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TELECOMMUTING IN HIGHER EDUCATION: AN EXAMINATION OF THE DECISION-MAKING FACTORS

A Dissertation
Presented for the
Doctor of Philosophy Degree
The University of Tennessee, Knoxville

Phyllis Joy Snodgrass
May 2002

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DEDICATION

This dissertation is dedicated to all those wonderful friends, family, teachers, professors, and coworkers who encouraged me, supported me, and never once told me that this was not possible. My gratitude to all of you is enormous.

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No one ever arrives at this point in the educational process without the help of many others. Encouragement, patience, and support from many people around me allowed me to reach this important goal. I would like to express my appreciation to the following individuals for their guidance and support throughout my academic pursuits.

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Finally, I am grateful to my family who never stopped asking, encouraging, and wondering just when I was going to finish even though at times they may not have understood why. To my father who laid the foundation for my pursuits because he never told me I could not do something because I was a girl.

ABSTRACT

The purpose in conducting this study was to research some of the factors that influence the decision whether or not to adopt a telecommuting program in the higher education setting. The study examined some organizational characteristics and the perceived constraints and motivators that could influence adoption (or not) of a telecommuting program at an institution. The study also examined the current perceptions of success of recruiting and retaining information technology staff at each institution. A post hoc survey was developed by the researcher to gather information about the motivators and constraints involved in adoption of telecommuting programs.

A total of 102 respondents from a sample of 181 (population of 347) provided an overall response rate of 62.19%. The study was conducted exclusively in the higher education setting.

Descriptive statistics, including frequencies, percentages, and means, were used to report demographic information and to also analyze some of the research questions. Further analysis of the survey information included Spearman's Rho, *t* test, and chi-square.

Major findings of the study were: (a) Research University I institutions were found to be more likely to have a telecommuting program; Master's Universities and Colleges I's comprised the highest percentage of non-adopters followed by Associate of Arts Colleges, (b) budget cuts had a significant effect on recruiting success but no statistically significant effect was found on retention success, (c) adopters and non-adopters of telecommuting reported that "improvement of overall (employee) benefits" was or would be the primary motivator for adoption of telecommuting, (d) adopters

reported cost of program implementation and legal issues as the primary constraints to adoption (e) non-adopters cited various reasons for not adopting that included a program was in the planning states, an informal program was already in place, there was not perceived need or suitable jobs, and negative issues would be or had been raised about telecommuting, (f) 62.5% of existing telecommuting programs were periodically evaluated, (g) the adoption of a telecommuting program was not related to more positive results in recruiting and retention of information technology staff, and (g) correlation coefficients indicated a positive relationship between the perceived level of success in recruiting and retention of IT staff and the success of the adopted telecommuting program, but not a statistically significant one.

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CHAPTER ONE

INTRODUCTION

Study Background

The impact of technology has exploded in higher education. The effects of this explosion are being felt in every major area of the academic world. Lembke and Rudy (2001) reported survey findings from a study conducted by EDUCAUSE in 2000 and 2001. EDUCAUSE (2002), an international non-profit association of information technology professionals in higher education, conducted a survey of its primary members and asked them to identify the most critical challenges in technology concerns to their institution. The top ten list complied from the survey included funding of information technology (IT), distance education and instructional delivery, courseware development, strategic planning, networking, and support services. Topping the list was administrative systems/ERP, IT staffing and human resources management, and distance education (Lembke & Rudy, 2001). However, a broader view highlighted the importance of technology in higher education and how the impact of technology has driven strategic planning, funding, delivery of instruction, and administration.

The impact of technology in America has created a high demand for qualified information technology professionals. The United States Department of Commerce (1998b) reported that between 1996 and 2006 the information technology industry would require more the 1.3 million new workers. Although the United States has led the world into the Information Age, it has difficulty meeting the demand for information technology workers.

With frequently limited funds and additional self-imposed obstacles, colleges and universities face critical struggle to recruit and retain IT staff. This leads to the question, What are colleges and universities doing to combat the IT staff shortage?

Although the problem of recruiting and retaining IT staff has been widely discussed in recent years, academic institutions did not feel the impact of the situation until more recently. One frequently studied solution for increasing retention and recruiting levels of IT professionals is telecommuting. However, most literature focused on the attitudes of mangers, telecommuters, and the possible impact on transportation patterns in large metropolitan areas. Further, very little has been written about the adoption and use of telecommuting programs, particularly in higher education.

The history of telecommuting is brief but indicative of the rise of technology coupled with an increased desire by employees to maintain a balance between work and personal/family life. Thompson (1999) reported that by 1998, approximately 15.7 million Americans were telecommuting at least one day per week. In a survey conducted by *Computerworld,* IT managers reported that 41% of the staff that telecommute were the IT staff of the organization (Morgan, 1999). Mega-financial corporation Merrill Lynch & Co. reported they are now training IT workers to telecommute. Hamblen (1999) reported that 300 of the 1,800 IT workers in that company telecommute at least two days per week.

It has become increasingly important for colleges and universities to cut costs. Administrative costs, the cost of conducting valuable research, and the cost of delivering higher education have created a difficult environment. Knowing how to reduce expenses

in higher education would expand their options and help to create a better, more attractive workplace.

Universities and colleges need evidence in the form of empirical research to assist them in making decisions to positively impact the recruiting and retention of valuable IT staff. This is a study of the decision-making process surrounding adoption of a telecommuting program. It also addressed the expressed concerns and provided insight into the advantages and disadvantages of offering a telecommuting program.

Statement of the Problem

Very few researchers have focused on the decision-making process of designing and adopting telecommuting programs. In the context of higher education, one small study examined the existence of telecommuting programs. However, no model for decision-making was developed and the study was conducted with a small population (54 respondents) in the western United States and Canada (Goldberg, 1993).

New technologies for delivery of instruction, research, and administration of institutional data have demanded a higher level of IT staffing than in the past. Without appropriate staffing, academic institutions lag behind and are less able to sustain their position in an increasingly competitive market. They are also frequently constrained by low budgets and limited funding which creates an even greater disadvantage.

Several studies reported that an effective tool to combat this situation is the implementation of a telecommuting program. A study that could assist academic institutions in the decision-making process and telecommuting program design would ease the difficulties of ascertaining the viability of a telecommuting program and help the

institution make better decisions about the advantages and disadvantages of such a program.

Purpose of the Study

The purpose in conducting this study was to research some of the factors that influence the decision whether or not to adopt a telecommuting program in the higher education setting. The study examined some organizational characteristics and the perceived constraints and motivators that could influence adoption (or not) of a telecommuting program at an institution. The study also examined the current perceptions of success of recruiting and retaining IT staff at each institution.

Review of the literature revealed few studies of the factors involved during the decision process of whether or not to adopt a telecommuting program. Additionally, research to date has been conducted almost exclusively in the corporate setting.

One study found in the research examined factors of telecommuting such as why colleges and universities have been slow to adopt such programs. Goldberg's (1993) study examined the use of telecommuting in the academic community, the positive and negative ramifications of telecommuting for staff and administrators, and what recommendations university administrators had for other universities considering a telecommuting program. Unfortunately, Goldberg (1993) used a very small population (54 respondents) and developed no model from the study. This study attempted to fill the knowledge gap in what constrains or motivates an academic institution to offer a telecommuting program.

Since there existed no decision-making model developed specifically for academic institutions, this study provided useful information for academic institutions

considering a telecommuting program. More importantly, it provided information for why the reasons to adopt or not adopt need to be identified to facilitate the design of an appropriate, successful telecommuting program.

Institutions considering adopting a telecommuting program could use this study to determine what factors most often motivated or constrained other institutions to adopt telecommuting and what organizational characteristics may impact the decision-making process. This study could also encourage institutions to examine the motivation, or lack thereof, for offering a program and could lead them to analyze the motivators and constraints before implementing a program.

The results of this study could ease the process of implementation and positively impact recruiting and retention of IT staff. This in turn could positively impact strategic planning and allow the institutions to properly align IT staffing and planning for the future.

This study: (a) researched the factors most often cited as motivators and advantages or constraints and disadvantages of offering a telecommuting program, (b) categorized the decision factors into groups according to a model used as a template to guide this study; and (c) developed a survey instrument to collect and study the decision-making factors surrounding adoption of telecommuting.

Theoretical Framework

The framework for this study was the examination of the motivators (advantages) and constraints (disadvantages) surrounding the decision to offer a telecommuting

program in an academic setting. Because the researcher did not discover a similar study, an original model guided this study as discussed later in this chapter.

Bernardino (1995) developed a decision-making model based on the employer's motivations and constraints and perceived impact of telecommuting on the organization's productivity and costs. However, the Bernardino study was limited to private industry. To expand the existing research, the researcher examined current studies found in the literature to design a study for use in an academic setting. Bernardino (1996) also published her study that will be used as the basis for discussion in the present study.

Goldberg (1993) looked at telecommuting in the university setting but restricted that study to institutions in the western part of the United States and parts of Canada. The small population (54 respondents) also prohibited Goldberg from making generalizations from the study. The emphasis of that study was not solely the decision-making process.

Goldberg (1993) examined the elements of the decision-making process as elements of motivators/advantages, constraints/disadvantages, program design elements, decision-making elements, recruiting and retention issues, and elements of consideration that apply specifically to information technology professionals.

Bernardino (1996) defined the employer's decision to offer a telecommuting program as a function of the organizational characteristics as well as the managers' attitudes toward telecommuting. The characteristics listed included composition of the labor force (at the organization), organizational costs associated with the telecommuting program, and the organizational structure.

Bernardino (1996) explained that she used the enumeration method to predict the results from small and large organizations, calculating the probability of a particular

telecommuting arrangement. The program design portion of the model was estimated by calculating the probability of each possible telecommuting arrangement being designed by each respondent in the sample. Finally, the decision offering model was used to calculate the probability of each designed telecommuting program being offered to the employees (Bernardino, 1996). Figure 1 illustrates the model adapted from Bernardino.

Assumptions inherent in the design of the Bernardino model were that the employer's objective was to maximize profit and that the employer searched for the attributes of a telecommuting program that would maximize profits. In the program offering decision stage of the model, the employer determined the benefits and costs of the designed program and decided whether or not to offer it to the employees.

In the academic setting, some institutions are for profit and others are not. Even though the public institutions are not solely in the business for profit, they are constrained by budgetary parameters and legislative bodies. This study assumed these constraints would have a similar impact on the public institutions as making a profit would have on private institutions, although not at the same place in the model.

In the Bernardino model, Organization's Characteristics consisted of the type of industry, location of the corporation, type of office, amount of revenue, number of employees, and whether or not the organization is undergoing a major change (i.e., re-engineering, relocation). In this study, the type and size of the institution was used as organizational characteristics as well as whether or not budget cuts had been levied in the last three years.

Bernardino (1996) described the Arrangement's Attributes as the characteristics of a telecommuting program. These attributes indicated the program’s level of flexibility

and consisted of the number of days employees were allowed to telecommute and how much home equipment was provided by the employer. According to the Bernardino model, the combination of the organizational characteristics and the arrangement attributes determined the telecommuting program design. The motivation for profit was a latent variable in the decision.

This study presented an alternative process and assumed arrangement attributes considered when examining the decision to initiate design and offering of a program. It also assumed the decision to offer and to adopt a program design was more dynamic in contrast to the linear process offered by Bernardino.

The Bernardino (1996) model originated from a structural model of the decision-making process when considering a telecommuting program. Using statistical modeling techniques, the outcomes of the possible decisions were estimated using data from the 1990 U.S. Census. Data were collected using the survey designed by Bernardino. The results of that survey were then statistically analyzed to determine how significantly the survey results matched the estimated results.

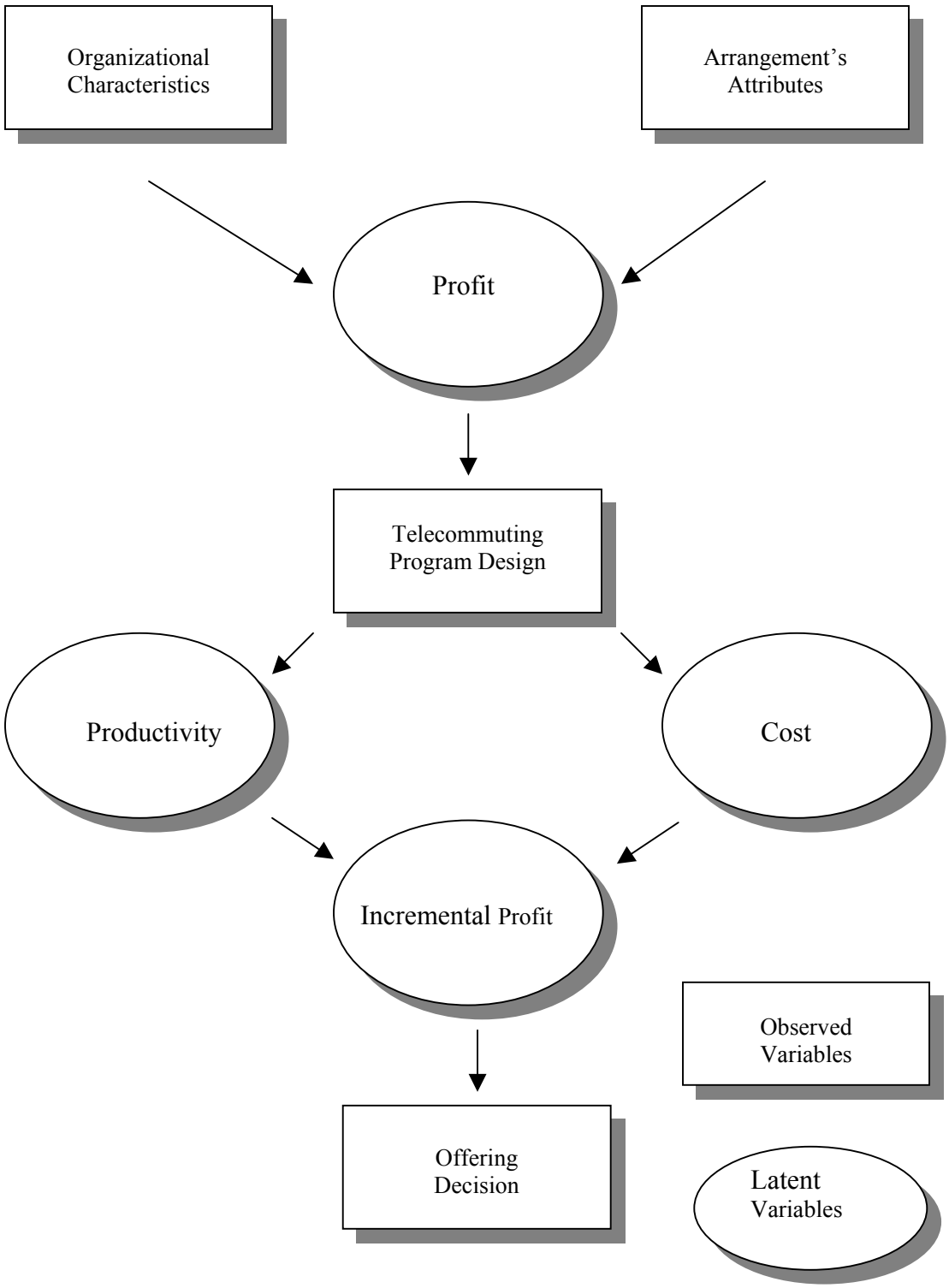

Figure 1

The Employer's Decision Process – Analytical Framework (Adapted from Bernardino, 1996)

The following original model (Figure 2), developed for the current study, graphically depicts the various elements, processes, and results of the decision-making process when considering adoption of a telecommuting program.

Organizational Characteristics

Some researchers postulated the existence of a telecommuting program in an organization to be related to innovativeness (Tomaskovic-Devey & Risman, 1993). Other studies reported that size and organizational structure are directly related to the decision to adopt telecommuting (Bernardino, 1996; Tomaskovic-Devey & Risman). The model in this study proposed organizational size as measured by number of employees and students as the key factor, with the existence of a telecommuting program to indicate innovativeness. Survey questions 4, 5, 6, and 7 collected information about the organizational characteristics.

Motivators and Advantages

This study assumed the advantages and disadvantages of a telecommuting program are closely tied to the motivators and constraints of adopting a program. For example, an employer may offer telecommuting because it is expected to increase employee productivity and is also seen as an advantage.

Conversely, if an employer expected the cost of supporting an employee to increase, offering a telecommuting program could be deemed as a disadvantage. The literature on the advantages and disadvantages of telecommuting frequently treated advantages as expectations and constraints as disadvantages.

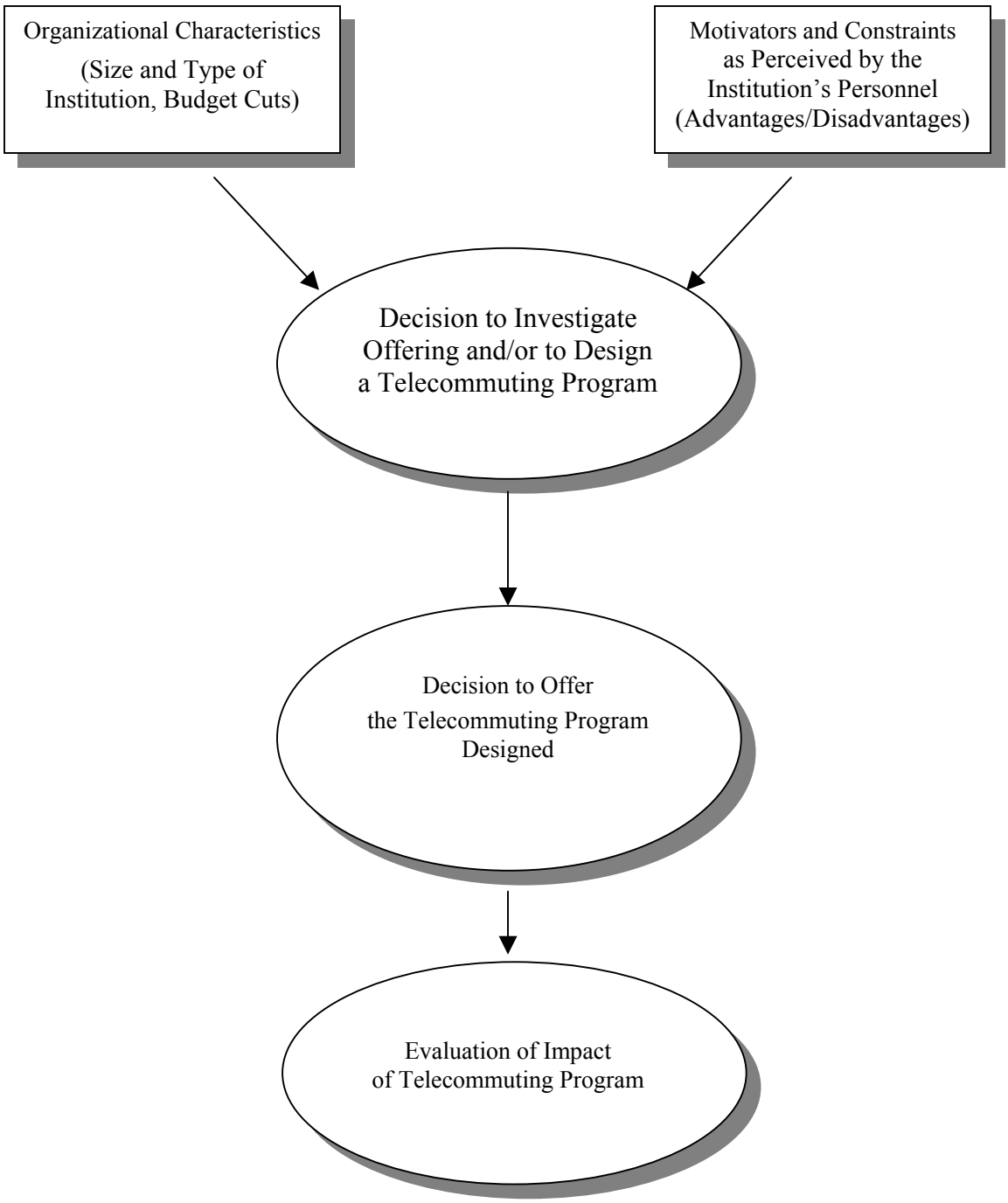

Figure 2

Decision-Making Process for Colleges and Universities Considering the Telecommuting Option for Employees

Bernardino (1996) classified motivators into three major groups: (a) the need to increase productivity, (b) reduction of costs, and (c) addressing employees' requests. However, this study tested a model that examined employee interest, increase in recruiting rate of IT staff, increase in retention rate of IT staff, increase in productivity, and improvement of overall employee benefits and workplace flexibility. These factors were found to be important to higher education and were notably identified in other studies.

The motivators for offering telecommuting cover a wide range of elements. Many states in the U.S. now have legislation that facilitates and encourages telecommuting because of heavy commuter traffic and pollution by vehicle emissions (Goldberg, 1993). Goldberg also reported that since many academic institutions are public, they are more likely to be impacted by state and local environmental protection laws and highway use.

Goldberg (1993) stated that improved productivity was most frequently cited among employers as being a motivator (advantage) to telecommuting programs. Cost reduction is a considered factor in many cases. Reducing office space requirements, cost of overhead for supporting on-site employees, and greater flexibility in recruiting were also listed as benefits or motivators for adoption. Survey questions 13, 14, 30, and 31 collected data related to this topic.

Constraints and Disadvantages

The Bernardino (1996) model considered size of the institution as a constraining factor on the adoption of telecommuting. Specifically, the organizational structure and scale were named as constraints.

Proposed constraints in this study were lack of upper management support, lack of interest from employees, cost of implementing the program, legal/regulatory issues (including union negotiations), and lack of knowledge about implementing a telecommuting program (Bernardino, 1996).

Additional studies have listed many other constraints or disadvantages to telecommuting. The factors employed here are not meant to represent an exhaustive list but are intended to provide a framework for the reader's understanding of the major issues surrounding the decision to design and adopt a telecommuting program. To review a comprehensive list of the disadvantages to adoption of a telecommuting program, refer to Appendix C.

Chapter Two of this study presents the motivators and advantages and constraints/disadvantages in greater detail. Survey questions 14 and 29 collected information about the constraints to offering a telecommuting program.

Organizational culture can impact the decision to offer telecommuting as well as the expected outcomes of a program. A study by Bernardino and Ben-Akiva (1996) reported that employers expect to gain employee productivity and enjoy lower costs associated with reduced need of employee support and overhead. Their study also reported organizations had higher expectations of benefits if the request for telecommuting was initiated by the employees.

In a study conducted by Yen, Mahmassani, and Herman (1994), with 83 executives, respondents indicated they expected telecommuting to have a positive impact on employee retention and recruitment. The respondents also expected a small increase in productivity as a result of telecommuting. This same study reported a negative impact

was expected on managers' ability to supervise telecommuters. Bernardino and Ben-Akiva (1996) stated that the previously mentioned perceptions were primarily influenced by management style. However, Conner (1986) found that management satisfaction with the telecommuting program was more of an indicator of program success than was management style. In the present study, survey questions 15, 16, 32, and 33 collected data about constraints to telecommuting adoption.

Program Design Elements

To initiate a telecommuting program, employers could consider the cost of providing additional equipment for the home office of the telecommuter. For IT professionals, the equipment could include computer, communication line, fax machine, and a computer printer. Other companies could stipulate that employees provide needed equipment themselves for the benefit of being able to work at home.

Designing a telecommuting program, if done carefully, requires research of employee needs, potential pitfalls, and benefits inherent with offering the program. Employee selection for telecommuting must be carefully studied and implemented to increase the success of the program (Goldberg, 1993). Goldberg addressed the need for a model in his study but did not analyze the different design elements of a program.

Survey questions 17, 18, 19, and 20 collected data on the program design elements. Statistical analysis determined if the motivators and constraints had an impact on the design of the telecommuting program.

Evaluation

The measurement of impact of a telecommuting program cannot be determined without formal evaluation of the program. This study collected information on whether

the participating colleges periodically conducted an evaluation of the telecommuting program. Survey question 21 guided this part of the study.

Bernardino and Ben-Akiva (1996) reported that research is needed on how the decision to telecommute would vary with different motivators and telecommuting arrangements. A model based on these factors could be used to foster the adoption process of telecommuting. Their review of current models showed that behavioral studies that examined the employer's decision process had focused only on the impact of changes in costs, salaries, and the decision to offer telecommuting and had not considered various design possibilities of a telecommuting program. According to them, empirical research has shown that an employer's decision to offer telecommuting is based at least partially on the specific telecommuting arrangements (design of the program).

Development of a model that considers expectations, motivators, constraints, and organizational characteristics would help higher education administration make a more informed, effective decision about a telecommuting program.

Research Questions

The following research questions were developed to guide this study. A brief statement about the question and the statistical treatment used for each question are presented in Chapter Three.

1. What is the relationship between the primary motivating factor for adopting a telecommuting program and level of flexibility of the telecommuting program design?

2. What is the relationship between the primary constraint to adopting a telecommuting program and the flexibility of the telecommuting program design?

3. What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and the existence of an adopted telecommuting program?

4. What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and whether or not the institution has had budget cuts in the last three years?

5. What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and the perceived success of the adopted telecommuting program?

6. What is the primary constraint for adoption for those institutions that have not adopted a telecommuting program?

7. What is the primary motivator that could be used to adopt a telecommuting program for an institution that does not have a telecommuting program?

8. What is the relationship between size and type of the institution and whether or not a telecommuting program is offered?

9. How frequently is an evaluation process of the telecommuting program in place?

Table 1 indicates which survey questions were utilized to address the 9 research questions.

Conceptual Framework

To illustrate the framework for the study, the researcher developed a graphical representation (Figure 3). The framework illustrates the inputs to the model at a broad level.

The first part of the illustration represents the population and context of the study. Second, the question of whether or not the institution currently allows telecommuting divides the population as to which survey questions they respond to. If an institution does have a telecommuting program, questions are answered about the motivations, constraints, elements of the program, and expectations realized as a result of the program.

Results of the questions are analyzed and tested to determine if they supported the proposed model in this study.

Table 1

Survey Questions Used to Answer Research Questions

Research Question	1	2	3	4	5	6	7	8	9
Survey Question	9	9	9	8	9	9	9	9	9
	13	14	10	10	10	32	30	4	21
	15	15	11	11	11	11		5	
		32			27			6	

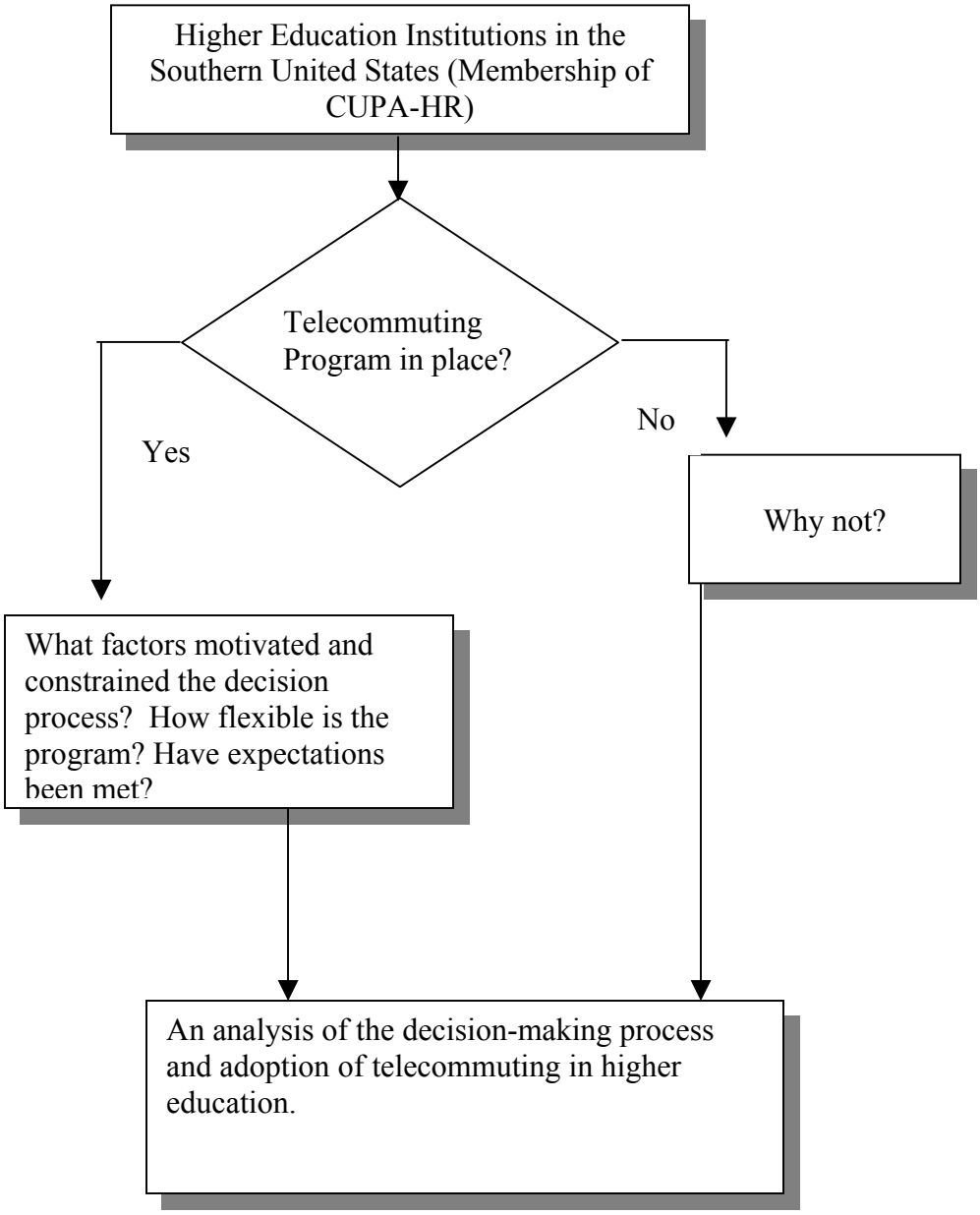

Figure 3

Conceptual Framework for Modeling the Decision-Making Process During Telecommuting Adoption in Higher Education

Delimitations of the Study

By design, the study targeted only those academic institutions that were members of the College and University Personnel Association for Human Resources (CUPA-HR). Although this is an international organization, only academic institutions in 11 of the southeastern United States were targeted.

Limitations of the Study

This study was limited by the disadvantages of collecting data via a self-reporting survey. Although every effort was made to present the survey questions with clear, concise meaning, interpretation could vary by individual.

Respondents were initially requested to complete the survey using the online form. However, the response could have been limited based on the respondents' access to the world wide web. Other factors limiting response rate could have been the threat of computer-based viruses that were prevalent at the time the survey was being conducted.

Assumptions of the Study

The researcher assumed that those responding are being truthful and are reporting as accurate information as possible. It was also assumed that each respondent had adequate access to the world wide web since the survey was presented using that medium.

The respondents were assumed to have adequate knowledge of telecommuting and the status of telecommuting at their institution. Additionally, it was assumed the respondents were knowledgeable of recruiting and retention rates at their institution.

Although it was intended to offer the survey exclusively on the world wide web, respondents were mailed a copy of the survey in the second contact. It is assumed that the paper surveys and those responses completed online did not vary due to the presentation media.

The instrument assumed that organizations were motivated in part by profit making. Since the institutions surveyed were a mixture of private and public institutions, this assumption may not be completely valid. However, the researcher assumed that although public institutions are not necessarily profit-making institutions, there are, in some cases, extreme budgetary constraints that by nature require the institution to practice sound financial decision making.

Operational Definitions

The following terms are used in this study as defined here.

Adopters – In the current study, adopters are those institutions that reported a formal telecommuting program was in place. They were considered as adopters of telecommuting.

Constraints and Disadvantages – Constraints to adopt a telecommuting program and the associated disadvantages are considered to behave the same. In the literature, constraints are also reported as deterrents as well as disadvantages. The term constraints is used in this study because of its use in the Bernardino model (Bernardino, 1996).

Integrated Services Data Network (ISDN) – A high speed telephone wire used in the home environment for accessing mainframes, local area networks, and the world wide web.

Modem – An electronic device that allows a computer to dial-up to another computer and establish a communication connection. Modems are commonly used by telecommuters to connect to central office databases, files, and email systems.

Motivators and Advantages – Motivators to adopt a telecommuting program and the associated advantages of a telecommuting program are considered to behave the same. In the literature, motivators are also reported as benefits as well as advantages. The term motivators is used in this study because of its use in the Bernardino model (Bernardino, 1996).

Non-Adopters – In the current study, non-adopters are those institutions that reported they did not have a formal telecommuting program in place. They were considered as non-adopters of telecommuting.

Telecommuting – Periodic work out of the principal office, one or more days per week either at home, a client's site, or in a telework center (Nilles, 1998). This term also means the employer and employee have a stated agreement about the employee's telecommuting arrangement.

Teleworking – Any form of substitution of information technologies (such as telecommunications and computers) for work-related travel; moving the work to the workers instead of moving the workers to work (Nilles, 1998). Commonly, this refers to home-based workers and part-time workers, not only those who telecommute.

Summary

Technology has impacted higher education in several major areas. At the base of the impact is the increased need for IT staff. Unfortunately higher education has not been as successful as private industry in retaining and recruiting qualified IT staff.

If colleges and universities in the United States are to effectively utilize new technologies in the boardroom as well as in the classroom, they must begin to compete with corporations for qualified information technology staff. Since these same institutions are constrained by low budgets, monolithic organizational structures, and, frequently, political and/or legislative constraints, they must offer employment options that are somewhat predictable and competitive.

Many researchers reported that telecommuting programs were an effective tool for improving retention and recruiting rates of IT staff in particular. However, higher education has lagged behind in adoption of telecommuting programs.

A study that provided specific information about the telecommuting adoption process could help higher education in the decisions concerning how to retain and recruit IT staff and provide needed support for technology utilization. It would also provide guidance for how to manage constraints and leverage motivators present in the decision-making process to improve the diffusion and success of an adopted program.

CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

The previous chapter introduced the purpose of this study, which was to test a model of decision-making and adoption. The research concentrated on what factors influence colleges and universities to adopt a telecommuting program. Chapter One also introduced the major constraints currently facing many colleges and universities in the area of recruiting and retention of information technology (IT) staff.

This chapter presents a review of the literature related to (a) the impact of technology on higher education institutions, (b) how that impact is creating a need for more IT staff in private industry and higher education and how telecommuting addresses the problem, (c) decision-making, planning, and management issues in higher education, (d) organizational characteristics and factors involved in the telecommuting adoption process, (e) factors to consider when adopting a telecommuting program, and (f) a summary of research pertaining to telecommuting. Following these items, a brief history of telecommuting in the United States is presented. The description includes frequently cited advantages, disadvantages, and expectations of telecommuting program implementation.

The review of literature consisted of a thorough examination of books, journal articles, periodicals, dissertations, and databases. An extensive search on the topic of telecommuting was conducted on the world wide web. Information was also obtained from the researcher's personal experience writing a proposal for telecommuting at The University of Tennessee, Knoxville.

The Impact of Technology in Higher Education

Colleges and universities in the United States grappled with the rapid changes in information technology (IT). From the administrative functions of the institution to the classroom, IT began to push into academia and insisted on a greater influence until today academic institutions are created without walls, full-time professors, or bookstores. Competition is another phenomenon that has begun to impact higher education.

Thirty-nine percent of the respondents to the *1999 National Survey of Information Technology in U.S. Higher Education* indicated the single most important IT challenge to American colleges and universities was to assist faculty efforts "to integrate technology into instruction" (Green, 1999, Report, para. 1). In 1997, 29.6 percent of the respondents in the same survey indicated "instructional integration" was the single most important challenge. In 1998, the percentage increased to 33.2. A major issue behind these statistics was the problem colleges and universities have faced in the last five years in "providing adequate user support" (Green, 1999, Report, para. 1). These statistics represent some of the continued challenges facing higher education today.

Over the past 10 years, educational institutions have been trying to control the rapid changes wrought by technology in every operational function of the institution. The computer revolution bounded upon education in the 1980s bringing computing power to the desktop (Green & Gilbert, 1995). Computers migrated from the research labs to classrooms, dorm rooms, and even the boardroom (Selleck, 2000). The presence of the computer continued to explode on campuses through the 1990s and is continuing today. Higher education's dependence on technology has also increased in areas such as enrollment management, fund-raising, instruction, curriculum development, and the

administrative functions (Selleck, 2000). However managing all the IT resources and money needed to fund it has presented many problems to higher education.

During this same period of time, financial resources were becoming scarce. As reported by Green and Gilbert (1995), this led even the most fervent technology advocates in higher education to question the cost of technology in comparison to the yield, particularly in the classroom. McCredie (2000) stated that an ongoing IT strategic plan is essential if a college or university is to remain competitive in every respect. Current information from a study reported by Olsen (2001) conducted at Hamilton College revealed that colleges and universities are spending more on information technology than any other budget item. A majority of the study participants reported that personnel expenses accounted for 50% of the total IT budget.

Rapid changes and the high impact of technology were new to most academic institutions that have historically been sheltered from many of the external forces that corporate America has had to contend with. The uniqueness of higher education meant that not only were administrative functions impacted by technology, but also the basic delivery of the product (instruction) was changing. The threat for institutions that lag behind is real. Lick (2001) stated that higher education must re-create itself using technology if it is to survive the pace of change.

These changes rapidly increased the need for qualified IT staff. Unfortunately, for some institutions, IT human resources are in high demand and come with a high price tag.

Information Technology Staffing in the United States

The Bureau of Labor Statistics (BLS) (1998, Graph) projected an increase of 14% of all information technology occupations by the year 2006. The BLS also reported in a 1999 report that computer-related occupations were slotted as the five fastest growing occupations. The projections also revealed that demand for computer engineers would increase to 108% by 2008, followed closely by 102 percent increase for computer support specialists (Bureau of Labor Statistics, 1999, Table 3b).

Naturally, the supply has driven up demand and, therefore the cost of hiring IT staff. As reported by Mateyaschuk (1999), a survey of 21,000 IT workers revealed that pay for some IT skills had increased by twice the national average. The "hot" areas were computer security, networking, and help desk support. This same survey reported that IT staff members' salary had grown 8% in 1998. This put the annual median annual salary at $54,000. Hecker (1999) also reported an increase in the median salary for information technology jobs in 1999. That report stated the annual salary was approximately $344 more per week over the previous 52 weeks of the year.

The ability to recruit and retain IT staff is a critical problem in higher education. Higher salaries, signing bonuses, more benefits, and flexible working hours are offered to keep staffing levels acceptable. More notable, the shortage of qualified IT staff is making it difficult for educators to apply technology in higher education (Skinner & Cartwright, 1998). Green (2000) reported that IT staffing issues affect all aspects of higher education from user support to the integration of instructional technology.

A survey conducted by the Computing Research Association and reported by Freeman and Aspray (1999) stated that education is slow to respond to changes in the

work force. This is due in part to the decision and review process in higher education. Although the deliberative process may be more democratic, it prohibits quick responses to change and is widely viewed as an operating style weakness.

Olsen (2000) reported that The University System of Georgia has implemented a new compensation plan for IT staff. Called the "80/20" plan, it includes progressive benefits such as allowing IT staff to work at other university system locations for up to 20% of the work week. Designed to recruit and retain IT staff, this plan also includes competitive salaries (to the local market), salary bonuses, and tuition fee waivers in information technology based programs.

In 1996, the California State University system-wide office implemented a compensation program for information technology workers. Their plan included new jobs classifications, a new job design model, and a new model for matching IT skills to performance and pay (Giunta, 1997).

Private industry is answering the IT staff shortage with aggressive recruitment strategies. Some of these are bonuses for employees who provide hiring leads, signing bonuses of $2,000 and up, and stock options. Private industry, therefore, has a decided advantage on academic institutions since they began aggressive recruiting and retention programs for IT staff several years ago. Academic institutions must devise creative and aggressive strategies and incentives to recruit and retain valuable IT staff.

Other enticements that are less monetary in nature include telecommuting, flexible work hours, day care centers, and on-site health clubs (United States Department of Commerce, 1998a). The U. S. General Services Administration (2002, Telework Program, para. 2) offers telecommuting and access to telework centers to federal

employees. Their telework website states the program is offered as a solution for environmental issues as well as a work life enhancement.

Given the inherent shortage of IT workers, fierce competition among corporations for highly skilled IT staff, budget cut-backs at many higher education institutions, and historically slower than average response time to changes in the work force at colleges and universities, the realization of how serious the IT staff shortage at academic institutions in the United States is not difficult to comprehend.

Telecommuting Programs and Recruiting and Retention of Information Technology Staff in the United States

Telecommuting can be a useful tool, particularly in the information technology profession. Furger reported that Travelers Insurance offered telecommuting to their IT staff in anticipation of a shortage of labor supply (as cited in Ruppel, 1995).

Several articles have reported that telecommuting has been specifically helpful in recruiting (Aldoaijy, 1999; Dash, 1999; Olsen, 2000; Ouellette, 1998). Closely related to recruiting is retention. Offering telecommuting has also been cited many times in the literature as an effective retention tool particularly for IT staff (Deck, 1999; Linkins, 1999; Olsen, 2000). Additional references can be found in Appendix B.

One of the many reasons why telecommuting is so attractive to IT staff is that the jobs tend to lend themselves well to the telecommuting situation. Since the IT staff person spends a large portion of the day interacting with a computer, place of that interaction becomes less important. Belanger (1999) conducted a study with 168 employees in a technology firm and found the largest group of workers who were telecommuting held IT staff positions. For this company, it accounted for 89% of its

telecommuters. Additionally, since IT workers are more conversant with technology, it is easier for them to navigate the information technology highway and connect to central computing services (Ruppel, 1995).

Decision-Making, Planning, and Management in Higher Education

In order to fully understand the process of implementing a telecommuting program, this study presents the idea that the decision-making process requires an effective model. A decision-making model would ease the entire process of adoption of a telecommuting program including the design, implementation, management, and impact. More importantly, a model was needed that was tested in the higher education setting instead of private industry.

Decisions required to implement any new work place program in an organization can be laden with problems and issues. In the higher education setting, decision-making issues are at the core of the organizational structure. For example, if the telecommuting program is offered, will it include teaching and non-teaching employees? Who will make the decision to offer the program? Who will design, plan, and implement the program?

Historically, telecommuting programs have been initiated and managed by the human resources or personnel offices. Dessler (1988) listed telecommuting as a flexible work arrangement being guided by the same part of the organization that administers job sharing, work sharing, flextime, and other work life programs. Likewise, French (1994) addressed telecommuting in his book with work rules and schedules and other work arrangements administered by the human resources or personnel department.

Goldberg's (1993) study included interviews of administrators in higher education who had been involved in planning and implementing a telecommuting program.

One respondent in Goldberg's study articulated the paradoxical situation when implementing telecommuting in higher education very well. A respondent reported to Goldberg, "The difference between the university and any other organization is the faculty; faculty aren't like corporate people, and the faculty have a different view of things" (p. 120). Another respondent in the same study from the University of California, San Diego summarized the telecommuting program planning process as follows:

> Do it as you should do all plans, and that is have everyone involved who's going to be impacted by it. That includes the employees, the supervisor, if they are a union shop, the union should be involved. You know, all the people who could be impacted by this situation. (p. 121)

This philosophy translated into a Flexible Workplace Task Force at the University of California, San Diego to plan and implement telecommuting. Fortunately, the task force was very mature and had already addressed work place issues such as Workers' Compensation, payroll, and other personnel issues when it tackled the telecommuting decision (Goldberg, 1993). A representative model such as this one could allow an institution to position the organization for an effective decision without getting bogged down in committees, sub-committees, and spending precious staff time with very little return on the investment. Bogue (1985) stated that a full franchise model promotes the involvement of any individual who might be impacted by the decision, but obviously costs the organization in staff time and was not always practical.

Administration and decision-making in a higher education setting can be complex. Due to the nature of the institution, governance bodies could include federal, state, and local governments, a board of trustees, faculty, a faculty senate, accreditation boards, administration, and students (Karol & Ginsburg, 1980). Birnbaum (1988) stated

that "American colleges and universities are the most paradoxical of organizations" (p. 3). Problems of governance are rooted in the complex reporting structure that includes trustees, faculty, and administration. To compound the problem, the larger the institution, the more likely there were other influences on management and decision making. Legal issues, federal regulations, implementation of technology, and politics were a few of these. Birnbaum also wrote that larger institutions can also experience increased isolation between faculty and administration, in part due to workload and division of purpose.

It is no wonder that universities have been criticized for their slow response when the need to allocate or reallocate resources is required. The slow response is blamed, in part, on the decision-making process traditionally used. Higher education most often utilizes a deliberative process that prohibits timely responses (Freeman & Aspray, 1999).

One view of management in higher education presents the idea that one cannot apply management theories to this industry because of its diversity. Baldridge, Curtis, Ecker, and Riley (1978) conducted a major study of academic management. One of the central findings stated that the organizational characteristics of academe were so different from other institutions that traditional management theories could not be applied to these constructs. The authors cautioned against applying traditional management theories in the higher education setting because (a) "their goals are more ambiguous and diverse," (b) "they serve clients instead of processing materials," and (c) "they have fluid participation with amateur decision makers who wander in and out of the decision process" (p. 9).

This comprehensive study also reported that there were major organizational differences and diversity among colleges and universities. Furthermore, the report found that not only did management differ from types of institutions, governance also varied

among institutions. Baldridge et al. (1978) also stated these differences were, in part, related to the size and complexity of the institution and the influence that size had on the institution's degree of centralization and governance.

Bogue (1985) wrote that management and decision making is an art. However, an artist must know his tools and incorporate judicious practices in process. Bogue presented four questions to guide the art of making a decision: (a) "what is the decision," (b) "who should be involved and how," (c) "what facts and feelings should inform the decision," and (d) "what values, assumptions, and principles should guide us?" (p. 47). In a higher education setting there exists a dichotomy in structures. Administrative and academic units do not make decisions or operate in the same manner. As reported by Creth (2000), on the academic department heads' side, there is the protection of tenure when it comes to taking risks in decision making. This is nonexistent on the administrative side.

In a traditional sense, decision making starts with gathering facts, examination of alternatives, and choosing the best option given. Odiorne (as cited in Bouge, 1985) proposed a typology of decisions that described them as routine, problem-solving, or innovative. His theory also that stated the involvement of others in the process should increase as the decision moves from routine, to problem solving, to innovative. Telecommuting is considered an innovative program, therefore, management should facilitate input from all employees who would be impacted by or be interested in participating in the program.

Some of the most respected and mature writings about management and decision making has been produced by Peter Drucker. In some of his earliest writing, Drucker

(1954) outlined the steps in decision making. He suggested that the first step was to find the real problem, clearly define it, and determine the conditions for a meaningful solution. According to Drucker, discovery of the right questions (for clear problem definition), setting the objectives for problem resolution, and determination of the rules governing solution constituted the first phase in decision making. Developing alternative solutions, selecting the best solution, and making the decision effective were the remaining steps to effective decision making as stated by Drucker.

In his book *The Effective Executive*, Drucker (1967) continued to address effective decisions. Drucker dispelled some of the myths surrounding decision making such as the myth that decisions do not form a consensus about the facts, rather, that most decisions are made with some facts and opinions. Additionally, Drucker reported that there was most likely conflict and disagreement surrounding the decision. He also purported that an effective executive insisted on alternatives in the decision process against which appropriate measurements have been applied.

In 1974, Drucker wrote more about effective decisions in *Management: Tasks, Responsibilities, Practices*. Interestingly, he addressed the problems with downward communication and how the information explosion was the "most compelling" reason to improve communication at work (p. 491). Drucker specifically listed problem areas for communication in which one was the communication gap "between faculty and students, and between both of them and university administration" (p. 491).

Still another view of management in higher education was the application of Total Quality Management (TQM) points. Penrod and Dolence (1992) stated that to be transformed and operate effectively in the 21st century, higher education must "set forth a

well-articulated information strategy that is synergistic with institutional decision-making" (p. 21). They continued by addressing the need for strong leadership and a strong link between IT and the institution.

Lewis and Smith (1994) recommended Total Quality Management (TQM) as a means of improving the efficiency and effectiveness of managing in higher education and as a way to prepare for the 21st century. Rapid changes, increasing demands, problems in public perception, and the rising cost of education were some of the reasons cited for the appropriate need of TQM. However, Lewis and Smith also recognized that application of TQM in higher education should be approached with some cautionary caveats. The authors noted the "dual" organizational structures of colleges and universities as being problematic. Fragmented leadership due to the nature of governance and the high level of divisionalization were two other reasons given as to why TQM might not work in higher education.

Keller (1983) wrote about the need for change in educational leadership. Skills being taught in management programs for administrators in education included strategic decision making, marketing, communications, financial forecasting, and computer modeling. Other programs reported by Keller were teaching participants how to lead, decide, plan, and establish priorities.

Keller (1983) also wrote that campus governance was taking new forms. As leaders of academic institutions are required to act more swiftly and as finances have become scarce, new faces are showing up at committee meetings. The new committee is composed of senior faculty members, key administrators, students, and some junior faculty.

More recently, Balderston (1995) wrote on the subject of management in the university setting. Some of the issues he addressed were the complexity of the academic institution and the inherent bureaucracy that looms over its daily functions. As noted by Balderston, Research Universities I's are the largest and most complex institutions in the academic world. Although there are many advantages to that status, some disadvantages are difficulty in management of funds, resources, and maintaining a clearly defined set of goals.

Decisions test the values and directions of any organization. Making an important decision about employee work life can be critical and filled with uncertainty in the best run companies. However, in the higher education setting, traditional management theories do not always apply, and the level of complexity rises exponentially.

Bound in the same issues with management and decision making is planning. For higher education the topic of strategic planning and more specifically technology planning tops the agenda of most every university and college (Kobulnicky, 1999). Some issues cited by Kobulnicky were the (a) need for strong IT leadership, (b) difficulty in recruiting and retaining IT staff with the skills needed, (c) need to replace outdated legacy systems, and (d) proliferation of "anytime, anyplace" learning.

Several articles reported on the increasing importance of information technology in the planning process. Technology has moved from the back office to a major driving force in planning and budgeting. Kobulnicky (1999) stated that at the institutional level, technology must be deemed as a parameter in the overall academic planning process. Even the board of trustees are advised to focus on the institutional strategy and what role technology plays in the core business of education (Selleck, 2000).

Much of the consternation of planning and managing technology is born out of the high cost. For many years, technology purchases came from left over monies, grants, and other ad hoc resources. McCollum (1999) stated that more recently, IT has been consuming a large portion of the allocations. Several other authors examined the haphazard way in which technology dollars have been spent and how the costs have sky rocketed to the point that no one wants to add it all up (Davidow, 1996; Green, 2000; McCollum, 1999; Young, 1998).

Organizational Characteristics and Consideration Factors Present in the Adoption Decision Process

Much of the literature clearly agreed that adoption of telecommuting is dependent upon the level of innovation in an organization (Bernardino, 1996; Tomaskovic-Devy & Risman, 1993). One report stated more specifically that telecommuting is dependent on the level of innovation in an organization. It also found that innovation is constrained by characteristics such as size and age of the organization and level of bureaucratic control. Larger organizations were found to be less innovative and more bureaucratic than smaller organizations (Tomaskovic-Devy & Risman).

The attributes of innovations and their adoption rate was one subject addressed by Rogers' (1983) research on innovation. He described the five attributes of innovations as (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability (p. 211). The first attribute was said to indicate the strength of reward or punishment as a result of adoption of an innovation. Compatibility was stated as how closely the innovation matches the existing social and cultural beliefs and need for innovation. The attribute complexity addressed the difficulty of using and understanding

the innovation, and trialability is the degree to which an innovation was experimented with. According to Rogers, these attributes are part of the complex process of determining the rate of adoption of innovations (p. 233).

Rogers' (1983) exhaustive research on adoption and diffusion of innovation also provided important criteria for categorization of adopters. In his book *Diffusion of Innovations*, Rogers presented adopter categorizations based on innovativeness. They were (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards (p. 245). He also stated unequivocally that the criterion for adoption categorizations was innovativeness.

Rogers (1983) also reported the adopter distributions were near normally distributed. Percentages of the categories were (a) innovator at 2.5%, (b) early adopters at 13.5%, (c) early majority at 34%, (d) late majority at 34%, and (e) laggards at 16% of the distribution (p. 247). Although Rogers' research about innovativeness originally looked at individuals, it was eventually applied to the organizational setting. A model of the innovation process was presented by Rogers as having the following stages: (a) agenda-setting, (b) matching, (c) redefining/restructuring, (d) clarifying, and (e) routinizing (p. 362).

Rogers and Shoemaker (1971) addressed the types of decisions made in organizations and the process by which they took place. For instance, Rogers described a paradigm that showed the functions in the authority innovation-decision process that was divided into decision-making and decision-implementation phases. The decision-making phase was comprised of 3 stages. The first stage was reported as the *knowledge* stage and was the point at which the decision-making unit in the organization obtained knowledge

about the need for innovative change. Second was the *persuasion* stage. At this point in the decision-making phase, an evaluation of the innovation for purposes of persuasion was carried out. Next, the *decision* to accept or reject the innovation was made. The last two stages comprised the decision-implementation phase. The *communication* stage was concerned with the decision to other units in the organization. The final stage was the *action* or implementation of the decision. At the end of this discussion, the authors presented the need for an adaptive unit in organizations. They proposed this unit would function as a change agent for the organization and report near the top of the hierarchical structure. Its purpose was to sense changes that were needed and identify and evaluate suitable innovations.

Culture has also been reported as important to the success, adoption, and diffusion of new programs. Harrington and Ruppel (1999) studied telecommuting success and the importance of trust in the organizational culture. Lack of trust, it was reported, was likely buried in the inflexible schedules and need for direct supervision. Trust became more important obviously when a worker and supervisor were not in the same physical location.

Harrington and Ruppel (1999) also reported that adoption of telecommuting was related to trust in an organization's culture. They found that perceptions of trust, security, advantage, and a rational culture were important to the adoption, diffusion, and success of telecommuting. The role of human resources as a department was also cited as an important factor influencing the success and diffusion of a program. On a broader scale, Harrington and Ruppel wrote about the importance of culture in an organization and how trust and group values affect the adoption level of telecommuting

Yen and Mahmassani (1997) reported that the complexity of the employer's decision-making process about telecommuting is obvious due to the various means of decision making in an organization. Some organizations had only one decision maker while others could have had teams or groups who made decisions about changes on the scale of telecommuting.

Additional research conducted by Goldberg (1993) stated that colleges and universities were lagging behind industry in the number of telecommuting programs offered. Goldberg also stated that (a) academic institutions were so diffused that implementation of policies were difficult, (b) historically, few external forces had affected university administrations, (c) academic administrators were not willing to relinquish power over individuals under their supervision, (d) politics had been a deterrent to innovation, and (e) academic institutions did not operate in a competitive environment as compared to private concerns. Goldberg also reported finding no studies that specifically addressed telecommuting in universities.

Goldberg (1993) presented a model for implementing a telecommuting program; however, that model was not tested as a part of the study conducted but was developed as a result of information gathered during the study. His model, however, did not address the decision-making aspect of adoption but only the design, implementation, and management of a program.

Ellison (1999) studied the state of the art of telework research. Kraut (as reported by Ellison) stated that resistance to change was firmly surrounded by a long history of bureaucratic organizational structures. These structures are easily threatened by change; therefore, adoption of new technology (telecommuting) is met with resistance. Along the

same theme, Goldberg (1993) stated that the academic section was slow to adopt telecommuting because of the diffusion of administration. Since bureaucracy and diffusion are frequently found in academia, the adoption of telecommuting could meet with serious resistance.

Bernardino (1996) stated that a need to model the telecommuting adoption process included the possible impact on commuter traffic, impact on public policy concerning transportation, and urban sprawl. Her study also stated that the long-term impact of telecommuting is still not known, particularly as it would influence commutes to work.

Research indicated that the adoption of telecommuting is dependent on the level of innovation in the organization. Only the Goldberg (1993) study was found to look at telecommuting in a university environment. His findings are also supported by a report in *The Chronicle of Higher Education* that reported institutions of higher education were less likely to adopt innovations and on average waited 25 years before adopting a new innovation such as information technology or changes in curriculum (Siegfried, Getz, & Anderson, 1995).

Telecommuting Program Considerations

Implementation planning of a telecommuting program was found to be a crucial step in the decision-making process. If an organization determined it wanted to move ahead with telecommuting, the literature provided a wealth of sources for guidance. However, these sources, with only one exception, did not address implementation of telecommuting in an academic setting.

Several researchers and authors agreed that obtaining top managerial or administrative support was essential to the success of any telecommuting program (Fusco, 1990; Hartman, Stoner, & Arora, 1991; Weiss, 1992). Nilles (1998) stated that the chief executive officer of the organization must at least be neutral to the idea of telecommuting or willing to try it personally. Nilles also stated that the entities listed as crucial to telecommuting success were an advisory board and one or more champions. Additional factors listed as important or crucial in the decision-making phase can be found in Appendix A.

Design Considerations

Critical to the success of a telecommuting program is the design and implementation of the program itself. Many researchers and industry professionals have written about the dos and don'ts of telecommuting programs.

Information on how to implement a telecommuting program is plentiful and remarkably easy to discover. Not only was the library a viable source of information, many organizations have published their telecommuting programs, strategies, and design factors on the world wide web. Several major organizations have also been formed to assist companies with implementation, help telecommuters adjust to working at home, and provide ongoing information about new communication technologies and home office equipment.

Implementation Strategies

Embarking upon the road to assess the benefits and costs of a telecommuting program can be both inspiring and disconcerting. Journals, periodicals, books, and websites provided lists, advice, and strategies for implementation and design of

programs. A list of factors to consider during implementation from the literature can be found in Appendix A.

Advantages of Telecommuting

Scholarly research and anecdotal data both list the advantages of telecommuting programs. Although most literature labeled these factors advantages, other reports labeled them motivators or benefits. A comprehensive list of the positive factors reported for adoption of a telecommuting program can be found in Appendix B.

Disadvantages of Telecommuting

Naturally, there are disadvantages to adoption of a telecommuting program and these were widely reported in the literature. Other labels of these same concepts were constraints and deterrents. A comprehensive list of negative consequences to adoption can be found in Appendix C.

Summary of Research Pertaining to Telecommuting

Scholarly research that examines various aspects of telecommuting has increased in the last five years. However, Kurland and Cooper (in press) stated that more scholarly research is needed to obtain a deeper understanding of the constructs present in the telecommuting environment. Following is a summary of a selected number of the research studies found by the researcher that addressed telecommuting.

Cree (1998) conducted a study looking at the perception of satisfaction of work/family life between telecommuters and non-telecommuters. It was reported that a potential positive influence was presented as telecommuting increased. The relationship was found between the increase of telecommuting and positive attitudes toward levels of work/family balance, flexibility, job and organizational satisfaction. McCloskey (1998)

also researched the impact of telecommuting on feelings related to autonomy, work/family relationships, and the level of participation in telecommuting. This study reported that telecommuting was not the panacea it had been touted as, but neither did it cause employees to work excessive hours or limit the telecommuter's career development.

Closely related to the McCloskey (1998) study was a study conducted by Neufeld (1997). This study examined the perceived individual consequences of telecommuting from the telecommuter's perspective. Results of the Neufeld study indicated a direct relationship between individual experiences of autonomy, tension and overload, satisfaction, and productivity and the occurrence of telecommuting. Still another study by Loverde (1997) looked at the relationship between the need for achievement, affiliation, autonomy, and job performance of telecommuters. The purpose of the study was to provide research about how to select employees for telecommuting.

Several other studies researched the psychological factors impacted when an employee becomes a telecommuter. Mackie-Lewis (1998) found that the longer an employee telecommutes, the less intense work relationships become. This study suggested that the strain on personal networks between employees could be a factor in gaining upper management support for telecommuting. Sturgill (1998) also studied telecommuters from the standpoint of communications and group process. This study suggested there may be a curvilinear relationship between the satisfaction of organizational communication and time spent in the office (by the telecommuter) and the available means of communication available to the telecommuter (media, email, etc.).

The decision factors present in an employee's decision to adopt telecommuting was researched by Clark (1998). This study was prompted by the dichotomy between the predicted levels of telecommuters and the slow rate of acceptance. Clark's study also reported that two possible explanations for the differences could be (a) telecommuting fails to deliver the reported benefits, and (b) the level of understanding of what is involved in the adoption process is too weak.

On a more technical level, one study examined the economic impact of telecommuting on the surrounding community and urban areas (Safirova, 1999). A study by McInerney (1998) looked at the problems of delivering data and information to remote knowledge workers and how new technological innovations could address some of the current problems.

McCloskey and Igbaria (1998) presented a critical review of empirical research on telecommuting. A summary of the research they found was as follows: (a) 4 studies looked at attitudes and beliefs of telecommuters as to the advantages and disadvantages of telecommuting, (b) 1 study was conducted in the United Kingdom, (c) 4 studies had a mix of telecommutes and non-telecommuters that weakened the study, (d) 1 survey included employees not eligible to telecommute, (e) 1 study had no respondents that were currently telecommuting, (f) 6 studies had less than optimal mixes of respondents, (g) 1 study had errors in the methodology, and (h) 11 studies were too limited as to size or population characteristics.

One of the most frequently researched topics revolved around management issues. Other studies looked at attitudes, perceptions, and impacts of telecommuting on the

telecommuter. Very few have examined the decision process and only the Goldberg (1993) study concentrated on telecommuting in higher education.

The success of telecommuting is dependent on many coinciding factors. Management is one of the most critical factors to the success of a program. Management must be supportive, the organizational structure needs to support the new work environment, supervisors need to support the telecommuters, and co-workers (particularly non-telecommuters) need to adjust to the telecommuting work environment.

Several studies cited management's loss of control as an important deterrent to adoption of telecommuting and to the success of a program once adopted (Ellis & Webster, 1999; Gainey, Kelley, & Hill, 1999; Harrington & Ruppel; 1999; Hartman et al., 1991; Kurland & Cooper, in press; Kurland & Egan, 1999; Pearlson & Saunders, 2001; Wilkes, Frolick, & Urwiler, 1994). Pearlson and Saunders (2001) studied the paradoxes of telecommuting, citing that the acceptance of telecommuting had not been as predicted. Their conclusion was that businesses had been slow to adopt telecommuting due largely to the difficulties presented to management when telecommuting is adopted.

The common thread in all of these studies was the problem with management's feeling of loss of control. When a telecommuter is working at home, many managers feel like they are helpless to know and determine if the employee is working. Studies advised that managers have to adjust their style to manage more for results and output. Other issues cited in these studies were compromised security and loss of team concept because the telecommuter is not available for informal meetings or interactions.

Hartman et al. (1991) studied variables that related to telecommuters' satisfaction and productivity. They stated that supervisors needed to be sensitive to the emotional

and technical needs of telecommuters. Particular attention should be paid to the evaluation system so it takes into account the mix of office time and telecommuting time. The evaluation system needs to adjust to output or product instead of just the observable behaviors.

Interestingly, the Hartman et al. (1991) study found that productivity decreased as the telecommuting time increased. Admittedly, this was contrary to many other studies. These researchers speculated that this could be caused by the increased family interruptions and conflicts of roles (spouse, parent, worker) that increased with telecommuting time.

Closely bound with the problem of separation due to telecommuting is the increased problem of communication when co-workers are not in the same physical location. Communication is an important part of any organization. If incumbents become hampered by physical or technical issues surrounding communication, all aspects of productivity and satisfaction of work can suffer.

Duxbury and Neufeld (1999) studied communication and the ways it could be impacted by telecommuting. The emphasis of their study was the possible influences telecommuting had on intra-organizational communication. The researcher found that part-time telecommuting had little impact on intra-organizational communication. The respondents in the study reported that they were easily able to adapt their communication needs to the new environment. A further finding was that over time (six months), communication actually improved for upward, downward, and lateral relationships in the organization. Communication also improved between telecommuter and client.

A Brief History of Telecommuting

The term telecommuting was coined by Jack Nilles (1998) while conducting research for energy conservation during the Arab oil embargo. It was then (1970s) that those in the information technology industry began to look at ways of performing work from a remote location. Nilles is currently Director of the Information Technology Program, Center for Futures Research, Graduate School of Business Administration, University of Southern California in Los Angeles, California. Nilles continues to research and write about telecommuting and is associated with JALA Associates in Los Angeles, California.

Nilles coined the tem "telecommuting" in 1973 while he led a project at UCLA to analyze the trade-offs between telecommunications and transportation (Fusco, 1990). Thompson (1999) predicted that by the year 2000, telecommuters would comprise up to 18% of the U.S. workforce. Nilles (1998) predicted telecommuters would number around 22 million in the year 2000 and just over 30 million by 2005.

Since the 1970s, the number of telecommuters has steadily risen as has the interest in offering telecommuting as a viable management option. The first industry areas to embrace and champion telecommuting were high-tech and information technology organizations. Currently, a list of companies provided by Langhoff (1999) that offered a formal telecommuting program includes 3Com, Apple Computer, Bell Atlantic, Boeing, CISCO Systems, Compaq, Control Data, DEC, EDS, IBM, Intel, MCI Communications, Novell, Oracle, Pacific Bell, Silicon Graphics, and many more.

Langhoff (1999) reported growth in the number of telecommuters in the United States as follows: 1990, 3.4 million; 1994, 9.1 million; 1997, 11.1 million; 1998, 15.7

million; 1999, 19.6 million. Higher estimates were reported by Nie (1999) who stated that in 1991 telecommuters numbered 15.7 million, up from 4 million in 1990. Nie also predicted that at least 25% of American workers would be telecommuters or home-based office workers by 2005. As reported by Langhoff (1999), Jack Nilles predicted that there would be 230 million telecommuters worldwide by 2030.

Telecommuters have steadily increased in numbers. A study conducted by InfoBeads (the research arm of Ziff-Davis Corporation) and reported by Dash (1999) revealed that San Francisco, the number of telecommuters had risen by 30% between 1998 to 1999 to a high of nearly seven million. Dannhauser (1999) reported that not only did the number of telecommuters rise from 1997 to 1998, the composition of those workers shifted significantly. Citing a report from the Bureau of Labor Statistics, Dannhauser wrote that the number of wage-and-salary employees who said they telecommuted from home rose from 1.9 million in 1991 to 3.6 million in 1997, resulting in an 89% increase.

On the other side of the statistics, *ComputerWorld* surveyed 124 IT managers in 1999 and found that nearly 75% of the respondents reported that only 10% of the eligible employees actually took advantage of the telecommuting option (Morgan, 1999). Reporting on the paradox of telecommuting, Khaifa and Davidson (2000) cited a 2000 study conducted by the International Telework Association and Council (ITAC). The ITAC study reported that although 62% of the companies surveyed reported they encouraged telecommuting, only 7% of the employees actually did.

Thompson (1999) reported that a 1995 survey indicated that almost two thirds of all *Fortune* 1000 companies had a telecommuting program in place. Unfortunately, she

also found that only a small percentage of the companies that offered telecommuting did so as a formal program. The majority of companies offered telecommuting as an ad hoc option for selected employees.

Summary

The purpose of this review of literature has been to present scholarly information needed to understand and frame the complexity of decision making and adoption of a telecommuting program in higher education. The purpose in conducting this study was to research some of the factors that influence the decision whether or not to adopt a telecommuting program in the higher education setting. The study examined some organizational characteristics and the perceived constraints and motivators that could influence adoption (or not) of a telecommuting program at an institution. The study also examined the current perceptions of success of recruiting and retaining IT staff at each institution.

To understand the context of this study, research was presented in this chapter that addressed the (a) impact of technology in higher education and how that has impacted many major functions of higher education, (b) serious shortage of IT staff in the United States and how that has impacted higher education's ability to recruit and retain qualified IT staff, (c) complex decision-making process and management issues in higher education, (d) specific organizational characteristics that can impact decision making and adoption of innovative programs, and (e) factors to consider when adopting a telecommuting program.

A summary of the research conducted about telecommuting programs and the issues surrounding them was presented to provide the reader with an appreciation of the

many and varied issues operating in the decision-making process. Finally, a brief history of telecommuting was presented.

The researcher found only one study conducted in higher education that examined telecommuting program adoption. That study, however, did not address the decision-making process and the factors that may or may not impact it.

Because the impact of technology has created a higher demand for qualified IT staff, organizations have been thrown into an intense, competitive arena when attempting to retain or recruit IT staff. Unfortunately, higher education grapples with additional issues such as lower salaries, complex and slow decision-making processes, and a history of being slow to adopt innovative programs such as telecommuting.

Telecommuting programs have been highly touted as effective tools for increasing recruiting and retention rates, particularly of IT staff. Therefore, an empirical study about the decision-making process for adoption of telecommuting set exclusively in higher education could provide valuable information.

CHAPTER THREE

METHODS AND PROCEDURES

Introduction

The review of literature indicated a need to study the status of telecommuting programs in the higher education setting. Previous research revealed that higher education lags behind in offering telecommuting, particularly as a staff recruiting and retention tool (Goldberg, 1993). Chapter Three describes the methods and procedures used to develop the instrument, determine the population, identify the sample, and analyze the data collected. Because technology impacts higher education in every aspect, collecting and analyzing data about using technology has the potential to positively influence this industry.

Research Methodology

This study was designed to research some of the factors that influence the decision whether or not to adopt a telecommuting program in the higher education setting. Factors studied included the primary motivators and constraints involved in adoption of a telecommuting program. The study was conducted exclusively in higher education.

The survey was executed using the world wide web as a presentation medium in order to increase ease of use of the survey, to keep costs to a minimum, and to make data analysis quicker and easier. This study utilized a post hoc survey design. Demographic data related to the study were included in the survey. Based on the purpose of this study, the data were analyzed using quantitative methods that included descriptive statistics, *t* tests, and correlation tests.

Research Questions

Research Question One

What is the relationship between the primary motivating factor for adopting a telecommuting program and level of flexibility of the telecommuting program design?

Organizations are motivated to offer a telecommuting program for a variety of reasons. Bernardino's (1996) study indicated that the primary motivating factor for adoption of a telecommuting program influences the flexibility of the program offered. Therefore, this research question was developed to further explore the impact of the primary motivating factor on program design. Bernardino also stated that the ideal telecommuting program was dependent on the characteristics of the organization and the employer's motivators and constraints for adopting a telecommuting program.

Research Question Two

What is the relationship between the primary constraint to adopting a telecommuting program and the flexibility of the telecommuting program design?

Constraints to offering a telecommuting program have been shown to prevent an organization from offering a program at all. In other cases, constraints impacted the flexibility of the subsequent program. This research question was developed to explore the role of constraints and the flexibility of a telecommuting program design. Bernardino (1996) reported that an organization's motivators and constraints impacted the telecommuting program design.

Research Question Three

What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and the existence of an adopted telecommuting program?

The review of literature showed that telecommuting programs have been offered by many organizations as a tool to increase recruiting efforts and retention rate of employees. A complete list of supporting references are in Appendix B. However, there are many other factors that influence recruiting and retention efforts, making it difficult to isolate the impact of one particular intervention.

Research Question Four

What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and whether or not the institution has had budget cuts in the last three years?

Many academic institutions, particularly public institutions, have suffered from loss of funding, budget impounding, and cuts in the last several years. One of the many functions of an organization impacted negatively by a decrease in funds is recruiting and retention of staff and faculty. In lean budget times, some organizations explore various means of retaining and recruiting valuable staff.

Research Question Five

What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and the perceived success of the adopted telecommuting program?

As reported in the review of literature, telecommuting programs have a variety of advantages and disadvantages. Ruppel (1995) stated that an advantage of telecommuting programs was the impact a program had on an organization's ability to recruit and retain employees, in particular, IT employees. If an organization is experiencing difficulty with recruiting and retention, the adoption of a telecommuting program could be an option explored.

Research Question Six

What is the primary constraint for adoption for those institutions that have not adopted a telecommuting program?

Part of an effective decision-making process is the discovery of obstacles to achieve the stated goal. An analysis of the most frequently reported constraint to adoption of a telecommuting program could assist other organizations in the decision-making process. This question will be analyzed using descriptive statistics.

Research Question Seven

What is the primary motivator that could be used to adopt a telecommuting program for an institution that does not have a telecommuting program?

Closely related to research question eight, these data could provide valuable information to those organizations considering adoption of a telecommuting program. Analysis of the motivators could determine the possibility of success of the program and program design factors that are appropriate for the nature of the motivating factor. This question will be analyzed with descriptive statistics.

Research Question Eight

What is the relationship between size and type of the institution and whether or not a telecommuting program is offered?

Based on previous studies, the size of an organization is directly related to innovation in the organization (Bernardino, 1996). Telecommuting is considered an innovative employment benefit. Examination of the instances of telecommuting programs and organizational size would prove beneficial to determine if colleges and universities exhibit the same behavior toward innovativeness as other industries.

Research Question Nine

How frequently is an evaluation process of the telecommuting program in place?

Evaluation of a telecommuting program could provide valuable information for making a program more successful, beneficial to the employees, and cost effective. This data is be presented in descriptive statistical form.

Population and Sample

The College and University Professional Association for Human Resources (CUPA-HR) is a network of more than 6,500 human resources administrators representing nearly 1,700 colleges and universities. Founded 50 years ago, CUPA-HR is an international organization interested in the advancement of human resources in higher education (College and University Personnel Association, 2001). As an organization, CUPA-HR was particularly suited for this study because of the characteristics of the membership. Telecommuting is widely considered to be a work place issue and would most often be initiated, designed by, and approved by upper level administrators and those in personnel offices.

Members of CUPA-HR are human resource professionals (directors, managers, etc.) currently working in a higher education setting. Private corporations are also allowed to be members; however, they were excluded from the selection process for this study. The review of literature revealed that in a majority of cases, telecommuting programs were initiated by personnel or human resource departments in an organization.

Population

This study targeted a sample of the current membership of CUPA-HR. The sample was drawn only from institutions based in 11 southern states of the United States. Those states were Virginia, Kentucky, North Carolina, South Carolina, Arkansas, Tennessee, Mississippi, Alabama, Georgia, Louisiana, and Florida. There were 347 higher education members from these states.

With a population size of 347, the selected sample size was 181. This number was determined from data in the sample Size (S) required for given Populations sizes (N) table (Gay, 1996).

Selection of Sample

All members of CUPA-HR in the 11 selected states were collected into a Microsoft Excel spreadsheet. Any private corporations or non-higher educational institutions were deleted. The *CUPA-HR 2000-2001 Annual Membership Directory* was accessed using the CUPA-HR online directory service available to members of the organization. Access to the directory was provided to the researcher by a member of CUPA-HR at The University of Tennessee, Knoxville. The directory was accessed via the Internet on October 9 and 10, 2001.

Since an institution may have more than one member in CUPA-HR, a single institution was treated as a possible respondent. In each case, the member with the highest administrative title was chosen to be the respondent for that institution. The list of current higher education CUPA-HR members from each of the 11 states and the selected member names were copied into a Microsoft Excel spreadsheet. The total number of institutions (respondents) was 347. A random number generator within Excel was used to generate a random number for each of the member institutions. The generated random number was used to sort the membership list. The first 181 in the sorted list were used as the sample.

Research Design

The design of the study was descriptive. According to Issac and Michael (1995), the purpose of descriptive research is "to describe systematically the facts and characteristics of a given population or area of interest, factually and accurately" (p. 50). Gay (1996) offered further definitions of descriptive research, one of which was survey research. He defined survey research as "an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables" (p. 251). Gay also stated that "current status" could involve variables such as "attitudes, opinions, characteristics, and demographic information" (p. 251).

For this study, the dependent variables were the respondent's membership status in CUPA-HR and being employed at an institution of higher education in one of the 11 states included in the study. The independent variables were (a) whether or not the respondent's institution currently had a formal telecommuting program in place, (b) factors influencing the decision around adoption of the program, (c) perceptions about the

institution's telecommuting program if one existed, and (d) perceptions about why a telecommuting program had not been adopted if one did not exist.

Research Procedures

The survey method followed the procedures for collection of data as prescribed by Dillman (1978). The medium for survey distribution was the world wide web. After the participants were randomly selected, email addresses were obtained for each from the CUPA-HR directory when possible. If an electronic mail (email) address was not provided on the CUPA-HR online directory, the researcher accessed the member's institution website and attempted to locate an email address from an employee directory maintained by the institution. In 18 cases, an email address was not found at all. In these cases, the member's postal address was obtained and used instead of the email address so those members were contacted using United States Postal Service (USPS) correspondence only.

For those CUPA-HR members who had an available email address, an email was sent to the sample with the universal resource locator (URL) of the survey in the body of the message. The URL address was http://bus.utk.edu/survey. This provided the possibility for immediate action on the part of the respondent. To increase response rate, the respondents were offered a chance to win one of four $25 gift certificates from Amazon.com. Recipients were selected from those who responded.

Each survey participant was asked to enter his or her email address on the survey instrument. The initial email addresses and USPS letters were sent October 26, 2001. A total of 163 emails and 18 USPS letters were sent on that date. The email and the letter promised confidentially but explained that the email address was needed to identify them

when they responded. The email address was also used to contact the respondents who were awarded the promised gift certificates. The survey can be found in Appendix D. A copy of the email letter can be found in Appendix E.

Approximately two weeks later, a second email or USPS letter was sent to non-respondents. The reminder email letter can be found in Appendix G. Eight days later, a letter with a copy of the survey and a self-addressed, stamped envelope was sent to the remaining non-respondents. A copy of the letter can be found in Appendix H. The last request to respond was sent out three weeks later. Emails were sent to final non-respondents who had a valid email address. Postcards were sent to those final non-respondents for whom an email address could not be found. A copy of the postcard and email can be found in Appendix I. At the end of seven weeks, the survey was removed from the web so no additional information could be entered.

The survey data were collected as the participants responded using the web survey instrument. A software package, Microsoft FrontPage, was used to develop and present the survey. As the survey respondents entered the data, they were stored in a database designed specifically for capturing the survey data. The database was secured and resided on a web server owned by the College of Business at The University of Tennessee (UT), Knoxville. If the email address had already been used in the survey, the second set of responses was discarded.

The researcher entered the data using the online form to enter data from survey forms returned via USPS mail. All data were collected into the same database. The data were then exported to Microsoft Excel from Microsoft Access and analyzed.

At the conclusion of the data collection process, it was determined that only 12 of the 101 respondents indicated they had a formal telecommuting program in place. Of those 12, 6 failed to complete all the questions about the program. The researcher contacted these 6 by telephone the week of January 14, 2002, and collected the remaining survey data. This resulted in 10 usable surveys that reported the existence of a formal telecommuting program. Because of this small number, several research questions originally intended to be analyzed with relational statistical procedures were analyzed using descriptive statistics.

Instrumentation

Review of the literature produced three instruments that had been used on a limited basis. Using instruments designed by Bernardino (1996), Goldberg (1993), and Ruppel (1995), the researcher developed the Higher Education Personnel Administrator Questionnaire–Telecommuting Programs. A copy can be found in Appendix D.

The majority of the instrument was adapted from a survey instrument titled Manager's Telecommuting Survey developed by Bernardino (1996). An adaptation of the survey can be found in Appendix F. Additional questions developed by the researcher were based on information presented in Chapter Two. The bases for these questions came from a study conducted by Ruppel (1995) that examined the correlates of the adoption of telecommuting for computer programmer/analysts. The Goldberg (1993) study represented qualitative research conducted in a university setting. It examined the reasons why universities have been slow to offer telecommuting programs.

The Bernardino survey instrument was adapted from an instrument described as the Employer's Survey and was divided into four main parts. Bernardino (1996) stated

the objective of the instrument was "to collect data with which to estimate a model of the decision to offer a telecommuting program as a function of the employer's motivations and constraints, as well as of the telecommuting attributes" (p. 47).

Bernardino (1996) said that the model underlying the survey instrument possessed a behavioral framework. She also stated that design of a telecommuting program was modeled as a function of the motivations and constraints presented to the organization. Bernardino provided no validity or reliability data on her survey.

The first part assessed the respondent's experience with and awareness of telecommuting. The second and third parts of the survey inquired about the viability of the respondent's own job for telecommuting and asked the respondents to select various telecommuting arrangement components for a program design. The fourth part gathered personal data about the respondent's organization and job (Bernardino, 1996).

Ruppel (1995) designed a survey by adapting questions from previously validated studies where possible. The survey was developed to determine the differences between adopters and non-adopters of telework. The Ruppel survey was designed using previously validated questions for the variables where possible. To determine reliability of the survey, Cronbach's alphas were calculated for measures that used Likert scales and multiple questions. Cronbachs' alpha for the questions ranged from 0.58 to 0.76 for the questions tested. Confirmatory factor analysis was also performed to test the construct validity of the measures (pp. 80-81).

Goldberg (1993) designed a questionnaire using a panel of experts to gather qualitative data from university administrators. He stated that in this qualitative study, the results could generally be confirmed with similar groups but offered no statistical test of

validity or reliability of his survey. His qualitative study was intended to discover why telecommuting had not been more widely adopted in the university environment.

Survey Instrument

A survey instrument was developed by the researcher to explore the primary motivators and constraints experienced by academic institutions when considering adoption of a telecommuting program. The instrument was also designed to collect information on existing telecommuting programs. It was comprised of four parts.

Part I of the survey collected data about the respondent's tenure at the institution. Part II of the survey requested basic information about the institution where the respondent was employed. Information on current student body size, type of institution, and total number of employees was requested. The Carnegie Classifications of Institutions of Higher Education (The Carnegie Foundation for the Advancement of Higher Education, 2001) were used to classify the participating institutions. Part III requested information about the telecommuting program at the institution. Questions were related to the design of the telecommuting program and were posed to assess the level of flexibility of the program. Part III was answered only by those participants who indicated there was a telecommuting program currently in place at their institution. Part IV requested information only from those respondents who indicated in Part II that the institution currently did not have a telecommuting program. Questions in Part IV were designed to determine the constraints the respondent perceived that were preventing the institution from offering a telecommuting program.

In each section, the Likert-scale with five response categories were labeled as: (a) "Strongly Agree," (b) "Agree," (c) "Undecided," (d) "Disagree," and (d) "Strongly

Disagree." In the statistical analysis, the labels were assigned the following values: (a) five for "Strongly Agree," (b) four for "Agree," (c) three for "Undecided," (d) two for "Disagree," and (e) one for "Strongly Disagree."

Pilot Test

A pilot test of the instrument was conducted by the researcher prior to the initial emailing to the sample population. Both Gay (1996) and Issac and Michael (1995) recommended testing an instrument with a small group of persons who are similar to the target population. For this study, the researcher used a small group similar to the target population as well as others who were in the information technology industry who provided more technical feedback and analysis. The pilot test consisted of eight Chief Business Officers and Chief Personnel Officers employed at UT, four employees in the Office of Information Technology at UT, one statistical computer programmer employed at NOVA Systems in Knoxville, Tennessee, and one human resource manager employed at Knox County government. A copy of the email sent to the pilot test group can be found in Appendix J.

The pilot test was designed to simulate the same experience a survey respondent had when the email containing the invitation to participate was received. An email was sent to the pilot test group that asked them to access the world wide web address provided in the email in order to complete the survey. Feedback from the pilot test was used to increase the ease of reading the survey. Data about part-time employees and students was removed as well as the months on the job. Question 18 was redesigned to make it easier to understand, while minor reworking was done to clarify two other questions.

Analysis of the Data

For this study, the researcher developed the Higher Education Personnel Administrator Questionnaire–Telecommuting Programs and used it for data collection. A paper representation of the survey can be found in Appendix D.

To analyze the data, the Statistical Package for the Social Sciences (SPSS) was used. The collected data were exported to a Microsoft Excel spreadsheet format. Demographic data were reported only in frequency counts and percentages. Other descriptive statistical methods used were *t* test, chi-square, and Spearman's Rho correlation. Research questions 1, 2, 6, 7, and 9 were answered using descriptive statistics. Research questions 3, 4, and 8 were analyzed using a *t* test. Question 5 was analyzed using Spearman's Rho test of correlation. Research question 8 also was analyzed using chi-square. For the post hoc analysis, chi-square was used. A .05 level of significance was used for all statistical tests.

Summary

The purpose in conducting this study was to research some of the factors that influence the decision whether or not to adopt a telecommuting program in the higher education setting. The study examined some organizational characteristics and the perceived constraints and motivators that could influence adoption (or not) of a telecommuting program at an institution. The study also examined the current perceptions of success of recruiting and retaining IT staff at each institution. A template (Figure 2) was designed by the researcher to aid in execution of the study.

The methods, procedures, and instrumentation for this study were presented in this chapter. A survey was developed to investigate the primary motivators and

constraints to adoption of a telecommuting program. The survey also collected information about existing telecommuting programs. Respondents were currently employed at a college or university in the southeastern United States and were also current members of CUPA-HR. This chapter explained in detail the methods used, the population, and outlined the statistical tests used for analysis of the data.

CHAPTER FOUR

ANALYSIS OF DATA AND RESULTS

Introduction

To analyze the factors involved in decision making when considering adoption of a telecommuting program, the researcher invited responses from 181 persons who were members of CUPA-HR. The Colleges and Universities Personnel Association for Human Resources (2001) is an international professional organization for human resource employees working in the higher education setting.

Presentation of the results and analysis of the data collected is presented in this chapter in the following sections: (a) Response Rate, (b) Demographic Data of Respondents, (c) Research Questions, and (d) Summary

Response Rate

A questionnaire titled Higher Education Personnel Administrators Questionnaire–Telecommuting Programs was developed using Microsoft FrontPage and made accessible to the 181 participants in this study. The first mailing consisted of 163 emails and 18 United State Postal Service (USPS) letters for a total of 181. Seventeen emails were returned by the respondents' email systems and determined to be invalid or incorrect addresses. The remaining sample number was 164. The first mailing resulted in 36 responses. The second contact resulted in 26 additional responses. The third contact brought another 30 responses. After the fourth and final contact, a total of 105 responses were collected. Three responses were deleted because they were duplicate entries in the database. This left a total of 102 valid responses. Sixty-four of the surveys were completed by respondents using the web-based survey; 38 were completed on paper.

Participants were offered a chance to win one of four $25 gift certificates from Amazon.com if the survey was completed.

Response rate is determined by dividing the number of returns by the number in the sample, subtracting the number undeliverable (Dillman, 1978). A sample of 164 was used after 17 emails were returned with "fatal errors" or "address not found" by the respondents' email systems. For this study the overall response rate was 62.19%.

Due to the small number of respondents that reported being adopters of telecommuting (10), research questions that were originally intended to be analyzed using relational statistical tests were reported using descriptive statistical methods instead. A sample size of 10 did not provide enough statistical power in some cases to conduct relational tests. Research Questions 1, 2, and 3 fell into this category. Research Question 5 was analyzed using the Spearman's Rho due to the small sample size.

Demographic Data of Respondents

Data were collected via the survey instrument that allowed the researcher to determine the number of years each respondent had been employed at his or her current institution and how long the respondent had held his or her current position. Ninety-eight respondents supplied this information. The average number of years at the respondent's institution was 11.11. Additionally, the average number of years a respondent had held his or her current position was 6.08.

Research Question One

What is the relationship between the primary motivating factor for adopting a telecommuting program and level of flexibility of the telecommuting program design?

Due to the small number of responses, it was not possible to look at a statistical relationship for this question. The data are, therefore, presented in descriptive form.

Twelve respondents indicated there was a telecommuting program in place at the institution. Of the 12 respondents, 10 provided sufficient data to report. Eight of these reported on the length of the existing telecommuting program. The average length of time was 3 years and 2 months. The range of time was from 6 years and 5 months to 2 years. Ten respondents supplied information about the maximum and minimum number of days an employee could telecommute. The fewest was number of days was zero; the highest was 5. The mean for minimum and maximum days was 3.

Information about the respondents' telecommuting programs also was collected. Due to the small sample size, statistical tests could not be run to test the relationship between the motivating factor and program design elements. Descriptive statistics showed that the most frequently offered option was the provision of a computer for the telecommuter. Nine of 10 respondents indicated a computer was provided. Seven of the 10 indicated the telecommuters were allowed to change their work schedule. The same number indicated that network access was provided as a part of the telecommuting program. Those data are presented in Table 2. The most frequently cited motivator to adopt for this group was to "improve overall benefits." Those data are presented in Table 3.

Research Question Two

What is the relationship between the primary constraint to adopting a telecommuting program and the flexibility of the telecommuting program design?

Table 2

Items Offered as Part of Telecommuting Program

	No		Yes	
	Count	%	Count	%
Schedule change	2	(22.2%)	7	(77.8%)
Provide computer	1	(10.0%)	9	(90.0%)
Provide printer	6	(60.0%)	4	(40.0%)
Provide fax	7	(70.0%)	3	(30.0%)
Provide communications line	6	(60.0%)	4	(40.0%)
Provide network access	3	(30.0%)	7	(70.0%)
Provide phone	7	(70.0%)	3	(30.0%)
Provide furniture	10	(100.0%)	0	(.0%)

Table 3

Primary Motivator to Adopt – Adopters

		Frequency	Percent	Valid Percent
Valid	Employee interest	1	1.0	11.1
	Increase recruiting/IT	1	1.0	11.1
	Improve overall benefits	6	5.9	66.7
	Other	1	1.0	11.1
	Total	9	8.8	100.0

Due to the small number of reported telecommuting programs, descriptive statistics were used to analyze the data for this question. Not enough data were collected to test for a relationship.

Two constraints tied as the most frequently mentioned items. These were cost of implementing the program and legal and/or regulatory issues, both achieving 42.9%. Table 4 presents this data.

Research Question Three

What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and the existence of an adopted telecommuting program?

The average means for level of perceived success of recruiting and retention was 3.7 for recruiting and 3.6 for retention for non-adopters. For adopters, the means were 3.4 for recruiting and 3.6 for retention success. Data are presented in Table 5.

To compare data between adopters and non-adopters, a *t* test was used to analyze the perceived success of recruiting and retention between the groups. Adopters had more variability in the data; therefore, equal variances were not assumed. For the retention

Table 4

Primary Constraint to Adopt - Adopters

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cost of program	3	2.9	42.9	42.9
	Legal issues	3	2.9	42.9	85.7
	Other	1	1.0	14.3	100.0
	Total	7	6.9	100.0	

Table 5

Means of Telecommuting Recruiting and Retention Rates and Existence of Telecommuting Program

	Telecommuting Program	*N*	Mean	Std. Deviation	Std. Error Mean
Retention	Non-Adopters	88	3.6932	.9512	.10
	Adopters	8	3.6250	1.1877	.42
Recruiting	Non-Adopters	88	3.7273	.8674	.09
	Adopters	8	3.3750	1.4079	.50

success test, the values were t =.190, df = 94 and p = .850. For the recruiting test, the values were t = .696, df = 7.491, and p = .508. Data are presented in Table 6.

Neither t test showed significance, therefore, it was not possible to detect a difference between perceived retention and recruiting success between telecommuting adopters and non-adopters.

Research Question Four

What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and whether or not the institution has had budget cuts in the last three years?

Respondents indicated a moderate amount of success in retention and recruiting (means of 3.9 and 3.9) if there had been no budget cuts in the last three years. Those who had experienced budget cuts were slightly less positive about the recruiting and retention success (means of 3.5 and 3.5) than were those who had not experienced budget cuts (means of 3.9 and 3.9). Data are reported in Table 7.

Table 6

t test of Recruiting and Retention Between Adopters and Non-Adopters

		Levene's Test for Equality of Variances		*t test for Equality of Means*		
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*
Retention	Equal variances assumed	1.078	.302	.190	94	.850
	Equal variances not assumed			.158	7.838	.879
Recruiting	Equal variances assumed	4.820	.031	1.038	94	.302
	Equal variances not assumed			.696	7.491	.508

* p < .05

Table 7

Means of Recruiting and Retention and Budgets Cuts

	Budget cuts	*N*	Mean	Std. Deviation	Std. Error Mean
Retention	No	54	3.8519	.8775	.1194
	Yes	42	3.4762	1.0415	.1607
Recruiting	No	54	3.8889	.7931	.1079
	Yes	42	3.4524	1.0170	.1569

A *t* test was run to compare the two groups (budget cuts and no budget cuts) to determine if a budget cut was significant. Both groups showed unequal variances for retention and recruiting perception of success.

Recruiting success was significant at the selected .05 level. Retention was not significant at the selected .05 level but would be at a .10 level. Data from the *t* test revealed $t = 2.292$, $df = 75.832$, and $p = .025$ for recruiting $t = 1.876$, $df = 79.926$, and $p = .064$ for retention. Data are reported in Table 8.

Budgets cuts did have a significant negative effect on recruiting. There was no significant statistical effect of budget cuts on perceived success of retention.

Research Question Five

What is the relationship between the perceived level of success in recruiting and retaining information technology staff in the last three years and the perceived success of the adopted telecommuting program?

Table 8

t test of Recruiting and Retention and Budget Cuts

		Levene's Test for Equality of Variances		*t-test for Equality of Means*		
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*
Retention	Equal variances assumed	4.824	.031	1.917	94	.058
	Equal variances not assumed			1.876	79.926	.064
Recruiting	Equal variances assumed	8.494	.004	2.364	94	.020
	Equal variances not assumed			2.292	75.832	.025

* $p < .05$

The Spearman's Rho test for correlation was used to analyze these data due to the small sample size (10) and because the data were not normally distributed. Correlation coefficient between perceived retention success and existence of a telecommuting program was .362 with $p = .304$; for recruiting, the values were coefficient .533 and $p = .113$. The results do not indicate significance; however, it is possible a relationship does exist. Data are presented in Table 9.

Correlation coefficients indicated a relationship. However, with a sample size of 10, power was not sufficient to detect a significant relationship. The correlation is positive but not significant at the .05 level.

Table 9

Spearman's Rho Test of Correlation of Recruiting, Retention, and Success of Telecommuting Program

		Success Retention of IT Staff	Success of Recruiting IT Staff	Success of telecommuting program
Success Retention of IT Staff	Correlation Coefficient	1.000	.921**	.362
	Sig. (2-tailed)	.	.000	.304
	N	10	10	10
Success of Recruiting IT Staff	Correlation Coefficient	.921**	1.000	.533
	Sig. (2-tailed)	.000	.	.113
	N	10	10	10
Success of telecommuting program	Correlation Coefficient	.362	.533	1.000
	Sig. (2-tailed)	.304	.113	.
	N	10	10	10

**. Correlation is significant at the .01 level (2-tailed).

Research Question Six

What is the primary constraint for adoption for those institutions that have not adopted a telecommuting program?

Frequencies of the responses of this question are presented in Table 10. The most frequently selected response was "Other" with 33.3% of the valid response. Respondents were allowed to enter comments if "other" was indicated as their responses. The researcher grouped the responses into four general categories. They are as follows: (a) a program is in the early stages of development or consideration, (b) there is an informal program or policy in place, (c) there is no perceived need or suitable jobs, and (d) various negative issues have or would be created if employees were allowed to telecommute.

There were 24 comments in the four categories. In the first category, 4 responses were counted. These responses indicated that a program was being developed or consideration was being given to development. The second category, totaling 7 responses, indicated an informal arrangement was being used. For the third category, 5 respondents indicated either that no need was perceived for telecommuting or that no jobs at the institution were suitable for such an arrangement. The fourth category had 8 responses and included statements such as "need office coverage," "perceived reduction in organizational effectiveness," and "extensive time is needed to place a new program."

The second highest choice for the primary constraint to telecommuting was "lack of interest." This was indicated by 20.8% of the respondents. "Lack of management support" was the third most frequent choice with 18.1%.

Table 10

Frequencies of Primary Constraint to Adopt – Non-Adopters

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Other	24	23.5	33.3	33.3
	Lack of interest	15	14.7	20.8	54.2
	Lack of mgmt support	13	12.7	18.1	72.2
	Legal issues	9	8.8	12.5	84.7
	Lack of knowledge	9	8.8	12.5	97.2
	Cost of program	2	2.0	2.8	100.0
	Total	72	70.6	100.0	
Missing		30	29.4		
Total		102	100.0		

Research Question Seven

What is the primary motivator that could be used to adopt a telecommuting program for an institution that does not have a telecommuting program?

Frequencies of responses revealed the most common motivator to adopt telecommuting was "Improvement of overall employee benefits." Fifty percent of the responses were in this category. The second highest primary motivator was "Employee interest." This was selected by 17.1% of the respondents. The third highest primary motivator for telecommuting was to "increase productivity" with 14.3%.

For those respondents who indicated "Other" as the response, the comments were varied. Examples of comments were "parking and environmental issues," "lack of existing office space," and "increased retention rate for any category of employee, not just IT staff." Data are presented in Table 11.

Table 11

Frequencies of Primary Motivators to Adopt – Non-Adopters

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Improve overall benefits	35	34.3	50.0	50.0
	Employee interest	12	11.8	17.1	67.1
	Increase productivity	10	9.8	14.3	81.4
	Other	7	6.9	10.0	91.4
	Increase retention/IT	6	5.9	8.6	100.0
	Total	70	68.6	100.0	
Missing		32	31.4		
Total		102	100.0		

Research Question Eight

What is the relationship between size and type of the institution and whether or not a telecommuting program is offered?

To determine if a relationship existed between size of institution and whether or not the institution offered a telecommuting program, the number of employees and students was collected to determine the size of each responding institution.

The means were calculated for the information between adopters and non-adopters. The average number of employees for adopters was 3,942. The average student body size for the same group was 14,278. For non-adopters, the average number of employees was 1,575. The average student body size was 6,832. These data are reported in Table 12.

Table 12

Means of Size of Institution by Existence of Program

	Telecommuting Program	*N*	Mean	Std. Deviation	Std. Error Mean
Number of employees	Non-Adopters	83	1,575.8193	2,942.4945	322.9807
	Adopters	12	3,942.5000	4,310.5408	1244.3459
Number of students	Non-Adopters	80	6,832.2750	8,451.3710	944.8920
	Adopters	12	14,278.8333	13,250.2622	3825.0212

A *t* test was run to compare institution size of adopters and non-adopters. Variances were unequal for both measures so equal variances were not assumed. The results of this analysis was for number of employees, $p = .089$ and for students $p = .082$. These are not significant at the selected .05 level; however, they would be significant at a .10 level. This indicates that larger institutions may be more likely to have a telecommuting program. Analysis of that data is presented in Table 13.

Carnegie Classification was used to categorize responding institutions by type. To determine if there was a difference between the classifications and whether or not a telecommuting program existed, a chi-square test was run and an exact *p* value calculated.

An exact *p* value was used since the default estimated *p* value is not reliable for small samples. Results were chi-square = 16.439, $df = 8$, and exact *p* value = .044. This indicated a relationship between the type of institution and the existence of a telecommuting program. Data in Table 14 present the results of the classification of those institutions cross-tabulated by adopters and non-adopters.

Table 13

t test of Size by Existence of Program

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*
Number of employees	Equal variances assumed	4.238	.042	-2.444	93	.016
	Equal variances not assumed			-1.841	12.524	.089
Number of students	Equal variances assumed	7.140	.009	-2.622	90	.010
	Equal variances not assumed			-1.890	12.377	.082

* $p < .05$

Table 14

Cross-tabulation of Carnegie Classification and Existence of Telecommuting Program

		Telecommuting Program		
		No	Yes	Total
Associate of Arts Colleges	Count	16	1	17
	% within Telecommuting Program	21.6%	9.1%	20.0%
Baccalaureate Colleges I	Count	12	2	14
	% within Telecommuting Program	16.2%	18.2%	16.5%
Baccalaureate Colleges II	Count	7	1	8
	% within Telecommuting Program	9.5%	9.1%	9.4%
Doctoral University I	Count	2	1	3
	% within Telecommuting Program	2.7%	9.1%	3.5%
Doctoral University II	Count	4	1	5
	% within Telecommuting Program	5.4%	9.1%	5.9%
Master Universities and Colleges I	Count	22		22
	% within Telecommuting Program	29.7%		25.9%
Professional Schools and Specialized Institutions	Count	2		2
	% within Telecommuting Program	2.7%		2.4%
Research University I	Count	6	5	11
	% within Telecommuting Program	8.1%	45.5%	12.9%
Research University II	Count	3		3
	% within Telecommuting Program	4.1%		3.5%
Total	Count	74	11	85
	% within Telecommuting Program	100.0%	100.0%	100.0%

Of the adopters, 45.5% were classified as Research University I. Of the non-adopters, 29.7% were Master's Universities and Colleges I, and 21.6% were Associate of Arts Colleges. Therefore, Research University I institutions are more likely to adopt a telecommuting program. Associate of Arts Colleges and Master's Universities and Colleges I's were the least likely to adopt a program.

Research Question Nine

How frequently is an evaluation process of the telecommuting program in place? Evaluation of a telecommuting program could provide valuable information for making a program more successful, beneficial to the employees, and cost effective. Of the respondents reporting on this question, 62.5% indicated they periodically evaluated their telecommuting program.

Post Hoc Data Analysis

In post hoc analysis, the present study indicated significance between type of institution and the occurrence of budget cuts in the last three years. A chi-square was executed to analyze the data. Significance was found between type of institution (public or private) and budget cuts at the $p < .001$ level. Additional results were chi-square = 12.242 and $df = 1$.

Data reported in Table 15 show the percentage of budget cuts by institution type. A larger percentage of budget cuts were reported by public institutions with 58.1%. Only 22.5% of private institutions reported budget cuts.

Table 15

Budget Cuts by Institution Type

		Budget cuts		
		No	Yes	Total
Private	Count	31	9	40
	% within Type of Institution	77.5%	22.5%	100.0%
	% within Budget cuts	54.4%	20.0%	39.2%
	Adjusted Residual	3.5	-3.5	
Public	Count	26	36	62
	% within Type of Institution	41.9%	58.1%	100.0%
	% within Budget cuts	45.6%	80.0%	60.8%
	Adjusted Residual	-3.5	3.5	
Total	Count	57	45	102
	% within Type of Institution	55.9%	44.1%	100.0%
	% within Budget cuts	100.0%	100.0%	100.0%

Summary

This chapter presented the statistical results of the 9 research questions formulated for the study. Response rate for this study was 62.19%. Unfortunately, only 10 respondents reported adoption of telecommuting at their institutions. This caused the researcher to analyze Research Questions 1, 2, and 3 with descriptive rather than correlation statistics. Additionally, Research Question 5 was analyzed using Spearman's Rho due to the small sample size. A discussion of the results is presented in Chapter Five.

CHAPTER FIVE

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

This chapter presents the conclusions, recommendations, and implications of the current study. Chapter sections include (a) Methods and Procedures, (b) Major Findings, (c) Implications and Discussion of the Results, (d) Recommendations, and (e) Conclusions.

The purpose in conducting this study was to research some of the factors that influence the decision whether or not to adopt a telecommuting program in the higher education setting. The study examined some organizational characteristics and the perceived constraints and motivators that could influence adoption (or not) of a telecommuting program at an institution. The study also examined the current perceptions of success of recruiting and retaining information technology (IT) staff at each institution.

Identifying the factors involved in the decision-making process had significance due to the popularity of telecommuting programs offered in private industry and the apparent lack of such programs in higher education. Since telecommuting programs have been particularly suited for IT workers and those same workers have been difficult to recruit and retain in higher education, the study contributed to a body of knowledge that could assist higher education institutions in their efforts to recruit and retain this valued labor population.

Method and Procedures

The study employed quantitative research methods. After a thorough review of literature about telecommuting program adoption and decision factors, the researcher developed a survey instrument. Studies by Bernardino (1996), Ruppel (1995), and Goldberg (1993) were used to determine appropriate research questions.

The survey instrument was comprised of four parts. Part I collected data about the respondent's tenure at the institution. Part II requested basic information about the institution where the respondent was employed. Information on current student body size, type of institution, and total number of employees was requested. The Carnegie Classifications of Institutions of Higher Education was used to classify the participating institutions (The Carnegie Foundation for the Advancement of Higher Education, 2001). Part III requested information about the telecommuting program at the institution. Questions were related to the design of the telecommuting program and were posed to assess the level of flexibility of the program. Part III of the survey was answered only by those participants who indicated there was a formal telecommuting program currently in place at their institutions. Part IV requested information only from those respondents who indicated in Part II that the institution currently did not have a formal telecommuting program in place. Questions in Part IV were designed to determine the constraints the respondent perceived that were preventing the institution from offering a telecommuting program.

The sample for the study consisted of 181 members of The College and University Personnel Association for Human Resources (CUPA-HR). The members were selected from 11 states in the southeastern section of the United States. Only those

CUPA-HR members who were employed at a institution of higher education were selected.

Data collection procedures included an initial mailing in which each participant received an email or United States Postal Service (USPS) letter. Only those participants for whom a valid email address could not be found were sent a USPS letter. Non-respondents were sent a follow-up email or letter approximately two weeks later. Eight days after the second contact, a USPS packet was sent to all non-respondents with a cover letter and copy of the survey. The packet included a self-addressed, stamped return envelope. The last request was sent to all non-respondents approximately three weeks later. An email was sent to all non-respondents with a valid email address. Postcards were sent to those for whom a valid email address was not obtainable. Of the 181 invited to participate, 102 submitted a survey. This yielded a response rate of 62.19%.

Due to the small number of reported telecommuting programs, Research Questions 1, 2, and 3 were analyzed using descriptive statistics rather than the intended relational tests. Research Question 8 was analyzed using Spearman's Rho due to the same small sample.

Data collected from the surveys were analyzed with a variety of statistical procedures. Descriptive statistics were used on the demographic items about the participants' job tenure. Research Questions 1 - 9, were analyzed using various descriptive statistical methods. A *t* test was employed to further analyze Research Questions 3, 4, and 8. Spearman's Rho was used to analyze Research Question 5 and 8. Chi-square was also used to analyze data for Research Question 8. A .05 level of significance was used for all statistical tests.

Major Findings

This section includes major findings in this study. Findings are discussed in relation to the model titled *Decision-Making Process for Colleges and Universities Considering the Telecommuting Option for Employees* (Figure 2) that guided this research. The first area of discussion is the *Organizational Characteristics*. Included in this area of the model were size and type of institution and the status of budget cuts at the institution.

1. Research Question 8 analyzed the relationship between size and type of Institution and whether or not a telecommuting program had been adopted. Results of the *t* test revealed that adopters were larger in size (number of employees and students) than non-adopters. Chi-square analysis also indicated a relationship between type of institution and adoption of a telecommuting program. A cross-tabulation of Carnegie Classification by existence of telecommuting program reported that 45.5% of adopters were classified as Research University I institutions and of the non-adopters, 29.7% were Master's and Universities and Colleges I, followed by Associate of Arts Colleges with 21.6%. This finding was not entirely expected and could present ideas for further research.

2. Research Question 4 analyzed the perceived level of success in recruiting and retaining information technology staff in the last three years and whether or not the institution had budgets cuts in the last three years. Means from respondents who had experienced budget cuts were less positive about the success of recruiting and retention than those who had not (means of 3.5 and 3.9 respectively). Results of a *t* test indicated that budget cuts did have a significant negative effect on recruiting success. No statistically significant effect on retention due to budget cuts was revealed.

The next area of discussion addressed the findings as to the motivators and constraints reported by the respondents. This area was represented in Figure 2 as the *Motivators and Constraints as Perceived by the Institution's Personnel (Advantages/Disadvantages)*.

3. In Research Question 1 adopters reported that "improvement of overall benefits" was the primary motivator at their institution to adopt telecommuting. In Research Question 7, non-adopters reported the same primary motivator. Non-adopters listed this motivator 50% of the time followed by employee interest with 17.1%.

4. The primary constraint to adopt as reported by adopters and analyzed in Research Question 2 was cost of the program and legal issues. Both these factors were reported by 42.9% of the respondents.

5. Research Question 6 analyzed the primary constraint as reported by non-adopters. This group most frequently selected "Other" (23.5%) as the primary constraint. The survey in this study collected personal responses when the "other" category was cited by the respondents. The responses were grouped into four categories as follows: (a) a program is in the early stages of development or consideration, (b) there is an informal program or policy in place, (c) there is not perceived need or suitable jobs, and (d) various negative issues have or would be created if employees were allowed to telecommute.

The last area of the model discussed in relation to the findings is the *Evaluation of Impact of Telecommuting Program*. In this portion of the model, frequency of program evaluation and the impact the program's impact on retention and recruiting were analyzed. Research Question 9 was used to address the frequency of program evaluation. Respondents indicated that 62.5% of the existing programs were being evaluated periodically.

6. Telecommuting adopters reported that 62.5% of the telecommuting programs were periodically evaluated. This is an important part of any program offered for employee work life enhancement and indicates the importance of the program to those who offer it.

7. Analysis of the impact of the success of telecommuting programs was addressed in Research Question 3. It examined the relationship between the perceived level of success of recruiting and retention of information technology staff in the last three years and the existence of an adopted telecommuting program. Several researchers reported that telecommuting was an effective tool for improving recruiting and retention rates of particularly IT staff.

Results of means for adopters were 3.4 for recruiting success and 3.6 for retention success. Non-adopters' means were 3.7 for recruiting success and 3.6 for retention success. Results of the *t* test did not indicate a significant difference in the perception of recruiting and retention success and the existence of a telecommuting. Therefore, the existence of a telecommuting program did not translate into higher recruiting and retention rates of IT staff.

8. Research Question 5 was also formulated to assess the impact of telecommuting programs. It addressed the relationship between the perceived level of success in recruiting and retention of information technology staff in the last three years and the perceived success of the adopted telecommuting program. The Spearman's Rho test revealed a positive relationship but not a statistically significant one due to the small number of reported telecommuting programs.

Demographic Data of Respondents

Data were collected via the survey instrument that allowed the researcher to determine the number of years each respondent had been employed at his or her current institution and how long the respondent had held his or her current position. Ninety-eight respondents supplied this information. The average number of years at the respondent's institution was 11.11. Additionally, the average number of years a respondent had held his or her current position was 6.08.

Demographic Data of Reported Telecommuting Programs

Data about the length of telecommuting programs were collected on the survey. The longest time a reported telecommuting program had been in place was just over three years. Elements of program design were also collected and summarized as follows: (a) the most frequently offered option was the provision of a computer for the telecommuter, (b) 9 of 10 respondents indicated a computer was provided, (c) 7 of 10 indicated the telecommuters were allowed to change their work schedule, and (d) the same number indicated that network access was provided as a part of the telecommuting program.

Program design elements were reported to impact adoption of telecommuting programs by employees. Bernardino (1996) found that the more flexible programs were more attractive to employees and thus had a higher rate of adoption.

Implications and Discussion of the Results

The implications drawn by the researcher were based on the data collected and analyzed as a part of this study. The following discussion is presented using the model (Figure 2) designed as part of this study. At the end of this section, a general discussion of demographical data is presented.

The first area of discussion is *Organizational Characteristics*. This area included size and type institution as well as the status of budget cuts.

1. This study found that size of institution did relate positively to the existence of a telecommuting program. Further, the Carnegie Classification of Research University I was the type most often reported as having adopted telecommuting.

   Size of institution could be impacting the need for telecommuting. In the present study the average size of the adopters was much larger than the average size of non-adopters. Other possible factors embedded in that statistic could be the proximity to larger cities, and therefore, more competition from private industry for work force; a wider variety of jobs, and, therefore, more positions suitable for telecommuting. Smaller institutions where employees are required to perform many job functions would be less able to offer telecommuting.

   A partial of the description of a Research University I included criteria such as giving "high priority to research" and "offering graduate education through the doctorate degree" (The Carnegie Foundation for the Advancement of Teaching, 2001, Table 4, para 1). It is possible that type of educational environment would also foster innovation in employee work life, such as telecommuting programs. Type Research University I institutions also receive at least $40 million dollars in federal support which also implies a large student body and workforce. The number of Research University I institutions in 2000 was 89. With this small number, it is possible the number of institutions able to support telecommuting is relatively small.

2. It was not surprising that this study found recruiting was negatively impacted by budget cuts, but not retention. Budget cuts impact specific areas of an organization. Recruiting, travel, and training functions are the easiest and most common targets of cutbacks.

   Nearly one half of the reporting institutions had experienced budget cuts in the last three years. Post hoc analysis also revealed that a majority (58.1%) of public institutions had experienced budget cuts in the last three years.

   Cost of implementing a new and somewhat unproven program could experience a lot of resistance, especially in a lean budget environment. The literature provided some insight into the frustration of universities with IT implementation (Davidow, 1996; Green, 2000; Green & Gilbert, 1995; Kolbulnicky, 1999). Since the current trend for universities is to see more and more of a lean budget devoted to new technology, they could be reluctant to implement a program that is going to cost even more when they will not be able to easily or at all determine the return on the investment.

The next area of discussion is the implications the respondents reported as motivators and constraints. This concept is represented in the model (Figure 2) as *Motivators and Constraints as Perceived by the Institution's Personnel (Advantages/Disadvantages)*.

3. Motivators as represented in Figure 2 influenced the decision to offer and/or design a telecommuting program. Non-adopters most frequently cited "improvement of overall benefits" as the primary motivator if the institution were to consider adoption. Similar results were reported by Bernardino (1996). Her study revealed that employers were "primarily motivated by the need to address employees' needs." (p. 55).

   Adopters in this study also were most frequently motivated to adopt by "improvement of overall benefits." Clearly, this factor was the most important to the respondents since it was most frequently cited as the motivator for both adopters and non-adopters.

   Goldberg (1993) reported the primary motivating factor discovered in his study was legislative mandates. However, many of those respondents were from universities in California where legislation regarding telecommuting was passed in the early1990s.

Apparently universities have an interest in improving work life and overall benefits. However, the interest could mean offering more liberal vacations, flex-hours, flex-time, and other benefits tailored to the employee population at the institution. Universities could possibly be investing time and energy in more mature, well-defined programs.

In his 1983 research, Rogers defined attributes of innovation which could be related to the adoption of telecommuting. Considering the complexity of decision making and the process of implementing a new program, it could be that the relative advantages are not as readily observed as is needed in the higher education setting. Additionally, the compatibility component of the adoption process could pose several problems in that telecommuting changes the way people work and are supervised.

4. For adopters, the most commonly cited constraint was cost of implementing the program. This is supported by the literature (Appendix C) as it has been reported as a common deterrent or disadvantage when organizations are considering implementing a program. The cost factor could also be related to the number of respondents who reported budget cuts in the last three years (42 of 96). Telecommuting is not a well-defined employee benefit as compared to other work life benefits such as flex-hours, day care, on-site health clubs. This could possibly deter employers from launching a program, particularly in lean budget times.

5. Constraints were shown in Figure 2 to impact the decision to offer or design a telecommuting program. For non-adopters, the most commonly cited constraint selected was "Other." On this question, respondents were able to write a personal response about the constraint. As discussed in the Major Findings, these responses were grouped as to the nature of the response. The four groups were (a) a program is in the early stages of development or consideration, (b) there is an informal program or policy in place, (c) there is not perceived need or suitable jobs, and (d) various negative issues have or would be created if employees were allowed to telecommute.

   This finding is different from most research reported on primary constraints to adopt telecommuting. Bernardino (1996) reported that one of the major barriers to the wide acceptance of telecommuting was managerial concern. Goldberg (1993) had also reported that "convincing management" of the benefits of telecommuting was an issue (p. 216). This finding personifies one of the many differences between the organizational concerns and characteristics in higher education and other industries.

The third area of the model guiding this study is *Evaluation of Impact of Telecommuting Program.* This concept included whether or not a telecommuting program was periodically evaluated and whether or not a telecommuting program had impacted the perceived recruiting and retention rates of IT staff at the institution.

6. As reported previously, 62.5% of adopters indicated that the telecommuting program was periodically evaluated. This is an important part of any program offered for employee work life enhancement and indicates the importance of the program to those who offer it.

   If any employee program is to be successful, it must be evaluated for effectiveness and cost benefits. Just as any other benefit offered by an organization, telecommuting needs to add to the value of the organization in cost savings, retention of valuable employees, or recruiting.

7. Data analysis did not reveal a relationship (impact) between recruiting and retention success and the existence of a telecommuting program. This suggested that even though the groups tended to agree that they had been slightly successful in recruiting and retention in the last three years, it was not strongly related to the existence of a telecommuting program. Only two of Goldberg's (1993) 54 respondents indicated that the telecommuting program had been used for recruitment or retention purposes (p. 217). Obviously other factors are contributing to the success of recruiting and retention.

   Literature reviewed in this study (Aldoaijy, 1999; Cole-Gomolski, 1998; Dash, 1999; Dash, 2000; Giunta, 1997; Linkins, 1999; Mateyaschuk, 1999; Olsen, 2000; York, 1999) revealed several factors impacting recruiting and retention, particularly of IT staff. They generally included quality of work life, opportunities to learn and advance, and work on interesting projects.

8. Success of the telecommuting programs was not shown to have a statistically significant impact on IT employee recruiting and retention rates. This was somewhat unexpected, however, it is not known what other benefits are currently offered by employers to make them more attractive to employees and potential employees. The literature revealed other perks being used in private industry to attract IT employees such as child day care, liberal vacation policies, and on-site health clubs.

The following implications are of a more general nature. Although they did not fit neatly into an area of the model that guided this study, the researcher deemed them important to the study.

9. Institutions of higher education are certainly lagging behind in the adoption of telecommuting programs. Only 12 of 102 indicated they had a formal policy in place. This finding was expected as it was supported in the review of literature and more specifically in Goldberg's (1993) study. According to Rogers' (1983) categories of adopters, higher education certainly fell into the 16% laggard category when adoption of telecommuting was the subject.

   Other variables such as proximity to a large city, local competition for information technology employees, and a host of other factors could be impacting the decision to (not) adopt telecommuting. Therefore, research is needed to determine if other factors are impacting the adoption rate.

   Goldberg (1993) reported that telecommuting was occurring "to quite a limited extent" in his study. He further stated that in many cases in his study, formal telecommuting had been approached only due to state or local government initiatives. Additionally, Goldberg stated that the unwieldiness of many university administrative processes made changes difficult and reasoned that the lack of competition was a disincentive to change. Complex decision-making processes, bureaucratic organizations, and diffusion of authority as were reported in higher education, could create an environment in which new adoptions would be difficult to implement, particularly university-wide.

10. The most mature telecommuting program reported was just over three years old. Goldberg (1993) found that the longest existing program in his study was 30 months. This indicated that not only is higher education lagging behind in programs, but those that do have telecommuting programs are relatively new at it.

    A slow adoption rate means less maturity in this area. Also, the present study queried the existence of formal programs only. Some respondents indicated they did allow telecommuting, but on an informal basis. As reported in Chapter Four, several non-adopters indicated there was an informal telecommuting policy in place. This may allow the institution to retain flexibility in employee work life. Thompson (1999) reported that in a 1995 survey of all *Fortune* 1000 companies, only a small percentage did so as a formal program.

11. While the number of reported programs was small, those institutions that reported a program provided an adequate array of equipment and network access for the telecommuter. The generous provision of equipment to a telecommuter causes the employee to be more likely to adopt the program for his or her own work arrangements (Bernardino, 1996). Nine of 10 provided a computer; 7 of 10 provided network access; 7 of 10 allowed the telecommuter to change his or her schedule from week to week. This indicates a great deal of flexibility in the programs offered, thus making the program attractive to employees.

Recommendations

After analysis of the data and results presented, the follow recommendations are offered for consideration. Although this study revealed some promising data, additional studies could build on the results of this study and provide a greater wealth of knowledge in this area.

1. Future research should be conducted in conjunction with Rogers' (1983) research on adoption of innovations. Using the categories of adopters and attributes of rate of adoption, a comprehensive study using Rogers' theory would reveal much more about the estimated level of telecommuting adoption in a specific industry such as higher education. Further research should be based on the decision-making phase of the adoption stages as described in Rogers and Shoemaker's (1971) paradigm that showed functions in the authority-innovation decision process.

2. The model designed in this study and used to guide it could serve as a model for further research. Empirical research should be conducted to rigorously test the model presented in the higher education and other industry settings. Studies using a consistent model for research can provide highly valuable results and significantly increase the body of knowledge about adoption of innovative programs.

3. More research about existing telecommuting programs (formal and informal) in higher education is needed. This information would prove useful to those considering telecommuting or other means of improving employee benefits and work arrangements and what program design elements were being used.

4. This study found that size and type of institution were influential in the decision to adopt telecommuting. Future studies should concentrate on those institutions found to be more likely to have a formal telecommuting program

in place. Since this study found that larger institutions and class Research University I's were more likely to have adopted telecommuting, these institutions should be specifically studied. Using the Carnegie Classification categories as a dependent variable could prove useful in determining the specific organizational characteristics that could be present in a type of institution.

Conclusions

This study provided information about the adoption of telecommuting programs in higher education in the southeastern United States. Factors that impacted the decision-making process were studied and results were discussed in this chapter. This study was unique in that it studied the decision-making process involved in the adoption of telecommuting programs in higher education.

The decision to offer telecommuting is a complex one. This study presented the major considerations as found in the literature and presented them so other institutions could use the information to aid in their decision-making process.

The body of literature presented a wealth of information about telecommuting programs, the advantages and disadvantages, suitable jobs for telecommuting, and how to implement a telecommuting program. However, the literature was seriously lacking in studies conducted in the higher education setting. This study provided information that expanded the body of knowledge about telecommuting programs and information about what impacts the decision-making process in an area that could greatly benefit from that knowledge.

As employers, institutions of higher education recognize the value of an attractive benefits package but face multiple obstacles in developing and implementing innovative programs. Telecommuting is certainly an important potential in an innovative

program but currently lacks the perspective of maturity. The results of this study can contribute to the efficiency of the decision process. With a viable foundation for development and implementation, telecommuting programs in higher education will have greater opportunity to achieve a necessary level of growth and maturity. The researcher hopes that the insights of this study become tools for that growth.

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APPENDICES

Appendix A

Critical Factors to Consider When Adopting Telecommuting

- State, local, Federal Government initiatives (Olszewski, & Mokhtarian, 1994; Pratt, 1997)

- Safety and security (data, equipment) (Fairweather, 1999; York, 1999)

- Obtain top management support (Hartman, Stoner, & Arora, 1992)

- Write a formal telecommuting agreement (Kurland & Bailey, 1999; Wilkes, Frolick, & Urwiler 1994)

- Management's resistance to change (Bush, 1990; Ellis & Webster, 1999; Fairweather, 1999; Fusco, 1990; Gainey, Kelley, & Hill, 1999; Harrington & Ruppel, 1999; Hartman, Stoner, & Arora, 1991; Kurland & Cooper in press; Kurland & Egan, 1999; Pearlson & Saunders 2001; Weiss, 1992Wilkes, Frolick, & Urwiler,1994)

- Selection of jobs for telecommuting (Ahmadi, Helms, & Ross, 2000; Ford & Butts, 1991; York 1999)

- Training (Davenport & Pearlson, 1998; Deeprose, 1999; Fister, 1999; Gordon, Jossi, Kiser, Lee, & Stamps, 1998; Kurland & Bailey, 1999)

- Definition and selection of telecommuters (Ahmadi, Helms, & Ross, 2000; Deeprose, 1999; Ford & Butts, 1991; Greenbaum, 1998; Hartman, Stoner, & Arora, 1992; Schilling, 1999; Wilkes, Frolick, & Urwiler, 1994; York, 1999; Young, 1991)

- Provide training (Ahmadi, Helms, & Ross, 2000)

- Selection of supervisors of telecommuters (Deeprose, 1999; Fister, 1999; Ford, & Butts, 1991; Hartman, Stoner, & Arora, 1992; Wilkes, Frolick, & Urwiler, 1994; York, 1999)

- Evaluation of program (Deeprose, 1999)

- Measurement of work (telecommuter's) (Fougere & Behling, 1995)

- Liability, costs (at home site) (Deeprose, 1999)

- Equipment requirements (Deeprose, 1999; Hartman, Stoner, & Arora, 1992)

- Management skills training (results orientation) (Deeprose, 1999)

- Write a formal policy document (Deeprose, 1999; Greenbaum, 1998; Wilkes, Frolick, & Urwiler,1994)
- Analysis of impact at organizational level (Bernardino & Beh-Akiva, 1996; Yen & Mahmassani, 1997)
- Non-telecommuters (Coutu, 1998)
- Exit strategy (Deeprose, 1999)
- Conduct a pilot project (Wilkes, Frolick, & Urwiler, 1994
- Effect on careers of telecommuters (Hartman, Stoner, & Arora, 1992)
- Security (Deeprose, 1999; Wilde, 2000)
- Family/work life balance (Harman, Stoner, & Arora, 1992; Schilling, 1999)
- Communications (equipment) (Ahmadi, Helms, & Ross, 2000; Deeprose, 1999; Hartman, Stoner, & Arora, 1992; Pliskin, 1998; Wilde, 2000)
- Taxes (Deeprose, 1999)
- OSHA (Deeprose, 1999; Wilde, 2000)
- Fair Labor Standards Act requirements (Hartstein & Schulman, 1996)
- Establish clear policies and guidelines (Kurland & Bailey, 1999; Wilkes, Frolick, & Urwiler, 1994)
- Provide reasonable accommodations to comply with the Americans with Disabilities Act (Hartstein & Schulman, 1996)
- Build trust between managers and telecommuters (Ahmadi, Helms, & Ross, 2000; Coutu, 1998)
- Find a champion (Wilkes, Frolick, & Urwiler, 1994)
- Adjust employee evaluation program (Ahmadi, Helms, & Ross, 2000)
- Form an implementation committee (Wilkes, Frolick, & Urwiler, 1994)

Appendix B

Reported Advantages of Telecommuting

- Recruiting (Ahmadi, Helms, & Ross, 2000; Ellison, 1999; Cole-Gomolski, 1998; Fister, 1999; Ford & Butts, 1991; Gainey, Kelley, & Hill, 1999; Khaifa & Davidson, 2000; Khalifa & Etezadi, 1997; Mariani, 2000; McCune, 1998; Pearlson & Saunders, 2001; Pratt, 1997; Schilling, 1999; Schwartz, 1997; Solomon, 2000; Spillman & Markham, 1997; Wilde, 2000)

- Retention (Ahmadi, Helms & Ross, 2000; Cole-Gomolski, 1998; Davenport & Pearlson, 1998; Deeprose, 1999; Ellison, 1999; Fister, 1999; Ford & Butts, 1991; Fougere & Behling, 1995; Fusco, 1990; Gainey, Kelley, & Hill 1999; Khaifa & Davidson, 2000; Khalifa & Etezadi, 1997; Mariani, 2000; McCune, 1998; Pearlson & Saunders, 2001; Pratt, 1997; Schwartz, 1997; Solomon, 2000; Spillman & Markham, 1997; Wilde, 2000)

- Increased employee productivity/performance (Ahmadi, Helms & Ross, 2000; Cole-Gomolski, 1998; Davenport & Pearlson, 1998; Deeprose, 1999; Ellis & Webster, 1999; Ellison, 1999; Ford & Butts, 1991; Fougere & Behling, 1995; Gordon, Jossi, Kiser, Lee, & Stamps, 1998; Greenbaum, 1998; Handy & Mokhtarian, 1995; Hartman, Stoner, & Arora, 1991; Hartstein & Schulman, 1996; Khaifa & Davidson, 2000; Kurland & Bailey, 1999; McCune, 1998; Nie, 1999; Pratt, 1997; Schilling, 1999; Schwartz, 1997; Solomon, 2000; Spillman & Markham, 1997; Wilde, 2000; Wilkes, Frolick, & Urwiler, 1994; Young, 1991)

- Enterprise productivity (Ford & Butts, 1991)

- Employee morale (Deeprose, 1999; Fougere & Behling, 1995; Khalifa & Etezadi, 1997; Solomon, 2000; Spillman & Markham, 1997; Wilkes, Frolick, & Urwiler, 1994)

- Access to new labor markets (Bush, 1990; Christensen, 1992; Deeprose, 1999; Ford & Butts, 1991; Khalifa & Etezadi, 1997; Kurland & Bailey, 1999; Schwartz, 1997)

- Cost savings in training and hiring contractors (Deeprose, 1999)

- Lower absenteeism (Deeprose, 1999; Kurland & Bailey, 1999; Pratt, 1997; Solomon, 2000; Spillman & Markham, 1997; Wilkes, Frolick, & Urwiler, 1994)

- Lower office space cost and support (Ahmadi, Helms & Ross, 2000; Christensen, 1992; Davenport & Pearlson, 1998; Deeprose, 1999; Ellison, 1999; Ford & Butts, 1991; Fougere & Behling, 1995; Fusco, 1990; Greenbaum, 1998; Handy & Mokhtarian, 1995; Hartstein & Schulman,

1996; Khalifa & Etezadi, 1997; Kurland & Bailey, 1999; Kurland & Egan, 1999; Mariani, 2000; Schilling, 1999; Schwartz, 1997; Spillman & Markham, 1997; Young, 1991)

- Overhead costs (Bush, 1990; Christensen, 1992; Ford & Butts, 1991; Greenbaum, 1998; Nie, 1999; Schilling, 1999)

- Allow for more flexible work schedules and productive work hours (Bush, 1990; Ford & Butts, 1991; Gainey, Kelley, & Hill, 1999; Greenbaum, 1998; Khaifa & Davidson, 2000; Knight & Westbrook, 1999; Mariani, 2000; Schilling, 1999; Schwartz, 1997; Young, 1991)

- Provide for better balance of work and family (family friendly workplace) (Ahmadi, Helms & Ross, 2000; Bush, 1990; Christensen, 1992; Ellis & Webster, 1999; Fougere & Behling, 1995; Gainey, Kelley, & Hill, 1999; Hartman, Stoner, & Arora, 1991; Khaifa & Davidson, 2000; Khalifa & Etezadi, 1997; Knight & Westbrook, 1999; Mariani, 2000; Nie, 1999; Pratt, 1997; Schwartz, 1997; Solomon, 2000; Spillman & Markham, 1997; Wilde, 2000; Wilkes, Frolick, & Urwiler, 1994; Young, 1991)

- Lower job related stress (Fougere & Behling, 1995; Fusco, 1990; Gainey, Kelley, & Hill, 1999; Hartman, Stoner, & Arora, 1991; Mariani, 2000; McCune, 1998; Schwartz, 1997; Spillman & Markham, 1997; Wilkes, Frolick, & Urwiler, 1994)

- Reduce over crowding in office (Young, 1991)

- Increase job satisfaction (Bush, 1990; Hartman, Stoner, & Arora, 1991; Kurland & Bailey, 1999; Pratt, 1997)

- Decrease distractions/interruptions (Bush, 1990; Mariani, 2000; Schwartz, 1997; Wilkes, Frolick, & Urwiler, 1994)

- Extend employment opportunities to disabled workers or comply with the American's with Disabilities Act (Deeprose, 1999; Ford & Butts, 1991; Khaifa & Davidson, 2000; Khalifa & Etezadi, 1997; Kurland & Bailey, 1999; Kurland & Egan, 1999; Schwartz, 1997; Spillman & Markham, 1997; Wilkes, Frolick, & Urwiler, 1994; Yen, Mahmassani, & Herman, 1994)

- Allow temporarily disabled workers to continue working (Ford & Butts, 1991; Spillman & Markham, 1997; Wilkes, Frolick, & Urwiler, 1994)

- Decrease traffic congestion and/or parking problems (Ellis & Webster, 1999; Ford & Butts, 1991; Fougere & Behling, 1995; Handy & Mokhtarian, 1995; Nie, 1999)

- Decrease air pollution and/or comply with Clean Air Act (Ahmadi, Helms, & Ross, 2000; Ellis & Webster, 1999; Ford & Butts, 1991; Fougere & Behling, 1995; Gainey, Kelley, & Hill,1999; Handy & Mokhtarian, 1995; Khalifa & Etezadi, 1997; Kurland & Bailey, 1999; Wilkes, Frolick, & Urwiler, 1994; Yen, Mahmassani, & Herman, 1994)

- Save workers commute time and expense (Bush, 1990; Fusco, 1990; Khalifa & Etezadi, 1997; Nie, 1999; Pratt, 1997; Schwartz, 1997; Weiss, 1992; Yen, Mahmassani, & Herman, 1994; Young, 1991)

- Conserve energy (Ellis & Webster, 1999; Fusco, 1990; Handy & Mokhtarian, 1995; Khalifa & Etezadi, 1997; Spillman & Markham, 1997; Yen, Mahmassami, & Herman, 1994; Wilkes, Frolick, & Urwiler, 1994)

Appendix C

Reported Disadvantages of Telecommuting

- Meeting OSHA standards in the home environment (Ford & Butts, 1991)
- Maintenance of home equipment (Ford & Butts, 1991)
- Liability, risk, data theft, software piracy, security (Deeprose, 1999; Ford & Butts, 1991; Spillman & Markham, 1997; Wilkes, Frolick, & Urwiler, 1994)
- Feelings of isolation (Bush, 1990; Deeprose, 1999; Ellison, 1999; Ford & Butts, 1991; Greenbaum, 1998; Khalifa & Etezadi, 1997; Kurland & Egan, 1999; Schilling, 1999; Solomon, 2000; Spillman & Markham, 1997)
- Communication difficulties with co-workers and supervisors (Bush, 1990; Coutu, 1998; Davenport & Pearlson, 1998; Deeprose, 1999; Ford & Butts, 1991; Greenbaum, 1998; Kurland & Bailey, 1999)
- Negative impact on teamwork (Ford & Butts, 1991; Khalifa & Etezadi, 1997)
- Co-worker resentment and reduced morale (Deeprose, 1999)
- Cost of equipment at home (Khalifa & Etezadi, 1997)
- Erosion of business ethic due to lack of face-to-face contact (Nie, 1999)
- Corporate culture conflict (Bush, 1990; Davenport & Pearlson, 1998; Ellison, 1999; Ford & Butts, 1991; Kurland & Bailey, 1999)
- Management resistance (resistance to change) (Bush, 1990; Fairweather, 1999; Fusco, 1990; Hartman, Stoner, & Arora, 1991; Weiss, 1992; Wilkes, Frolick, & Urwiler, 1994)
- Scheduling difficulties (Hartman, Stoner, & Arora, 1991; Kurland & Bailey, 1999)
- Lowered promotability (“out of sight, out of mind”) (Ahmadi, Helms, & Ross, 2000; Bush, 1990; Ford & Butts, 1991; Hartman, Stoner, & Arora, 1991; Khalifa & Etezadi, 1997; Spillman & Markham, 1997)
- Dealing with unions (Ford & Butts, 1991)
- Lack of feedback and input from co-workers (Bush, 1990; Ellison, 1999; Ford & Butts, 1991; Greenbaum, 1998; Khalifa & Etezadi, 1997; Kurland & Bailey, 1999; Solomon, 2000)
- Feeling of being "on call" all the time (Garland, 2000)

- Acquisition of new skills (Khalifa & Etezadi, 1997)
- Distractions (family, neighbors, etc.) (Greenbaum, 1998; Kurland & Bailey, 1999; Schilling, 1999)
- Improper equipment setup (Spillman & Markham, 1997)
- Lack of office services and reference materials (Khalifa & Etezadi, 1997; Kurland & Bailey, 1999; Spillman & Markham, 1997)
- Reduced informal knowledge (Bush, 1990; Ellison, 1999; Ford & Butts, 1991; Khalifa & Etezadi, 1997; Kurland & Bailey, 1999; Nie, 1999; Solomon, 2000)
- Increased complexity of task (Bush, 1990; Kurland & Bailey, 1999)
- Management cannot monitor work as easily (Ahmadi, Helms, & Ross, 2000; Bush, 1990; Davenport & Pearlson, 1998; Grantham & Nichols, 1994; Kurland & Bailey, 1999; Kurland & Egan, 1999; Wilkes, Frolick, & Urwiler, 1994)
- Not begin able to separate work and home (Bush, 1990; Hartman, Stoner, & Arora, 1991)
- Decreased productivity (Khalifa & Etezadi, 1997; Spillman & Markham, 1997)
- Management's feeling of loss of control (Ahmadi, Helms & Ross, 2000; Bush, 1990; Davenport & Pearlson, 1998; Fairweather, 1999; Ford & Butts, 1991; Grantham & Nichols, 1994; Hartman, Stoner, & Arora, 1991; Khalifa & Etezadi, 1997; Wilkes, Frolick, & Urwiler, 1994)
- Managers are not trained to supervise telecommuters (Bush, 1990; Khalifa & Etezadi, 1997)
- Cost of supplying home equipment (Davenport & Pearlson, 1998)
- Loss of availability to customers (Kurland & Bailey, 1999)
- Increased security risk to information (Ahmadi, Helms, & Ross, 2000; Fairweather, 1999)
- Difficulty in training and education (Grantham & Nichols, 1994; Greenbaum, 1998)
- Legal issues (Grantham & Nichols, 1994)

Appendix D

Higher Education Personnel Administrator Questionnaire
-- Telecommuting Programs --

Higher Education
Personnel Administrator Questionnaire
---- Telecommuting Programs ----

Part I. ABOUT YOU

1. How long have you been at your present institution? _____ years.

2. What is your current position at this institution?
_____

3. How long have you been in your current position?_____ years.

Part II. ABOUT YOUR INSTITUTION

4. What is the total number of employees at your institution?
_____ Full time

5. What is the student enrollment at your institution?
_____ Full time

6. At what type of institution are you employed? (Carnegie Classification)
   - _____ No answer
   - _____ Don't know
   - _____ Research University I
   - _____ Research University II
   - _____ Doctoral University I
   - _____ Doctoral University II
   - _____ Master's Universities and Colleges I
   - _____ Baccalaureate Colleges I
   - _____ Baccalaureate Colleges II
   - _____ Associate of Arts Colleges
   - _____ Professional Schools and Specialized Institutions

7. Is your institution public ____ or private ____?

8. Has the overall budget of the institution been reduced during any of the last 3 years?
Yes ____ No ____

9. Does your institution currently have a formal telecommuting program or policy in place? Yes ____ No ____
(If **Yes**, continue to question 10 if **No**, skip to question 28.)

Please indicate which best answers the following:

10. My institution has been able to successfully retain Information Technology staff in the last 3 years.

___ Strongly Agree
___ Agree
___ Undecided
___ Disagree
___ Strongly Disagree

11. My institution has been able to successfully recruit Information Technology staff in the last 3 years

___ Strongly Agree
___ Agree
___ Undecided
___ Disagree
___ Strongly Disagree

Answer these questions only if you currently have a Telecommuting Program!

Part III. ABOUT YOUR TELECOMMUTING PROGRAM

Please answer the following about your institution's current telecommuting program.

12. How long has your institution's telecommuting program been in place?
_____ years _____ months.

13. What was the **primary** factor that **motivated** your institution to adopt a telecommuting program? Place an "x" beside the factor.

____ Employee interest
____ Increase recruiting rate of Information Technology staff
____ Increase retention rate of Information Technology staff
____ Increase in productivity
____ Improvement of overall employee benefits and workplace flexibility
____ No answer
____ Other, please specify_____

14. What was the **secondary** factor that **motivated** your institution to adopt a telecommuting program? Place an "x" beside the factor.

____ Employee interest
____ Increase recruiting rate of Information Technology staff
____ Increase retention rate of Information Technology staff
____ Increase in productivity
____ Improvement of overall employee benefits and workplace flexibility
____ No answer
____ Other, please specify_____

15. What was the **primary** factor that **constrained** your institution to adopt a telecommuting program? Place an "x" beside the factor.

____ Lack of upper management support
____ Lack of interest from employees
____ Cost of implementing the program
____ Legal/regulatory issues (including union negotiations)
____ Lack of knowledge about implementing a telecommuting program
____ No answer
____ Other, please specify _____

16. What was the **secondary** factor that **constrained** your institution to adopt a telecommuting program? Place an "x" beside the factor.

____ Lack of upper management support
____ Lack of interest from employees
____ Cost of implementing the program
____ Legal/regulatory issues (including union negotiations)
____ Lack of knowledge about implementing a telecommuting program
____ No answer
____ Other, please specify _____

17. What is the **minimum** days per week an employee is required to telecommute?
_____ (0 -- 5)

18. What is the **maximum** days per week an employee is allowed to telecommute?
_____ (0 -- 5)

19. Is the telecommuter allowed to change his/her telecommuting days from week to week?
Yes_____ No _____

Please indicate by placing an "x" beside any of the following items if they are provided to your telecommuters as a part of your telecommuting program. If the item is not part of your program leave the column blank.

20.

Item	Provided by your institution?
Computer	____
Printer	____
Fax	____
Dedicated communications line	____
Network access	____
Phone line expense	____
Home office furniture	____
Other_____	____

21. Do you currently evaluate your telecommuting program on a periodic basis?
_____ Yes _____ No

22. Employee productivity for telecommuters has increased since the telecommuting program began.

___ Strongly Agree
___ Agree
___ Undecided
___ Disagree
___ Strongly Disagree

23. Retention of Information Technology staff has increased since the telecommuting program began.

___ Strongly Agree
___ Agree
___ Undecided
___ Disagree
___ Strongly Disagree

24. Recruiting Information Technology staff has been more successful since the telecommuting program began.

___ Strongly Agree
___ Agree
___ Undecided
___ Disagree
___ Strongly Disagree

25. Cost of supporting an employee has increased since the telecommuting program began.

___ Strongly Agree
___ Agree
___ Undecided
___ Disagree
___ Strongly Disagree

26. Employee morale for those who are telecommuting has increased since they began telecommuting.

___ Strongly Agree
___ Agree
___ Undecided
___ Disagree
___ Strongly Disagree

27. The telecommuting program at my institution is successful.

___ Strongly Agree
___ Agree
___ Undecided
___ Disagree
___ Strongly Disagree

Please enter your email address here _____

You have completed the survey --- Thank you!!

Answer the following only if you do NOT have a telecommuting program in place.

Part IV. TELECOMMUTING PROGRAM ADOPTION FACTORS

28. My institution has been able to successfully retain Information Technology staff in the last 3 years.

    ___ Strongly Agree
    ___ Agree
    ___ Undecided
    ___ Disagree
    ___ Strongly Disagree

29. My institution has been able to successfully recruit Information Technology staff in the last 3 years.

    ___ Strongly Agree
    ___ Agree
    ___ Undecided
    ___ Disagree
    ___ Strongly Disagree

30. What would be the **primary** factor that would **motivate** your institution to adopt a telecommuting program? Place an "x" beside the factor.

    ____ Employee interest
    ____ Increase recruiting rate of Information Technology staff
    ____ Increase retention rate of Information Technology staff
    ____ Increase in productivity
    ____ Improvement of overall employee benefits and workplace flexibility
    ____ No answer
    ____ Other, please specify_____

31. What would be the **secondary** factor that would **motivate** your institution to adopt a telecommuting program? Place an "x" beside the factor.

    ____ Employee interest
    ____ Increase recruiting rate of Information Technology staff
    ____ Increase retention rate of Information Technology staff
    ____ Increase in productivity
    ____ Improvement of overall employee benefits and workplace flexibility
    ____ No answer
    ____ Other, please specify_____

32. What is the **primary** reason why your institution has not adopted a telecommuting program? Place an "x" beside the factor.

____ Lack of upper management support
____ Lack of interest from employees
____ Cost of implementing the program
____ Legal/regulatory issues (including union negotiations)
____ Lack of knowledge about implementing a telecommuting program
____ No answer
____ Other, please specify _____

33. What is the **secondary** reason why your institution has not adopted a telecommuting program? Place an "x" beside the factor.

____ Lack of upper management support
____ Lack of interest from employees
____ Cost of implementing the program
____ Legal/regulatory issues (including union negotiations)
____ Lack of knowledge about implementing a telecommuting program
____ No answer
____ Other, please specify _____

Please enter your email address here _____

You have completed the survey --- Thank you!!

Appendix E

Survey Cover Letter

October 26, 2001

Greetings!

Your important position at your institution means, among other things, that you are aware of the programs and benefits your institution offers to its employees. This is especially true of special benefits like telecommuting.

Much has been written about telecommuting in the last ten years. Unfortunately, most of the research has been done in the private sector. This is your opportunity to help correct that.

I am asking you to complete a quick survey about telecommuting at your institution as part of my doctoral dissertation at the University of Tennessee. Please be assured that your answers are confidential. You will be required to enter your email address to verify you were asked to participate and to help me determine who has completed a survey. Your name or email address will not in any way be identified with your responses.

However, your email will allow you to be entered into a drawing for four $25 gift certificates from Amazon.com! After the survey data collection is completed, I will randomly select four respondents to receive one of the $25 gift certificates. You will be notified by email if you have won.

Click http://bus.utk.edu/survey to access the survey. You will be required to enter a Userid and Password. The Userid is survey. The Password is OK. The Password **is** case sensitive so you will need to type it in capital letters. You will not be required to enter a domain name.

If you would prefer a paper copy of the survey, please email me with your postal address and I will be happy to mail you a survey with a paid postage return envelope.

If you wish to have a copy of the results emailed to you, please let me know by emailing me at pj-snodgrass@tennessee.edu. Thank you for your time and your thoughtful answers. If you wish to contact me by phone, you may do so at 865-974-7315.

P. J. Snodgrass
Ph.D Candidate
Human Resource Development
The University of Tennessee, Knoxville
(865) 974-7315

Appendix F

Manager's Telecommuting Survey

Manager's Telecommuting Survey

Defining Telecommuting

Telecommuting refers to working arrangements in which the office worker is allowed or required to work at home or at a telework center on a regular basis, during regular working hours, full- or part-time, maintaining contact with the central office through communications devices. A telework center is a facility located near the worker's home where the necessary office infrastructure is provided by a third party.

YOUR EXPERIENCE WITH TELECOMMUTING

1. When did you first hear about telecommuting?
   _____days _____ months, _____ years ago.

2. How often have you received information about it since then?
   ( ) very often ( ) often ( ) occasionally ( ) never

3. What kind of experiences have you had with telecommuting (choose as many as apply)?
   ( ) none ( ) from the organization I work for
   ( ) from readings ( ) from co-workers
   ( ) other _____ ( ) from an organization I have contact with

Please answer the following questions about your institution's current, formal telecommuting program.

4. Why would (do) you offer a telecommuting program to the employees you supervise?

	definitely not								definitely yes
To increase productivity	1	2	3	4	5	6	7	8	9
To address their personnel needs	1	2	3	4	5	6	7	8	9
To reduce labor costs (turnover, sick leave)	1	2	3	4	5	6	7	8	9
To reduce/avoid overhead expenses	1	2	3	4	5	6	7	8	9
To attract skilled employees	1	2	3	4	5	6	7	8	9
Other	1	2	3	4	5	6	7	8	9
I wouldn't offer a telecommuting program	1	2	3	4	5	6	7	8	9

5. Is there a telecommuting program currently available to the employees you supervise?
   ( ) yes ( ) no

6. How many salaried employees do you currently supervise? _____ employees

7. How many independent contractors do you currently supervise?
   _____contractors.

8. In what kind of structure do the salaried employees you supervise work?
   ( ) mostly in teams
   ( ) mostly performing individual tasks, within a team structure
   ( ) mostly on independent projects.

DESIGNING A TELECOMMUTING PROGRAM

Consider the possibility of making telecommuting available to your institution.

Assume that:

- employee participation is voluntary
- participating employees will receive the same basic benefits they receive as regular employees
- participating employees will work under the same schedule (full- or part-time) they currently work.

Your telecommuting program will be characterized by the following attributes:

Attributes which would apply to ANY telecommuting program:

- Minimum: number of days per week to telecommute will be required.
- Maximum: number of days per week to telecommute will be allowed.
- Schedule: (a) fixed means the telecommuter is required to telecommute the same days each week; (b) flexible means the telecommuter can vary the days he/she telecommutes each week.
- Work Space: work space available to a telecommuter when they are working at the central office location.
- Salary: regular pay an employee receives.
- Place: site from where telecommuting is performed (home or telework center).

Attributes which apply to HOME-BASED telecommuting only:

- Equipment: equipment and/or telecommunications services required for telecommuting
- Equipment provider: party who provides the required equipment and services
- Phone bill: party who pays the work related home phone bills
- Liability: party financially responsible for work related accidents during telecommuting time

Attributes which apply to TELEWORK CENTER telecommuting only:
If you choose to design a program which is telework center based, assume that the telework center provides each employee with a computer equipped with basic office software, a laser printer, and a telephone. In addition, they have access to a computer network and a fax machine at a daily rate of $150 per telecommuter.

YOUR TELECOMMUTING PROGRAM

If there is a telecommuting program currently available to the employees you supervise, please refer to it when answering the following questions.

9. How many of the employees you supervise occupy a **MANAGERIAL POSITION**?
_____ employees

If none of the employees you supervise occupies a managerial position, go to question 13.

10. What percentage of these employees have demonstrated some interest in telecommuting? _____%

11. What percentage have formally requested to telecommute? _____%

12. How would you design a telecommuting program for these employees?

Minimum (days per week)	( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Maximum (days per week)	( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Schedule:	( ) fixed ( ) flexible
Work Space:	( ) individual offices ( ) share office ( ) shared desk
Salary:	( ) % lower ( ) same ( ) & higher

The following refer to home-based telecommuting only:

Equipment:	( ) computer ( ) fax ( ) dedicated phone line ( ) network access ( ) other: _____
Equipment provided by:	( ) employer ( ) employee
Phone bill paid by:	( ) employer ( ) employee
Liability:	( ) employer ( ) employee

12a. Would the organization you work for actually offer this telecommuting arrangement to your employees? ( ) yes ( ) no.

12b. How many of these employees do you believe would adopt this arrangement?
_____ employees.

12c. How would you expect the following issues to vary under this arrangement?

Employee productivity
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Direct costs per employee
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Employee turnover expense
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Overhead costs
( ) increase _____ % ( ) remain the same ( ) decrease _____ %

12d. What type of impact would you expect this arrangement to have on:

	Extremely negative								Extremely positive
These employees' job satisfaction	1	2	3	4	5	6	7	8	9
The team spirit among the group you supervise	1	2	3	4	5	6	7	8	9
The quality of the work produced by these employees	1	2	3	4	5	6	7	8	9
The quality of the work produced by the whole group	1	2	3	4	5	6	7	8	9
Your ability to manage these employees	1	2	3	4	5	6	7	8	9
Your ability to evaluate the performance of these employees	1	2	3	4	5	6	7	8	9
Your ability to attract other qualified employees	1	2	3	4	5	6	7	8	9

12e. The overall impact of this arrangement on the organization would be:
( ) positive ( ) neutral ( ) negative

13. How many of the employees you supervise occupy a **PROFESSIONAL POSITION**?
_____ employees

If none of the employees you supervise occupies a professional position, go to question 17

14. What percentage of these employees have demonstrated some interest in telecommuting? _____%

15. What percentage have formally requested to telecommute? _____%

16. How would you design a telecommuting program for these employees?

Minimum (days per week)	( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Maximum (days per week)	( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Schedule:	( ) fixed ( ) flexible
Work Space:	( ) individual offices ( ) share office ( ) shared desk
Salary:	( ) % lower ( ) same ( ) & higher

The following refer to home-based telecommuting only:

Equipment:	( ) computer ( ) fax ( ) dedicated phone line ( ) network access ( ) other: _____
Equipment provided by:	( ) employer ( ) employee
Phone bill paid by:	( ) employer ( ) employee
Liability:	( ) employer ( ) employee

16a. Would the organization you work for actually offer this telecommuting arrangement to your employees? ( ) yes ( ) no.

16b. How many of these employees do you believe would adopt this arrangement?
_____ employees.

16c. How would you expect the following issues to vary under this arrangement?

Employee productivity
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Direct costs per employee
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Employee turnover expense
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Overhead costs
( ) increase _____ % ( ) remain the same ( ) decrease _____ %

16d. What type of impact would you expect this arrangement to have on:

	Extremely negative								Extremely positive
These employees' job satisfaction	1	2	3	4	5	6	7	8	9
The team spirit among the group you supervise	1	2	3	4	5	6	7	8	9
The quality of the work produced by these employees	1	2	3	4	5	6	7	8	9
The quality of the work produced by the whole group	1	2	3	4	5	6	7	8	9
Your ability to manage these employees	1	2	3	4	5	6	7	8	9
Your ability to evaluate the performance of these employees	1	2	3	4	5	6	7	8	9
Your ability to attract other qualified employees	1	2	3	4	5	6	7	8	9

16e. The overall impact of this arrangement on the organization would be:
( ) positive ( ) neutral ( ) negative

17. How many of the employees you supervise occupy a PROFESSIONAL POSITION?
_____ employees

If none of the employees you supervise occupies a professional position,
go to question 21.

18. What percentage of these employees have demonstrated some interest in telecommuting? _____%

19. What percentage have formally requested to telecommute? _____%

20. How would you design a telecommuting program for these employees?

Minimum (days per week)	( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Maximum (days per week)	( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Schedule:	( ) fixed ( ) flexible
Work Space:	( ) individual offices ( ) share office ( ) shared desk
Salary:	( ) % lower ( ) same ( ) & higher

The following refer to home-based telecommuting only:

Equipment:	( ) computer ( ) fax ( ) dedicated phone line ( ) network access ( ) other: _____
Equipment provided by:	( ) employer ( ) employee
Phone bill paid by:	( ) employer ( ) employee
Liability:	( ) employer ( ) employee

20a. Would the organization you work for actually offer this telecommuting arrangement to your employees? ( ) yes ( ) no.

20b. How many of these employees do you believe would adopt this arrangement? _____ employees.

20c. How would you expect the following issues to vary under this arrangement?

Employee productivity
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Direct costs per employee
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Employee turnover expense
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Overhead costs
( ) increase _____ % ( ) remain the same ( ) decrease _____ %

20d. What type of impact would you expect this arrangement to have on:

	Extremely negative								Extremely positive
These employees' job satisfaction	1	2	3	4	5	6	7	8	9
The team spirit among the group you supervise	1	2	3	4	5	6	7	8	9
The quality of the work produced by these employees	1	2	3	4	5	6	7	8	9
The quality of the work produced by the whole group	1	2	3	4	5	6	7	8	9
Your ability to manage these employees	1	2	3	4	5	6	7	8	9
Your ability to evaluate the performance of these employees	1	2	3	4	5	6	7	8	9
Your ability to attract other qualified employees	1	2	3	4	5	6	7	8	9

20e. The overall impact of this arrangement on the organization would be:
( ) positive ( ) neutral ( ) negative

How many of the employees you supervise occupy a SALES POSITION? _____ employees

If none of the employees you supervise occupies a sales position,
go to question 25.

21. What percentage of these employees have demonstrated some interest in telecommuting? _____%

22. What percentage have formally requested to telecommute? _____%

23. How would you design a telecommuting program for these employees?

Minimum (days per week)	( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Maximum (days per week)	( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Schedule:	( ) fixed ( ) flexible
Work Space:	( ) individual offices ( ) share office ( ) shared desk
Salary:	( ) % lower ( ) same ( ) & higher

The following refer to home-based telecommuting only:

Equipment:	( ) computer ( ) fax	( ) dedicated phone line
	( ) network access	( ) other: _____
Equipment provided by:	( ) employer	( ) employee
Phone bill paid by:	( ) employer	( ) employee
Liability:	( ) employer	( ) employee

24a. Would the organization you work for actually offer this telecommuting arrangement to your employees? ( ) yes ( ) no.

24b. How many of these employees do you believe would adopt this arrangement? _____ employees.

24c. How would you expect the following issues to vary under this arrangement?

Employee productivity
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Direct costs per employee
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Employee turnover expense
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Overhead costs
( ) increase _____ % ( ) remain the same ( ) decrease _____ %

24d. What type of impact would you expect this arrangement to have on:

	Extremely negative								Extremely positive
These employees' job satisfaction	1	2	3	4	5	6	7	8	9
The team spirit among the group you supervise	1	2	3	4	5	6	7	8	9
The quality of the work produced by these employees	1	2	3	4	5	6	7	8	9
The quality of the work produced by the whole group	1	2	3	4	5	6	7	8	9
Your ability to manage these employees	1	2	3	4	5	6	7	8	9
Your ability to evaluate the performance of these employees	1	2	3	4	5	6	7	8	9
Your ability to attract other qualified employees	1	2	3	4	5	6	7	8	9

24e. The overall impact of this arrangement on the organization would be:
( ) positive ( ) neutral ( ) negative

24. Are there employees in OTHER POSITIONS who you would consider for a telecommuting program?
( ) yes, _____ employees ( ) no (go to question 29).
(please specify position:_____)

25. What percentage of these employees have demonstrated some interest in telecommuting? _____%

26. What percentage have formally requested to telecommute? _____%

27. How would you design a telecommuting program for these employees?

Minimum (days per week)	( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Maximum (days per week)	( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5
Schedule:	( ) fixed ( ) flexible
Work Space:	( ) individual offices ( ) share office ( ) shared desk
Salary:	( ) % lower ( ) same ( ) & higher

The following refer to home-based telecommuting only:

Equipment:	( ) computer ( ) fax ( ) dedicated phone line ( ) network access ( ) other: _____
Equipment provided by:	( ) employer ( ) employee
Phone bill paid by:	( ) employer ( ) employee
Liability:	( ) employer ( ) employee

28a. Would the organization you work for actually offer this telecommuting arrangement to your employees? ( ) yes ( ) no.

28b. How many of these employees do you believe would adopt this arrangement? _____ employees.

28c. How would you expect the following issues to vary under this arrangement?

Employee productivity
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Direct costs per employee
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Employee turnover expense
( ) increase _____ % ( ) remain the same ( ) decrease _____ %
Overhead costs
( ) increase _____ % ( ) remain the same ( ) decrease _____ %

28d. What type of impact would you expect this arrangement to have on:

	Extremely negative								Extremely positive
These employees' job satisfaction	1	2	3	4	5	6	7	8	9
The team spirit among the group you supervise	1	2	3	4	5	6	7	8	9
The quality of the work produced by these employees	1	2	3	4	5	6	7	8	9
The quality of the work produced by the whole group	1	2	3	4	5	6	7	8	9
Your ability to manage these employees	1	2	3	4	5	6	7	8	9
Your ability to evaluate the performance of these employees	1	2	3	4	5	6	7	8	9
Your ability to attract other qualified employees	1	2	3	4	5	6	7	8	9

28e. The overall impact of this arrangement on the organization would be:
( ) positive ( ) neutral ( ) negative

ABOUT THE ORGANIZATION YOU WORK FOR

28. What industry do you work in?
    ( ) Banking and Finance
    ( ) Real Estate
    ( ) Business Services
    ( ) Government
    ( ) Consultancy
    ( ) Telecommunication
    ( ) Computer Software and/or Hardware
    ( ) Education
    ( ) Other: _____

29. Location of your work place (state, city and zip code).

30. How long has your office been located at this site? _____months, _____ years

31. What type of office is this?
    ( ) headquarters
    ( ) divisional branch
    ( ) support services
    ( ) sales
    ( ) other: _____

32. What type of market does your organization address?
    ( ) local
    ( ) regional
    ( ) national
    ( ) international

33. What was your organization's total revenue in the last fiscal year?
    _____ dollars.

34. How many salaried employees are currently on the payroll of your organization?
    _____ employees.

35. Is your organization currently undergoing any of the following processes?
    ( ) expanding scale
    ( ) reducing scale
    ( ) re-engineering
    ( ) relocating

THANK YOU FOR COMPLETING THIS SURVEY!!!!!!

Appendix G

Follow-up Email

November 10, 2001

Dear HR Professional,

A couple of weeks ago, you received an email from me requesting your input on my survey about Telecommuting in Higher Education. The goal of my dissertation is to determine why institutions like yours do or do not have a telecommuting program. So, whether or not you currently have a telecommuting program, your input is valuable! Also, since this survey was sent to a small population, your input is critical to my study.

You will be required to enter your email address to verify you were asked to participate and to help me determine who has completed a survey. Your name or email address will not, in any way, be identified with your responses. Your email will also make you eligible for one of four $25 gift certificates I will give away after the response time has ended…which is soon!

If you wish to have a copy of the results emailed to you, please let me know by emailing me at pj-snodgrass@tennessee.edu. Thank you for your time and your thoughtful answers. If you wish to contact me by phone, you may do so at 865-974-7315. Click here http://bus.utk.edu/survey to complete the survey or you may copy and paste the web address in your browser.
Thank you **very much** for your time!

P. J. Snodgrass
Ph.D Candidate
Human Resource Development
The University of Tennessee, Knoxville
(865) 974-7315

Appendix H

Survey Cover Letter (USPS Mail)

November 19, 2001

Dear HR Professional,

A few weeks ago, you received an email or letter seeking information about telecommuting at your campus. Much research has been conducted about telecommuting programs in the last few years. However, most of the research has been conducted in the private sector. Information is needed to ease the decision process when considering a telecommuting program. Higher education institutions like yours are an important resource for determining the status of telecommuting programs in an educational setting.

Your institution is one of a small number in the Southeast that is being asked to provide information about your institution and whether or not a telecommuting program is offered. Since the selected sample is small, each response is critical. If you prefer, you may provide your information online, by going to **http://bus.utk.edu/survey**.

Please be assured of complete confidentiality. Your email address is needed only to contact you if you win one of the four $25 gift certificates from Amazon.com that will be awarded after the responses are collected. Your responses will never be associated with your email address or with your personal information.

The results of this research will be made available to you if you email me at pj-snodgrass@tennessee.edu and indicate you would like a copy of the results. I would be happy to answer any questions you might have. You may email me or call me at (865) 974-7315.

Thank you in advance for your thoughtful answers and your time.

Sincerely,

P. J. Snodgrass
Ph.D. Candidate in Human Resource Development
The University of Tennessee, Knoxville

Encl.

Appendix I

Postcard Follow-up

Just a reminder…

Our study about **Telecommuting in Higher Education** is coming to a close. We want to make sure that the things that are important to you are included in the results. Your response is critical!

Please complete your questionnaire and use the envelope you received in the mail or go to http://bus.utk.edu/survey and complete it online this week. If you need a paper copy, I will gladly mail you another one. Just email me at pj-snodgrass@utk.edu.

Thanks so much for your help,

P. J. Snodgrass

Project Director

Appendix J

Email to Pilot Test Group

Dear Collegue,

You have received this email because I value your time and skills. I am preparing to collect survey data for my doctoral dissertation and I need to pilot test my survey instrument. I value your input and am asking you to complete the survey about telecommuting in higher education. Even though this is a pilot test, please be assured that your answers are strictly confidential and will not reported in any way other than as my pilot test group.

When you can (in the next couple of days, I hope) please visit http://bus.utk.edu/Survey. You will have to supply a UserId and Password which are **Survey** and **OK** respectively. You do not have to supply a Domain. It should take you less than 5 minutes to complete the survey.

What I would like to know is if you 1). access the site without trouble, 2). find the survey easy to read and understand, and 3). about how long it takes you to complete it. If you can email with that information after you have filled it out, I would be most appreciative. If you have any questions or concerns, feel free to call me at 974-7315 or email me at pj-snodgrass@utk.edu. Thank you in advance.

P. J. Snodgrass
Ph.D Candidate in Human Resource Development

VITA

Phyllis Joy Snodgrass was born in White Pine, Tennessee, January 2, 1955. She graduated in 1973 from White Pine High School in White Pine, Tennessee. She entered Knoxville Business College and received an Associate Degree in Computer Science in 1975. She began a career in data processing at National Cash Register (NCR) in Morristown, Tennessee in 1975. She was later employed as a computer programmer and programmer analyst as she advanced in her career. In 1984 she accepted a position at The University of Tennessee, Knoxville. She was eventually promoted to Senior Systems Analyst in the Office of Information Systems. She was a team leader and worked with the student records system at the university.

Through the years, she completed additional coursework at Walter's State Community College and in 1990 received a Bachelors degree in Applied Organizational Management from Tusculum College. In 1994, she received a Masters of Science degree from The University of Tennessee in Human Resource Development. She continued her education in the Department of Human Resource Development and received a Doctor of Philosophy degree in May, 2002.

She was a member of the university's SAP implementation project as a trainer, writer and technical support for the Change Management Team. She is currently employed in the Customer Technology Service area in the Office of Information Technology at The University of Tennessee as an Instructional Technologist.

She currently resides in Knoxville, Tennessee with her dog, Sophie.