IT Professional Magazine, 3*(3), 37-40. doi:10.1109/6294.939973

Gaskin, J. (2015, February 17). *SEM boot camp 2015* [Video file]. Retrieved from https://www.youtube.com/user/Gaskination

Gaskin, J. (2015, July 2). *StatWiki*. Retrieved from http://statwiki.kolobkreations.com/wiki/Main_Page

Griffis, S. E., Goldsby, T. J., & Cooper, M. (2003). Web-based and mail surveys: A comparison of response, data, and cost. *Journal of Business Logistics*, *24*(2), 237-259. doi:10.1002/j.2158-1592.2003.tb00053.x

Heine, J., & Fiering, L. (2007). *Operational considerations in determining PC replacement life cycle.* Stamford, CT: Gartner.

Hendrickson, A. R., Massey, P. D., & Cronan, T. P. (1993). On the test-retest reliability of perceived usefulness and perceived ease of use scales. *MIS Quarterly, 17*(2), 227-230. doi:10.2307/249803

International Data Corporation [IDC]. (2010). *PC market rebound will drive double-digit growth through 2014, according to IDC*. Retrieved from http://www.businesswire.com/news/home/20100315005565/en

International Data Corporation [IDC]. (2015). *Worldwide IT asset management software forecast, 2015-2019*: *Virtual and mobile endpoints accelerating market growth*. Retrieved from http://www.idc.com/getdoc.jsp?containerId=257925

James, V. (2014). Evaluation of factors affecting acceptance of nanotechnologies by managers using technology acceptance model. *International Journal of Research in Science and Engineering*. Retrieved from http://prj.co.in/setup/socialscience/paper140.pdf

Jaw, C., Yu, O. S., & Gehrt, K. C. (2011). The determinants of the adoption of online payment services: Integrating customer experiences and perceptions into the technology acceptance model. *International Journal of Arts & Sciences, 4*(22), 255-271.

Juve, G., & Deelman, E. (2011, November). Automating application deployment in infrastructure clouds. IEEE Third International Conference on Cloud Computing Technology and Science (CloudCom), (pp. 658-665). doi:10.1109/CloudCom.2011.102

Kamal, M., & Petree, R. (2006). Enterprise IT asset management. *Review of Business Information Systems* (RBIS), *10*(3), 47-52.

Khan, N., & Valverde, R. (2014). The use of RFID based supply chain systems in data centers for the improvement of the performance of financial institutions. *Engineering Management Research, 3*(1), 24. doi:10.5539/emr.v3n1p24

Kittleson, M. J. (1997). Determining effective follow-up of e-mail surveys. *American Journal of Health Behavior, 21*(3), 193-196.

Lai, V. & Li, H. (2005). Technology acceptance model for internet banking: An invariance analysis. *Information Management*, *42*(2), 373-86. doi:10.1016/j.im.2004.01.007

Liu, C. F., Tsai, Y. C., & Jang, F. L. (2013). Patients' acceptance towards a web-based personal health record system: An empirical study in Taiwan. *International Journal of Environmental Research and Public Health, 10*(10), 5191-5208. doi:10.3390/ijerph10105191

Ma, C. M., Chao, C. M., & Cheng, B. W. (2013). Integrating technology acceptance model and task-technology fit into blended e-learning system. *Journal of Applied Sciences, 13*(5), 736-42.

Matougui, M. E. A., & Leriche, S. (2012, November). A middleware architecture for autonomic software deployment. ICSNC 2012, The Seventh International Conference on Systems and Networks Communications (pp. 13-20). Retrieved from *https://www.thinkmind.org/download.php?articleid=icsnc_2012_1_30_20169.pdf*

Microsoft. (2009). *Upgrading from Windows® XP to Windows® 7*. Retrieved from http://windows.microsoft.com/en-US/windows7/help/upgrading-from-windows-xp-to-windows-7

Mouritsen, M. (2013). Is your organization managing or mangling its technology assets? *Strategic Finance, 94*(7), 35-41. Retrieved from http://www.thefreelibrary.com/Is+your+organization+managing+or+mangling+its+technology+assets%3F-a0315371317

Mouritsen, M. L., & Mano, R. (2007). Do you know where your computers are? *Strategic Finance, 88*(7), 46-52.

Naik, V. K., Mohindra, A., & Bantz, D. F. (2004). An architecture for the coordination of system management services. *IBM Systems Journal, 43*(1), 78-96. doi:10.1147/sj.431.0078

Niehm, L. S., Tyner, K., Shelley, M. C., & Fitzgerald, M. A. (2010). Technology adoption in small family-owned businesses: accessibility, perceived advantage, and information technology literacy. *Journal of Family and Economic Issues, 31*(4), 498-515. doi:10.1007/s10834-010-9197-0

Nkenke, E., Vairaktaris, E., Bauersachs, A., Eitner, S., Budach, A., Knipfer, C., & Stelzle, F. (2012). Acceptance of virtual dental implant planning software in an undergraduate curriculum: A pilot study. *BMC Medical Education, 12*(1), 90. doi:http://dx.doi.org/10.1186/1472-6920-12-90

Norušis, M. J. (2007). *SPSS® 15.0 Advanced Statistical Procedures Companion*. Upper Saddle River, N.J: Prentice Hall.

Pell, N. (2010). How to discuss the upgrade of the computer lab. Retrieved from http://www.ehow.com/how_7307155_discuss-upgrade-computer-lab.htmlctronic software distribution, and help desk consolidation

Qualtrics. (2011). *About Qualtrics*. Retrieved from http://www.qualtrics.com/about

Ruth, S. (2011). Reducing ICT-related carbon emissions: An exemplar for global energy policy? *IETE Technical Review, 28*(3), 207-211. doi:10.4103/0256-4602.81229

Shroff, R. H., Deneen, C. D., & Ng, E. M. (2011). Analysis of the technology acceptance model in examining students' behavioural intention to use an e-portfolio system. *Australasian Journal of Educational Technology*, *27*(4), 600-618.

Spector, L. (2009). *Windows® 7: Upgrade checklist*. Retrieved from http://www.pcworld.com/article/172589/windows_7_upgrade.html

Strassmann, P. A. (1997). Computers Have Yet To Make Companies More Productive. Retrieved from http://www.strassmann.com/pubs/computerworld/yetprod.shtml

Straub, E. T. (2009). Understanding technology adoption: Theory and future directions for informal learning. *Review of Educational Research, 79*(2), 625-649. doi:10.3102/0034654308325896

Thanjaivadivel, M., & Singh, K. (2012). WWDC server software inventory management and automation. *International Journal on Computer Science & Engineering, 4*(8), 1493-97.

Turner, M., Kitchenham, B., Brereton, P., Charters, S., & Budgen, D. (2010). Does the technology acceptance model predict actual use? A systematic literature review. *Information and Software Technology, 52*(5), 463-479. doi:10.1016/j.infsof.2009.11.005

Wirth, A. (2011). Cybercrimes pose growing threat to medical devices. *Biomedical Instrumentation & Technology, 45*(1), 26-34. doi:10.2345/0899-8205-45.1.26

Wu, I. & Chen, J. (2005), An extension of trust and TAM model with TPB in the initial adoption of on-line tax: an empirical study. *International Journal of Human-Computer Studies, 62*(6), 784-808. doi:10.1016/j.ijhcs.2005.03.003

Xin, Z., Chen, H., Wang, X., Liu, P., Zhu, S., Mao, B., & Xie, L. (2012). Replacement attacks: Automatically evading behavior-based software birthmark. *International Journal of Information Security, 11*(5), 293-304. doi:10.1007/s10207-012-0170-9

Yang, B. (2009). *Structural models of technology adoption* (Doctoral dissertation). Retrieved from ProQuest database. (Order No. NR55690).,

Zhang, Y., & Zhou, Y. (2011). Separating computation and storage with storage virtualization. *Computer Communications*, *34*(13), 1539-1548. doi:10.1016/j.comcom.2010.06.024

APPENDIX A: NATIONAL RETAIL FEDERATION MEMBERS

No.	Title	Company	City	State	Country
1	GVP & Co-CIO	Abercrombie & Fitch Co.	New Albany	OH	United States
2	VP & Co-CIO	Abercrombie & Fitch Co.	New Albany	OH	United States
3	VP Global IT	Adidas Group AG			Germany
4	SVP & CIO	Aeropostale	Lyndhurst	NJ	United States
5	SVP/CIO	Ann	New York	NY	United States
6	CIO	Army & Air Force Exchange Service	Dallas	TX	United States
7	CIO	Ascena Retail Group Inc.	New Albany	OH	United States
8	VP - CIO	Avenue Stores	Rochelle Park	NJ	United States
9	VP and CIO	Barnes & Noble, Inc.	New York	NY	United States
10	CIO	Batteries Plus	Green Bay	WI	United States
11	SVP & CIO	Beall's, Inc.	Bradenton	FL	United States
12	VP, CIO	Bed Bath & Beyond	Union	NJ	United States
13	EVP and CIO	Belk, Inc.	Charlotte	NC	United States
14	VP and CIO	BevMo!	Concord	CA	United States
15	CIO	Big 5 Sporting Goods	El Segundo	CA	United States
16	SVP, IT	Books-A-Million Inc.	Franklin	TN	United States
17	SVP and CIO	Boscov's Department Store LLC	Reading	PA	United States
18	CIO	Brooks Brothers Group, Inc.	Enfield	CT	United States
19	CIO	Build-A-Bear Workshop Inc.	Saint Louis	MO	United States
20	VP, IT	Canadian Tire (FGL Sports)		AB	Canada
21	SVP and CIO	Carter's Inc.	Atlanta	GA	United States
22	CIO	Charlotte Russe Holdings	San Francisco	CA	United States
23	EVP CIO	Coach	New York	NY	United States
24	CIO	Container Store	Coppell	TX	United States
25	VP, IT	Crate and Barrel	Northbrook	IL	United States
26	SVP & CIO	Crocs	Niwot	CO	United States
27	SVP IT	Deckers Outdoor Corporation	Goleta	CA	United States
28	EVP and CIO	Domino's Pizza Inc.	Ann Arbor	MI	United States
29	SVP and CIO	DSW Inc.	Columbus	OH	United States
30	CIO	Dunkin' Brands Inc.	Canton	MA	United States

No.	Title	Company	City	State	Country
31	COO	Etam Groep	2700 AA Zoetermeer		Netherlands
32	EVP, Operations	Ethan Allen Interiors Inc.	Danbury	CT	United States
33	SVP & CIO	Express, Inc	Columbus	OH	United States
34	CIO	Gap Inc.	San Francisco	CA	United States
35	EVP and CIO	Gap Inc.	San Francisco	CA	United States
36	VP, Enterprise Systems	Genesco	Nashville	TN	United States
37	SVP, CIO	Golfsmith International	Austin	TX	United States
38	VP information Technology	Helzberg Diamond Shops, Inc.	North Kansas	MO	United States
39	EVP & CIO	HSNi	St. Petersburg	FL	United States
40	CIO	J. Crew Group Inc.	New York	NY	United States
41	SVP, Information Services	L.L. Bean Inc.	Freeport	ME	United States
42	CIO	Laz-y-boy	Monroe	MI	United States
43	CIO	Levi Strauss	San Francisco	CA	United States
44	Director, Information Technology	Lindt & Sprüngli	Stratham	NH	United States
45	CIO	Living Spaces	La Marinda	CA	United States
46	Group CIO	L'Occitane			France
47	CIO	Lululemon Athletica Inc.			Canada
48	EVP, Systems Development	Macy's Systems Group	Johns Creek	GA	United States
49	CIO	Macy's Systems Group	Cincinnati	OH	United States
50	SVP, Technology	Macys.com	Cincinnati	OH	United States
51	SVP & CIO	Mattress Firm	Houston	TX	United States
52	SVP & Global CIO	McDonald's Corporation	Oak Brook	IL	United States
53	CIO - US	McDonald's Corporation	Oak Brook	IL	United States
54	CIO	Meijer, Inc.	Grand Rapids	MI	United States
55	SVP CIO	Modell's Sporting Goods	New York	NY	United States
56	SVP, Command Information Officer	Navy Exchange Service Command	Virginia Beach	VA	United States
57	SVP and CIO	Neiman Marcus	Dallas	TX	United States
58	EVP and CIO	New York & Co. Inc.	New York	NY	United States
59	EVP & CAO	Nordstrom Inc.	Seattle	WA	United States
60	VP, Information Technology	Nordstrom Inc.	Seattle	WA	United States

No.	Title	Company	City	State	Country
61	VP, IT	Northern Tool & Equipment	Burnsville	MN	United States
62	SVP & CIO	Orvis	Sunderland	VT	United States
63	VP IT	Pacific Sunwear	Anaheim	CA	United States
64	SVP and CIO	Payless Holdings	Topeka	KS	United States
65	SVP & CIO	PETCO Animal Supplies Inc.	San Diego	CA	United States
66	SVP and CIO	Pier 1 Imports, Inc.	Fort Worth	TX	United States
67	CIO	PureFormulas.com	Miami	FL	United States
68	CIO	Racetrac	Atlanta	GA	United States
69	SVP & CIO	Ratner Companies	Vienna	VA	United States
70	CIO	Red Wing Shoes	Minneapolis	MN	United States
71	VP IT	REI	Kent	WA	United States
72	CIO	Reitmans (Canada) Limited	Montreal	QC	Canada
73	SVP CIO	Restoration Hardware	Corte Madera	CA	United States
74	CIO	Rooms To Go Inc.	Seffner	FL	United States
75	SVP and CIO	Safeway	Pleasanton	CA	United States
76	SVP/CTO	Saks Incorporated	Jackson	MS	United States
77	Executive Director, Retail Management Institute	Santa Clara University	Santa Clara	CA	United States
78	SVP and CIO	Sonic Corp.	Oklahoma City	OK	United States
79	CIO	Spencer Gifts	Egg Harbor	NJ	United States
80	CIO	Sport Chalet	Flintridge	CA	United States
81	SVP, Information Technology	Sterling Jewelers Inc.	Fairlawn	OH	United States
82	CIO/CTO	Taubman	Bloomfield Hills	MI	United States
83	SVP and CIO	The Bon Ton Stores, Inc.	York	PA	United States
84	SVP & CIO	The Children's Place Retail Stores	Secaucus	NJ	United States
85	SVP & CIO	The Talbot's	Hingham	MA	United States
86	CIO	The TJX Companies, Inc.	Framingham	MA	United States
87	VP Technology	The UPS Store	San Diego	CA	United States
88	CIO	The Yankee Candle Co. Inc.	South Deerfield	MA	United States
89	CIO	Tory Burch	New York	NY	United States
90	SVP & CIO	Total Wine & More	Potamac	MD	United States
91	SVP & CIO	Tractor Supply Company	Brentwood	TN	United States
92	CIO	Under Armour	Baltimore	MD	United States
93	CIO	Urban Outfitters Inc.	Philadelphia	PA	United States

No.	Title	Company	City	State	Country
94	CAO	Urban Outfitters Inc.	Philadelphia	PA	United States
95	SVP and CIO	Wendy's	Dublin	OH	United States
96	VP of IT	Wet Seal	Foothill Ranch	CA	United States

Note: Companies were numbered for reference purposes.

APPENDIX B: SURVEY INSTRUMENT

Survey Overview

The management of personal computers across a distributed business environment can be challenging for IT professionals. Those who use personal computers depend upon them for access to communications and email, business and productivity applications, and user-created files. Because of the level of effort required to track and manage these assets, tools have been introduced to assist information technology (IT) organizations in the management of personal computers.

These personal computer (PC) asset management tools satisfy at least three basic needs. They perform electronic asset inventory management, automatic software distribution, and software metering and monitoring.

The purpose of this study is to determine the barriers that impact the use of these tools. For the purpose of this survey, please only consider your use of tools used to manage PCs running the Microsoft Windows family of operating system products in your environment.

Participants have the option to receive a copy of the study and survey results. The results can provide insight into the barriers that prevent the use of PC management tools across their peer group.

Survey Questionnaire

Demographic Questions

Role of Participant	
D1	Which title best describes your current role? • Chief Information Officer (CIO) • Chief Technology Officer (CTO) • VP of Information Technology • Director of Information Technology • Manager of Information Technology • Staff IT Professional

Experience of Participant	
D2	Please select your years of experience in your current role • Less than 5 years • Between 5 and 10 years • Between 10 and 15 years • Between 15 and 20 years • Between 20 and 25 years • More than 25 years

TAM Questionnaire

Research Question 1: Attitude (A)

R1.1	Using PC asset management tools is a good idea
R1.2	Implementing PC asset management tools in my organization's work environment is a wise idea
R1.3	Using PC asset management tools would be unpleasant
R1.4	It is desirable to use PC asset management tools

Research Question 2: Perceived Ease of Use (EOU)

R2.1	Learning how to apply PC asset management tools would be easy for my organization
R2.2	My organization would find it easy to get PC asset management tools to perform its job functions
R2.3	My organization's interaction with PC asset management tools would be clear and simple
R2.4	My organization would find PC asset management tools easy to interact with during its job performance
R2.5	It would be easy for my organization to become more skillful and experienced with PC asset management tools
R2.6	My organization would find PC asset management tools easy to use when performing its job functions