FACTORS INFLUENCING THE ADOPTION OF NEW INFORMATION TECHNOLOGY IN COLLEGE AND UNIVERSITY FOODSERVICES

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DEDICATION

This thesis is dedicated to my father, Yoo-Taek Kim, my mother Kye-Sung Park, and my sisters Ji-Young Kim and Sumee Kim.

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CHAPTER I

INTRODUCTION

College and university foodservice operations are facing new challenges to satisfy the needs of a wide range of campus dining customers in most educational institutions. There are the growing needs for responding to demographic and attitudinal changes of campus dining customers, such as demographic shifts of students having more non-traditional students (Ayres & Partlow, 1999), students' changing lifestyles pursuing convenience and variety (Ryan, 2000), and culturally diversified students representing a wide range of national origin, life experience, economic and social status, and academic goals (Chi & Brown, 1996).

In addition to those changes, there are increased student enrollments resulting in a shortage of on-campus housing facilities (Ryan, 2000) and fierce competition from within the institutions as well as the off-campus commercial sector (Martin, Sneed, & White, 1992). Moreover, as some chronically repeated concerns in the foodservice setting, most college and university foodservice operators have difficulties in motivating and retaining part-time student employees to supplement the work of permanent staff (Bartlett, Probber, & Scerbo, 1999) and in managing the extreme variance of business demands throughout the year (McCool, Smith, & Tucker, 1994).

Moreover, the foodservice segment often is expected to generate revenue at a minimum of break even and often to make significant contributions to offset other university costs (Ryan, 2000). Management in the campus dining business has also experienced pressures to meet certain budgetary goals as well as to pursue organizational missions, while maintaining desired profit levels within some allocated budgets.

Historically, this foodservice segment has had the difficulty of handling those critical challenges, while overcoming the limited scope of institutional foodservice operations to compete with commercial foodservices outside campus. College and university foodservice markets have been traditionally considered a captive market: the development of products and services has often been lacking. Furthermore, business was primarily based on the intent of maintaining spending within a certain predetermined budget (Sutherlin & Badinelli, 1993). Because of the lack of creative and innovative management practices, trying to compete primarily based on limited institutional facilities and dining options in the noncommercial segment has proven to be insufficient (Tayce, Gassenheimer, & Ingram, 1999).

Considering the needs for achieving a competitive edge, college and university foodservice managers began to realize that the foodservice operations under the conventional management philosophy and practice have found it increasingly hard to expand the customer base while motivating employees. Efforts to satisfy the growing needs of diverse campus dining customers resulted in this segment of the foodservice industry transforming into commercial dining establishments in many ways other than just providing auxiliary services to meet the basic dining and nutritional needs of students at reasonable prices (Chi & Brown, 1996). The recognition of the evolution of

foodservice operations from a university service into a strategic business unit has been shown in many aspects of college and university foodservice operations. Given the recurrence of proactive developments in foodservice management, university administrators' strategic efforts formerly available only to commercial foodservice organizations are necessary.

Ryan (2000) indicated that campus dining services departments have been modifying their programs, services, menus, organizational structures, size and number of outlets, branding programs, labor force, educational programs, and virtually every other aspect of their operations. With the transformations occurring in all organizational levels, there is an urgent need for continual and integral improvement of campus dining operations in order to compete in the fierce foodservice market. Management has been greatly concerned with tightened budgets coupled with rising operating costs. Accordingly, more college and university foodservice operations are emphasizing nationally recognized food product concepts (Ayres & Partlow, 1999; Tayce, Gassenheimer, & Ingram, 1999).

In an attempt to be competitive and improve customer and employee satisfaction in the institutional environment, the successful implementation of information technology has emerged as a method of maintaining profitability and productivity. Importantly, it is consistent with the recent proliferation and dependency on computer technology applications and the Internet. Walker (1999) identified the driving forces of change in campus foodservices as computer use, advent and growth of branded concepts, privatization, and campus cards. Hurst (1997) considered technology applications as a promising trend influencing the future of college and university foodservice and

suggested the technology advances contribute to keeping foodservice operations more accurate and efficient, while increasing costs to the customer and raising expectations of service quality. McCool et al. (1994) emphasized the growing significance of computer systems used in noncommercial foodservices, by considering the economic condition, level of competition, and increasingly sophisticated demands of the customers. Fulfilling today's dramatically increasing computer-literate students' needs in the electronic age and establishing innovative services, such as on-line menu selection, ordering, and network-based promotions would also produce significant changes in the segment (Food Management, 1997). Eventually, it is hoped that the technological shift will contribute and transform institutional characteristics from maintaining its secured captive market into seeking aggressive and proactive marketing orientation.

The use of information technology applications is flourishing and gaining operational emphasis in the institutional foodservice segment, including college and university foodservice systems. As the organizational use of information technology proliferates, and as technology becomes more critical for competitive advantage, the role of technology can be influential in the present competitive situation. Therefore, foodservice operators and administrators will need to include information technology in a set of strategic tools for controlling, simplifying, delegating, and reducing job-related tasks to maximize their current operational capacity. Just accepting some existing affordable or university-wide standardized technology options may not be adequate.

A sense of technology advances serves a strategic base for expanding current operations. Even if the foodservice professionals in administrative and managerial positions have promoted a wide range of innovation efforts, there is often less emphasis

on the consideration of the individuals who actually plan, implement, adopt, and operate technology-oriented systems. Though it is known that these individuals play a significant role in making decisions associated with adopting and implementing new technologies in the workplace, little information regarding the adoption of information technology applications and its determinants has been published, particularly in the context of college and university foodservices. Most of the previous studies have been primarily restricted to utilizing computerized technology applications to increase individual productivity and effectiveness in the given facilities and systems (Bednar & Pangan, 1997; Garand & McCool, 1985; McCool & Garand, 1996; Rhoades, 1995).

Therefore, it is significant to review the information technology applications currently adopted in the college and university foodservice operations and then, to identify the variety of factors influencing the adoption of those technology applications, particularly new innovative information technologies in the future. Understanding how individuals form overall perceptions of technological innovations would help technology implementers, vendors, and users in their evaluation, selection, and continuous use of the applications. To ensure job effectiveness in the working environment, knowing what makes people continue to adopt new job-related technology applications is crucial. With the rapid changes in technology, organizations also must be aware of the human element influencing the successful implementation and subsequent adoption of technological innovations by an organization. Through understanding of the human-aspect of information technology related to individual and organizational factors, it is possible to predict and explain the behavioral intentions needed for to adopt and use in task-related information technology in the future.

Statement of the Problem

Adopting new information technology is often based on what is affordable or standardized rather than individual perceptions and organizational environments.

Purposes and Objectives of the Study

College and university foodservice administrators have frequently utilized the variety of information technology applications and have heavily relied on them to do their job-related tasks. In addition, with the emerging current trends in modern technology advances, most of colleges and universities have invested in the adoption and development of technological innovations, while experiencing huge budget constraints in the higher education environment throughout the U.S. The recognition of potential benefits using information technology has provided the basis for transforming many foodservice organizations over the last several decades. Taking into accounting the importance role of technology for the business, it is crucial to understand the efforts to willingly accept the technological advances emerged in all aspects of college and university foodservice operations.

Even though a number of studies have been conducted regarding information technology (IT) usage in the institutional foodservice setting, there is little research on factors affecting the intention to adopt new information technology applications used in college and university foodservices. Simply using affordable or standardized technologies offered by the institution may not be sufficient nor competitive against commercial foodservice establishments. An in-depth understanding of those factors with respect to

individual and organizational dimensions would be helpful to make appropriate decisions about adopting new technologies and to design constructive technology learning programs in the future.

The literature related to the use of technology in college and university foodservices implicitly indicated that the lack of technological innovation and urgency in bringing cutting-edge technologies to foodservice operations has caused the segment to lag behind other commercial foodservice establishments. This perceived gap underlines the need for continued and increased efforts to restructure, innovate and adopt new technologies. Given the strong market potential in the segment, there is much room for the development and improvement of technology in order to professionally serve on-campus dining customers and accomplish enhanced competitiveness over other commercial foodservice companies efficiently.

The purpose of this study was to identify the determinants of the adoption of new information technology (IT) for college and university foodservices. First, the study determined the perceived importance and satisfaction level of a wide range of information technology applications currently adopted in college and university foodservice operations, as perceived by foodservice administrators. Then, this study aimed to assess the impact of individual perceptions of technology, perceived internal and external computing supports, motivation factors, and inhibiting factors on the adoption of the new technology applications in the future. These perceptions indicated what factors influence the decision to adopt new technology based innovations. Given the nature of the foodservice industry, where an extensive range of technologies are concurrently utilized in an operation, this study attempted to identify foodservice

administrators' overall perceptions of new technology-based innovations rather than a particular target technology.

The objectives of the study are as follows,

1. To determine college and university foodservice administrator' perceived importance and satisfaction level of selected information technology applications currently adopted by college and university foodservice operations.
2. To identify college and university foodservice administrators' individual perceptions of technology innovation, perceived internal and external computing supports, technology motivations, and technology inhibitors.
3. To assess dimensions of individual perceptions of technology innovations, perceived internal and external computing supports, technology motivations, and technology inhibitors of college and university foodservice administrators when deciding to adopt new information technology in the future.
4. To analyze differences in the dimensions of individual perceptions of technology innovations, perceived internal and external computing supports, technology motivations, and technology inhibitors between college and university foodservice administrators with different demographic profiles and behavioral characteristics.

Significance of the Study

This study made four unique contributions to the literature of institutional foodservice research: (1) it provided an overview of information technology applications currently adopted by college and university foodservice organizations to understand their

current technology usage ; (2) it evaluated important information technology applications with perceived satisfaction; (3) it compared the impacts of individual perceptions and organizational factors when adopting new information technology in college and university foodservice operations; (4) it compared the impacts of motivations and inhibitors when adopting new information technology for job-related tasks in college and university foodservice operations.

Assumptions

This study employed a mixed mode methodology where data for empirical analysis was collected through a mail and web-based survey. It was assumed that different data collection techniques, mail and web-based forms, did not affect the responses. It was also assumed that respondents would complete the questionnaire objectively and accurately on the basis of their own perception, knowledge, and experience of job-related technology usage.

Limitations

The first limitation was that the study was comprised of current voting delegates of the National Association of College and University Food Services (NACUFS). Therefore, the results cannot be generalized beyond this population. Second, the purpose of this study was to determine the general perceptions of new technological innovations and technology applications currently adopted by the college and university foodservices. As a result, respondents were not required to evaluate a particular information technology

(IT) based on its specific version, operating system, and manufacturer. Thus, the results of this study cannot be generalized beyond the findings.

Definition of Terms

1. Information Technology (IT): The hardware, software, and telecommunications that create, store, retrieve, exchange, transform, analyze, and communicate data and information around the globe (Kudyba & Diwan, 2002).
2. Noncommercial Foodservices: Foodservice operations located in host organizations that do not have foodservice as their primary business or purpose (McCool, Smith, & Tucker, 1994).
3. College and University Foodservices: Foodservices provided in residence halls, student unions, and faculty clubs, as well as catering services provided throughout a campus. (McCool, Smith, & Tucker, 1994).

Research Questions

1. How do college and university foodservice administrators perceive information technology applications currently adopted by college and university foodservice organizations?
2. What are the individual perceptions of technology that affect the adoption of new information technology by college and university foodservice administrators?
3. How do organizational computing supports influence the desire to adopt new information technology?

4. What are the motivational factors of college and university foodservice administrators when adopting new information technology?
5. What are the inhibiting factors college and university foodservice administrators face that de-motivate the intention to adopt new information technology?
6. Are there any significant differences in the dimensions of individual perceptions of technology, organizational computing supports, technology motivations, and technology inhibitors between college and university foodservice administrators with different demographic profiles and behavioral characteristics?

Research Hypotheses

Hypothesis 1

H_{1o}= There is no significant difference between the overall perceived importance score of information technology attributes currently adopted in college and university foodservices and the overall perceived satisfaction score.

H_{1a}= There is a significant difference between the overall perceived importance score of information technology attributes currently adopted in college and university foodservices and the overall perceived satisfaction score.

Hypothesis 2

H_{2o} = There is no significant relationship between the individual perceptions of technology and the intention to adopt new information technology.

H_{2a} = There is a significant relationship between the individual perceptions of technology and the intention to adopt new information technology.

Hypothesis 3

H_{3o} = There is no significant relationship between the perceived organizational computing support and the intention to adopt new information technology.

H_{3a} = There is a significant relationship between the perceived organizational computing support and the intention to adopt new information technology.

Hypothesis 4

H_{4o} = There is no significant relationship between the technology motivational factors and the intention to adopt new information technology.

H_{4a} = There is a significant relationship between the technology motivational factors and the intention to adopt new information technology.

Hypothesis 5

H_{5o} = There is no significant relationship between the technology inhibiting factors and the intention to adopt new information technology.

H_{5a} = There is a significant relationship between the technology inhibiting factors and the intention to adopt new information technology.

Hypothesis 6

H_{6o} = There is no significant difference in the four technology dimensions between college and university foodservice administrators with different demographic profiles and behavioral characteristics.

H_{6a} = There is a significant difference in the four technology dimensions between college and university foodservice administrators with different demographic profiles and behavioral characteristics.

CHAPTER II

LITERATURE REIVEW

This study assessed the impacts of various individual and organizational level factors on the intentions to adopt new information technology in the context of college and university foodservice operations. To accomplish a competitive edge over commercial foodservice establishments, it is crucial to encourage and support the development of individual users' constructive attitudes and perceptions toward those innovations including new information technologies or systems, particularly in the institutional foodservice setting. Through an in-depth understanding of a wide range of factors affecting individual user's intentions to accept technology systems, it is hoped that technology development professionals as well as college and university administrators are able to build technical systems that satisfy the needs of a broad spectrum of users within an organization.

Growth of Information Technology (IT)

Information Technology (IT) is defined as the hardware, software, and telecommunications that create, store, retrieve, exchange, transform, analyze, and communicate data and information around the globe (Kudyba & Diwan, 2002). It entails

the broader technological innovations and applications used in daily business operations. Information technologies have a tremendous potential to transform the nature of work and organizations and the way they conduct business.

Lucas (1999) conceptualized information technology as three components of technological innovations, such as computers, databases, and communications that transform organizations, markets, and education. Thompson and Cats-Baril (2003) pointed out that advances in information technology and communication technologies altered conventional concepts of time and distance, using an example of business negotiations in multiple locations of the world. Given the perception that information technologies promote productivity and cost reduction, major industries have made investments in this technology (Kudyba & Diwan, 2002, p.11). As suggested in Table 1, investment in information technology (IT) has been increasing continuously in the past decade.

TABLE 1

Growth in the Investment in Information Technology (IT)

Year	Investment in IT as a proportion of total investment in Industrial equipment and software (%)
1980	30.7
1990	39.1
1999	47.2

Note: Investment in IT refers to computers, software, and other information-processing equipment
Source: *The Economic Report of the President*, 2001, Table B-18, p.296.

There are many ways in which information technologies can help organizations achieve higher levels of quality in their products, services, and operations. For example,

the Web has grown phenomenally since its inception in 1990. The total value of goods and services traded over it in the U.S. alone will reach $327 billion (U.S.) in the year 2002 with an average annual growth rate of 110% (Yang & Mason, 1998). With this emerging trend, World Wide Web services for satisfying personal day-to-day needs are growing at a rate that will have substantial influence in the larger information infrastructure (D'Ambra & Rice, 2001). In addition, existing companies, start-up firms, consultants, and end users are now investing considerable resources in the Web. Corporations are building Intranets and Extranets to help them accomplish their operational objectives by assisting their employees in doing their jobs better (Lederer, Maupin, Sena, & Zhuang, 2000). Households with a personal computer (PC) increased from 9.5% in 1984 to slightly over 50% in 1999; it is forecasted that over 70% of all households in the U.S. will own a PC by the year of 2020 (Parks, 2002).

Information Technology (IT) in College and University Foodservices

The proliferation of various types of technological innovations with huge technology investments that support their operations has necessitated the development of information technology applications in every aspect of today's business. Given the potential wide usage of new information technologies, there is a growing significance of computerized systems needed to enhance managements' control of foodservice operations. Computers and technology were starting to have a significant impact on college and university foodservice programs in the 1970s: as evidenced by the first computerized card-checking systems were introduced in the late 1970s (Food

Management, 1997). A description of the beginning of technology usage in the segment was provided as:

> "We went from 'paper and pencil' systems to computerized food production managers were freed from the hours formerly spent forecasting production, expanding recipes, and managing inventories and were able to spend more time in the kitchens and serveries, where the action is." (Ron Inlow, Auxiliary Services Director, University of Richmond) (Food Management, 1997, p.40.).

Though ample evidence gathered during past decades demonstrated the impact of information technology on a wide variety of foodservice operations, information technology has played a relatively limited role in the foodservice industry, particularly in the noncommercial segment (Garand & McCool, 1985; McCool & Garand, 1986; McCool et al., 1994; Warner, 1994). According to a study by Garand & McCool (1985), a majority of the college and university foodservice professionals surveyed indicated that they were using computers as a management tool in their operations, although the intensity of using computers at work was not high as often as they would have liked it to be. In the study, institutional size was found to be related to the use of computers. McCool and Garand (1986) surveyed individuals associated with the management of institutional foodservices to uncover their computer technology use in the foodservice operations. As previously indicated in their 1985 study, McCool and Garand also reported a strong and direct relationship between institutional size and computer usage in their 1986 study. In addition, educational institutions, including colleges and universities, used computers more than all types of health care institutions.

A sense of technology advances is emerging as an increasingly important component of foodservices; it is also increasingly being viewed as an important alternative to traditional manual process. Utilizing information technologies, such as

communications and networking through the Internet had emerged which made it much easier for foodservice professionals to acquire accurate information. Kasavana and Cahill (1992) commented that computerized management systems support managers to obtain timely information to measure current effectiveness and plan business strategies. McCool et al. (1994) stated that noncommercial foodservice professionals should possess accurate information available to them when they need it with the aid of computer-based applications. Cornyn and Coons-Fasano (1995) indicated that there is a continuing need to have timely, operational, and financial data on which to base practical future management decisions in the area of foodservice. Further inquiry of the development of computer-powered information services for general foodservice use was presented.

Hurst (1997) stated that advanced technology increases costs to the customers and raises expectations of offered services, while making business systems more accurate and efficient in their segment. For college and university foodservice operators, these technological advances have permitted them to spend less time performing routine administrative functions and more time emphasizing quality services and performances. According to *Professional Practices in College and University Food Services* (1998), there are five principles with respect to technology as one of basis for developing food service policies and procedures for NACUFS members:

(1) Analysis of technology needs

(2) Selection of technology systems

(3) Future technological development

(4) Maintenance of technology systems

(5) Security of technology systems

Use of Information technology (IT) Applications in College and University Foodservices

People have a tendency to rely on the presently available technology applications and systems rather than actively adopting new technology in the noncommercial foodservices, particularly in college and university foodservice operations. Compared with commercial foodservice establishments, a choice of options and varieties with respect to information technology has been limited in the setting. In the context of the noncommercial segment, financial considerations have often been cited as a critical constraint limiting the introduction of new technology and the availability of various technology options (McCool et al., 1994).

To date, a limited number of previous studies relating to specific information technology applications used in particular foodservice operations have been published. Garand and McCool (1985) categorized specific computer applications into five functional areas: menu (e.g., planning, analysis, precosting, printing); purchasing/storage (e.g., order preparation, inventory, cost analysis, forecasting); production (e.g., recipe analysis, recipe costing, recipe calculations, ingredient room issues, store room requisitions, production schedules, forecasting); service (e.g., client interviewing, client education. nutrient analysis, client menu selection, participation tally, employee education); and managerial information (e.g., payroll report, food cost report, budget report, supply/inventory report, personnel scheduling, word processing, income statement, balance sheet, special events record). Data provided 196 NACUFS members indicated that the managerial information applications were the applications most frequently used by the participants, followed by purchase/storage applications.

McCool and Garand (1986) also used the same five categories of information technology applications, evaluated by 2,064 respondents associated with the management of institutional foodservices, as reported in the study of Garand and McCool (1985). Managerial information applications were most frequently reported by all respondents, including college and university foodservice professionals. It was also found that college and university foodservices have access to systems more specifically designed for foodservices due to their relatively large size and autonomous status.

Cornyn and Coons-Fasano (1995) presented the following list of computer-powered technology applications generally used in the context of noncommercial foodservices: production management systems, bar codes, POS systems, and debit cards. Hurst (1997) listed information technology applications based on management perspective. They included decision support system, purchasing system, new software programs of food ordering, inventory tracking, and other administrative functions related to scheduling and menu planning. According to McCool et al. (1994, p.344), the following applications for computers in noncommercial foodservices have been utilized:

(1) Inventory control

(2) Production control through recipe standardization and ingredient room issues

(3) Point-or-service (POS) systems for cafeterias and other points of service

(4) Integration of total systems from purchasing and inventory management to POS outlets

(5) Spreadsheet development for financial analysis

(6) Development of data bases for clientele profiles, product sales analysis, and human resource management

(7) Production forecasting

(8) Nutritional analysis of recipes and menus

(9) Management of patient diet orders and census changes

Table 2 shows the summary of empirical studies associated with information technology (IT) applications used in the noncommercial foodservice industry. To broaden the scope of the study, an array of technology applications for general purposes utilized in commercial foodservice and the health care sector, was also considered in the summary. An analysis of Table 2 suggested that there were several distinct common applications that were relatively important. Those included a word processing package, inventory management software, menu planning/recipe scaling software, forecasting software, and other daily use of technological devices for communication, such as personal computers and FAX machines.

TABLE 2

Summary of the Use of Information Technology Applications in Institutional Foodservices

Author(s) (Publication Date)	Sample	Most Important Information Technology (IT) Applications
Garand & McCool (1985)	College and university foodservice managers	1. Managerial information applications category (payroll report, food cost report, budget report, etc.) 2. Purchase/storage applications category (order preparation, inventory, cost analysis, & forecasting)
McCool & Garand (1986)	Management of institutional foodservices	1. Managerial information applications category (Payroll report was the application most frequently used in the category.) 2. Purchase/storage applications category (Inventory management was the application most frequently used in the category)
Miller (1989)	Dietetic/Foodservice Educators	1. Foodservice/nutrition software 2. Spreadsheet 3. Word processing software 4. Statistics software 5. Database management
Rhoades (1995)	Dietitians in Louisiana	1. Phone answering machine 2. Desktop computer 3. Word processing software 4. FAX machine 5. Pager 6. Nutritional analysis software
Bednar & Pangan (1997)	Foodservice directors at Texas hospitals	1. Inventory management 2. Menu & recipe costing 3. Ordering food/supplies 4. Menu planning 5. Recipe scaling 6. Printing patient menus
O'Hearn (1998)	Entry-level clinical management and foodservice systems management dietitians	1. Ordering food/supplies 2. Inventory management 3. Recipe scaling 4. Menu and recipe costing 5. Production scheduling 6. Forecasting

Individual Perceptions of Technology

Today organizations are faced with an increasingly complicated environment where pressures for quality information are dominant for remaining competitive (Collins, 1994). Advances in information technology have set the pace for tremendous growth in the development of technological innovations assisting today's organizations in achieving competitive advantages. Agarwal and Karahanna (2000) addressed that the actual value of information technology comes to be realized only when information systems are utilized by their intended users in a manner that contributes to the strategic goals of the organizations. They indicated that computerized systems themselves are itself fueled by recent technological development does not represent innovations that facilitate organizational effectiveness for most corporations. Systems that are not accepted by their committed users will not result in any sought-after benefits and advantages (Agarwal & Prasad, 2000). As individuals are willing to accept and employ the systems, they are empowered with the ability to fully utilize the technology systems. Thus, in order to construct strategic planning of purchasing and implementing information technology in foodservice operations, understanding how individuals perceive technology applications is increasingly crucial for foodservice administrators as well as technology manufacturers and suppliers.

Even if technology-oriented systems are successfully implemented, they are not effective when people don't actively utilize them. Mathieson (1991) indicated that information systems cannot be effective unless they are used. Through an in-depth understanding of individual user's intention to accept technology systems, it is hoped that technology development professionals are able to build technical systems that satisfy the

needs of a broad spectrum of users within an organization. Furthermore, passive individual attitudes and perceptions are not desirable during the recent "tightened-budget" period. According to Agarwal and Prasad (1997), having the technology available is not enough; it must be accepted and used appropriately by its target user group in order to realize anticipated productivity gains.

A number of studies associated with explaining and predicting the adoption of new information technologies have been completed that focus on individual user's technology acceptance behavior. Among those research topics in this area, the perceived characteristics of an innovation as a determinant of intentions to use existing technology applications as well as to accept new technological innovations was examined (Agarwal & Prasad, 1997; Moore & Benbasat, 1991). Theoretical backgrounds of the individual innovation characteristics were based on the diffusion of innovation (Rogers, 1983), Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989) and the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975). The Technology Acceptance Model (TAM) is primarily based on Fishbein and Ajzen's theory of the reasoned action model, which is based on a person's beliefs about the consequences of performing a behavior (Davis, 1989). More specifically, TAM hypothesizes that a user's actual usage of technology could be explained by the user's intention to use, which could be influenced by two key determinants: perceived usefulness and perceived ease of use. Rogers (1983) suggested that measuring potential adopters' perceptions of information technology has been termed a "classic issue" in innovation diffusion research. With the significance of the characteristics, the adoption of information technologies by

individuals and organizations is part of the process of information systems (IS) implementation (Moore & Benbasat, 1991).

Prior empirical studies (e.g., Brancheau & Wetherbe, 1990; Chiasson & Lovato, 2001; Moore, 1987) related to innovation diffusion have focused on how potential users' perceptions of the information technology innovation influence its adoption. As one of the most often cited studies associated with the factors affecting the rates of adoption of a certain information technology across an entire population, Rogers (1983) suggested five generic innovation attributes that a variety of diffusion studies had shown as an influence to adoption: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Tornatzky and Klein (1982) reported ten characteristics through a review of one hundred five articles. These attributes included cost, communicability, divisibility, profitability, and social approval, as well as the five characteristics identified by Rogers (1983). Moore and Benbasat (1991) expanded the relevant innovation characteristics measurements and developed eight constructs of the perceived characteristics of using an innovation. The instrument set includes relative advantage, compatibility, ease of use, result demonstrability, image, visibility, trialability, and voluntariness. To explore the diffusion of new end-use information technology (IT), they focused on measuring the potential adopters' perceptions of the technology. The perceptions of adopting new technology were originally based on the diffusion of innovations characteristics by Rogers (1983). Fichman and Kemerer (1993) commented that innovation attributes related to individual perceptions play a crucial role in the context of organizational adoption of complex technologies, influencing not only the

initial decisions to adopt, but also the ease of further stages of adoption, such as implementation, adoption, and routinization.

Numerous studies conducted over the last decade to explain and predict individual user's innovation characteristics and usage/adoption behavior (i.e., Brancheau & Wetherbe, 1990; Chiasson & Lovato, 2001; Moore & Benbasat, 1991, Premkumer & Potter, 1995). The theoretical models used in these studies are primarily based on Rogers (1983) and Moore & Benbasat's (1991) models, which measure the perceptions of adopting information technology innovations using successfully tested psychometric properties. However, only a few studies have attempted to encompass a wide range of variables applied in different contexts. Moreover, there has been little large-scale empirical research on individual factors influencing the adoption of information technology in the context of any foodservice operations. In order to develop a new framework applicable to the institutional foodservice setting, this study included perceived compatibility and perceived voluntariness from Moore & Benbasat (1991) and attempted to incorporate additional determinants of the adopting behavior of individual, perceived innovativeness and perceived technology awareness. The theoretical construct related to user perceptions of technology has provided critical implications in influencing adoption and diffusion of innovation.

Perceived Innovativeness

Personal innovativeness in the context of information technology has been recognized as a primary construct that is significant to the study of individual behavior toward technological innovations. Agarwal and Prasad (2000) indicated that recognition

of personal innovativeness helps identify individuals who are likely to adopt information technology innovations earlier than others. Based on previous research associated with personal characteristics (Flynn & Goldsmith, 1993; Kennedy & Deeter-Schmelz, 2001; Leonard-Barton & Deschamps, 1988; Midgley & Dowling, 1978), personal innovativeness was defined as "the willingness of an individual to try out any new information technology." They pointed out that users with higher personal innovativeness were more likely to cope with the uncertainty of innovative technologies and have more positive intention to use innovative technologies. Midgley and Dowling (1978) indicated that some people are more willing than others to try new things and will precede their peers in adoption in any population. Rogers (1995) noted that innovators are "active information seekers about new ideas" (1995, p.22) and they have greater mass-media exposure and are less reliable on the subjective evaluation of other members in their social system about the expected consequences of adopting an innovation.

Kirton (1976) addressed that innovation is associated with risk taking characteristics, such as greater risk, uncertainty, and imprecision. With respect to the risk-taking behaviors, Leonard-Barton and Deschamps (1988) argued that highly innovative users with managerial support are more likely to use a certain technology, whereas low innovative users with no managerial support are not likely to adopt the system. Rogers (1995) argued that innovators and early adopters are able to cope with higher levels of uncertainty. Agarwal and Prasad (1998b) also examined that personal innovativeness moderates the relationship between user's perceptions of the Internet and intentions to use. As previously noted, trying out an innovation is inherently risky without any guaranteed positive consequences; the more innovative users may be more willing to

adopt the innovation in the face of uncertainly about expected benefits due to their risk taking propensity. Accordingly, it is required that individuals with higher innovativeness develop more positive intentions toward the use of an innovation, compared with less innovative individuals (Agarwal & Prasad, 1998b).

Thong and Yap (1995) attempted to investigate the effect of the three CEO (Chief Executive Officer) characteristics, CEO innovativeness, CEO attitude towards adoption of IT, and CEO IT knowledge, on adoption of IT. The results of the study showed that small businesses that have CEOs who are more innovative, possess a more positive attitude towards the adoption of IT, are more knowledgeable about IT, and are more likely to adopt IT. Kennedy and Deeter-Schmelz (2001) explored the impact of various individual (i.e., personal perceptions of technology), organizational (i.e., influence of organizational environments), and market variables (i.e., factors of external environment) on the propensity to use online resources in purchasing. According to the study, the more organizational buyers perceive themselves as innovative, the more likely those buyers are to report positive intentions of using the Internet for corporate purchasing activities.

Perceived Compatibility

Rogers (1983) defined compatibility of as an innovation of "degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of the potential adopter" (p.223). This characteristic is associated with the perception of innovation being compatible with innovator's work behavior (Agarwal & Prasad, 1997). Tornatzky and Klein (1982) found that only three innovation characteristics, perceived relative advantage, perceived complexity, and perceived

compatibility, appeared to be consistently related to adoption behavior. Hoffer and Alexander (1992) showed the applicability of IT-related beliefs in studying adoption. They explored the implementation of database machines in relation to three perceived characteristics of a new technology, perceived compatibility, relative advantage, and complexity. Chin and Gopal (1995) noted that "the perceived compatibility scale taps into factors beyond relative advantage and ease of use because, unlike relative advantage, it calls for an assessment of the technology relative to a user's existing values and experiences to another technology." As Agarwal and Prasad (1997) found, perceptions of compatibility appear to be the most significant predictor of current usages rather than future use intentions. Regarding the impact of perceived compatibility, they commented that both the innovation and the user's work style would have been modified after putting an innovation into use for some period of time.

Previous studies on innovation (Cooper & Zmud, 1990; Ettlie & Vellenga, 1979) examined the relationship between the existing practices in organizations and the decision of potential innovation adoption. They pointed out that greater compatibility of the innovation to existing work practices and value systems has been found to favor adoption. According to a study by Rogers (1983), the more an innovation is perceived as consistent with present systems, procedures, and value systems of the potential adopter, the more likely it is that it will be adopted. In addition, prior studies regarding technological innovation have found innovation to be positively associated with adoption decision (Cooper & Zmud, 1990; Ettlie & Vellenga, 1979). Thus, it is necessary for a technical innovation to be not only be organizationally compatible, but also technically compatible with other interconnected technologies in the organization (Alavi, 1993).

Several empirical studies related to the perceived compatibility of technical innovations have been completed in the context of a certain target technology, such as Computer Aided Software Engineering (CASE) technology and Electronic Data Interchange (EDI) system. Premkumar and Potter (1995) also attempted to explain firms that perceive greater compatibility of CASE technology with their existing information system (IS) environment are more likely to adopt the technology. Premkumar, Ramamurthy and Nilakanta (1994) reported that technical compatibility was found to be one of major predictors of adoption of Electronic Data Interchange (EDI) system. Both forms of compatibility (i.e., technical and organizational) and costs were found to be one of the important predictors of the implementation success in EDI. To determine the impact of compatibility on EDI adoption, as Premkumar, Ramamurthy and Nilakanta (1994) found, Premkumar and Ramamurthy (1995) claimed that firms which perceive EDI technology to be compatible with their existing beliefs and work practices would be more likely to be proactive in their decision to adopt EDI.

Chin and Gopal (1995) predicted the intention to adopt group support system (GSS) using four constructs of personal beliefs, including relative advantage, ease of use, compatibility, and enjoyment. The results of the study revealed that the most salient belief bought to bear in determining intention to use the specific GSS appears to be its compatibility with an individual's values and experiences. Chiasson and Lovato (2001) examined how a user forms his or her perceptions of an innovation over time. To achieve the research objectives, they longitudinally observed a health planner's use of a DSS software tool for health planning, over a 12-month period. With regard to the perceived compatibility, the study showed that the user attempted to reconcile the structured

approach in the software to the person's existing workstyle. They stressed that it is important to understand technology diffusion through the viewpoint of an individual to capture how a system user "make sense" of a new technology. Chau and Hu (2001) reported that perceived compatibility appeared to be a significant determinant of perceived usefulness but not perceived ease of use shown in the technology acceptance model (TAM). With regard to the results of the study, they concluded that the compatibility of a telemedicine technology with a physician's existing practice routine is a crucial antecedent to his or her perceived technology usefulness rather than perceived ease of use.

Perceived Voluntariness

Moore and Benbasat (1991) defined perceived voluntariness of technology use as "the degree to which use of the innovation is perceived as being voluntary or of free will." They suggested that when adopting a particular innovation, it is crucial to recognize whether individuals are free to implement personal adoption or rejection of the decisions. Agarwal and Prasad (1997) linked a mandate from superiors affecting technology acceptance behavior with the theoretical constructs of perceived voluntaries. Although not a part of the original set of innovation characteristics proposed by Rogers (1983), perceived voluntariness was included by Moore & Benbasat (1991) as a determinant of technology usage behavior.

Based on an example shown in the study of Moore and Benbasat (1991), use of a particular innovation within organizations may be either mandated or discouraged by corporate policy related to the freedom of choice of the rejecting or the accepting option.

Given the voluntariness as perceived by innovators, they argued that, while many studies assume that they have "voluntary" adopters of innovations, some adopters may actually feel a degree of compulsion within organizations (Moore & Benbasat, 1991). Chin and Gopal (1995) considered the characteristics of voluntariness as truly perceived by adopters, measuring personal beliefs about technology, because the participants were not called upon to actually adopt the GSS.

Hartwick and Barki (1994) demonstrated that the degree to which a technology innovation is perceived as voluntary has a positive effect on perceptions of technology and ultimately technology infusion, that is, the internalized use of a technology innovation. They also indicated that even when users perceive system use to be organizationally mandated, usage intentions vary because some users are not willing to comply with such mandates. Agarwal and Prasad (1997) assessed the differential influence of perceived voluntariness on current usage and future use intentions. According to the study, mandating the use of a system could generate the initial momentum for system use by inducing individuals to overcome the hurdle of first-time use. Venkatesh and Davis (2000) adopted perceived voluntaries as a moderating variable in the model, hypothesizing that the direct compliance-based effect of subjective norm on intention over and above perceived usefulness and perceive ease of use will occur in mandatory, but not voluntary setting. Speier and Venkatesh (2002) hypothesized that organizational characteristics (i.e., voluntariness, user involvement, user participation, and management support) would positively influence individual perceptions of the sales force automation (SFA) technologies.

Perceived Awareness

Perceived awareness is defined as "a pro-innovation attitude that is conceptually similar to the construct of attitude toward the object or target (Ajzen & Fishbein, 1980). Based on the definition of awareness, Agarwal and Prasad (1998a) conceptualized it as a positive attitude toward the innovation and developed a set of items measuring perceived awareness of innovation. The contents of the awareness represented its perceived significance as an important innovation, conceptual relationship with firm's competitive edge, and appropriateness to the adoption behavior. The concept of positive attitude toward an innovation is important because it is directly associated with user's likelihood of addressing a felt need which causes consequent information seeking behavior among many innovations in a social system (Zaltman, Duncan & Holbek, 1973). Thus, such awareness of an innovation encourages potential adopters to seek further information and then, to persuade organizations to actively adopt technological innovations.

The perceived awareness of innovation has not been considered a direct predictor of adoption behavior. Rather, it precedes other variables of perceptions of innovation, influencing behavioral beliefs about the consequences of adopting the target innovation (Agarwal & Prasad, 1998a; Kwon & Zmud, 1987). Agarwal and Prasad (1998a) attempted to determine the relationship between three perceptions of innovation (relative advantage, ease of use, and compatibility) as independent variables and the communication channel type and awareness as dependent variables. They found the overall significant relationship among those variables by utilizing a multivariate multiple regression analysis.

Organizational Computing Supports

The use of information technology (IT) continues to increase in the workplace. The successful implementation of information technology has provided a wide range of industries with great advantages in speed of operation, consistency of data generation, accessibility and exchange of information (Stewart & Mohamed, 2003). Given the proliferation of information technology to facilitate job-related outcomes, it has been predicted that all managers and professionals will be using technological innovations. Subsequently, the successful acceptance of information technology will become a primary objective of operational activities as information technology presents significant impacts on job performance.

Faced with increased emphasis on information technology as a facilitator of individual performance in organizations, Montazemi (1988) raised several critical questions related to the successful adoption of an IT application, or computer-based information systems (CBIS). The questions included: "How is computer technology being absorbed within the organizations?", "What problems are being encountered in absorbing these technologies?" and "What are the possible strategies for providing a better fit between organizational needs and the available technologies?" (p.239). Subsequently, in search of some answers to the above questions, the identification of the various organizational-level factors influencing a user's positive or negative reactions in relation to the decision of adopting and implementing new information technology is of greater importance.

Previous research has succeeded in identifying numerous organizational variables which affect supporting effective use of information technology and satisfying individual

technology users (e.g., Essex, Magal, & Masteller, 1998; Kaiser & Srinivasan, 1982; Premkumar & Potter, 1995; Rockart & Flannery, 1983). Since employees often find it difficult to adapt to the rapidly changing new technologies being adopted in their organizations, it is essential to establish IT support systems provided by the organization to solve immediate problems and to help integrate technology into work methods and procedures (Shaw, DeLone, & Niederman, 2002). By mandating a variety of supporting systems and processes, it is expected to create some favorable organization environment for high level of performance gains. This issue is especially important as the use of information technology becomes non-volutional in the workplace and organizations increase their human and financial resources committed to these information systems (Henry & Stone, 1995).

For this study, three categories of organizational computing support were included. Based on the study of Igbaria (1990) and Igbaria and Chakrabarti (1990), there are two broad categories of support: (1) end-user support (i.e., internal computing support), which includes the availability of system development assistance, specialized instruction, and guidance in using microcomputer applications; and (2) management support, which includes top management encouragement, and allocation of resources (Igbaria, Guimaraes & Davis, 1995). In addition, there is (3) external support, which means the availability of computing support from technology vendors and agencies in a local community (Premkumar & Roberts, 1999).

Top Management Support

Top management support has appeared as a primary determinant of successful technology adoption and implementation for a number of years. Management support refers to "the extent to which management encourages the use of IT by their subordinates and the extent to which they encourage end-user developments and initiatives. This will be influenced by management's awareness of the technology" (McBride & Wood-Harper, 2002). Consistent with the emerging role of top management support, it has broadly emerged as an important variable in studies in information system (IS) implementation (Lucas, 1978), organizational commitment of information systems executives (Raghunathan, Raghunathan, & Tu, 1998), and information technology (IT) adoption (Premkumar & Potter, 1995; Zmud, 1984). Rai and Patnayakuni (1996) empirically assessed top management support using the following items that represent beneficial characteristics of top management in facilitating computing activities within organizations:

(1) Top management takes a hands-off approach to information systems

(2) Strong and involved leadership when it comes to information systems

(3) Support innovations in information technology

(4) Establish clear linkages between corporate and IS goals

Prior research identified top management support for individual user computing as an important determinant of computer attitudes and individual performance, creating a supportive climate and providing adequate resources for adoption of new technologies. Igbaria and Chakrabarti (1990) indicated that, as management support increases, attitudes

toward microcomputers improve and computer anxiety is reduced. According to the results of the study, management plays a leadership role in creating a favorable organizational computing environment. Given the critical role of management support, Igbaria (1990) reported that management support coupled with information center (IC) support was considered to be influential in helping end-users build a computing infrastructure by offering extensive training and developing software tools. Igbaria, Guimaraes, and Davis (1995) confirmed the demonstrated impact of organizational computing support, management support and end-user computing (EUC) support, on perceived ease of use and perceived usefulness of microcomputers, particularly for managerial level users. Igbaria, Parasuraman, and Baroudi (1996) assessed general support, which includes top management encouragement and allocation of adequate resources for creating a favorable computing environment. They stressed that organizational support can take a variety of forms, including encouraging experimentation with microcomputers, providing appropriate technology learning opportunities, and offering a wide selection of user-friendly software for special use in different jobs.

The concept of management support has been applied in a wide range of computing environments. DeLone (1988) demonstrated that chief executive involvement in computerization lead to more successful computer usage in small manufacturing firms. Henry and Stone (1995) pointed out that management support is crucial since it represents a form of persuasion and encouragement and provided direction for subsequent behavior. To test the role of management support, they adopted a structural equation model in a large nonprofit hospital regarding its computer-based order entry

system. They showed that management support can indirectly influence the user's job performance by increasing the individual user's computer self-efficacy and outcome expectancy. Furthermore, it helps to ensure that what and how appropriate resources within organizations will be allocated if the new innovation is adopted. Given the supporting role of top management, Srinivasan, Lilien, and Rangaswamy (2002) proposed that if top management advocate new technologies, middle and junior managers would dedicate the resources necessary for sensing and responding to new technologies.

The active involvement and support of top management provides appropriate strategic vision and direction, in addition to sending signals about the importance of the innovation (Premkumar & Potter, 1995). Numerous studies have attempted to determine the influence of top management support in the context of particular technology or information systems. More specifically, top management support, shown in several forms, has consistently appeared as a determinant of individual success in models of end-user computing (Rivard & Huff, 1988), DSS success (Kaiser & Srinivasan, 1982; Rockart & Flannery, 1983), and electronic data interchange (EDI) (Premkumar & Ramamurthy, 1995), and has been suggested as a determinant of MIS attitudes (Zmud, 1979).

Premkumar and Ramamurthy (1995) stated that firms where top management enthusiastically supported EDI were more likely to be proactive in their decision to adopt EDI. To provide top priority to EDI system development, marketing/sales department have to seek top management help in convincing the IS department that EDI system is a strategic necessity to survival in the industry. Premkumar and Potter (1995) noted that unless the IS manager has a firm commitment from top management to adopt some expensive technology applications, such as CASE methodology, the decision to adopt the

technology could be risky for the manager. According to the study of Rai and Patnayakuni (1996), top management support dose not affect CASE adoption behavior. However, it is likely that top management support is more critical during the post-adopting stages of the diffusion process. They concluded that top management support was particularly important for technology implementation because there is significant resistance to new technologies during the later stages of innovation diffusion process.

In addition, Speier and Venkatesh (2002) included management support as one of organizational characteristics affecting the individual perceptions of sales force automation (SFA) technologies in the study. It is expected that some organizational characteristics have a positive influence on the successful acceptance and implementation of technology applications. Aladwani (2002) suggested that management advocacy provides the appropriate guidance for end-user computing, resulting in sufficient organizational resources being dedicated to end-user computing. According to the results of the study, management advocacy has positive direct effects on computer attitudes and end-users satisfaction.

With respect to the influence of top management support on end-user computing satisfaction, Montazemi (1988) examined factors influencing end-user satisfaction in the context of the small business environment using a total of 35 attributes of a successful computer-based information system (CBIS). The study reported a high satisfaction level with several salient issues such as accuracy, top management involvement, currency, reliability, timeliness, format of output, and relevancy of systems. Guimaraes, Yoon, and Clevenson (1996) investigated the satisfaction of end-users with expert systems

applications in a large American organization and reported that management advocacy is the second most important predictor of overall user satisfaction.

Internal Computing Support

Internal computing support is primarily associated with the availability of specialized instructions and guidance for end-users within an organization (Aladwani, 2002; Amoroso & Cheney, 1991; Igbaria & Chakrabarti, 1990; Igbaria, Zinatelli, Cragg, & Cavaye, 1997) and the supporting role of the information center (IC) within organizations (Bergeron, Rivard, & De Serre, 1990; Shaw, DeLone, & Niederman, 2002). More specifically, it entails application development support, which is quite specific, and includes the presence of an information center (IC), availability of development assistance, and specialized instruction and guidance in using microcomputer applications (Igbaria, 1993). Cheney, Mann, and Amoroso (1986) proposed that organizational support of end-user computing, in the form of hardware, software, data, processes, and people, has been recognized as a strategic effort that will increase the likelihood of end-user computing success. Compeau and Higgins (1995) hypothesized that the higher the support for computer users in the organization, the higher the individual's computer self-efficacy. Even if the findings of their research was somewhat conflicting, they expected that the availability of assistance from organization provides individuals with clues about the likely consequences of using computers, and presenting some positive outcome expectations of using them. Amoroso and Cheney (1991) suggested the following dimensions of internal computing support provided by organizations:

(1) Guidance for the selection of hardware and software

(2) User-specific computer training programs

(3) Access to corporate data for the development and operation of specific applications

(4) Assistance from the information system staff in the development and maintenance of end-user developed applications

Considering the importance of end-user computing (EUC), there is a growing body of literature on end-user computing support as a strategic initiative to satisfy their computing experiences. Various studies have included the provision of extensive end-user support as one the most effective methods of facilitating end-user computing (EUC) in an organization. In order to measure EUC support, Mirani and King (1994) developed an instrument which consisted of 42 items and 9 factors. The factors included applications development support, standards and guidelines, data provision support, operational support, purchasing-related support, variety of software support, support staff characteristics, post-development support, and training on backups/security.

With respect to the supporting role of a support group, such as an information center within an organization, Rivard and Huff (1988) revealed that user satisfaction with the support provided by a data processing (DP) department was the construct most closely related to overall user satisfaction. They indicated that the there was a need for the supporting department to create a climate that facilitated user satisfaction, including services in support of end users' activities, shifting from the passive role of application development. As Amoroso and Cheney (1991) found, perceived organizational support appeared to be indirectly related to improved end-user information satisfaction and

application utilization. They explained that supported end-user computing environments would create higher positive user attitudes, a greater degree of motivation to develop new applications, and higher levels of user information satisfaction.

Additional support can be found by Essex, Magal, and Masteller (1998), who examined the determinants of information center (IC) success, defined as individual user satisfaction with the supporting facility within organizations. Internal computing support has been identified as one of the major contributions to IC success (Cheney, Mann & Amoroso, 1986; Lederer & Spencer, 1988; Magal, Carr, & Watson, 1988). According to the study of Essex et al. (1998), variables identified in the literature associated with organizational support included the following components: top management support, organizational acceptance of the IC concept, end-user commitment to the IC concept, existence of sufficient budget, rank of the IC executive, monitoring and tracking of IC success, and promotion of IC services.

External Computing Support

External support refers to the availability of support for implementing and using an information system (Premkumar & Roberts, 1999). More specifically, it indicated the availability of computing support from outside an organization, such as technology vendors, local community agencies, and other technical-support businesses. With respect to the support outside the organization, many researchers attempted to examine the relationship between the availability of external support and adoption behavior, particularly in the context of small businesses. Since small businesses are faced with limited financial and managerial resources, they must either look outside the company for

specialized knowledge or must attempt to develop less sophisticated techniques internally (Deeks, 1976). Consistent with the necessity of external support in small business environment, DeLone (1981) found that smaller firms would be more highly dependent on external programming/software services. The results of the study provided meaningful implications to small business executives in relation to the ability of the firm to make a knowledgeable choice of a software vendor.

As one of the supply-side competitive characteristics, Gatignon and Robertson (1989) proposed that incentives offered to a firm by external manufacturers encouraged adoption of technological innovation. They revealed that the likelihood of adoption increases with the availability of supplier incentives. Premkumar and Roberts (1999) indicated that the popularity of outsourcing and the growth in third party support has had a significant impact on the adoption of new technologies. They suggested that the greater the external support for communication technologies the more likely they would be adopted. It was based on the logic that firms are more willing to risk trying new technologies if they felt there was sufficient vendor or third party support for the technology.

Technology Motivations and Inhibitors

The success of information technology (IT) adoption and implementation depends on diverse factors which are primarily associated with individual perceptions and attitudes toward the system and its expected benefits. As the dependency on IT increases, so does the need to assess the perceived consequences of the strategic application of IT, such as productivity, effectiveness, and performance. Stewart and Mohamed (2003)

argued that even if IT has provided industries with extensive advantages in the speed of operation, consistency of data generation, accessibility and exchange of information, some of organizations are dissatisfied by their IT investments. They indicated that this dissatisfaction is due in part to the limited understanding the value IT adds to the current process of operation. Tallon, Kraemer, and Gurbaxani (2000) addressed the satisfaction level of organizational productivity and performance relative to IT investments. Considering the productivity impacts of IT, they focused on the needs of more inclusive and comprehensive approaches needed to measure the expected IT business value.

The perception of operational performance from the strategic application of IT continues to have a dramatic effect on the behavioral intentions to adopt or reject an IT application in the future. As positive benefits from using IT are strongly perceived, they grow into motivational attributes which might contribute to encourage the adoption of the IT applications in the future. On the contrary, as negative consequences resulting from IT usage are strongly perceived, they grow into de-motivational attributes which might negatively influence the behavioral intention to adopt. In response to the understanding of factors for the strategic use of IT, King and Teo (1996) indicated that since strategic IT applications can have a significant impact on the firm's strategy, determining the factors that facilitate or inhibit the development of such applications is critical. King, Grover, and Hufnagel (1989) defined facilitators as "factors that positively influence the ability of an organization to exploit information resources" or "factors that positively influence an organization's decision to use IT applications for strategic purposes." They also defined inhibitors as "factors that negatively influence this ability or those decisions."

Given the two aspects of factors, positive (i.e., encouraging) and negative (i.e., limiting) characteristics, affecting the success of IT adoption and implementation, past studies attempted to identify those two perspectives using slightly different terms, such as motivators and inhibitors (Cragg & King, 1993) facilitators and inhibitors (King & Teo, 1996), motivators and de-motivators (Baddoo & Hall 2002; Baddoo & Hall 2003), persuasion factors and hindrance factors (Baker, 1987), benefits and drawbacks (Van Hoof & Combrink, 1998), and benefits and barriers (Pérez, Sánchez, & Luis Carnicer, 2002). As firms recognize the potential motivating and inhibiting factors for IT use to create strategic impacts, practitioners in corporations pursue a more active role in deciding how, when, and where to use IT resources (Tallon, Kraemer, & Gurbaxani, 2000).

Technology Motivations

The individual perspective on the basis of the expected positive operational outcome from the strategic application of IT may be a significant predictor in encouraging adoption behavior. According to King and McAulay (1989), the existence of sufficient motivational influence results in success. The motivational influence arises from factors which are capable of motivational impact, then, adoption of technology is a function of the overall level of motivational influence. Consistent with the perceived IS/IT benefits which motivate individual users to encourage the future adoption decisions, King and Schrems (1978), in one of the initial studies, classified perceived benefits of information systems into six categories:

(1) Contributions of calculating and printing tasks

(2) Contributions to record-keeping tasks

(3) Contributions to record-searching tasks

(4) Contributions to system restructuring capability

(5) Contributions of analysis and simulation capability

(6) Contributions to process and resource control.

Several previous studies were focused on factors encouraging information technology implementation in the context of small firms to confirm the findings conducted in large firms (Baker, 1987; Cragg & King, 1993; Farhoomand & Hrycyk, 1985; Malone, 1985). Farhoomand and Hrycyk (1985) listed perceived benefits resulting from computerized automation intending to computerize operations. The benefits perceived by respondents were increased productivity, better and faster information access, improved customer service, less paperwork, improved competitive position, and decreased personnel and operating costs.

Baker (1987) examined the factors which tended to persuade small businesses to implement automated information systems. Leading factors included increased office productivity, more accurate information, and greater information processing capability. Factors which tend not to be major persuasive attributes were product loyalty (favorite brand), low price for the system, and reduced system complexity. The author pointed out that those primary persuasion factors seemed to be appropriate factors on which to make decisions in relation to adopting computerized systems. Cragg and King (1993) suggested factors that encourage information technology (IT) growth in small firms. Factors motivating greater use of IT were classified as relative advantage and other factors.

Relative advantage included improved information processing, improved planning and control, and work improvement. Other factors included competitive pressure, consultant support, and managerial enthusiasm.

The results of a study by King and Teo (1996) indicated that dimensions of innovative needs, competitive position, favorable external environment, economies of scale, and top management guidance were the most important facilitators for the strategic use of information technology. Tallon, Kraemer, and Gurbaxani (2000) compiled a list of thirty items to assess the impact of IT on various critical business activities within the value chain. The items were grouped into six critical process areas, process planning and support, supplier relations, production and operations, product and service enhancement, sales and marketing support, and customer relations, and used to measure the perceptions of realized IT impacts. The results of this study indicated that executives in firms with more focused goals for IT systematically perceived higher levels of IT business value throughout the value chain. Stewart and Mohamed (2003) attempted to evaluate the degree of IT-induced value adding in the context of managing a construction project. To measure the value IT adds to the process of project information management, they developed "Construct IT" Balanced Scorecard (BSC) through the validation of the frameworks five IT-related performance measurement perspectives. The performance indicators were primarily related to IT-induced expected benefits/outcomes and consisted of operational, benefits, technology/system, strategic competitiveness, and user orientation perspectives.

A number of studies regarding the motivational factors of technology adoption and implementation have been conducted in the context of various technology

applications. Rivers and Dart (1999) examined the factors that related to the acquisition and effective use of sales force automation (SFA) technology. A list of twenty 22 items was selected representing strategic concerns (e.g., react to competition), administrative concerns (e.g., reduce processing errors), and operating concerns (e.g., more prospecting time) relating to factors playing a part in justifying their most recent acquisition of the SFA technology. According to the results of this study, firms that look to SFA for administrative efficiencies and strategic advantages are more likely to make the required technology investment and realize beneficial results as compared to those firms that seek simply to automate existing tasks.

Premkumar, Ramamurthy, and Nilakanta (1994) highlighted the potential benefits of new technology applications referred to as an Electronic Data Interchange (EDI) system. They stated that EDI brings in many benefits to the organizations such as reduced costs, faster turnaround, better customer service, and in some firms strategic advantage over their competitors. McDermott and Stock (1999) measured technology implementation benefits using four dimensions: operational benefits, organizational benefits, competitive performance, and satisfaction in the context of AMT implementation. Operational benefits included output levels, efficiency, cost reduction, reliability, repeatability, quality, and flexibility. Organizational and managerial benefits were associated with the extent to which the technology has improved work flows, communication, integration of business activities, and management control. Relative competitive performance included sales growth, market share, and return on investment (ROI) as a measure of implementation effectiveness. Satisfaction with technology implementation was related to satisfaction with the technical aspects of the system, the

process of implementation, and the impacts on jobs. Consistent with some identified implementation benefits, Stock and McDermott (2001) explored the potential benefits of advanced manufacturing technology (AMT) in several industries, automotive, electrical, plastics, textiles, metal fabrication, and furniture. To assess the manufacturing technology implementation, they measured two types of expected benefits from the successful AMT implementation including organizational benefits (e.g., improved work flows, communications, integration of business activities, and management control) and operational benefits (e.g., increased output levels, efficiency, cost reduction, reliability, repeatability, quality, and flexibility). Shaw, DeLone, and Niederman (2002) explored factors supporting effective use of information technology and satisfying information technology users. Among the 21 potential end-user computing support factors, 'the technical competence of the IS staff' and 'the IS staff response time" were most highly rated for importance.

Regarding the effective use of an electronic mail system, Zienert (1995) indicated that organizations have benefited from the use of electronic mail with improved response time, improved communication, and better decision-making process. It contributes to improve in the overall efficiency and productivity of the firm as well as the coordination of internal processes. The effective use of e-mail to expedite projects offered a series of competitive advantages by providing better and faster products/services to the customers. McManus, Sankar, Carr, and Ford (2002) assessed the intraorganizational (i.e., internal) and interorganizational (i.e., external) uses and benefits of e-mail. Items to measure the organizational potential benefits of e-mail included improves communication, improves productivity, increases access to people, improves response time, lessens multiple call-

back/phone tag, improves decision-making, improves communications between decision-makers, facilitates direct communication, expedites projects, and increases document turnaround. According to the study, the intraorganizational uses of e-mail (e.g., individual tasks and interrelated tasks) indicated a significant and positive relationship with the organizational benefits of e-mail, thus supporting the electronic exchange channel of information within organizations.

Table 9 shows the summary of findings of the motivational factors of technology adoption and implementation decision in the context of various technology settings. The major motivating factors are increased productivity, enhanced image and reputation of organization, improved data and information processing, faster internal/external communication, improved customer relations, enhanced organizational competitiveness, and support product/service innovations.

TABLE 3

Summary of Motivation Factors of Technology

Author(s)	Sample	Important Motivating Factors or Dimensions of Technology Adoption/Implementation
Farhoomand & Hrycyk (1985)	Small business computer users	**Perceived Benefits Resulting From Computer** 1. Increased productivity 2. Better and faster information access 3. Improved customer service 4. Less paperwork 5. Improved competitive position 6. Decreased personnel and operating costs
Baker (1987)	CEOs in manufacturing and professional service	**Persuasion Factors of Automation** 1. Increased office productivity 2. Faster processing or system responsiveness 3. More accurate information 4. Reduced cost of your operations 5. Greater information processing 6. Improved decision making
Cragg & King (1993)	Small manufacturing firms (case study)	**Motivators (Factors that Encourage IT Growth)** 1. Relative advantage (e.g., Improved information processing, Improved planning and control, Work improvement) 2. Other factors (e.g., Competitive pressure, Consultant support, Managerial enthusiasm)
Ghorab (1995)	United Arab Emirates' (UAE) national and foreign bank managers	**Perceived Benefits of Automation of Services** 1. Increased volume 2. Business flexibility 3. Reduced cash 4. Reduced labor cost 5. Improved service quality 6. Competitive advantage 7. Improved accuracy 8. Reduced complaints 9. Improved morale 10. Improved productivity

Table continued

Author(s)	Sample	Important Motivating Factors or Dimensions of Technology Adoption/Implementation
Kettinger & Grover (1997)	Interorganizational email users on the Internet from 33 countries	**Perceived Benefits of Email Usage** 1. Task Dimension (e.g., Send a message in place of a phone call, Coordinate activities of projects, Monitor progress of projects, Resolve conflicts/disagreements, Brainstorm/Generate ideas) 2. Social/Entertainment Dimension (e.g., Keep in touch/maintain relationships, Get to know someone, Discuss confidential matters, Participate in entertaining events of conversations) 3. Broadcast Dimension (e.g., Broadcast requests for information, Ask questions in a public setting)
King & Teo (1996)	Executive M.B.A. graduates from a large northeastern university	**Facilitators for the Strategic Use of IT** 1. Innovative Needs Dimension (e.g., Perceived need to facilitate paperwork, Perceived need to differentiate products/services, Favorable image/reputation of company) 2. Competitive Position Dimension (e.g., Perceived need to improve/maintain market position, Perceived need to improve/maintain image/reputation) 3. Environment Dimension (e.g., Favorable market growth, Favorable economic growth, Favorable environmental change in industry) 4. Economies of Scale Dimension (e.g., Economies of scale for strategic use of IT, Extensive distribution network) 5. Top Management Guidance Dimension (e.g., Well-defined management objectives, Top management vision and support)
Van Hoof & Combrink (1998)	U.S. Lodging Operators	**Benefits of the Internet** 1. Exposure of property 2. Advertising and marketing 3. Faster and better communication 4. Marketing and reservations 5. Source of information on other hotels, clients, and the industry 6. Saves cost and time

Table continued

Author(s)	Sample	Important Motivating Factors or Dimensions of Technology Adoption/Implementation
Mirani & Lederer (1998)	Information System (IS) practitioners	**Benefits of IS Projects** 1. Strategic Dimension (e.g., Change the way the organization conducts business, Improve customer relations, Provide new products or services to customers) 2. Informational Dimension (e.g., Present information in a more concise manger or better format, Improve the accuracy or reliability of information, Enable faster retrieval or delivery of information or reports) 3. Transactional Dimension (e.g., Save money by reducing the work force, Facilitate organizational adherence to governmental regulations, Provide greater data or software security, Speed up transactions or shorten product cycles)
Rivers & Dart (1999)	Medium sized manufacturers in Canada	**Justifying Sales Force Automation Acquisition** 1. Operational Dimension (e.g., Increase sales calls, More client time, Reduce calls per sale) 2. Administrative/Traditional Dimension (e.g., Reduce processing errors, Better inventory management, Improved business processes) 3. Administrative/Communication Dimension (e.g., Improved internal communications, Facilitate telecommuting, Closer field/office links) 4. Strategic Dimension (e.g., Easier new product additions, Improve overall profitability, Gain competitive advantage, React to competition)
McDermott & Stock (1999)	Plant managers and vice-presidents of manufacturing in cooperation with the American Production and Inventory Control Society (APICS)	**Benefits of Advanced Manufacturing Technology (AMT)** 1. Operational Benefits Dimension (e.g., Improved work flow, Increased efficiency) 2. Competitive Performance Dimension (e.g., Sales growth, Market share, Return on investment) 3. Organizational and Managerial Outcomes Dimension (e.g., Improved communication, Improved integration of business activity, Improved management control, Met organizational goals)

Table continued

Author(s)	Sample	Important Motivating Factors or Dimensions of Technology Adoption/Implementation
Tallon, Kraemer, & Gurbaxani (2000)	U.S. companies and other non-U.S. companies with similar size and operating characteristics to those in the *Fortune* 1,000	**Business Value of IT** 1. Process Planning & Support Dimension (e.g., Improve internal communication and coordination, Improve management decision making) 2. Supplier Relations Dimension (e.g., Help reduce variance in supplier lead times, Improve monitoring of the quality of products/services from suppliers) 3. Production and Operations Dimension (e.g., Improve the productivity of labor, Enhance utilization of equipment) 4. Product and Service Enhancement Dimension (e.g., Support product/service innovation, Reduce the time to market for new products/services) 5. Sales and Marketing Support Dimension (e.g., Enable the identification of market trends, Improve the accuracy of sales forecasts, Help track market response to pricing strategies) 6. Customer Relations Dimension (e.g., Enhance the ability to attract and retain customers, Enhance the flexibility and responsiveness to customer needs)
Stock & McDermott (2001)	Plant managers and vice-presidents of manufacturing in cooperation with the American Production and Inventory Control Society (APICS)	**Benefits of Advanced Manufacturing Technology (AMT)** 1. Operational Outcomes Dimension (e.g., Output, Efficiency, Reliability, Work flow) 2. Competitive Outcomes Dimension (e.g., Profitability, Market share, Sales growth) 3. Cost Emphasis Dimension (e.g., Inventory reduction, Capacity utilization, Labor productivity) 4. Quality/Design Emphasis Dimension (e.g., High performance products, Rapid design changes, Consistent quality) 5. Flexibility Emphasis Dimension (e.g., Lead time reduction, Product variety) 6. Speed/Responsiveness Emphasis Dimension (e.g., Fast delivery, Delivery reliability, Rapid volume changes) 7. Organizational Change Dimension (e.g., Communication, Integration, Management control, Organizational goals met)

Table continued

Author(s)	Sample	Important Motivating Factors or Dimensions of Technology Adoption/Implantation
Pérez, Sánchez, & Carnicer (2002)	Human resources managers of Spanish companies	**Benefits of Telework to Company** 1. Productivity increase 2. Fixed cost reduction 3. Work organization 4. Flexibility **Benefits of Telework to Employee** 1. Labor time flexibility 2. Less commuting to work 3. Autonomy 4. Easier work life
Baddoo & Hall (2002)	Software practitioners	**Motivators for Software Process Improvement (SPI) – Developers' Perspective** 1. Visible success 2. Bottom-up initiatives 3. Communication 4. Feedback 5. Job satisfaction 6. Process ownership 7. Resources 8. Shared best practice 9. Top-down commitment
Stewart & Mohamed (2003)	Construction project professionals representing large construction contractors and project management organizations	**Value of IT** 1. Operational Dimension (e.g., Faster reporting and feedback, Reduced unnecessary site visits, IT-enhanced coordination & communication) 2. Benefits Dimension (e.g., Time savings due to efficient document management, Improved client satisfaction, Quicker response time) 3. Technology/System Dimension (e.g., Improved quality of output, Effective system security) 4. Strategic Competitiveness Dimension (e.g., Enhanced organizational competitiveness, Enhanced organizational image, Ability to attract more sophisticated clients) 5. User Orientation Dimension (e.g., Satisfactory level and frequency of IT training, Satisfactory level and frequency of IT support)

Technology Inhibitors

Compared with motivational factors, inhibitors are studied less frequently in the domain of technology (King & Teo, 1996). They suggested that exploring the underlying structure of both facilitators and inhibitors that could help in understanding situational and process elements associated with the development of strategic IT applications. By identifying the potential factors that limit the future technology adoption and implementation, it is hoped that system developers would take appropriate steps to alleviate the perceived barriers and constraints, while encouraging the presence of appropriate facilitators. As the other aspect of the perceived impact of IT, Baddoo and Hall (2003) called attention to why practitioners are de-motivated to get involved in improving process change using an information system in companies. They reported that software process improvement (SPI) may not be delivering the benefits promised because insufficient attention had been paid to it, and that there was a need to be aware of the human aspects of implementing the system.

Baker (1987) reported the factors that most significantly hindered the implementation of automation in businesses in two industries, manufacturing and professional service segments. The top five factors of the fifteen attributes were (a) feel that technology is changing too rapidly, (b) lack of confidence in claims made by computer sales representatives, (c) lack of time to do the necessary analysis to determine what or how to automate, (d) lack of confidence in computer vendors to provide ongoing service and support after implementation, and (e) lack of knowledge on new technology.

Cragg and King (1993) identified four primary factors, including education, managerial time, economic, and technical aspect that discourage IT growth in small

firms. The education factor included lack of information system (IS) knowledge, skills shortage, and influence of higher levels. The second factor of managerial time was related to lack of time. The third economic factor included inappropriate economic climate, excessive cost, and firm too small. The factor of technical aspect was about unstructured system and poor software support. King and Teo (1996) founded that dimensions of the lack of IT drivers, the lack of economies of scale, and the lack of innovative needs were the most important facilitators for the strategic use of information technology.

Baddoo and Hall (2003) presented software practitioners' de-motivators for software process improvement (SPI). They reported the following major issues as the most critical barriers/inhibitors to SPI success: resistance to change, lack of evidence, imposed SPI initiatives, resource constraints, and commercial pressures. They reported that there were perceived differences in de-motivators for SPI across staff groups and these differences were directly related to the roles that practitioners play in their organizations. Developer specific de-motivators included lack of feedback, workload, reduced creativity, customers, and lack of management commitment. Project manager specific de-motivators were lack of measures for controlling projects, fire-fighting, low process priority, and staff turnover. Senior manager specific de-motivators were organizational changes and lack of SPI management skills.

Regarding the barriers to effective technology implementation in the healthcare field, Kerwin (2002) addressed several barriers that prevented the successful implementation of the Internet in the setting. Despite the Internet's growing popularity and use to improve healthcare quality, a number of factors have impeded the prevalent

adoption of Internet-based systems in the healthcare sector. For instance, there are limiting factors specific for patients/consumers (e.g., lack of universal access to the Internet, computer illiteracy, and the cost of computers), for physicians (e.g., wary of new computer applications and may be unskilled in electronic communication and data searching), and for administrators/organizations (e.g., reluctance to adopt new technologies, uncertainty about the impact of Internet, and lack of consensus on using and adopting the Internet).

Several previous studies regarding the inhibiting factors of technology have been conducted, particularly in the context of institutional foodservice operations. To determine the computer usage of institutional foodservice professionals, Garand and McCool (1985) surveyed the members of the National Association of College and University Food Services (NACUFS) and dietitians in College and University Foodservice Dietetic Practice Group (DICUFS). They reported a total of seven reasons for limiting computer use. Most important factors included lack of capital, lack of knowledge about computers, lack of upper management support, and lack of time to learn about/establish a computer system. Miller (1989) identified five factors limiting the utilization of computers in foodservice management education. They are cost, lack of software, lack of faculty expertise, lack of compatible hardware, and lack of administrative support. O'Hearn (1998) found a set of barriers limiting computer use by entry-level clinical management and foodservice systems management dietitians. The result of the study was consistent with the prior studies (Garand & McCool, 1985; Miller, 1989). The inhibiting factors identified in the study were lack of time to learn on the job,

cost, inadequate/outdated computers, lack of software, lack of administrative support, lack of compatible hardware, lack of employer expertise, and location of computers.

Table 4 provides a summary of findings of inhibiting factors for technology adoption and implementation decision in the context of various technology settings. The major motivating factors are lack of funding, lack of management support, system maintenance and operating costs, inadequate/outdated hardware, lack of awareness of technology innovations, personal resistance to new technologies, and insufficient software support.

TABLE 4

Summary of Inhibiting Factors of Technology

Author(s)	Sample	Important Inhibiting Factors or Dimensions of Technology Adoption/Implementation
Garand & McCool (1985)	Members of the National Association of College and University Foodservices (NACUFS) and Dietitians in College and University Foodservice Dietetic Practice Group (DICUFS)	**Reasons for Limiting Computer Usage** 1. Lack of capital 2. Lack of knowledge about computers 3. Lack of upper management support 4. Lack of time to learn about/establish a computer system 5. Personal dislike of computers 6. Personal belief that computers will not benefit foodservice 7. Employee resistance to computers
Baker (1987)	CEOs in manufacturing and professional service	**Hindrance Factors of Automation** 1. Feel that technology is changing too rapidly 2. Lack of confidence in claims made by computer sales representatives 3. Lack of time to do the necessary analysis to determine what or how to automate 4. Lack of confidence in computer vendors to provide ongoing service and support after implementation 5. Lack of knowledge on new technology
Miller (1989)	Directors of plan IV, V, or coordinated undergraduate programs at universities approved or accredited by The American Dietetic Association	**Factors Limiting the Utilization of Computers** 1. Cost 2. Lack of software 3. Lack of faculty expertise 4. Lack of compatible hardware 5. Lack of administrative support
Cragg & King (1993)	Small manufacturing firms	**Inhibitors (Factors that Discourage IT Growth)** 1. Education Dimension (e.g., Lack of IS knowledge; Skills shortage; Influence of higher levels) 2. Managerial Time Dimension (e.g., Lack of time) 3. Economic Dimension (e.g., Inappropriate economic climate; Excessive cost; Firms too small) 4. Technical Dimension (e.g., Unstructured system; Poor software support)

Table continued

Author(s)	Sample	Important Inhibiting Factors or Dimensions of Technology Adoption/Implementation
Ghorab (1995)	United Arab Emirates' (UAE) national and foreign bank managers	**Perceived Problems of Automation of Services** 1. Software development time 2. Software development cost 3. IS developing cost 4. IS operating cost 5. Employees training 6. System security 7. Customer awareness 8. Financing the system 9. Increased maintenance cost 10. Employee resistance
King & Teo (1996)	Executive M.B.A. graduates from a large northeastern university	**Inhibitors for the Strategic Use of IT** 1. Lack of IT Drivers Dimension (e.g., Perceived importance of strategic use of IT; Experience with IT) 2. Lack of Economies of Scale Dimension (e.g., Economies of scale for strategic use of IT; Extensive distribution network) 3. Lack of Innovative Needs Dimension (e.g., Perceived need for uniqueness/innovation; Perceived need to keep up with new technology)
Van Hoof & Combrink (1998)	U.S. Lodging Operators	**Drawbacks of the Internet** 1. Cost and time involved 2. Security and confidentiality 3. Maintenance and site-update costs 4. Accessibility 5. No drawbacks 6. Unauthorized staff use and wasted time 7. Training, lack of knowledge, ignorance 8. Loss of personal touch 9. Lack of corporate support
O'Hearn (1998)	Dietitians from the Management in Health Care Systems Practice Group and the Clinical Nutrition Management Practice Group of the American Dietetic Association (ADA)	**Barriers Limiting Computer Use** 1. Lack of time to learn on the job 2. Cost 3. Inadequate/outdated computers 4. Lack of software 5. Lack of administrative support 6. Lack of compatible hardware 7. Lack of employer expertise 8. Location of computers

Table continued

Author(s)	Sample	Important Inhibiting Factors or Dimensions of Technology Adoption/Implementation
Eggers, Villani, & Andrews (2000)	Manufacturing facilities and environmental consulting facilities in North Carolina	**Barriers to Technology Change (Facility)** 1. Payback period too long 2. Current technology already adequate 3. Limited availability of other technology options 4. Lack of working capital/cash flow 5. Lack of credible data on technology performance **Barriers to Technology Change (Consultant)** 1. Payback period too long 2. Current technology already adequate 3. Limited availability of other technology options 4. Cost and time requirements of environmental permitting 5. Lack of working capital/cash flow
Pérez, Sánchez, & Carnicer (2002)	Human resources managers of Spanish companies	**Barriers to Telework Adoption** 1. Resistance to change job procedures 2. Little Telework knowledge 3. Computer and communication costs 4. Telework introduction costs 5. Managers resistance **Barriers to Telework Implementation** 1. Teleworks management 2. Work and job control 3. Customer direct contact 4. Labor activity management 5. Information security
Baddoo & Hall (2003)	Software practitioners	**De-motivators for Software Process Improvement (SPI)** 1. Time pressure/constraints 2. Inertia 3. Lack of resources 4. Commercial pressures 5. Lack of overall support 6. Budget constraints 7. Cumbersome processes 8. Lack of evidence of direct benefits 9. Negative/bad experience 10. Inadequate communication

Evaluations of Information Technology (IT) Applications

Driven by user demand for computing resources and by inexpensive hardware and easy-to-use software, a wide selection of technology applications has become available for individual users. The Internet, particularly the World Wide Web, is rapidly providing people with access to information, products and services, and personal contacts. Business investment in computer technology and the number of computer-related jobs has increased dramatically over the last few years (Jones & Berry, 2000). Central to the growing recognition, as the world in which an organization exists becomes more fast-paced, communication technologies (e.g., electronic mail, audio and video conferencing system) have also become an integral part of the corporate culture in many organizations (McManus, Sankar, Carr, & Ford, 2002). Given the demonstrated significance of IT, it worth evaluating an extensive range of critical technology applications, based on perceptions of individual users who actually participate in technology acquisition and implementation. An evaluation process of selection of information technologies currently available in organizations enables company executives to more precisely identify individuals' technology needs, thus facilitating a better choice of hardware and software.

Prior studies conducted in the evaluation of information technology (IT) applications illustrated perceived importance of technology on the basis of its availability, preference, frequency, priority, and usefulness as perceived by individual users. Raymond (1985) evaluated information technology (IT) applications, which are currently adopted in small manufacturing firms (N=464), in terms of implementation rate. The most widely implemented IT application was accounts receivable (85.6%), followed by accounts payable (80.6%), general ledger (78.9%), billing (72.6%), payroll (71.3%), sales

analysis (68.5%), and inventory management (56.4%). Baker (1987) identified a total of 24 computer-based information processes and examined the usage of those processes in manufacturing firms and professional service firms. According to the study, all information processes except mass mailing systems, library/document management, and graphics occurred in a majority of the manufacturing firms. For the professional service firms, all information processes except order entry/processing, inventory control, and shipping/receiving were utilized in a majority of the businesses.

Grover and Goslar (1993) described the utilization of information technology (IT) applications, particularly telecommunications technologies, in business organizations. They divided the IT applications into three broad categories of technologies. Category 1 technologies included technologies that have been formally evaluated by most firms (>90%), have consequently have adopted (>80%), and have also been extensively implemented (>5.0). This category included relatively mature technologies, such as voice/data PBXs and FAX. Category 2 included technologies that have been formally evaluated by most firms (>90%), consequently adopted by most firms (>80%), and have been moderately implemented (3.0 to 4.0). Voice systems, LAN, WAN, E-mail, network management software, commercial database access, and interoganizational links were included in the grouping. Category 3 included technologies that have been formally evaluated by fewer firms (>40%), but relatively fewer have decided to adopt it, and have not been widely implemented (<3.0). According to the study, these included expensive, novel, or substitutable technologies, such as ISDN, videoconferencing, videotext, VANs, owned communication lines, and intelligent/mobile phones.

McLean, Kappelman, and Thompson (1993) identified a list of 27 technology applications used by the members of Grocery Manufacturers of America (GMA). The top 14 technology application areas were identified in terms of the percentage of responding firms most often associated with such activities as desk-top computing, office automation, and personal support. These applications included spreadsheets, graphics, word processing, report generation, e-mail, decision support systems, local area networks (LANs), local database, external database, calendaring, executive information systems, voice mail, FAX, and computer-aided design and manufacturing (CAD/CAM).

Premkumar and Roberts (1999) determined the level of information technology use, particularly communication technology and software application, in small businesses in rural communities. According to the results, fax was the most prevalent communication technology (93.6%), followed by direct on-line access to computers (71.8%), email (41.0%), and electronic data interchange (EDI) system (32.1%). As for the software applications, word processing package (96.2%) and accounting system (96.2%) was the most frequently used application, followed by database management system (85.9%), customer billing systems (84.6%), and spreadsheet package (84.6%) in the context of small businesses.

As for the technology adoption and implementation in hospitality industry, Siguaw, Enz, and Namasivayam (2000) examined the utilization of information technology (IT) for guest services in all hotel sectors, ranging from deluxe to budget properties. The single most frequently used technological innovation was participation in an interactive Web site for reservation via Internet (77.4%). In addition, email system (69.5%), in-room modems (56.1%), voice mail system (45.8%), and interactive television

guide (20.1%) followed in frequency. Breiter and Hoart (2000) explored the utilization of information technology systems of commercial foodservice establishments, such as full service, limited service (i.e., fast food), and cafeteria units. According to the study, the top seven technology systems implemented by them were payroll (81.8%), daily record keeping (79.5%), Point of Sale (POS) (70.5%), accounts payable (67.0%), inventory management (65.9%), purchasing (54.6%), and recipe management (47.7%).

Comparative Analysis of Technology Applications

Comparative studies related to the adoption and use of information technology (IT) applications identified several important factors that influence the behavioral intention to adopt new technological innovations. They are different cultural background, gender, type of business, location of business, organizational characteristics, and so forth. As for the multi-cultural comparison, Jones and Berry (2000) examined perceived differences between U.S. and Taiwanese students in familiarity with and use of various types of 18 information technology applications. Findings indicated that U.S. students use the majority of the applications as much or more often than Taiwanese students and U.S. students use PCs in general more often than their Taiwanese counterparts. The study also indicated that neither group of students were very familiar with emerging information technologies, such as multimedia, communication packages, Internet, desktop publishing, statistical packages, and CD ROM.

Cobanoglu, Corbaci, and Ryan (2001) listed a total of 35 technology applications used in 516 lodging properties in the United States and Turkey. The 10 most frequently utilized technologies in lodging properties in the United States were computers for

managers, an automatic wake-up system, word processing software, a central reservation system, guest history software, spreadsheet software, a property management system, e-mail, interactive TV, and a global reservation system. According to the study, the 10 most frequent technologies utilized in lodging properties in Turkey were computers for managers, a satellite dish, word processing software, a PBX phone system, a fax machine, an accounting-front office interface, spreadsheet software, presentation software, fire, heat, smoke alarms, and a property management system.

Finally, Cobanoglu (2001) determined the importance of disruptive and sustaining technology applications in hotel selection by business travelers. He categorized the technology factor, one of the identified factors of hotel selection, into those two types of technology, disruptive and sustaining technology. For instance, disruptive technologies included video conferencing capabilities, Web TV, wireless Internet access, in-room fax machine, on-line reservation capability, and so forth. Sustaining technologies consisted of express check-in/out system, remote control TV, voice mail system, high speed Internet access, electronic key cards, and so forth. According to the results of the study, there was a significant difference between those two types of technology: the overall mean for disruptive technologies was 2.51, while the overall mean for sustaining technologies was 3.75. Based on the comparisons of Importance-Performance Analysis (IPA) grids, the study also reported there were similar perceptions of those technologies between male and female respondents.

The Overview of College and University Foodservice Segment

The segment of college and university foodservices was originated from Harvard University, established in 1638, counterparts of the university were at Oxford and Cambridge in the United States. As a part of administrative responsibilities, residence halls with dining rooms were offered to all students (McCool et al., 1994). By the time of the American Revolution, ten universities existed in the various colonies, such as William & Mary University, Yale University, and Princeton University, established in 1693, 1701, and 1746, respectively. These educational institutions all had some form of foodservice for both students and faculty (Warner, 1994).

At early educational institutions, the overall quality of their meal and residence hall provisions was very low and did not meet with students' expectations. As a result of urbanization and industrialization in the 20th century and an increasing number of university enrollments, on-campus foodservice programs began to diversify and become more sophisticated (Food Management, 1997). Furthermore, in the early 1990s, institutions came to recognize a responsibility for the physical and social well-being of the students. After World War II, traditional table service was replaced by the speedy informal self-service and the efficient cafeteria-style dining in most residence halls, resulting from the influx of older students into colleges and universities (McCool et al., 1994).

Meanwhile, the foodservice segment has evolved into an integral part of higher education to assure students' campus dining experiences and nutritional concerns during past several decades. In the 1960's and 1970's, computers and technology had just been introduced and developed with creative facilities and services in operations. Most

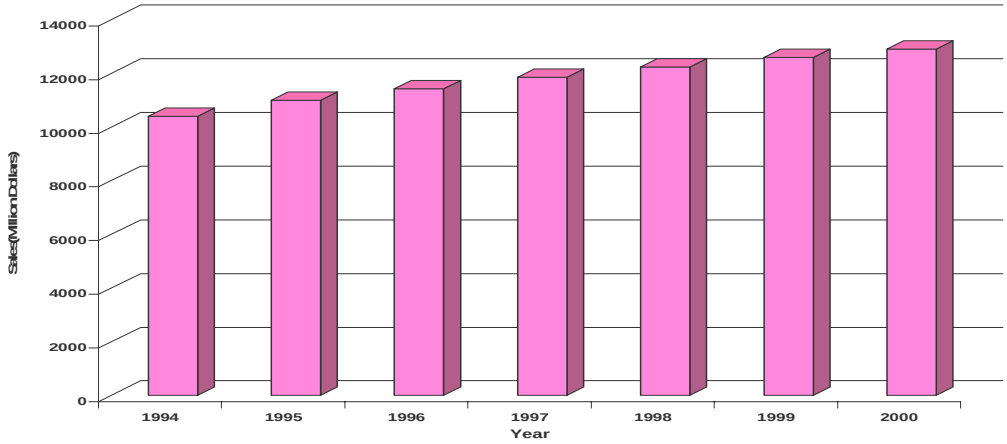
foodservices were expected to generate revenues and profits for their institutions by offering sophisticated catering services in the 1980's. As students' preferences and tastes rapidly changed with increased mobility of student populations, more aggressive efforts of promotion and marketing were prevalent in the 1990's (Food Management, 1997).

The college and university foodservice segment has been continually growing throughout the past decade and will continue to change into the 2000s. As a primary customer group, there are more than 4,000 two-and four-year institutions of higher education in the United States, educating approximately 15 million students (The Chronicle of Higher Education's 2002 Almanac, 2002). In the next 10 years, colleges and universities will see a better than 19% increase in full-time enrollment and a 20% increase for part-time enrollment (Matsumoto, 2001). The segment of the foodservice industry is of considerable size and represented $ 9.252 billion of the total foodservice industry sales in 2001, showing 2.5% of nominal growth from 2000 to 2001. The market segment has represented approximately 10% share of total noncocommerical foodservice industry (Matsumoto, 2001).

For the college and university foodservice market in 2003, "Technic" forecasted a nominal increase of 2.5%, while the "National Restaurant Association" forecasted 7.0% for contracted operations and 0.7% for self-operated units (Buzalka, 2003). In addition, the Department of Agriculture reported that the sales of colleges and university foodservices have been constantly increased from 1994 to 2000 as a key noncommercial segment (See Figure 1).

FIGURE 1

Foodservice Sales by Colleges and Universities, 1994-2000



Source: Agricultural Statistics, Department of Agriculture, 2002, p. XIII-10.

The college and university foodservice segment has been developed from an era of hostels and home-cooked meals to current convenience-focused services, such as in-dorm delivery and 24-hour operating shops. (Food Management, 1997). A greater need for the evolution of the foodservice segment came from new philosophy about the role of the segment in higher education and new understanding of students' demographics and their demands related to the rapidly changing students' needs, expectations, and preferences. Faced with those challenges, it is necessary for the college and university foodservice administrators to shape their future businesses to keep up with the needs and issues newly emerging in the industry. The results of such efforts can enhance experiences for students by enriching the quality of services offered in the institution.

Several previous studies suggested some future trends and challenges highlighted in the college and university foodservices. According to Hurst (1997), increased competition and restrictions on budget allocations have forced foodservice operators to

develop innovative ways to maintain profitability. Hurst (1997) indicated that outsourcing, privatization, branding and ethnic and healthy menu offerings are major trends shaping the future of college and university foodservices. Ayres and Partlow (1999) pointed out rapidly changing students' needs and expectations which have significantly affected this segment. Changes in their eating habits forced the initiation of expanded hours in foodservice operations and branding helped improve the image of university foodservices while increasing students' satisfaction and repeat patronage. Ryan (2000) stated that convenience and variety available at nontraditional hours and locations are leading motivators in students' use of the campus dining services today. He focused on forecasting continued changes to accommodate students' diverse needs, such as voluntary meal plans, value packaging for food and services, elimination of traditional board plans, and more opportunities for dining with friends.

According to the study of Watkins (2000) based on discussions with NACUFS experts, several future trends for campus foodservice were derived: 1) demographic shifts; 2) more takeout and delivery; 3) food emporiums (e.g., c-stores); 4) more dedicated campus conference centers; and 5) greater focus on student life. Matsumoto (2001) presented some future trends to keep campus dining operations constantly evolving for the increasing number of students. It included more restaurant partnerships, finish-to-order food from market-place-style services, extended operating hours, more points of service, more grab-and-go options, and increased use of debit and credit cards. Buzalka (2003) recommended six trends to watch in higher education: 1) "organic" growth; 2) meal plan flexibility; 3) "retailization" of board dining halls; 4) cocooning continues; 5) library foodservice; and 6) beyond the kid stuff.

CHAPTER III

METHODOLOGY

The purposes of this study are to investigate the overall perceptions of college and university foodservice administrators regarding information technology (IT) currently used in their foodservice operations and to explore the behavioral intentions to adopt new information technology applications in the future. This chapter was developed to identify and explain the research methodology used to accomplish the purpose of the study. The specific areas that will be presented are research design, population, instrument, validity and reliability, data collection techniques, and data analysis techniques.

Research Design

Planning and development for the study began in the fall of 2002 and continued through August 2003. During that time, a review of literature was conducted and data collection procedures were determined. A descriptive cross-sectional questionnaire survey was formulated and data analysis techniques were selected. Since the expected outcome of this study is to recommend a final course of action for foodservice administrators when adopting new information technology (IT) applications, priority has given to finding facts and consequences of their general perceptions towards technology.

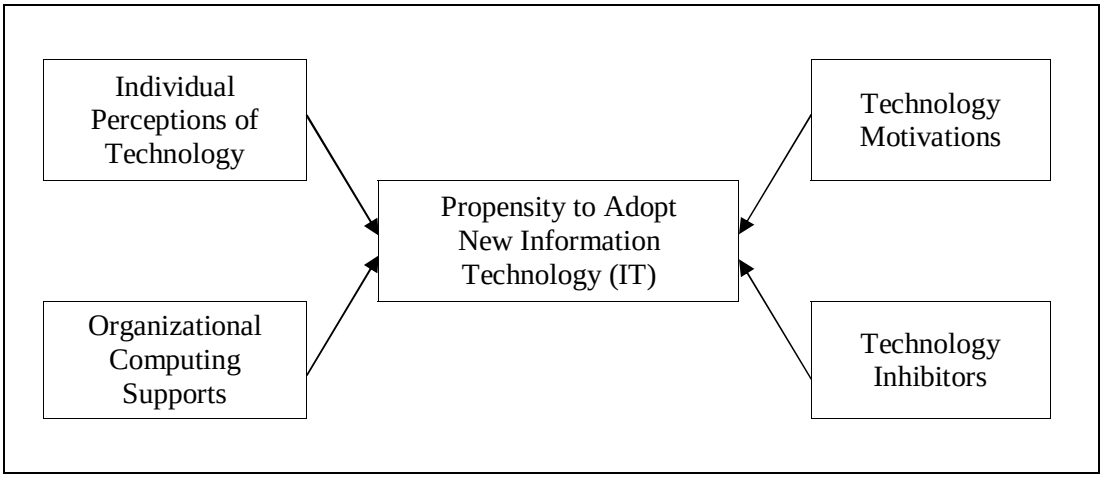
Accordingly, a quantitative approach was utilized in the study because there is a need to determine certain facts and correlations between those facts.

Research Model

The following figure is a conceptualization of the research model encompassing the influences of college and university foodservice administrators' individual perceptions of technology, perceived organizational computing supports, technology motivations, and technology inhibitors on the intention of new information technology adoption at work.

FIGURE 2

Research Model



Population

The population for the study was the voting delegates of the National Association of College and University Food Services (NACUFS) as of December 2003. NACUFS is a

volunteer professional association which represents independently operated college and university foodservices. The voting delegates are the individuals in the foodservice operations who would normally have responsibility for single and multi-unit managers. Their positions encompassed various types of administrative roles as director, assistant director, foodservice manager, purchasing manager, and so forth. The study was a census, including the population of current voting delegates that make up the population, that is, a total enumeration rather than a sample (Zikmund, 1999). The population was identified by the NACUFS national office. The researcher obtained a complete spreadsheet-format list of names, positions, institutions, postal mailing addresses, and e-mail address of the voting delegates from the national office. The population for this study consisted of six-hundreds-thirty-nine NACUFS voting delegates (N=639).

Instrument

This study used a self-administered questionnaire, which consisted of nine sections (Appendix B). The relevant literature and survey instruments developed by past researchers and a small group interview provided the basis for developing the questionnaire for this study. To ensure the practicability, clarity, reliability, and comprehensiveness of the questionnaire, a pilot study (N=20) of this questionnaire was conducted among university dining managers, staff members, and graduate assistants, in Residential Life, at Oklahoma State University. In addition, to detect potential bias in the instructions or contents of the instrument, it was distributed to faculty members and doctoral students (N=8), who specialized in the areas of statistics, quantitative research methods, hospitality management, foodservice, and management information systems

(MIS). Participants in the pilot study indicated that the questionnaire was long. Revisions to the questionnaire were made based on recommendations from the pilot study. The number of information technology attributes was reduced to 29 from 36 by combining some attributes together and removing some attributes that were not relevant in college and university foodservice operations. In addition, items of demographic profile associated with respondent's marital status and total household annual income were excluded in this study.

The survey was organized into nine sections. The first section of the questionnaire was about respondents' institution profile. It included NACUFS membership classification as of 2003, type of institution, location of institution, total average annual foodservice revenue, and total enrollment in the institution.

The second section consisted of questions related to individual perceptions of information technology innovations which might influence their desire to adopt new technology in the future. The individual-level factors included perceived awareness toward technological innovations, perceived innovativeness, perceived compatibility, and perceived voluntariness in the acceptance of new information technology. The measurement of perceived awareness was adapted from Agarwal & Prasad (1998a). There were three items used for this construct to measure positive attitudes toward an innovation. Perceived innovativeness was measured with four items adapted from Agarwal & Prasad (1998b) to ask subjects to indicate the willingness of an individual to try out any new information technology. The measurement of perceived compatibility and perceived voluntariness was adapted from the scale of Moore & Benbasat (1991), which was designed to measure the perceptions of adopting an information technology

(IT) innovation. For perceived compatibility, respondents were asked to indicate the extent to which they agreed with statements related to the perceptions of innovation being compatible with their existing work behavior. In order to measure perceived voluntariness, subjects were asked about their perceptions of innovation use being voluntary. A five-point Likert scale response format (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree) was used for this section.

The third section of the questionnaire was about organizational computing support. The organization-level factors included top management support, internal computing support, and external computing support. Top management support was measured with four items adapted from Igbaria (1990). Respondents were asked whether they agreed or disagreed that top management encouraged and allocated adequate resources to create a favorable computing environment. Internal computing support was operationalized using a scale adapted from Igbaria, Zinatelli, Cragg, & Cavaye (1997). The construct of internal computing support consisted of four items that measured the availability of technical assistance and specialized instructions to users within an organization. Items to measure external computing support were adapted from Premkumar & Roberts (1999). External computing support was measured with five items asking respondents to indicate how they felt whether there was adequate vendor or third party support in adopting new technology. A five-point, Likert-type scale was used for all of the measurement scale items, with anchors ranging from strongly disagree (1) to strongly agree (5).

The fourth section of the questionnaire consisted of 24 motivational factors, which might influence university foodservice administrators' desire to adopt new information technology in their workplace. The motivation attributes were based on and

derived from the studies of Baker, (1987), Cragg & King (1993), Farhoomand & Hrycyk (1985), King & Teo (1996), McManus et al. (2002), Malone, (1985), Premkumar et al. (1994), Rivers and Dart (1999), and Stock and McDermott (2001). All items were measured through the use of a five-point Likert-type scale ranging from strongly disagree (1) to strongly agree (5).

The fifth section of the instrument for this study was a collection of 24 inhibiting factors which might limit university foodservice administrators' desire to adopt job-related new information technology applications at work. To create a list of inhibiting factors, previous studies related to attitudes toward technology acquisition and implementation were carefully reviewed. The inhibiting attributes discussed by Baddoo & Hall (2003), Baker (1987), Cragg & King (1993), Eggers, Villani, & Andrews (2000), King & Teo (1996), Pérez, Sánchez, & Carnicer (2002), and Van Hoof & Combrink (1998) were referenced. In order to reflect some specific characteristics of technology use in noncommercial foodservice operations, previous studies that had been conducted, particularly in the college and university foodservice setting, such as Garand & McCool (1985), Miller (1989), and O'Hearn (1998), were also referenced. A five-point, Likert-type scale was used for all of the measurement scale items, with anchors ranging from strongly disagree (1) to strongly agree (5).

The sixth section of the questionnaire listed 29 information technology (IT) applications, which are currently adopted in college and university foodservice operations. In this section, participants were asked to evaluate the perceived importance of the 29 technology application attributes, and were also required to rate the satisfaction level of the same 29 technology applications. The information technology attributes were

carefully selected, based on previous studies (e.g., Garand & McCool, 1985; Grover & Goslar, 1993; Jones & Berry, 2000; McLean, et al., 1993; Miller, 1989; O'Hearn, 1989). Each technology attribute was rated using a five-point Likert scale, ranging from "not at all important (1)" to "very important (5)" in the importance section. Similarly, each attribute was evaluated from "not at all satisfied (1)" to "very satisfied (5)" in the satisfaction section.

The seventh section reflected participants' general attitudes toward technology use and adoption with five indicators developed by the researcher. It included (1) overall satisfaction level with information technology currently adopted in their organizations, (2) perceived satisfaction level with information technology for job-related tasks (3) behavioral intentions to adopt new information technology at work, (4) likelihood of increasing use of new information technology at work, and (5) likelihood of participating in technology learning programs.

The eighth section consisted of questions related to general technology-related behavior, including past experience with computers and the Internet, computer and Internet use at home, technology use at work and while traveling, past technology learning opportunities, perceived level of technology expertise, and perceived importance of technology in campus dining operations.

The final section of the survey consisted of demographic questions that dealt with gender, age, race/ethnicity, highest degree earned, current position, total current annual income, total experiences of working in college and university foodservices, total experiences of presently working in college and university foodservices, and the number of separate foodservice facilities managed by a respondent.

Validity and Reliability

Validity is the extent to which a scale or set of measures accurately represents the concept of interest (Hair, Anderson, Tatham, & Black, 1998, p.118). It is primarily concerned with the accuracy of a measure. Any measurement instrument that accurately measures what it was intended to measure may be considered as valid. More specifically, a measurement is valid when it measures what it is supposed to measure and performs the functions that it purports to perform. Validity refers to the relationship between a concept and its indicators. Two validity checks were performed: content and construct validity.

Content Validity

Content validity is the extent to which items on a scale are representative of the domain of interest. If a measurement instrument adequately covers most aspects of the construct that is being measured, it has content validity (Churchill, 1996). It is directly related to the subjective agreement among professionals that a scale logically appears to accurately reflect what it purports to measure (Zikmund, 2003, p.332). According to Churchill (1996), the key to content validity lies in the procedures that are used to develop an instrument. One way would be to search the literature and see how other researchers defined and investigated the concept (Gay & Airasian, 2000). In order to ensure the content validity of the questionnaire, in-depth reviews of literature in the areas of individual perceptions of technology, organizational computing supports, technology motivations, and technology inhibitors were conducted to determine the attributes for the instrument. After this stage, the researcher may add and delete some items from the previous instrument.

A small group focus interview was also conducted to learn more about college and university foodservice administrators' perceptions of technological innovations. The focus group consisted of local university dining managers (N=5). The purpose of this interview was to identify critical factors (i.e., individual perceptions of technology, organizational computing supports, technology motivations, and technology inhibitors) which affect the behavioral intentions to adopt new information technology applications in the context of college and university foodservices. In addition, a pilot study (N=20) of this questionnaire was conducted among local university dining managers, staff members, and graduate assistants, to test the usefulness and clarity of the questionnaires. Pilot participants pointed out that the instrument was long and some items were ambiguous in wording. Revisions of the questionnaire were made based on the recommendations of the pilot testers. As a result, a panel of experts who were campus dining professionals in the local community verified the instrument to ensure the content validity of the questionnaire.

Construct Validity

Construct validity refers to the degree to which a study, test, or manipulation measures and/or manipulates what the researcher claims it does (Mitchell and Jolley, 2001). It is established by the degree to which the measure confirms a network of related hypotheses generated from a theory based on concepts (Zikmund, 2003, p.332). According to Mitchell and Jolley (2001), construct validity is important because it takes on a fundamental question: What does the measure really measure? They pointed out that researchers should be careful when leaping from the public, observable, physical world of

operational definitions to the private, unobservable, mental world of constructs. Each item in an instrument must reflect the construct and must also show a correlation with other items in the instrument. The instrument used in this study included operational variables that proved to be relative to the theoretical constructs of college and university foodservice administrators' technology-related behavior, attitude, and perception, which were developed by an in-depth analysis of pertinent literature and a focus group interview.

Reliability

Reliability is the degree to which a questionnaire measures whatever it is measuring (Gay & Airasian, 2000). It is an assessment of the degree of consistency between multiple measurements of a variable, and a commonly used measure of reliability is internal consistency, which applies to the consistency among the variables in a summated scale (Hair et al., 1998, p.118). They noted that the rationale for internal consistency is that the individual items or indicators of the scale should all be measuring the same construct and thus be highly intercorrelated (Hair et al., 1998, p.118). Internal consistency between the items in the measures was estimated using Cronbach's coefficient alpha.

A reliability analysis of Cronbach's alpha was performed to test the reliability and internal consistency of the individual perceptions of technology, organizational computing support, technology motivation, and technology inhibitor dimensions, which were obtained from an exploratory factor analysis. The results of the pilot test showed that the alpha coefficients of each dimension of the individual perceptions of technology, organizational computing support, technology motivation, and technology inhibitor dimensions were high, ranging from 0.72 to 0.91 (Nunnally & Bernstein, 1994).

Data Collection Techniques

The population of this study was the voting delegates currently listed in the official directory of the National Association of College and University Food Services (NACUFS) as of December 2003. By adopting a census as a form of data collection strategy it allowed the questionnaire to reach every member of the sample selected (N=639). Permission to conduct this study was obtained from the Oklahoma State University Institutional Review Board (IRB) (Appendix C).

This study employed mixed mode methodology where the surveys instruments were disseminated by e-mail/web-based forms and mail. The main reason one may want to use a mixed-mode method for surveys is that developing technologies may not be available for all members of a population, therefore, eliminating the chance for their being selected (Cobanoglu, 2001). Dillman (1999) claimed that with the development of the Internet, the biggest concern in using email or web-based surveys is that not all members of the population have access to email and to the World Wide Web. Past studies about comparisons of survey methodologies (e.g., Cobanoglu, Warde, & Moreo, 2001; Dillman, 1999; Dillman & Tarnai, 1988; Ranchhod & Zhou, 2001) indicated that the web-based survey methodology usually yields higher response rate and faster response as well as incurs lower cost, compared with personal interview, telephone, fax, and mail survey methods. Couper, Traugott, and Lamias (2001) indicated that visual elements, such as graphics, color, typography, and animation, have significant effects on respondents' answers, particular in the context of self-administered web survey.

A total of 568 questionnaires were electronically sent to respondents who had an email address after the removal of 71 entries that did not include an email address. An

email invitation including a hyperlink (http://fp.okstate.edu/cheshrad/nacufs.htm) (Appendix A) was sent to the respondents for the web-base survey. When participants clicked on the hyperlink on the email message, they were directed to the survey website. For respondents whose email addresses were not available on the list, a self-administered mail survey was employed to reach them using their postal addresses. A questionnaire for mail survey was created exactly in the same format as the web-based survey in order to obtain consistent responses from both surveys. Each participant received the same introduction, with detailed instructions on how to respond using either of the two methods. For web-based survey, two follow-up procedures were designed to ensure ample time to respond which increased the overall response rate. A follow up letter was electronically distributed to notify and encourage non-responding respondents to participate in the study. Since respondents who didn't have email addresses represented a relatively small proportion of the total population, follow up surveys were conducted only via the web-based method.

For the web-based survey, the initial questionnaire was sent out via email on December 4, 2003, and the first follow up survey and the second follow up survey was distributed using email on December 16, 2003 and January 29, 2004, respectively. Since there were no identifications on the returned email questionnaires, all respondents received a message in the letter, saying "if you have previously submitted a survey one within the last month, please disregard." For the mail survey, the survey was sent to the respondents by mail on December 11, 2003. There were no identity questions in the survey in order to protect the anonymity of the respondents.

This study employed a monetary incentive strategy to encourage the respondents to actively participate in the survey. The researcher indicated in questionnaire saying that "as a token of our appreciation for your participation in this study, we will enter your name in a drawing for three cash prizes ($40/$30/$25)." The researcher entered 93 responses that had been returned from the initial web-based survey. A total of 81 respondents agreed to participate in the cash drawing and provided their names and email address for the purpose of this drawing. The main office of the National Association of College and University Food Services (NACUFS) sponsored this monetary incentive plan.

Data Analysis Techniques

The data analysis was organized into six parts, including descriptive and inferential statistics. Data was coded into and analyzed with The Statistical Packages for Social Sciences version 12.0 (SPSS, 2003).

The first part of the data analysis involved descriptive statistics to determine frequency distribution for a demographic profile of participants and institutions, individual perceptions of technology, organizational computing supports, technology motivations, technology inhibitors, and general technology-related behavior and opinions of respondents. Demographic data was tabulated using frequency and percentages. In order to describe the data, it included means and standard deviation of each variable.

Second, exploratory factor analysis with VARIMAX rotation was employed to identify the underlying dimensions of individual perceptions of technology, organizational computing supports, technology motivations, technology inhibitors, and technology applications currently used in the respondents' foodservice operations. The

primary objective of using factor analysis was to gain a better understanding of the underlying structure of the data (Pitt & Jeantrout, 1994). It also served to simplify subsequent analysis using a set of simplified composite factors or dimensions of attributes. It was used to construct a summated scale of the dimensions of individual perceptions of technology, perceived organizational computing support, technology motivation, and technology inhibitors for subsequent multiple regression and one-way analysis of variance (ANOVA) procedures. Based on mean ratings of section six of the survey, importance and satisfaction level of technology attributes, factor analysis was also conducted to reduce the data into underlying dimensions for subsequent gap analysis.

The most common and reliable criterion is the use of eigenvalues in extracting factors. All factors with eigenvalues greater than 1.0 were retained (Kaiser, 1974), because they account for at least the variance of a single variable. In addition, all items with a factor loading above 0.4 were included, whereas all items with factor loading lower than 0.4 were removed. The remaining items were factor analyzed again, using the principal component method with VARIMAX rotation procedure and any items with a factor loading less than 0.4 were eliminated. Cronbach's alpha was calculated to test the reliability of variables retained in each factor, and coefficients greater than or equal to 0.5 were considered acceptable and a good indication of construct reliability (Nunnally, 1967). In order to ensure the suitability of using factor analysis, the Kaiser-Meyer-Oklin (KMO) measure of Sampling Adequacy and the Bartlett test of Sphericity were performed.

The third part of data analysis involved conducting a gap analysis on the attributes of information technology applications in college and university foodservices. According

to prior studies (e.g., Chu & Choi, 2000; Oh, 2001; Qu & Tsang, 1998; Zhang & Chow, 2004), the purpose of gap analysis was to identify the differences between two measurements within one attribute. The analysis for this study was conducted to evaluate the technology attributes in terms of importance and satisfaction, as perceived by the respondents. Paired sample t-tests were used to compare the overall mean scores for perceived level of importance with the mean scores for the perceived level of satisfaction for the 29 technology attributes.

Fourth, Importance-Performance Analysis (IPA) with all 29 technology variables was utilized. Many analysts in the marketing research area have taken advantages of IP analysis since 1976 (Martilla & James, 1977). The underlying assumption of the IPA technique is that the customers' level of satisfaction with the attributes is mainly derived from their expectations and judgment of the product's or service's performance (Chu & Choi, 2000). The importance-performance grid serves to identify and classify attributes that affect the success or failure of a strategic plan (Go & Zhang, 1997). IPA has become a popular managerial tool that has been broadly used to identify the strengths and weaknesses of brands, products, services, and retail establishments (Chapman, 1993; Cheron, McTavish, & Perrien, 1989). Martilla and James (1977) noted that IPA can yield important insights into which aspects of the marketing mix a firm should devote more attention, as well as identify areas that may be consuming too many resources.

The importance-performance matrix is divided into four quadrants, distinguishing between low and high importance and between low and high performance (i.e., satisfaction). To complete the matrix, first, the two mean values of each variable concerning its importance and satisfaction level were calculated. Then, a vertical and a

horizontal line representing the overall means of importance and satisfaction level of those variables were produced on the matrix, dividing the matrix into four quadrants. Finally, each of attributes was located on the matrix as a form of point (See Figure 3).

FIGURE 3

Importance-Performance Analysis (IPA) Grid

IMPORTANCE		
	Quadrant I ***Concentrate Here*** High Importance Low Performance	Quadrant II ***Keep Up the Good Work*** High Importance High Performance
	Quadrant III ***Low Priority*** Low Importance Low Performance	Quadrant IV ***Possible Overkill*** Low Importance High Performance

PERFORMANCE

Quadrant I *Attributes are perceived to be very important to respondents, but performance levels are fairly low. This sends a direct message that improvement efforts should concentrate here.*

Quadrant II *Attributes are perceived to be very important to respondents, and at the same time, the organization seems to have high levels of performance on these activities. The message here is To Keep up the Good Work.*

Quadrant III *Attributes are with low importance and low performance. Although performance levels may be low in this cell, managers should not be overly concerned since the attributes in the sell is not perceived to be very important. Limited resources should be expended on this low priority cell.*

Quadrant IV *This cell contains attributes of low importance, but relatively high performance. Respondents are satisfied with the performance of the organizations, but managers should consider present efforts on the attributes of this cell as being over-utilized.*

Source: Chu & Choi (2000)

Fifth, the data analysis involved Multiple Regression Analysis to determine both individual and collective impact of college and university foodservice administrators' of individual perceptions of technology, perceived organizational computing supports,

technology motivations, and technology inhibitors on the likelihood of adopting new information technology applications at work. Since multiple independent variables were employed, Tolerance and Variance Inflation Factor (VIF) values were examined to check for multicollinearity. Tolerance values above 0.1 and VIF values below 10 indicate an absence of multicollinearity among the independent variables (Hair el al., 1998).

The final stage of the data analysis involved testing hypotheses based on factor analysis outcomes by using One-Way Analysis of Variance (ANOVA). The purpose of the analysis of variance was to determine whether college and university foodservice administrators differ on demographic profiles and behavioral characteristics as they related to the derived factors. Bonferroni multiple-range test was utilized to distinguish which of demographic and behavioral characteristics were significantly different among the derived factors of individual perceptions of technology, perceived organizational computing supports, technology motivations, and technology inhibitors.

CHAPTER IV

RESULTS AND DISCUSSIONS

This study investigated the importance and satisfaction of information technology currently adopted by college and university foodservice operations. Subsequently, it also examined factors that lead to the decision of adopting new information technology applications for job-related tasks in the future. This study attempted to report information that may be useful in planning and implementing the adoption of innovative technology applications in the college and university foodservice environment. The research questions for this study were:

1. How do college and university foodservice administrators perceive information technology applications currently adopted by college and university foodservice organizations?

2. What are the individual perceptions of technology that affect the adoption of new information technology by college and university foodservice administrators?

3. How do organizational computing supports influence the desire to adopt new information technology?

4. What are the motivational factors of college and university foodservice administrators when adopting new information technology?

5. What are the inhibiting factors college and university foodservice administrators face that de-motivate the intention to adopt new information technology?

6. Are there any significant differences in the dimensions of individual perceptions of technology, organizational computing supports, technology motivations, and technology inhibitors between college and university foodservice administrators with different demographic profiles and behavioral characteristics?

Response Rate

The population in the study was composed of voting delegates listed in the official directory of the National Association of College and University Food Services (NACUFS) (N=639). For respondents who had email addresses, they were invited to visit the web site (http://fp.okstate.edu/cheshrad/nacufs.htm) to compete the survey. For those who did not provide email addresses on the list, the questionnaire, which was created exactly in the same format as the web-based one, was sent to them by mail.

Table 5 provides a summary of the response rate. For the web-based survey, the initial questionnaire was sent via electronic mail on December 4, 2004. After the initial survey, the first follow-up survey was sent on December 16, 2003. In order to ensure ample time for response and to increase the overall response rate, a second follow-up survey was sent on January 29, 2004. For the mail survey, the questionnaire was sent to the respondents via U.S. mail service on December 11.

A total of 639 surveys were distributed to the voting delegates of the National Association of College and University Food Services (NACUFS). Of this, 568 surveys were sent via email and asked to visit the website (http://fp.okstate.edu/cheshrad/nacufs.htm) and 71 surveys were sent via postal mail. Table 5 shows raw and adjusted response rates for both survey methodologies. Of the 568 surveys sent via email, 117 (20.6%) were undeliverable due to wrong email addresses or a system blocker, there were no returned mail surveys to the researcher. For the web-based methodology, the blocker did not allow the intended recipients to receive emails from outside their institution. This yielded an effective response of 451 for the web-based survey method and 71 for the mail survey method. This resulted a 36.3% raw response

rate and 45.7% net effective response rate for the web-based method, and a 21.1% raw response rate and net effective response rate for the mail survey method. Of those returned, there were a total of 12 unusable surveys, blank and partially completed, from the web-based method, while 2 surveys were unusable from the mail method. Those unusable responses were eliminated before data analysis. This yielded 194 (43.0%) surveys for the web-based method and 13 (18.3%) surveys for the mail method, for a total of 207 (39.7%) usable responses. Overall, this study had a total response rate of 32.4% (n=207) responses combined from both survey methods.

TABLE 5

Response Rate

	Web-based survey	**Mail survey**	**Total**
Total number of surveys	568	71	639
Number not deliverable	117	0	117
Percent not deliverable[1]	20.6%	0%	18.3%
Effective response[2]	451	71	522
Surveys returned	206	15	221
Raw response rate[3]	36.3%	21.1%	34.6%
Net effective response rate[4]	45.7%	21.1.%	42.3%
Number unusable	12	2	14
Net number usable	194	13	207
Usable response rate[5]	43.0%	18.3%	39.7%
Net response rate[6]	34.2%	18.3%	32.4%

Notes 1: Number of not deliverable/ Total number of surveys
2: Total number of surveys-Number not deliverable
3: Surveys returned/ Total number of surveys
4: Surveys returned/ Effective size
5: Net number usable/ Effective size
6: Net number usable/ Total number of surveys

Profile of Respondents

In order to describe the respondents' profile, five types of information, respondents' demographic profiles, their institution profiles, their technology behavior, their technology usage, and their past technology learning opportunities were discussed.

Demographic Profile of Respondents

Table 6 provides a summary of the respondents' demographic profile. Of the respondents 59% were male, while 41% were female. The main age group was 40-49, representing 44.9% of the respondents. The majority of the respondents were Caucasian/Euro American (88.3%). The remaining ethnicity groups only accounted for a minority of respondents, Asian/Pacific Islander (4.9%), Hispanic (2.9%), American Indian/Alaskan Native (2.9%), and African American (1.0%). More than half of the respondents had a bachelor's degree, accounting for 52.7% of the total respondents, while master's degree holders represented 24.9% accounting for the second highest percentage. The majority of the respondents were directors/general managers (77.3%). The most frequent level of current annual income for a college and university foodservice administrator is $70,000 or more (52.2%), followed by $60,000 to $69,999 (16.8%). As for the total years of experience working in college and university foodservices, respondents with above 20 years of experience (37.7%) dominated the population. Approximately 33% of the respondents had less than 5 years of working experience in their current foodservice operations followed by 25.6% with 5-10 years at their current institutions. Finally, as many as 44.1% and 35.1% of the respondents managed less than 5 and 5-10 separate foodservice units in their campus dining operations, respectively.

TABLE 6

Demographic Profile of Respondents

	F	Valid %		F	Valid %
Gender			**Age**		
Male	115	59.0	Under 30	0	0.0
Female	80	41.0	30-39	26	12.6
			40-49	93	44.9
			50-59	77	37.2
			60 and above	11	5.3
Ethnicity			**Education**		
Caucasian/ Euro American	181	88.3	High school diploma/ GED	14	6.8
African American	2	1.0	Associate degree	24	11.7
Hispanic	6	2.9	Bachelor's degree	108	52.7
Asian/Pacific Islander	10	4.9	Master's degree	51	24.9
American Indian/ Alaskan Native	6	2.9	Educational specialist/ Doctoral degree	8	3.9
Current Position			**Current Annual Income**		
Director	160	77.3	Under $40,000	10	4.9
Assistant director	8	3.9	$40,000-$49,999	24	11.8
Foodservice manager	7	3.3	$50,000-$59,999	29	14.3
Purchasing manager	2	1.0	$60,000-$69,999	34	16.8
Production manager	4	1.9	$70,000 or more	106	52.2
Other	26	12.6			
Experience in College & University Foodservice[1]			**Experience in Current Foodservice Operation**[2]		
Less than 5 years	33	15.9	Less than 5 years	69	33.3
5-10 years	35	16.9	5-10 years	53	25.6
11-15 years	29	14.0	11-15 years	39	18.9
16-20 years	32	15.5	16-20 years	18	8.7
Above 20 years	78	37.7	Above 20 years	28	13.5
Number of Managing Foodservice Units[3]					
Less than 5 units	89	44.1			
5-10 units	71	35.1			
11-15 units	18	8.9			
16-20 units	14	6.9			
Above 20 units	10	5.0			

Note: n=207; Valid % - Based only on the cases who actually answered a question

[1]Mean=16.3 (years), [2]Mean= 10.2 (years), [3]Mean= 7.5 (units)

Demographic Profile of Respondents' Institutions

Table 7 shows the profile of the institution the respondents worked at. The values in the table indicate that the respondents were fairly distributed across various institution type, institution location, NACUFS membership classification, total annual foodservice revenue, and total enrollment. Approximately 79% of the institutions were public (78.5%), while 21.5% of the institutions were private. The most frequent location of colleges and universities reported by the respondents was urban (38.5%). Those with institutions located in rural area represented 33.2% of the total institutions, while 28.3% were located in suburban area. The institution's membership classification in NACUFS as of 2003 was evenly distributed among all categories. The largest group was the Midwest, representing 24.6% of the respondents. The next three groups were Southern (22.7%), Northeast (15.0%), and Pacific (13.5%). There was a wide distribution of institutions ranging from relatively small institutions (10.2%) with self-reported total annual foodservice revenue up to $500,000 to large institutions (30.2%) having over the annual foodservice revenue of $10,000,000. Regarding the total enrollment of the institutions, 42.2% of the institutions had more than 10,000 students. As many as 18.4% and 14.6% of the participating institutions had 2,001 to 4,000 students and up to 2,000 students, respectively.

To determine how well the participating institutions represent the population, a demographic statistics of all listed institutions obtained from the NACUFS national office and the profiles of institutions in the study were statistically compared. As desired, the participating institutions and the population of institutions do not differ significantly in terms of type of institution (χ^2=0.544, p=0.498) and total enrollment (t=0.430, p=0.667).

TABLE 7

Demographic Profile of Respondents' Institutions

	F	Valid %
Type of Institution		
Public	161	78.5
Private	44	21.5
NACUFS Membership Classification		
Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, Provinces of New Brunswick, Nova Scotia, Prince Edward Island, Ontario, and Quebec)	31	15.0
Mid-Atlantic (Delaware, District of Columbia, Maryland, New Jersey, Pennsylvania, Virginia, and West Virginia)	23	11.1
Southern (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, New Mexico, North Carolina , Oklahoma, South Carolina, Tennessee, Texas, Puerto Rico, and Virgin Islands)	47	22.7
Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, Ohio, and Wisconsin)	51	24.6
Continental (Colorado, Idaho, Minnesota, Montana, North Dakota, South Dakota, Utah, Wyoming, Provinces of Alberta, Manitoba, and Saskatchewan)	27	13.1
Pacific (Alaska, Arizona, California, Hawaii, Nevada, Oregon, Washington, Province of British Columbia, Australia, China, Fiji, Mexico, New Zealand, and Taiwan)	28	13.5
Location of Institution		
Urban	79	38.5
Suburban	58	28.3
Rural	68	33.2
Total Annual Foodservice Revenue		
Up to $500,000	21	10.2
$500,001-$1,000,000	15	7.4
$1,000,001-$2,000,000	27	13.1
$2,000,001-$3,000,000	16	7.8
$3,000,001-$4,000,000	8	3.9
$4,000,001-$5,000,000	6	3.0
$5,000,001-$6,000,000	14	6.8
$6,000,001-$7,000,000	14	6.8
$7,000,001-$10,000,000	22	10.8
Above $10,000,000	62	30.2
Total Enrollment[1]		
Up to 2,000	27	14.6
2,001-4,000	34	18.4
4,001-6,000	15	8.1
6,001-8,000	23	12.4
8,001-10,000	8	4.3
Above 10,000	78	42.2

Note: n=207; Valid % - Based only on the cases who actually answered a question

[1]Mean=11,930 (students)

Technology Behavior of Respondents

The description of general characteristics regarding technology usages and perceptions at work and at home is shown in Table 8. As for the total years using a computer at work, the 11-15 years category was dominant, accounting for (33.8%), followed by 16-20 years (30.0%) and 5-10 years (22.7%). Approximately 76% of the respondents had the total years of having an Internet access at work 5 to 10 years (75.8%). Most of the respondents used a computer (94.7%) and the Internet (87.9%) at home. Approximately 55% of respondents indicated that they had an average level of computer and Internet expertise (54.9%). More than half of the foodservice professionals (53.9%) reported that computer and Internet is very important in today's dining operations.

TABLE 8

Characteristics of Respondents' General Technology Behavior

	F	Valid %		F	Valid %
Experience of Using Computer at Work[1]			**Experience of Using Internet at Work**[2]		
Less than 5 years	2	1.0	Less than 5 years	18	8.7
5-10 years	47	22.7	5-10 years	157	75.8
11-15 years	70	33.8	11-15 years	24	11.6
16-20 years	62	30.0	16-20 years	8	3.9
Above 20 years	26	12.5	Above 20 years	0	0
Use Computer at Home			**Use Internet at Home**		
Yes	196	94.7	Yes	182	87.9
No	11	5.3	No	25	12.1
Self-rated Computer/ Internet Expertise[3]			**Perceived Importance of Computer/Internet**[4]		
Low	2	1.0	Not at all	0	0
Below average	27	13.4	Slightly important	0	0
Average	111	54.9	Moderately important	28	13.9
Above average	56	27.7	Very important	109	53.9
High	6	3.0	Extremely important	65	32.2

Note: n=207; Valid % - Based only on the cases who actually answered a question
[1]Mean=15.5 (years), [2]Mean= 8.5 (years), [3]Mean= 3.2, [4]Mean=4.2

Technology Usage at Home and while Traveling

Table 9 shows descriptive statistics for the availability of methods to access work-related software programs at home and while traveling for the respondents. Most of the college and university foodservice administrators used Internet and email (82.6%) and floppy disc, CD-ROM, and local hard drive (82.6%) to access work-related computer software at home. More than half of the respondents (58.7%) were not using laptop computers at home, while more than half of the respondents (52.2%) used a laptop computer while traveling for their technology needs. Most of the respondents did not utilize user support facilities or information centers outside their workplace, such as Internet café, business center, or public libraries, neither at home (87.9%) or while traveling (73.4%) to access task-related information outside the workplace. The majority of respondents used a PDA and cellular phone both at home (76.1%) and while traveling (77.4%) for their communication needs.

TABLE 9

Availability of Methods to Access Work-related Software Programs

Methods	**At home**		**While traveling**	
	Yes	**No**	**Yes**	**No**
	F (Valid %)	F (Valid %)	F (Valid %)	F (Valid %)
Internet/Email	171 (82.6)	36 (17.4)	126 (61.5)	79 (38.5)
Floppy disc/ CD-ROM/ Local hard drive	171 (82.6)	36 (17.4)	101 (49.3)	104 (50.7)
Laptop	83 (41.3)	118 (58.7)	107 (52.2)	98 (47.8)
PDA/Cellular phone	156 (76.1)	49 (23.9)	154 (77.4)	45 (22.6)
Internet café/Business center/ Library	24 (12.1)	174 (87.9)	54 (26.6)	149 (73.4)

Note: n=207; Valid % - Based only on the cases who actually answered a question

Technology Learning Opportunities

Table 10 shows the descriptive statistics for technology learning opportunities respondents previously experienced. There is an approximate equal distribution of respondents who experienced (52.2%) and did not experience (47.8%) technology learning chances through formal courses at a college or university. Most of the respondents received technology learning opportunities from self-study or self-taught (89.9%), in-house company course (83.1%), and fellow workers (74.4%). Approximately 35% of the respondents had some prior technology learning opportunities from their supervisors (34.8%) in the workplace, while 65.2% of them did not. Nearly 77% of the participating college and university foodservice administrators did not receive any opportunities to learn about technology using a distance learning (e.g., on-line learning) system via Internet or other communication technologies.

TABLE 10

Availability of Technology Learning Opportunities

Technology Learning Opportunities	**Yes**	**No**
	F (Valid %)	F (Valid %)
Formal course(s) at a college or university	108 (52.2)	99 (47.8)
Vendors or outside consultants/organizations	133 (64.3)	74 (35.7)
In-house company course (On-the-job training)	172 (83.1)	35 (16.9)
Supervisors	72 (34.8)	135 (65.2)
Fellow workers	154 (74.4)	53 (25.6)
Self-study: self-taught	186 (89.9)	21 (10.1)
Distance (on-line) learning	48 (23.2)	159 (76.8)

Note: n=207; Valid % - Based only on the cases who actually answered a question

Perceived Importance and Satisfaction Level of Information Technology Applications

In order to address the perceived importance and satisfaction level of the technology attributes by college and university foodservice administrators, the means and standard deviation were calculated. Items of the administrators' evaluations based on satisfaction level were factor analyzed using principal component analysis with orthogonal VARIMAX rotation, to delineate the underlying dimensions. Items with factor loadings of 0.40 or higher were clustered together to form constructs, as recommended by Hair et al. (1998). A reliability alpha (Cronbach's alpha) was computed to check the internal consistency of items with each dimension. The Correlation Matrix, Bartlett's Test of Sphericity, and Measure of Sampling Adequacy were used to assess the appropriateness of applying a factor analysis.

Then, based on the identified factor groupings, two-tail paired sample *t* tests were undertaken to examine any significant differences between the importance level and satisfaction level of those technology attributes. A positive *t* score indicated that the importance rating for that particular attribute was higher than the satisfaction rating. Similarly, a negative *t* score indicated that the satisfaction score for the attribute was higher than the importance rating. Finally, the mean scores of the 29 IT attributes were plotted on the IPA grid according to their perceived importance and the satisfaction levels. Cross-hairs (vertical and horizontal lines), using mean values of the perceived importance and performance parts of the same 29 technology attributes, were generated to separate those attributes into four identifiable quadrants.

Perceived Importance of Information Technology Attributes

The results presented on Table 11 are based on the rankings of mean scores. All 29 technology attributes currently adopted in the college and university foodservice operations had a mean score higher than 3.0, ranging from 3.36 to 4.95. The standard deviations of those attributes ranged from 0.23 to 1.13 and did not show a large variation of the opinion among the respondents. The top three most important attributes were "email" (4.95), "personal computer" (4.90), and "order entry/ point-of-sale (POS)" (4.75), indicating the importance of these attributes. "Personal digital assistant (PDA)" (3.36), "ingredient room issues software" (3.53), and "statistical analysis package" (3.73) were perceived as the least important attributes.

Perceived Satisfaction of Information Technology Attributes

The mean ratings of the perceived satisfaction level of the same technology attributes were also calculated. The survey results were shown on Table 7, based on the rankings of mean scores. It was shown that the mean scores for all 29 technology attributes, which are currently adopted in the college and university foodservices, ranged from the highest of 4.51 to the lowest of 2.91. The range of the standard deviation of the technology attributes was from 0.62 to 1.30. Participating college and university foodservice administrators gave the top ratings to "personal computer" (4.51), "email" (4.43), and "Internet/ Web browser" (4.36). In contrast, the three lowest ratings by the foodservice professionals were give to "employee scheduling software" (2.91), "nutritional analysis software" (3.01), and "employee training tool" (3.06).

TABLE 11

Mean Ratings of Perceived Importance and Satisfaction Level of IT Applications

IT applications	Importance[1]			Satisfaction[2]		
	Mean	SD	Rank	Mean	SD	Rank
Email	4.95	0.23	1	4.43	0.78	2
Personal computer	4.90	0.30	2	4.51	0.64	1
Order entry/Point-of-Sale (POS)	4.75	0.53	3	3.66	1.09	14
Spreadsheet package	4.67	0.62	4	4.30	0.78	4
Debit card system	4.65	0.76	5	3.71	1.15	12
Printing equipment	4.64	0.52	6	4.03	0.90	8
Meal plan system	4.63	0.70	7	3.39	1.13	17
Accounting/Billing/Budget report	4.60	0.68	8	3.34	1.19	19
Inventory/Purchasing software	4.59	0.65	9	3.37	1.08	18
Food cost analysis software	4.57	0.69	10	3.29	1.24	20
Voice mail system	4.56	0.61	11	4.16	0.91	7
Internet/Web browser	4.56	0.57	12	4.36	0.62	3
Recipe analysis software	4.49	0.78	13	3.25	1.27	21
Word processor	4.43	0.97	14	4.25	0.80	5
Nutritional analysis software	4.41	0.88	15	3.01	1.30	28
Menu planning/analysis software	4.40	0.82	16	3.16	1.25	25
Payroll report software	4.38	0.84	17	3.20	1.14	23
Fax machine	4.28	0.89	18	4.19	0.83	6
Database management package	4.28	0.88	19	3.73	1.05	11
Employee scheduling software	4.16	0.93	20	2.91	1.16	29
Production scheduling software	4.11	0.89	21	3.08	1.09	26
Employee training tool	4.09	0.88	22	3.06	0.87	27
Presentation/Graphics package	4.08	0.81	23	3.80	0.91	9
Desktop publishing package	3.94	1.02	24	3.64	0.95	15
CD/DVD ROM	3.89	0.89	25	3.80	0.92	10
Digital camera	3.78	0.90	26	3.71	1.00	13
Statistical analysis package	3.73	1.08	27	3.24	0.92	22
Ingredient room issues software	3.53	1.10	28	3.20	0.86	24
Personal Digital Assistant (PDA)	3.36	1.13	29	3.46	1.06	16
Grand mean	4.33	0.40		3.72	0.64	

Scale 1: 1=Not at all important; 2=Little important; 3=Neutral; 4=Important; 5=Very important
Scale 2: 1=Not at all satisfied; 2=Little satisfied; 3=Neutral; 4=Satisfied; 5=Very satisfied

Underlying Dimensions of Information Technology Applications: Level of Satisfaction

Twenty-nine technology attributes based on the satisfaction level were factor analyzed with VARIMAX rotation procedure to condense the information contained in those attributes. Two statistics were used to test if the factor analysis was appropriate for this study. First, the Kaiser-Meyer-Olkin (KMO) overall measure of sampling adequacy (MSA) was 0.851, which was considered meritorious (Hair et al., 1998). Second, the overall significance of the correlation matrix was 0.0000 with a Bartlett Test of Sphericity value was 1900.825. These measures indicated that the variables had good predictive power for the underlying dimensions. All 7 factors had eigenvalues greater than 1.0, accounting for 67.90% of the total variance. The reliability coefficients for the items in the study ranged from 0.62 to 0.95, above the minimum value of 0.50 that is considered acceptable as an indication of reliability for basic research (Nunnally, 1967).

The first dimension was labeled as “Foodservice Operation” which explained 19.75% of the total variance with a reliability coefficient of 0.95. The second dimension was labeled as “Daily Use” which accounted for 9.74% of the total variance with a reliability coefficient of 0.76. The third dimension labeled as “Documentation” accounted for 8.81% of the variance with a reliability coefficient of 0.81. The fourth dimension labeled as “Student Services” accounted for 8.06% with a reliability coefficient of 0.86. The fifth dimension was labeled as “Administration” which accounted for 8.02% of the total variance with a reliability coefficient of 0.84. The sixth dimension labeled as “Information Exchange” accounted for 7.89% of the variance with a reliability coefficient of 0.83. The final dimension labeled as “Communication” accounted for 5.63% with a reliability coefficient of 0.62 (See Table 12).

TABLE 12

Underlying Dimensions of Information Technology Applications

Technology factors & attributes	Factor loading	Eigen value	Variance explained	Reliability coefficient
Factor 1: Foodservice Operation		5.73	19.75%	0.95
Recipe analysis software	0.88			
Food cost analysis software	0.86			
Menu planning/analysis software	0.84			
Nutritional analysis software	0.82			
Production scheduling software	0.77			
Inventory/Purchasing software	0.68			
Ingredient room issues software	0.64			
Employee training tool	0.53			
Factor 2: Daily Use		2.82	9.74%	0.76
Internet/Web browser	0.71			
Email	0.66			
Personal computer	0.65			
Voice mail system	0.64			
Word processor	0.58			
Factor 3: Documentation		2.55	8.81%	0.81
Presentation/Graphics package	0.77			
Desktop publishing package	0.64			
Spreadsheet package	0.57			
Statistical analysis package	0.55			
Database management package	0.52			
Factor 4: Student Services		2.34	8.06%	0.86
Order entry/Point-of-Sale (POS)	0.78			
Debit card system	0.77			
Meal plan system	0.65			
Factor 5: Administration		2.33	8.02%	0.84
Employee scheduling software	0.80			
Payroll report software	0.76			
Accounting/Billing/Budget software	0.65			
Factor 6: Information Exchange		2.29	7.89%	0.83
CD/DVD-ROM	0.72			
Digital camera	0.66			
Printing equipment	0.63			
Factor 7: Communication		1.63	5.63%	0.62
Personal Digital Assistant (PDA)	0.76			
Fax machine	0.73			
Total Variance Explained			67.90%	

Importance and Satisfaction Level of Information Technology Applications

Table 13 showed the respective importance means, satisfaction means, mean differences (i.e., gap means), *t*-values, and significant levels regarding a range of information technology attributes currently offered by college and university foodservice operations. A series of paired sample *t* tests were applied to investigate if there was any statistical differences between the perceived importance level and satisfaction level of those attributes existing in the seven dimensions of technology attributes. This test was based on the cross sectional nature of the study and used to examine two measurements within one attribute.

First, the "Foodservice Operation" factor included various technology applications particularly designed for foodservice operations, including recipe analysis software, food cost analysis software, menu planning/analysis software, and so forth. The mean ratings of all items in the factor were found to be significantly different between their perceived importance and satisfaction level at the $p<0.001$ level of significance.

Second, the mean scores of items included in the "Daily Use" factor, such as Internet/Web browser, email, personal computer, voice mail system, and word processor, were found to be significantly different between their perceived importance and satisfaction level at the $p<0.001$ level of significance.

Third, the "Documentation" factor consisted of presentation/graphics package, desktop publishing package, spreadsheet package, statistical analysis package, and database management package. The mean ratings of all items in the third factor were found to be significantly different between their perceived importance and satisfaction level at the $p<0.001$ level of significance.

Fourth, the factor of "Student Services" included order entry/Point-of-Sale (POS), debit card system, and meal plan system. The mean ratings of all items in the factor were found to be significantly different between their perceived importance and satisfaction level at the $p<0.001$ level of significance.

Fifth, the mean scores of attributes included in the "Administration" factor (e.g., employee scheduling software and payroll report software) were also found to significantly different between their perceived importance and satisfaction level at the $p<0.001$ level of significance.

Sixth, no significant differences of the mean scores of attributes , such as CD/DVD-ROM ($p=0.189$) and digital camera ($p=0.290$) located in the factor of "Information Exchange" were found between the perceived importance and satisfaction level, except for the item of printing equipment ($p<0.001$).

Seventh, there were no statistically significant differences of the mean ratings of items, such as Personal Digital Assistant (PDA) ($p=0.210$) and fax machine ($p=0.280$), which are included in "Communication" factor.

Finally, a two-tailed paired sample *t* test was conducted on the grand means of importance and satisfaction attributes to determine whether there was a gap between university foodservice administrators' overall perceived importance and satisfaction of the technology applications offered in the foodservice operations. The results of the analysis showed that this perceived difference (i.e., perceived gap) between the overall importance level and satisfaction level was statistically significant at the $p<0.001$ level ($t=13.71$).

TABLE 13

Importance-Performance GAP Analysis

Technology factors & attributes	Importance Mean[1]	Satisfaction Mean[2]	Diff[3]	*t*	Sig.
Factor 1: Foodservice Operation					
Recipe analysis software	4.49	3.25	1.24	11.24	0.000
Food cost analysis software	4.57	3.29	1.28	11.93	0.000
Menu planning/analysis software	4.40	3.16	1.24	11.25	0.000
Nutritional analysis software	4.41	3.01	1.40	11.20	0.000
Production scheduling software	4.11	3.08	1.03	8.86	0.000
Inventory/Purchasing software	4.59	3.37	1.22	13.70	0.000
Ingredient room issues software	3.53	3.20	0.33	3.30	0.000
Employee training tool	4.09	3.06	1.03	10.90	0.000
Factor 2: Daily Use					
Internet/Web browser	4.56	4.36	0.20	4.55	0.000
Email	4.95	4.43	0.52	9.45	0.000
Personal computer	4.90	4.51	0.39	9.96	0.000
Voice mail system	4.56	4.16	0.40	6.69	0.000
Word processor	4.43	4.25	0.18	3.72	0.000
Factor 3:Documentation					
Presentation/Graphics package	4.08	3.80	0.28	4.42	0.000
Desktop publishing package	3.94	3.64	0.30	3.67	0.000
Spreadsheet package	4.67	4.30	0.37	6.89	0.000
Statistical analysis package	3.73	3.24	0.49	5.52	0.000
Database management package	4.28	3.73	0.55	7.01	0.000
Factor 4: Student Services					
Order entry/Point-of-Sale (POS)	4.75	3.66	1.09	12.81	0.000
Debit card system	4.65	3.71	0.94	10.97	0.000
Meal plan system	4.63	3.39	1.24	12.54	0.000
Factor 5:Administration					
Employee scheduling software	4.16	2.91	1.25	9.63	0.000
Payroll report software	4.38	3.20	1.18	11.04	0.000
Accounting/Billing/Budget report	4.60	3.34	1.26	13.17	0.000
Factor 6: Information Exchange					
CD/DVD-ROM	3.89	3.80	0.09	1.32	0.189
Digital camera	3.78	3.71	0.07	1.06	0.290
Printing equipment	4.64	4.03	0.61	9.18	0.000
Factor 7: Communication					
Personal Digital Assistant (PDA)	3.36	3.46	-0.10	-1.26	0.210
Fax machine	4.28	4.19	0.09	1.08	0.280
Grand Mean	4.33	3.72	0.61	13.71	0.000

Notes 1: 1=Not at all important; 2=Little important; 3=Neutral; 4=Important; 5=Very important
2: 1=Not at all satisfied; 2=Little satisfied; 3=Neutral; 4=Satisfied; 5=Very satisfied
3: Mean difference (Gap mean) is defined as importance mean – satisfaction mean.

Hypothesis Testing 1

Overall importance values exceeded satisfaction values in 28 of the total 29 technology attributes. This indicated that there was a positive gap in the 28 attributes; overall, college and university foodservice organizations did not offer satisfactorily advanced and sophisticated information technology (IT) applications to the administrators for their enhanced job-related tasks. A paired *t* test performed on the grand means of importance and satisfaction attributes to test the following Hypothesis 1:

H_{1o}= There is no significant difference between the overall perceived importance score of information technology attributes currently adopted in college and university foodservices and the overall perceived satisfaction score.

H_{1a}= There is a significant difference between the overall perceived importance score of information technology attributes currently adopted in college and university foodservices and the overall perceived satisfaction score.

As shown in Table 13, the grand mean was 4.33 for importance and 3.72 for satisfaction ratings. The results showed that the technology applications adopted by the college and university foodservices did not meet the foodservice administrators' satisfaction level when utilizing them for job-related tasks. This perceived difference (i.e., perceived gap) was statistically significant at the $p<0.001$ level ($t=13.71$). Thus, H_{1o} was rejected and H_{1a} was accepted that there was a significant difference between perceived level of importance and perceived level of satisfaction of the technologies, which are currently adopted in the college and university foodservice operations.

Importance-Performance Analysis (IPA)

Importance-Performance Analysis (IPA) was applied to compare the importance and the satisfaction of information technology (IT) attributes as perceived by college and university foodservice administrators, and to recommend proper allocation of resources to areas requiring future improvement. The mean ratings of the perceived importance of the 29 technology attributes and the satisfaction of the same attributes were calculated (see Table 13). The results of the analysis were plotted in the IPA grid (in Figure 4). The grand means for importance and satisfaction level were used for the placement of the axes on the matrix.

In the Figure 4, X-axis represents the perception of satisfaction (i.e., performance) scores relaying to the college and university foodservice professionals' experience of technology applications, which are currently adopted in their organizations. The Y-axis represents the perception of importance scores of the same technology attributes. The four quadrants are constructed based on the mean scores of the importance and satisfaction ratings. The identified four quadrants are (1) Concentrate Here, (2) Keep up the Good Work, (3) Low Priority, and (4) Possible Overkill. For the college and university foodservice administrators, the mean importance rating for the pooled data (i.e., grand mean) was 4.33 and the mean satisfaction rating was 3.72. As illustrated in Figure 3, ten attributes were identified in the Concentrate Here quadrant, seven in the Keep up the Good Work quadrant, eight in the Low Priority, and four in the Possible Overkill quadrant.

(1) Concentrate here quadrant

The attributes loaded in the *concentrate here* quadrant were "recipe analysis software", "food cost analysis software", "menu planning/analysis software", "nutritional analysis software", "inventory/purchasing software", "order entry/point-of-sale (POS)", "debit card system", "meal plan system", "payroll report software", and, "accounting/billing/budget report." They were evaluated above average for importance but below average on satisfaction. Most of the technology applications, particularly used for foodservice operation, student services, and administrative tasks were included in the quadrant. It is suggested that continuous efforts and special attention should be directed at and concentrated on the enhancement of those technology applications to accomplish a high level of satisfaction in utilizing them for job-related tasks.

(2) Keep up the good work quadrant

The *keep up the good work* quadrant captured 7 technology attributes, including, "Internet/Web browser", "email", "personal computer", "voice mail system", "word processor", "spreadsheet package", and "printing equipment." All items in the factor of "Daily use" and other essential technology applications utilized for most common individual tasks (e.g., sending messages, creating documents) were loaded in the quadrant. These items were rated above average for both importance and satisfaction level. These results convey the message that in general, college and university foodservices have performed well in the above respects. Strategic efforts should be made to maintain and improve quality dining services in these areas to enhance individual performance and then, to be competitive against commercial foodservice establishments.

(3) Low priority quadrant

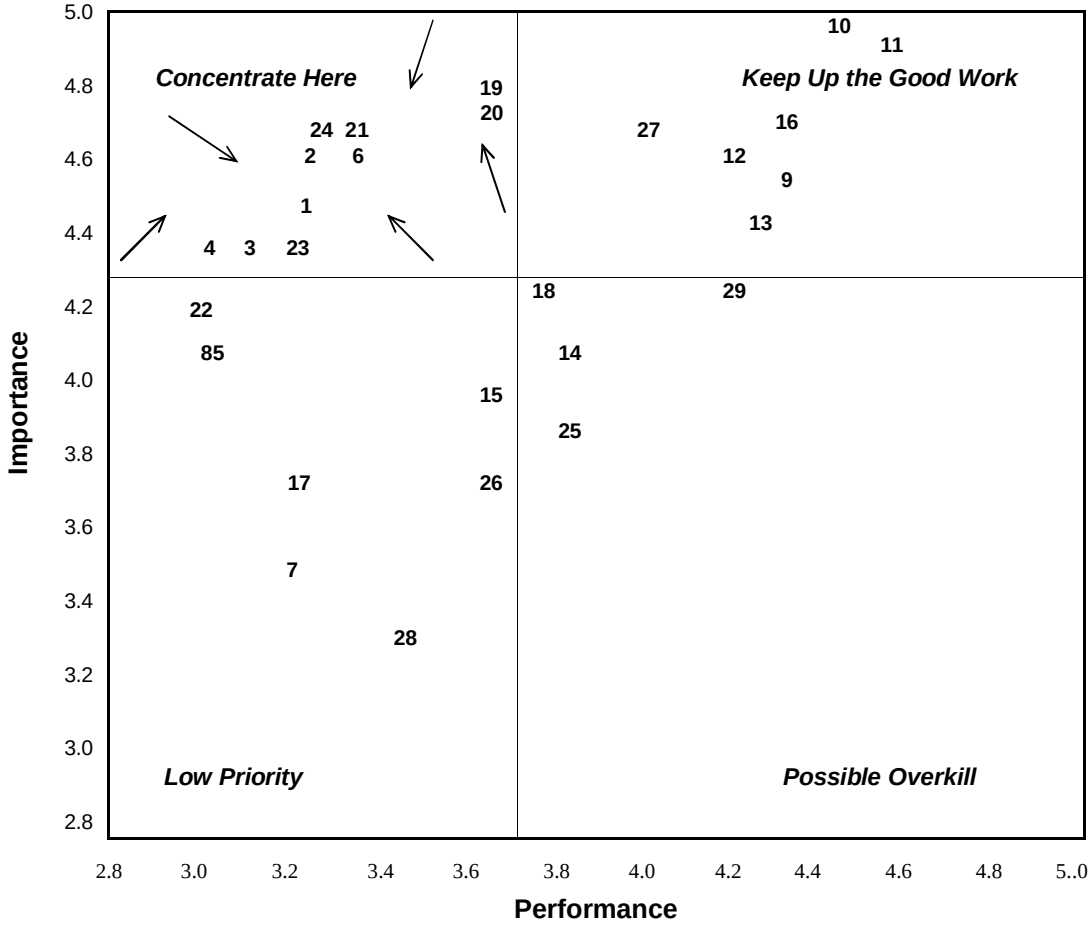
Among 29 information technology attributes used for the study, 8 were identified in the *low priority* quadrant. These were “production scheduling software”, “ingredient room issues software”, “employee training tool”, “desktop publishing package”, “statistical analysis package”, “employee scheduling software”, “digital camera”, and “Personal Digital Assistant (PDA).” The quadrant encompassed some sophisticated and advanced technology applications, which were designed for specific foodservice operation, employee management, data analysis, and other various personal uses. They were evaluated below average for both importance and satisfaction. The results indicated that even if the satisfaction level was below average, efforts should not be overly concentrated on these technologies, as attributes identified here were rated as low importance by the respondents, compared with other technology attributes.

(4) Possible overkill quadrant

There were 4 attributes “presentation/graphics package”, “database management package”, “CD/DVD ROM”, and “fax machine.” Information technology (IT) attributes related to organizing, disseminating, and storing information were included in the final quadrant of *possible overkill.* This implied that the attributes were evaluated as lower than the average of the importance level, and that the satisfaction level of those technologies was higher than the average Since those technology applications identified in the quadrant were considered the most standardized applications for daily tasks, which are normally accompanied by typical hardware or operating system, efforts should be towards maintaining a high level of standards without overspending resources in this area.

FIGURE 4

Importance-Performance Analysis (IPA) Grid of IT Applications



1:Recipe analysis software
2:Food cost analysis software
3:Menu planning/analysis software
4:Nutritional analysis software
5:Production scheduling software
6:Inventory/Purchasing software
7:Ingredient room issues software
8:Employee training tool
9:Internet/Web browser
10:Email
11:Personal computer
12:Voice mail system
13:Word processor
14:Presentation/Graphics package
15:Desktop publishing package
16:Spreadsheet package
17:Statistical analysis package
18:Database management package
19:Order entry/Point-of-Sale (POS)
20:Debit card system
21:Meal plan system
22:Employee scheduling software
23:Payroll report software
24:Accounting/Billing/Budget report
25:CD/DVD-ROM
26:Digital camera
27:Printing equipment
28:Personal Digital Assistant (PDA)
29:Fax machine

Individual Perceptions of Technology Attributes

In order to determine the respondents' overall perceptions of technology, the descriptive mean scores and standard deviations of the 14 statements regarding the individual perceptions of technology were reported in Table 14. The mean ratings ranged from 2.41 to 4.30 and the standard deviations ranged from 1.13 to 0.59.

The respondents indicated that "I think it is appropriate for my organization to adopt new information technology" (4.30) was the strongest agreement that would influence the way one would feel about their inclined technology adoption behavior. In addition, the respondents provided higher rating on the statements, "I believe that new information technology represents an important innovation." (4.26), "I believe that new information technology is critical for my organization to get a competitive edge" (4.07), and "Using new information technology does not match with my workstyle." (3.86). This negatively-worded item was reverse-scored, so higher scores represented a more positive attitude. Of those statements, three items which explained "Perceived Awareness" of new technology were highly rated by the respondents.

On the other hand, the majority of the respondents disagreed with the statement "My superiors expect me to use new information technologies" (2.41), "My boss does not require me to use new information technologies" (2.74), and "Among my peers, I am usually the first to try out new information technology" (2.95). The results indicated that only 3 out of the 14 statements associated with the individual perceptions of technology (21%) were rated by the respondents to choose either "disagree" or "strongly disagree."

TABLE 14

Individual Perceptions of Technology Attributes

Attributes	**Mean**	**SD**
I think it is appropriate for my organization to adopt new information technology.	4.30	0.61
I believe that new information technology represents an important innovation.	4.26	0.59
I believe that new information technology is critical for my organization to get a competitive edge.	4.07	0.89
Using new information technology does not match with my workstyle.*	3.86	0.95
In general, I am hesitant to try out new information technology.*	3.82	0.89
If I heard about a new information technology application, I would look for ways to experiment with it.	3.71	0.79
I think that using new information technology fits the way I like to work.	3.68	0.77
I like to experiment with new information technologies.	3.43	0.98
Using new information technology would be compatible with all aspects of my work.	3.35	0.95
My use of a new information technology application is required by job description.*	3.26	1.01
Although it might be helpful, using new information technology is certainly not compulsory in my job.	3.08	1.13
Among my peers, I am usually the first to try out new information technology.	2.95	0.92
My boss does not require me to use new information technologies.	2.74	1.07
My superiors expect me to use new information technologies.*	2.41	0.87

Scale: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree
Note: * Reverse-scored

Underlying Dimensions of Individual Perceptions of Technology

In order to identify dimensions of individual perceptions of technology, principal component analysis was used to group the individual-level items. Two statistics were used to test if the factor analysis was appropriate for this study. First, the Kaiser-Meyer-Olkin (KMO) overall measure of sampling adequacy (MSA) was 0.797, which was considered middling (Hair et al., 1995). Second, the overall significance of the correlation matrix was 0.0000 with a Bartlett Test of Sphericity value was 994.932. These measures indicated that the variables had good predictive power for the underlying dimensions. Fourteen statements were initially factor analyzed using VARIMAX rotation to delineate the underlying dimensions that were associated with perceptions of technological innovations. However, one item was removed due to factor loading lower than 0.4 in the factor structure. Thirteen items were factor analyzed again, resulting in four underlying dimensions. All four factors had eigenvalues greater than 1.0, accounting for 65.19% of the total variance. The results of the factor analysis were shown in Table 15.

As demonstrated in prior empirical evidence (e.g., Agarwal & Prasad, 1998a; Agarwal & Prasad, 1998b; Moore & Benbasat, 1991), the four underlying dimensions were identified. First dimension was labeled as “Perceived Innovativeness” which explained 20.28% of the variance with a reliability coefficient of 0.73. The second dimension was labeled as “Perceived Voluntariness”, which accounted for 17.71% of the variance with a reliability coefficient of 0.81. The third dimension labeled as “Perceived Compatibility” explained 14.50% of the variance with a reliability coefficient of 0.69. The fourth underlying dimension named as “Perceived Awareness” accounted for 12.70% of the variance with a reliability coefficient of 0.73.

TABLE 15

Underlying Dimensions of Individual Perceptions of Technology

Attributes	Factor loading	Eigen value	Variance explained	Reliability coefficient
Factor 1: Perceived Innovativeness		2.64	20.28%	0.73
I like to experiment with new information technologies.	0.79			
Among my peers, I am usually the first to try out new information technology.	0.70			
If I heard about a new information technology application, I would look for ways to experiment with it.	0.63			
In general, I am hesitant to try out new information technology.*	0.61			
Factor 2: Perceived Voluntariness		2.30	17.71%	0.81
Although it might be helpful, using new information technology is certainly not compulsory in my job.	0.84			
My superiors expect me to use new information technologies.*	0.83			
My use of a new information technology application is required by job description.*	0.57			
My boss does not require me to use new information technologies.	0.46			
Factor 3: Perceived Compatibility		1.89	14.50%	0.69
I think that using new information technology fits the way I like to work.	0.85			
Using new information technology would be compatible with all aspects of my work.	0.81			
Factor 4: Perceived Awareness		1.65	12.70%	0.73
I believe that new information technology represents an important innovation.	0.79			
I think it is appropriate for my organization to adopt new information technology.	0.69			
I believe that new information technology is critical for my organization to get a competitive edge.	0.60			
Total Variance Explained			65.19%	

Note: * Reverse-scored

Organizational Computing Supports

Organizational Computing Supports Attributes

Table 16 presents the mean and standard deviation scores of the 13 statements of a wide range of computing supports offered by internal and external organization, which might influence the inclined technology adoption behavior. As indicated in Table 16, the mean ratings of statements ranged from 2.62 to 4.29 with the standard deviations ranging from 0.65 to 1.12.

The statements with mean scores over 4.0 included “A specific person or group is available for assistance with hardware difficulties” (4.29), “A specific person or group is available for assistance with software difficulties” (4.26), and “Guidance is available to me in the selection of hardware, software, printers, and other equipments” (4.06). The top three statements, highly evaluated by the respondents, were adopted in this study to measure “internal computing support” (i.e., instructions and guidance for individual users within an organization). Relatively, the statements with the lowest mean scores, rated by the participating college and university foodservice administrators, were “Community agencies/businesses provide incentives for the adoption of new information technologies” (2.62), “Technology vendors promote new information technologies by offering free training sessions” (2.74), and “Technology vendors actively market new information technologies by providing incentives for adoption” (2.96).

TABLE 16

Orgnizational Computing Supports Attributes

Attributes	**Mean**	**SD**
A specific person or group is available for assistance with hardware difficulties.	4.29	0.65
A specific person or group is available for assistance with software difficulties.	4.26	0.70
Guidance is available to me in the selection of hardware, software, printers, and other equipments.	4.06	0.76
Specialized instruction and education concerning new information technology is available to me.	3.85	1.03
I am convinced that university administration is aware of what benefits can be achieved with the use of new information technologies.	3.70	0.92
I am always supported and encouraged by my boss to use new information technology in my job.	3.62	0.86
University administration really wants to see that we are happy using new information technology.	3.31	0.89
There are agencies/businesses in the community which provide training on new information technologies.	3.31	0.78
There are businesses in the community which provide technical support for effective use of new information technologies.	3.25	0.92
University administration has provided most of the necessary help and resources for us to get quickly used to new information technology.	3.11	1.12
Technology vendors actively market new information technologies by providing incentives for adoption.	2.96	0.85
Technology vendors promote new information technologies by offering free training sessions.	2.74	0.91
Community agencies/businesses provide incentives for the adoption of new information technologies.	2.62	0.78

Scale: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Underlying Dimensions of Organizational Computing Supports

The principal component factor method with a VARIMAX rotation was used to generate the factors underlying the 13 statements of internal and external organizational computing supports. The eigenvalues suggested that a four-factor solution explained 71.18% of the overall variance. The Kaiser-Meyer-Olkin (KMO) overall measure of sampling adequacy (MSA) was 0.708, which was considered middling (Hair et al., 1998). The overall significance of the correlation matrix was 0.0000 with the Bartlett test of Sphericity value of 1304.698. These measures indicated that the variables had good predictive power for the derived dimensions. Cronbach's alpha was calculated to test the reliability of each factor. The results showed that the alpha coefficients for all four dimensions ranged from 0.77 to 0.82.

Table 17 summarizes the factor analysis results. The derived four factors were labeled as "Internal Support", "University Support", "External Practical Support", and "External Technical Support". Unlike the single factor structure identified in the previous study (i.e., Premkumar & Roberts, 1999), two dimensions of external computing support with the same five items of external computing support were found in the study. The first underlying dimension was labeled as "Internal Support" which explained 22.20% of the variance with a reliability coefficient of 0.80. The second dimension was named "University Support", which accounted for 17.94% of the total variance with a reliability coefficient of 0.77. The third dimension labeled as "External Practical Support" explained 16.74% of the variance with a reliability coefficient of 0.78. The fourth underlying dimension labeled as "External Technical Support" accounted for 14.30% of the variance with a reliability coefficient of 0.82.

TABLE 17

Underlying Dimensions of Organizational Computing Supports

Attributes	Factor loading	Eigen value	Variance explained	Reliability coefficient
Factor 1: Internal Support		2.89	22.20%	0.80
A specific person or group is available for assistance with software difficulties.	0.90			
A specific person or group is available for assistance with hardware difficulties.	0.88			
Specialized instruction and education concerning new information technology is available to me.	0.72			
Guidance is available to me in the selection of hardware, software, printers, and other equipments.	0.66			
Factor 2: University Support		2.33	17.94%	0.77
I am convinced that university administration is aware of what benefits can be achieved with the use of new information technologies.	0.83			
I am always supported and encouraged by my boss to use new information technology in my job.	0.82			
University administration really wants to see that we are happy using new information technology.	0.65			
University administration has provided most of the necessary help and resources for us to get quickly used to new information technology.	0.57			
Factor 3: External Practical Support		2.18	16.74%	0.78
Technology vendors actively market new information technologies by providing incentives for adoption.	0.89			
Technology vendors promote new information technologies by offering free training sessions.	0.81			
Community agencies/businesses provide incentives for the adoption of new information technologies.	0.71			
Factor 4: External Technical Support		1.86	14.30%	0.82
There are agencies/businesses in the community which provide training on new information technologies.	0.91			
There are businesses in the community which provide technical support for effective use of new information technologies.	0.88			
Total Variance Explained			71.18%	

Technology Motivation Attributes

The means and standard deviations are listed in Table 18 in order to describe the respondents' overall perceptions of the 24 motivation factors. The technology motivation attributes ranged from the highest mean score of 4.43 to the lowest mean score of 3.14. The standard deviations were below 1.0, ranging from 0.57 to 0.97, and did not show a large variation of agreement among the respondents.

The major factors that would motivate foodservice administrators to adopt new technology applications for their job-related tasks were "faster information/data processing" (4.43), "easier access to information/data" (4.37), "faster retrieval and delivery of documents" (4.32), "more accurate and reliable information/data available" (4.27), and "timely information for decision making" (4.18). On the other hand, the majority of the respondents were not motivated by the following attributes: "reduced travel expenses" (3.14), "reduced operational costs" (3.39), "increased opportunities for advancement" (3.43), "improved monitoring of the quality of products from suppliers" (3.46), and "better relationships with suppliers" (3.48).

TABLE 18

Technology Motivations Attributes

Attributes	**Mean**	**SD**
Faster information/data processing	4.43	0.59
Easier access to information/data	4.37	0.64
Faster retrieval and delivery of documents	4.32	0.60
More accurate and reliable information/data available	4.27	0.63
Timely information for decision making	4.18	0.60
Improved internal coordination and communication	4.15	0.73
Enhanced useful linkages with other organizations	4.12	0.57
Reduced multiple handling of documents	4.06	0.77
Improved document quality	4.05	0.64
Expedited projects	4.05	0.70
Providing better products or services to customers	3.91	0.67
Improved customer relations	3.90	0.74
Reduced multiple call-back/phone tag	3.86	0.90
Quicker and easier to work	3.86	0.70
Enhanced the credibility and prestige of organization	3.82	0.82
Increased access to people	3.71	0.83
Easier new products/services additions	3.61	0.85
Interesting and enjoyable working environment	3.61	0.80
Enhanced utilization of existing equipment	3.56	0.76
Better relationships with suppliers	3.48	0.79
Improved monitoring of the quality of products from suppliers	3.46	0.85
Increased opportunities for advancement	3.43	0.95
Reduced operational costs	3.39	0.97
Reduced travel expenses	3.14	0.87

Scale: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Underlying Dimensions of Technology Motivations

Principal component analysis with VARIMAX rotation was used to determine the underlying dimensions of the technology motivation. The findings of the analysis are presented in Table 19. Prior to factor analysis, the Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy were pursued to test the fitness of the data. For the 24 motivation attributes used for the study, the Bartlett test of Sphericity was 2634.993, with significance lower than 0.000. The KMO measure of sampling adequacy (MSA) of 0.800 was meritorious (Hair et al., 1998). Six underlying dimensions comprising 24 attributes were derived from the analysis. All six factors had eigenvalues greater than 1.0, accounting for 68.17% of the total variance. Table 19 showed the reliability coefficients for the items in the study ranging from 0.61 to 0.87. Moreover, all factor loadings indicated a reasonably high correlation between the delineated factors and their individual technology inhibitors.

The first underlying dimension was labeled as "Enhanced Information Access" which explained 18.79% of the variance with a reliability coefficient of 0.87. The second dimension was named "Attractive Working Environment", which accounted for 11.88% of the total variance with a reliability coefficient of 0.77. The third dimension labeled as "Strategic Initiatives" explained 11.53% of the variance with a reliability coefficient of 0.76. The fourth underlying dimension labeled as "Enhanced Communication" accounted for 11.49% of the variance with a reliability coefficient of 0.83. The fifth dimension was named "Reduced Costs" which explained 7.92% of the total variance with a reliability coefficient of 0.74. The final dimension labeled as "Improved Daily Operation" accounted for 6.56% of the variance with a reliability coefficient of 0.61.

TABLE 19

Underlying Dimensions of Technology Motivations

Attributes	Factor loading	Eigen value	Variance explained	Reliability coefficient
Factor 1: Enhanced Information Access		4.51	18.79%	0.87
Faster information/data processing	0.85			
Faster retrieval and delivery of documents	0.79			
Easier access to information/data	0.78			
Timely information for decision making	0.74			
More accurate and reliable information/data available	0.67			
Expedited projects	0.61			
Improved document quality	0.55			
Factor 2: Attractive Working Environment		2.85	11.88%	0.77
Interesting and enjoyable working environment	0.79			
Enhanced the credibility and prestige of organization	0.72			
Reduced multiple handling of documents	0.62			
Increased opportunities for advancement	0.45			
Factor 3: Strategic Initiatives		2.77	11.53%	0.76
Providing better products or services to customers	0.78			
Enhanced utilization of existing equipment	0.67			
Improved customer relations	0.59			
Easier new products/services additions	0.57			
Factor 4: Enhanced Communication		2.76	11.49%	0.83
Enhanced useful linkages with other organizations	0.82			
Increased access to people	0.76			
Reduced multiple call-back/phone tag	0.75			
Improved internal coordination and communication	0.56			
Factor 5: Reduced Costs		1.90	7.92%	0.74
Reduced operational costs	0.86			
Reduced travel expenses	0.69			
Factor 6: Improved Daily Operation		1.58	6.56%	0.61
Improved monitoring of the quality of products from suppliers	0.76			
Better relationships with suppliers	0.64			
Quicker and easier to work	0.47			
Total Variance Explained			68.17%	

Technology Inhibitor Attributes

The mean ratings of 24 technology inhibitor attributes are displayed in Table 20. The respondents indicated that “lack of funding” (3.90) was the most important inhibitor that would limit them to adopt new information technology applications at work. On the other hand, they most disagreed with the item “lack of confidence in computerized systems” (2.24). The respondents showed neutral attitude that the “lack of time to establish a computerized system” (3.01) and “disagreement among managers regarding the need of potential benefits of new technology” (3.00) would potentially deter them from adopting innovative technologies in the future.

The mean scores range from 2.24 to 3.90. The attribute with the highest mean score is “lack of funding” (3.90), followed by “too costly” (3.77)” and “difficulty of obtaining financing for technology investment” (3.64). The results reflected financial consciousness and awareness of college and university foodservice professionals in acquiring innovative technologies in their foodservice operations. Other attributes with mean scores equal to or higher than 3.0 included “Lack of time to learn new technology” (3.26), “Lack of time to establish a computerized system” (3.01), and “Disagreement among managers regarding the need of potential benefits of new technology” (3.00). Attributes with relatively lower mean scores are, “Lack of confidence in computerized systems” (2.24), “low security and privacy” (2.25), “personal resistance to new technology” (2.33), and “fear of new technology” (2.35).

TABLE 20

Technology Inhibitors Attributes

Attributes	**Mean**	**SD**
Lack of funding	3.90	1.03
Too costly	3.77	0.98
Difficulty of obtaining financing for technology investment	3.64	1.05
Lack of time to learn new technology	3.26	1.11
Lack of time to establish a computerized system	3.01	1.08
Disagreement among managers regarding the need of potential benefits of new technology	3.00	0.98
Lack of direct benefits of technology relative to investment	2.95	1.04
Lack of sufficient user training opportunities	2.93	0.93
Lack of knowledge about new technology	2.90	1.02
Lack of managerial enthusiasm	2.90	0.99
Inadequate/outdated hardware	2.84	1.03
Lack of compatible hardware	2.78	1.00
Lack of adequate technical competence of support staff	2.74	1.01
Lack of user participation in planning of technology developments	2.69	0.95
Slow support staff response time	2.68	1.10
Feel that technology is changing too rapidly to make investment	2.67	0.94
Lack of social contact of technology	2.56	0.90
A low degree of personal control over computerized systems	2.55	0.99
Not necessary for job-related tasks	2.44	0.90
Unfriendly support staff	2.42	0.98
Fear of new technology	2.35	1.05
Personal resistance to new technology	2.33	0.97
Low security and privacy	2.25	0.77
Lack of confidence in computerized systems	2.24	0.91

Scale: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Underlying Dimensions of Technology Inhibitors

The results of principal component analysis are presented in Table 21. For the 24 technology inhibitors, the Bartlett test of Sphericity with a value of 2823.998; nonzero correlation exists at the significance level of 0.000. The measure of sampling adequacy (MSA) of 0.794 was middling (Hair et al., 1998). The factor analysis indicated that a seven-factor solution was appropriate. All seven factors had eigenvalues greater than 1.0, accounting for 73.26% of the total variance. All factors had relatively high reliability coefficients ranging from 0.72 to 0.92. Moreover, all factor loadings indicated a reasonably high correlation between the delineated factors and their individual items.

The first dimension was labeled as “Financial Consciousness” which explained 12.67% of the variance with a reliability coefficient of 0.92. The relatively large proportion of the total variance for that factor might be attributed to the fact that financial matter is a major barrier of new technology adoption. The second dimension was labeled as “Lack of Perceived Assurance”, which accounted for 11.47% of the total variance with a reliability coefficient of 0.80. The third dimension labeled as “Lack of Computing Support” explained 11.09% of the variance with a reliability coefficient of 0.86. The fourth underlying dimension labeled as “Inadequate Awareness” accounted for 10.57% of the variance with a reliability coefficient of 0.79. The fifth dimension was named “Personal Opposition” which explained 10.23% of the total variance with a reliability coefficient of 0.72. The sixth dimension labeled as “Inactive Involvement” accounted for 8.96% of the variance with a reliability coefficient of 0.76. The final dimension was named “Insufficient Hardware” which explained 8.27% of the variance with a reliability coefficient of 0.89.

TABLE 21

Underlying Dimensions of Technology Inhibitors

Attributes	Factor loading	Eigen value	Variance explained	Reliability coefficient
Factor 1: Financial Consciousness		3.04	12.67%	0.92
Lack of funding	0.89			
Too costly	0.87			
Difficulty of obtaining financing for technology investment	0.85			
Factor 2: Lack of Perceived Assurance		2.75	11.47%	0.80
Lack of confidence in computerized systems	0.75			
Fear of new technology	0.74			
Personal resistance to new technology	0.63			
A low degree of personal control over computerized systems	0.62			
Lack of knowledge about new technology	0.62			
Factor 3: Lack of Computing Support		2.66	11.09%	0.86
Slow support staff response time	0.87			
Unfriendly support staff	0.80			
Lack of adequate technical competence of support staff	0.79			
Factor 4: Inadequate Awareness		2.54	10.57%	0.79
Lack of time to learn new technology	0.78			
Lack of time to establish a computerized system	0.74			
Lack of direct benefits of technology relative to investment	0.58			
Lack of sufficient user training opportunities	0.56			
Factor 5: Personal Opposition		2.45	10.23%	0.72
Low security and privacy	0.80			
Not necessary for job-related tasks	0.67			
Feel that technology is changing too rapidly to make investment	0.58			
Lack of social contact of technology	0.57			
Factor 6: Inactive Involvement		2.15	8.96%	0.76
Disagreement among managers regarding the need of potential benefits of new technology	0.86			
Lack of managerial enthusiasm	0.85			
Lack of user participation in planning of technology developments	0.50			
Factor 7: Insufficient Hardware		1.99	8.27%	0.89
Inadequate/outdated hardware	0.82			
Lack of compatible hardware	0.72			
Total Variance Explained			73.26%	

Impact of the Individual Perceptions of Technology on the Intentions to Adopt New Information Technology

Impact of Individual Perceptions of Technology

Multiple regression analysis was performed to explore whether the independent variables (four individual-level factors) had a significant impact on the dependent variable (intention to adopt new information technology). Four factors from the factor analysis were used as the input variables in the analysis. Table 22 shows the results of regression analysis.

The adjusted R^2 of the model is 0.249, which indicates that approximately 25% of the variation of the dependent variable could be explained by the four factors combined. The significant *F*-ratio (F=18.052, p=0.000) indicated that the results of the regression model could hardly have occurred by chance. Overall, the goodness-of-fit of the model is satisfactory. Three factors, "Perceived Innovativeness" (t=4.941, p<0.001), "Perceived Voluntariness" (t=2.550, p<0.05), and "Perceived Awareness" (t=3.027, p<0.01), were each found to be significant variables in the model, but the third variable, "Perceived Compatibility", was not statistically significant (p=0.361).

Based on the standardized coefficient of each independent variable, one can assess the impact of each variable on the dependent variable. From the Table 22, it could be noted that the factor of "Perceived Innovativeness" (β=0.381) was the most important determinant factor in explaining the technology adoption behavior. "Perceived Awareness" (β=0.214) and "Perceived Voluntariness" (β=0.170) follow in importance. Since, the third variable, "Perceived Compatibility", did not turn out to be significant, the coefficient's value is of little importance.

Hypothesis Testing 2

Hypothesis 2 proposed that the more positive the individual perceptions of technology, the more likely the college and university foodservice administrators would adopt new information technology (IT) for their job-related tasks.

H_{2o} = There is no significant relationship between the individual perceptions of technology and the intention to adopt new information technology.

H_{2a} = There is a significant relationship between the individual perceptions of technology and the intention to adopt new information technology.

Based on the results, the hypothesis 2, which postulated that four individual-level factors were perceived to have an impact on the level of behavioral intention to adopt new technologies, was not entirely demonstrated because only three factors out of all four factors were statistically significant in the model. However, base on the regression model as a whole, H_{2o} was rejected and H_{2a} was accepted; there was a positive relationship between the individual-level factors and the adoption behavior.

TABLE 22

Regression Model of Predicting Technology Adoption Behavior (1)

Individual Factor	**Std. β**	***t***	***p***	**VIF**
Perceived Innovativeness (F1)	0.381	4.941	0.000	1.629
Perceived Voluntariness (F2)	0.170	2.550	0.012	1.215
Perceived Compatibility (F3)	0.072	0.916	0.361	1.711
Perceived Awareness (F4)	0.214	3.027	0.003	1.373
Constant		2.548		

R^2=0.263; Adjusted R^2=0.249; F=18.052; p=0.000

Impact of the Organizational Computing Support on the Intentions to Adopt New Information Technology

Impact of Organizational Computing Supports

Having identified the four dimensions of organizational computing support, a multiple regression analysis was conducted to investigate whether and to what extent the independent variables (four organizational-level factors) exert significant influence on the dependent variable (intention to adopt new information technology). Four factors from the factor analysis were used as the input variables in the analysis.

Table 23 shows the results of regression analysis. The adjusted R^2 of the model is 0.011 for the model. The significant *F*-ratio (F=1.589, p=0.179) indicated that, overall, the goodness-of-fit of the model is not satisfactory. Based on the results, there was no significant relationship between these four dimensions of organizational computing support and the dependent variable of the technology adoption behavior. There were no relationships found on all factors of organizational computing support, "Internal Support" (β=0.124, p=0.103), "University Support" (β= -0.129, p=0.116), "External Practical Support" (β=0.132, p=0.091), and "External Technical Support" (β=0.011, p=0.885). No organizational factors were perceived to have an impact on the level of inclined technology adoption behavior.

There was not a high degree of collinearity among the independent variables because all variance inflation factor (VIF) for all four organizational computing support factors were between 1.163 and 1.392, which were less than 10.0. A variance inflation factor (VIF) less than 10.0 indicated that collinearity among the independent variables was sufficiently low so as not to affect the stability of the regression analysis.

Hypothesis Testing 3

Hypothesis 3 proposed that the more positive the perceptions of computing supports offered by internal and external organization, the more likely the college and university foodservice administrators would adopt new information technology (IT) at work.

H_{3o} = There is no significant relationship between the perceived organizational computing support and the intention to adopt new information technology.

H_{3a} = There is a significant relationship between the perceived organizational computing support and the intention to adopt new information technology.

Based on the results of regression analysis, hypotheses 3, which postulated that four organizational factors were perceived to have an impact on the level of behavioral intentions to adopt new technologies was not entirely demonstrated because none of the factors were statistically significant in the entire regression model. Thus, the researcher failed to reject the null hypothesis of H_{3o}, which proposed that there was no significant relationship between the organizational-level factors and the adoption behavior.

TABLE 23

Regression Model of Predicting Technology Adoption Behavior (2)

Organizational Factor	**Std. β**	***t***	***P***	**VIF**
Internal Computing Support (F1)	0.124	1.639	0.103	1.183
University Support (F2)	-0.129	-1.581	0.116	1.392
External Practical Support (F3)	0.132	1.700	0.091	1.260
External Technical Support (F4)	0.011	0.145	0.885	1.163
Constant		10.219		

R^2=0.031; Adjusted R^2=0.011; F=1.589; p=0.179

Impact of the Technology Motivations on the Intentions to Adopt New Information Technology

Impact of Technology Motivations

A multiple regression analysis was used to determine whether and to what extent the independent variables (six motivation factors) had a significant influence on the dependent variable (intention to adopt new information technology). Six factors derived from the factor analysis were used as the input variables in the analysis. The results of the regression analysis are presented in Table 24.

The adjusted R^2 of the model is 0.091, which indicates that approximately 9.1% of the variation of the inclined behavior of technology adoption could be explained by the four factors combined. This share is certainly not overwhelming, but it is statistically significant. The low percentage indicated that there may be other factors affecting new technology adoption in the model. The significant *F*-ratio (F=4.440, p=0.000) indicated that the results of the regression model could hardly have occurred by chance. Of the six independent variables, three factors, "Enhanced Information Access" (t=2.242, p<0.05), "Strategic Initiatives" (t=2.721, p<0.01), and "Reduced Costs" (t= -2.114, p<0.05), were each found to be significant variables in the model. The three variables accounted for virtually all of the explained variance.

Of the three factors, "Strategic Initiatives" (β=0.268) carried the heaviest weight in explaining the overall level of new technology adoption intention, followed by "Enhanced Information Access" (β=0.221) and "Reduced Costs" (β=0.180). There was not a high degree of collinearity among the independent variables because all VIF for all six motivation factors was between 1.644 and 2.202, which was less than 10.0.

Hypothesis Testing 4

Hypothesis 4 proposed that the more positive the motivation factors, the more likely the college and university foodservice administrators would adopt new information technology (IT) at work.

H_{4o} = There is no significant relationship between the technology motivational factors and the intention to adopt new information technology.

H_{4a} = There is a significant relationship between the technology motivational factors and the intention to adopt new information technology.

Based on the results, hypothesis 4, which postulates that the foodservice administrators' motivations regarding their inclined technology adoption behavior affects their intention of new IT adoption at work, was not entirely demonstrated because only three factors were statistically significant in the model. However, based on the regression model as a whole, H_{4o} was rejected and H_{4a} was accepted in that there was a positive relationship between the motivational factors and the technology adoption behavior.

TABLE 24

Regression Model of Predicting Technology Adoption Behavior (3)

Motivation Factor	**Std. β**	***t***	***p***	**VIF**
Enhanced Information Access (F1)	0.221	2.242	0.026	2.202
Attractive Working Environment (F2)	0.069	0.715	0.475	2.129
Strategic Initiatives (F3)	0.268	2.721	0.007	2.194
Enhanced Communication (F4)	-0.040	-0.472	0.637	1.668
Reduced Costs (F5)	0.180	2.114	0.036	1.644
Improved Daily Operation (F6)	-0.053	-0.583	0.560	1.886
Constant		5.465		
R^2=0.118; Adjusted R^2=0.091; F=4.440; p=0.000				

Impact of the Technology Inhibitors on the Intentions to Adopt New Information Technology

Impact of Technology Inhibitors

In order to explore whether the independent variables of seven factors had statistically significant impacts on the dependent variable, the intention to adopt new technology, a multiple linear regression analysis was conducted. Seven inhibiting factors derived from the factor analysis were used as the input variables in the analysis. The results of the regression analysis are presented in Table 25.

According to the adjusted R^2 of this regression model, 24.3% of the variation of the overall technology adoption level was explained by the seven independent variables together. The significant *F*-ratio (F=10.471, p=0.000) indicated that the satisfactory level of the "Goodness-of-Fit" of this regression model. Of the seven independent variables, four factors, "Financial Consciousness" (t= -2.989, p<0.01), "Inadequate Awareness" (t= -3.939, p<0.001), "Inactive Involvement" (t= -3.557, p<0.001), and "Insufficient Hardware" (t= -2.505, p<0.05) were each found to be significant variables in the model. The four variables accounted for virtually all of the explained variance.

The four independent variables were significant determinants of college and foodservice administrators' overall intention of new IT adoption. The standardized β was used to investigate the relative importance of each of the independent variables in contributing to the adoption behavior. The direction of the coefficients was consistent with prior expectations: all inhibiting factors were negative: "Inadequate Awareness" (β = -0.325), "Inactive Involvement" (β = -0.256), "Financial Consciousness" (β = -0.223), and "Insufficient Hardware" (β = -0.183).

Hypothesis Testing 5

Hypothesis 5 proposed that the less the inhibiting factors, the more likely the college and university foodservice administrators would adopt new information technology (IT) at work.

H_{5o} = There is no significant relationship between the technology inhibiting factors and the intention to adopt new information technology.

H_{5a} = There is a significant relationship between the technology inhibiting factors and the intention to adopt new information technology.

Hypothesis 5, which postulates that the technology inhibitors negatively affects their intention of new IT adoption at work, was not entirely demonstrated, because only four factors were statistically significant. However, base on the model as a whole, H_{5o} was rejected and H_{5a} was accepted in that there was a positive relationship between the inhibitors and the adoption behavior.

TABLE 25

Regression Model of Predicting Technology Adoption Behavior (4)

Inhibiting Factor	**Std. β**	***t***	***P***	**VIF**
Financial Consciousness (F1)	-0.223	-2.989	0.003	1.516
Lack of Perceived Assurance (F2)	-0.133	-1.721	0.087	1.633
Lack of Computing Support (F3)	-0.106	-1.461	0.146	1.445
Inadequate Awareness (F4)	-0.325	-3.939	0.000	1.858
Personal Opposition (F5)	-0.108	-1.364	0.174	1.721
Inactive Involvement (F6)	-0.256	-3.557	0.000	1.412
Insufficient Hardware (F7)	-0.183	-2.505	0.013	1.449
Constant		23.758		
R^2=0.269; Adjusted R^2=0.243; F=10.471; p=0.000				

A Collective Impact of the Four Technology Factors on Technology Adoption Behavior

A multiple regression analysis was used to determine whether and to what extent the independent variables, four summated scales of each technology dimension, had a significant influence on the dependent variable, intention to adopt new information technology. Four factors derived from the factor analysis were used as the input variables in the analysis. The results of the multiple regression analysis are presented in Table 26.

The adjusted R^2 of the model is 0.247, which indicates that approximately 24.7% of the variation of the inclined behavior of technology adoption could be explained by the four factors combined. The significant *F*-ratio (F=17.882, p=0.000) indicated that the results of the regression model could hardly have occurred by chance. Of the four independent variables, two factors, "Individual Perceptions of Technology" (t=5.654, p<0.001) and "Technology Inhibitors" (t= -2.892, p<0.01), were each found to be significant variables in the regression model. The two significant variables accounted for virtually all of the explained variance.

The results showed that the two independent variables were significant determinants of college and foodservice administrators' overall intention of new IT adoption. In addition, the standardized β was used to investigate the relative importance of each of the independent variables in contributing to the adoption behavior. From the results, "Individual Perception of Technology" (β = 0.428) carried the heaviest weight in explaining the overall level of technology adoption intention, followed by "Technology Inhibitors" (β = -0.201). These factors were the significant determinant factor in predicting the foodservice administrators' intention to adopt new information technology applications, particularly in the college and university foodservice environment. However,

"Organizational Computing Supports" (β = -0.037, p=0.576) and "Technology Motivations" (β = -0.032, p=0.666) appeared not to be statistically significant in predicting the behavioral intention in the regression model. The direction of the coefficients was consistent with prior expectations: Factor 1 (Individual Perceptions of Technology) was positive and Factor 4 (Technology Inhibitors) was negative. There was not a high degree of collinearity among the independent variables because all VIF for the four factors was between 1.189 and 1.568, which was less than 10.0.

TABLE 26

Regression Model of Predicting Technology Adoption Behavior (5)

Factor	**Std. β**	***t***	***p***	**VIF**
Individual Perceptions of Technology (F1)	0.428	5.654	0.000	1.568
Organizational Computing Supports (F2)	-0.037	-0.561	0.576	1.189
Technology Motivations (F3)	-0.032	-0.432	0.666	1.457
Technology Inhibitors (F4)	-0.201	-2.892	0.004	1.318
Constant		3.581		

R^2=0.262; Adjusted R^2=0.247; F=17.882; p=0.000

Differences of Technology Dimensions by Respondents' Demographic Profiles and Behavioral Characteristics

Differences of Individual Perceptions of Technology Dimensions

One-way Analysis of Variance (ANOVA) was used to determine whether there was a significant mean difference in the individual perceptions of technology across respondents with different demographic profiles and behavioral characteristics. The dependent variable was each of the four individual-level dimensions derived from the factor analysis, "Perceived Innovativeness" (factor 1), "Perceived Voluntariness" (factor 2), "Perceived Compatibility" (factor 3), and "Perceived Awareness" (factor 4). The independent variable was each of demographic profile and behavioral characteristic of the foodservice administrators including gender, age, educational level, prior computer experience at work, and prior Internet experience at work. In order to assess where the significant differences were, the Bonferroni post hoc test was employed. The results of ANOVA test was shown on Table 27.

The ANOVA test showed that there was a significant difference in factor 1, "Perceived Innovativeness", by the category of prior computer experience at work. Respondents who had more years of computer experience at work indicated a higher "Perceived Innovativeness" than did respondents using computers for less years (F=4.329, p<0.01).

College and university foodservice administrators who were in the age group of 60 and above (group 4) had a higher "Perceived Voluntariness" level than those who were in the age of 40-49 (group 2) and 50-59 (group 3) (F=3.337, p<0.05). In addition,

respondents with less hours of Internet usage at work (F=7.276, p<0.01) and lower level of education (F=3.295, p<0.05) showed a higher "Perceived Voluntaries" level.

The results of the ANOVA also showed significant differences in the third factor, "Perceived Compatibility." Respondents who were in the age of 30-39 (group 1) had a higher positive perception than those who were in the age of 40-49 (group 2) (F=3.342, p<0.05). As expected, respondents who used computers and the Internet for longer periods of time indicated higher levels of "Perceived Compatibility." Those who utilized computers for 16-20 years in their workplace (group 3) had a higher perception of the innovation characteristics than those who did for 10-15 years (group 2) (F=6.100, p<0.01). In addition, respondents who used the Internet for their job-related tasks more than 10 years showed a high level of "Perceived Compatibility" than those who did less than 5 years (F=5.427, p<0.01).

A statistically significant mean difference was found between prior computer experience at work and factor 4, "Perceived Awareness." Perhaps surprisingly, respondents who used computers less than 10 years (group 1) in the workplace were more aware of the needs and importance of technological innovations than those who were in the 16-20 years group (group 3) (F=3.529, p<0.05).

TABLE 27

Individual Perceptions of Technology Differences by Demographic Profiles and Behavioral Characteristics

Demographic/ Behavioral Variables	F1 Perceived Innovativeness	F2 Perceived Voluntariness	F3 Perceived Compatibility	F4 Perceived Awareness
Gender	F=2.411	F=0.187	F=0.115	F=0.051
1. Male	3.54	2.88	3.53	4.22
2. Female	3.39	2.82	3.49	4.20
Age	F=0.415	F=3.337*	F=3.342*	F=0.411
1. 30-39	3.58	2.88	3.88	4.21
2. 40-49	3.43	2.85	3.40	4.22
3. 50-59	3.49	2.80	3.56	4.23
4. 60 and above	3.55	3.61	3.27	4.03
Post Hoc Test (Bonferroni)		**4>2** **4>3**	**1>2**	
Education	F=1.359	F=3.295*	F=1.150	F=3.044
1. High school	3.25	3.39	3.29	4.24
2. College/Univ	3.47	2.84	3.50	4.16
3. Post-graduate	3.57	2.80	3.61	4.37
Post Hoc Test (Bonferroni)		**1>2** **1>3**		
Prior Computer Experience at Work	F=4.329**	F=1.855	F=6.100**	F=3.529*
1. >10 years	3.48	2.90	3.60	4.57
2. 10-15 years	3.32	2.98	3.30	4.23
3. 16-20 years	3.63	2.68	3.80	4.11
4. 20 years <	3.73	2.92	3.58	4.13
Post Hoc Test (Bonferroni)	**3>2** **4>2**		**3>2**	**1>3**
Prior Internet Experience at Work	F=1.565	F=7.276**	F=5.427**	F=0.910
1. > 5 years	3.22	3.56	3.08	4.11
2. 5-10 years	3.49	2.82	3.51	4.20
3. 10 years <	3.55	2.77	3.80	4.32
Post Hoc Test (Bonferroni)		**1>2** **1>3**	**3>1**	

* p<0.05, ** p<0.01, ***p<0.001

Mean Scale: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Multiple Range Tests: Bonferroni tests with significance level at p<0.05

Differences of Organizational Computing Supports Dimensions

The one way Analysis of Variance (ANOVA) was used to determine whether there was a significant mean difference in the perceived organizational computing support by categories of the demographic profiles and behavioral characteristics. The dependent variable was each of the four dimensions of "Organizational Computing Supports", "Internal Support" (factor 1), "University Support" (factor 2), "External Practical Support" (factor 3), and "External Technical Support" (factor 4). The independent variable was each of the demographic profile and behavioral characteristics of the foodservice administrators including gender, age, educational level, prior computer experience at work, and prior Internet experience at work. In order to assess where the significant differences were, post hoc tests using the Bonferroni method were also employed. The results of the ANOVA test are shown on Table 28.

The ANOVA test showed that there was a significant difference in the first factor of "Internal Support" by the category of educational level. Respondents with college or university level education (group 2) and post-graduate level education (group 3) showed higher level of agreement toward the importance of "Internal Support", compared with high school education (group 1) (F=10.943, p<0.001).

The results of ANOVA also showed significant differences in the third factor of "External Practical Support." Male college and university foodservice administrators had higher perception than female administrators towards "External Practical Support" (F=3.953, p<0.05). Respondents who were in the age of 60 and above (group 4) had a higher positive perception than those who were in the age of 30-39 (group 1) (F=3.175, p<0.05). In addition, respondents with college/university level education (group 2) placed

higher agreement scores towards the "External Practical Support" factor than with post-graduate level education (group 3). (F=4.238, p<0.05).

A perception of "External Technical Support" varied significantly by the level of gender, age and prior Internet experience at work. Male respondents placed higher agreement scores than female respondents (F=6.543, p<0.05). Respondents who were in the age of 50-59 (group 3) had a higher positive perception toward the external support than those who were in the age of 60 and above (group 4) (F=3.207, p<0.05). Finally, the participating foodservice administrators who used the Internet more than 10 years (group 3) in the workplace were more aware of the technical support offered by external organization in the community than those who did in the 5-10 years group (group 2) (F=4.652, p<0.05).

TABLE 28

Organizational Computing Supports Differences by Demographic Profiles and Behavioral Characteristics

Demographic/ Behavioral Variables	F1 Internal Support	F2 University Support	F3 External Practical Support	F4 External Technical Support
Gender	F=0.309	F=3.398	F=3.953*	F=6.543*
1. Male	4.09	3.51	2.85	3.39
2. Female	4.14	3.32	2.64	3.10
Age	F=0.022	F=0.515	F=3.175*	F=3.207*
1. 30-39	4.13	3.27	2.51	3.19
2. 40-49	4.11	3.45	2.81	3.14
3. 50-59	4.09	3.47	2.76	3.49
4. 60 and above	4.12	3.43	3.27	3.18
Post Hoc Test (Bonferroni)			**4>1**	**3>4**
Education	F=10.943***	F=3.028	F=4.238*	F=2.260
1. High school	3.39	3.00	2.52	2.86
2. College/Univ.	4.14	3.50	2.87	3.29
3. Post-graduate	4.22	3.41	2.59	3.34
Post Hoc Test (Bonferroni)	**2>1** **3>1**		**2>3**	
Prior Computer Experience at Work	F=1.120	F=0.192	F=0.371	F=2.104
1. >10 years	4.13	3.55	2.63	3.60
2. 10-15 years	4.07	3.42	2.77	3.19
3. 16-20 years	4.10	3.41	2.81	3.24
4. 20 years <	4.33	3.44	2.82	3.46
Prior Internet Experience at Work	F=0.044	F=1.266	F=0.622	F=4.652*
1. > 5 years	4.15	3.19	2.74	3.28
2. 5-10 years	4.11	3.47	2.76	3.20
3. 10 years <	4.13	3.39	2.91	3.66
Post Hoc Test (Bonferroni)				**3>2**

* p<0.05, ** p<0.01, ***p<0.001

Mean Scale: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Multiple Range Tests: Bonferroni tests with significance level at p<0.05.

Differences of Technology Motivations Dimensions

A series of one way Analyses of Variance (ANOVA) was used to test whether the participating college and university foodservice administrators with different demographic profiles and technology behavioral characteristics had different technology motivations. The dependent variable was each of the six technology motivation dimensions,, “Enhanced Information Access” (factor 1), “Attractive Working Environment” (factor 2), “Strategic Initiatives” (factor 3), “Enhanced Communication” (factor 4), “Reduced Costs” (factor 5), and “Improved Daily Operation” (factor 6). The independent variable was each of the demographic profiles and behavioral characteristics of the foodservice administrators including gender, age, educational level, prior computer experience at work, and prior Internet experience at work. The Bonferroni post hoc method was also used to assess the statistically significant mean differences of technology motivational dimensions. Table 29 provides the results of the ANOVA test.

There were significant differences in the first motivation factor, Enhanced Information Access by the categories of gender, age, and prior Internet experience. Females were more motivated by “Enhanced Information Access” as a driver of new technology adoption than males (F=11.881, p<0.01). Respondents who were in the age of 30-39 (group 1) had a higher positive perception toward the motivation factor than those who were in the age group of 40-49 (group 2). Similarly, the second group showed a more strong agreement on the motivation factor than the third age group (50-59) (F=4.966, p<0.01). Respondents who had a longer period of Internet access at work (5-10 years) placed higher agreement scores on the factor than those who did less than 5 years (F=3.633, p<0.05).

Second, in terms of degree of motivation by "Attractive Working Environment" in adopting new information technologies at work, there was significant differences between females and males (F=4.224, p<0.05), between respondents in the age group of 30-39 years, 40-49 years, and 50-59 years group participants (F=6.692, p<0.001), and between respondents with higher level of education (post-graduate) and individuals with college/university level (F=3.133, p<0.05).

The mean differences of the third factor, "Strategic Initiatives", by prior computer and Internet experience at work were significant. Respondents having 16-20 years of computer experience at work were more motivated than those who had more than 20 years of experience (F=3.538, p<0.05). In addition, people who had 16-20 years of Internet experience (group 2) and more than 20 years (group 3) were more motivated by the motivation factor than those who had less than 5 years of Internet experience (F=5.302, p<0.01).

A significant difference was found in the "Enhanced Communication." Participants who had post-graduate level education (group 3) were significantly more motivated than the other groups, high school graduates (group 1) and college/university graduates (group 2) (F=8.412, p<0.001).

Finally, "Reduced Costs" and "Improved Daily Operation" differed only by age. For the fifth factor, "Reduced Costs", a significance was found between the age group of 40-49 years (factor 2) and 50-59 years (factor 3) (F=3.735, p<0.05). As for the sixth factor, a significance was also found between the age group of 40-49 years (group 2) and 50-59 years (group 3) as well as 40-49 years (group 2) and 60 years and above(group 4) (F=6.138, p<0.001).

TABLE 29

Technology Motivations Differences by Demographic Profiles and Behavioral Characteristics

Demographic/ Behavioral Variables	F1 Enhanced Information Access	F2 Attractive Working Environment	F3 Strategic Initiatives	F4 Enhanced Communication	F5 Reduced Costs	F6 Improved Daily Operation
Gender	F=11.881**	F=4.224*	F=0.010	F=0.964	F=3.815	F=0.054
1. Male	4.01	3.63	3.75	3.92	3.17	3.59
2. Female	4.26	3.83	3.76	4.01	3.40	3.60
Age	F=4.966**	F=6.692***	F=2.595	F=0.759	F=3.735*	F=6.138**
1. 30-39	4.34	4.10	3.90	4.10	3.46	3.51
2. 40-49	4.18	3.81	3.78	3.92	3.40	3.75
3. 50-59	3.97	3.53	3.70	3.94	2.95	3.51
4. 60 and above	3.99	3.50	3.36	4.11	3.26	3.15
Post Hoc Test (Bonferroni)	**1>2** **2>3**	**1>2** **1>3** **2>3**			**2>3**	**2>3** **2>4**
Education	F=0.787	F=3.133*	F=0.193	F=8.412***	F=0.332	F=0.686
1. High school	3.96	3.89	3.68	3.54	3.21	3.76
2. College/Univ.	4.12	3.66	3.77	3.94	3.30	3.58
3. Post-graduate	4.15	3.86	3.75	4.19	3.20	3.60
Post Hoc Test (Bonferroni)		**3>2**		**3>1** **3>2**		
Prior Computer Experience at Work	F=0.961	F=2.078	F=3.538*	F=1.443	F=0.963	F=0.151
1. >10 years	4.06	3.80	3.80	4.00	3.15	3.60
2. 10-15 years	4.07	3.65	3.74	3.93	3.21	3.60
3. 16-20 years	4.20	3.88	3.87	4.07	3.26	3.62
4. 20 years <	4.11	3.60	3.44	3.79	3.50	3.54
Post Hoc Test (Bonferroni)			**3>4**			
Prior Internet Experience at Work	F=3.633*	F=2.832	F=5.302**	F=2.119	F=1.901	F=2.843
1. > 5 years	3.82	3.39	3.33	3.68	2.92	3.33
2. 5-10 years	4.15	3.75	3.79	4.00	3.27	3.64
3. 10 years <	4.13	3.79	3.75	3.95	3.38	3.54
Post Hoc Test (Bonferroni)	**2>1**		**2>1** **3>1**			

* p<0.05, ** p<0.01, *** p<0.001

Mean Scale: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Multiple Range Tests: Bonferroni tests with significance level at p<0.05.

Differences of Technology Inhibitors Dimensions

One way Analyses of Variance (ANOVA) was used to investigate whether there was a significant mean difference in the inhibiting factors across the college and university foodservice administrators with different demographic profiles and behavioral characteristics. The dependent variable was each of the seven technology inhibitor dimensions, "Financial Consciousness", "Lack of Perceived Awareness", "Lack of Computing Support", "Inadequate Awareness", "Personal Opposition", "Inactive Involvement", and "Insufficient Hardware." The independent variable was each of the demographic profile and behavioral characteristics of the foodservice administrators. Table 30 provided the results of the ANOVA test.

There was a significant difference in "Financial Consciousness" (factor 1) between respondents having 10-15 years (group 2) and less than 10 years (group 1) prior computer experience at work (F=3.022, p<0.05). The awareness of financial difficulties would deter more experienced computer users than less-experienced computer users in adopting new technologies.

The results of the ANOVA test also showed that the perceived level of "Lack of Computing Support" (factor 3) differed by gender, age, and length of prior Internet usage at work. The technology inhibitor would bother more females than male (F=5.227, p<0.05). Respondents who were in the age group of 30-39 years (group 1) were less tolerant towards the inhibitor than those who were in the age group of 50-59 years (group 3) (F=4.810, p<0.01). Moreover, respondents who had 16-20 years of computer experience (group 3) were more disrupted by the "Lack of Computing Support" than those who had more than 20 years of experience (group 4) (F=4.542, p<0.01).

TABLE 30

Technology Inhibitors Differences by Demographic Profiles and Behavioral Characteristics

Demographic/ Behavioral Variables	F1 Financial Consciousness	F2 Lack of Perceived Awareness	F3 Lack of Computing Support	F4 Inadequate Awareness	F5 Personal Opposition	F6 Inactive Involvement	F7 Insufficient Hardware
Gender	F=0.019	F=0.940	F=5.227*	F=0.466	F=0.417	F=0.000	F=3.258
1. Male	3.79	2.42	2.48	3.02	2.52	2.85	2.70
2. Female	3.80	2.53	2.78	3.10	2.46	2.85	2.95
Age	F=1.693	F=1.645	F=4.810**	F=1.557	F=2.175	F=1.131	F=1.624
1. 30-39	4.05	2.38	3.08	2.96	2.42	3.01	3.00
2. 40-49	3.84	2.58	2.61	3.16	2.59	2.92	2.74
3. 50-59	3.61	2.36	2.58	2.90	2.35	2.79	2.75
4. 60 and above	3.82	2.69	1.91	3.18	2.57	2.58	3.32
Post Hoc Test (Bonferroni)			**1>3**				
Education	F=0.907	F=2.455	F=1.411	F=0.455	F=0.423	F=2.284	F=0.826
1. High school	3.48	2.86	3.00	3.14	2.61	2.86	3.07
2. Post-secondary	3.82	2.46	2.59	2.99	2.48	2.78	2.82
3. Post-graduate	3.73	2.38	2.56	3.09	2.43	3.05	2.71
Prior Computer Experience at Work	F=3.022*	F=2.147	F=4.542**	F=0.941	F=2.156	F=2.219	F=0.618
1. >10 years	3.30	2.74	2.63	2.75	2.60	2.90	2.60
2. 10-15 years	3.91	2.56	2.57	3.06	2.54	2.81	2.89
3. 16-20 years	3.65	2.36	2.89	3.07	2.31	3.06	2.75
4. 20 years <	3.95	2.23	2.15	3.10	2.58	2.62	2.81
Post Hoc Test (Bonferroni)	**2>1**		**3>4**				
Prior Internet Experience at Work	F=1.414	F=2.267	F=1.598	F=1.066	F=2.666	F=2.103	F=0.813
1. > 5 years	3.44	2.78	2.28	3.31	2.81	3.22	2.97
2. 5-10 years	3.79	2.45	2.67	3.01	2.46	2.82	2.76
3. 10 years <	3.91	2.32	2.56	3.02	2.40	2.92	2.95

* p<0.05, ** p<0.01, *** p<0.001

Mean Scale: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Multiple Range Tests: Bonferroni tests with significance level at p<0.05.

Hypothesis Testing 6

Hypothesis 6 proposed that college and university foodservice administrators with different demographic profiles or behavioral characteristics perceived the four technology dimensions differently, "Individual Perceptions of Technology" (factor 1), "Organizational Computing Supports" (factor 2), "Technology Motivations" (factor 3), and "Technology Inhibitors" (factor 4). The null and alternative hypotheses are stated as follows:

H_{6o} = There is no significant difference in the four technology dimensions between college and university foodservice administrators with different demographic profiles and behavioral characteristics.

H_{6a} = There is a significant difference in the four technology dimensions between college and university foodservice administrators with different demographic profiles and behavioral characteristics.

Based on a series of the ANOVA test results indicating 30 statistically significant results out of a total of 105 ANOVA tests, it is found that there was a significant difference existing with some demographic profiles or technology behaviors; while no significant difference was also found with other demographic profiles or behavioral characteristics. Thus, H_{6o} which proposed that "there is no significant difference in the technology dimensions among foodservice administrators with different demographic profiles and technology characteristics" was rejected for this study.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to identify the determinants of the adoption of new information technology (IT) in the context of college and university foodservices. First, the study determined the perceived importance and satisfaction level of a range of information technology applications currently adopted in foodservice operations. Then, this study aimed to assess the impact of individual perceptions of technology, organizational computing supports, motivation factors, and inhibiting factors on the adoption of the new IT applications in the future. The objectives of the study were:

1. To determine college and university foodservice administrator' perceived importance and satisfaction level of selected information technology applications currently adopted by college and university foodservice operations.

2. To identify college and university foodservice administrators' individual perceptions of technology innovation, perceived internal and external computing supports, technology motivations, and technology inhibitors.

3. To assess dimensions of individual perceptions of technology innovations, perceived internal and external computing supports, technology motivations, and technology inhibitors of college and university foodservice administrators when deciding to adopt new information technology in the future.

4. To analyze differences in the dimensions of individual perceptions of technology innovations, perceived internal and external computing supports, technology motivations, and technology inhibitors between college and university foodservice administrators with different demographic profiles and behavioral characteristics.

The objective of this study, related to the application of information gained through this study, was to report information that would be helpful in making appropriate decisions about adopting new information technologies and to design constructive technology learning programs in the future.

The research questions that related to the objectives are listed as follows:

1. How do college and university foodservice administrators perceive information technology applications currently adopted by college and university foodservice organizations?

2. What are the individual perceptions of technology that affect the adoption of new information technology by college and university foodservice administrators?

3. How do organizational computing supports influence the desire to adopt new information technology?

4. What are the motivational factors of college and university foodservice administrators when adopting new information technology?

5. What are the inhibiting factors college and university foodservice administrators face that de-motivate the intention to adopt new information technology?

6. Are there any significant differences in the dimensions of individual perceptions of technology, organizational computing supports, technology motivations, and technology inhibitors between college and university foodservice administrators with different demographic profiles and behavioral characteristics?

The population of this study consisted of the current voting delegates of the National Association of College and University Food Services (NACUFS). A self-administered questionnaire was sent to a total of 639 voting delegates of NACUFS using a mixed mode methodology where data was collected through mail and web-based surveys. A focus-group interview was conducted to assess possible attributes in individual perceptions of technology, organizational computing supports, technology motivations, and technology inhibitors related to the inclined behavior of technology

adoption. The focus group consisted of five campus dining managers in the local community.

The overall approach taken to empirically test the relationships implied by the research model and the research hypotheses was a self-administered survey methodology. The questionnaire was developed through a literature review, an evaluation of focus group findings, and other questionnaires utilized in similar previous studies regarding technology adoption and usage in the foodservice industry. The questionnaire consisted of nine sections: (1) Profiles of Institutions, (2) Individual Perceptions of Technology, (3) Organizational Computing Supports, (4) Technology Motivations, (5) Technology Inhibitors, (6) Evaluations of Information Technology Applications, (7) General Opinions of Technology Adoption and Implementation, (8) General Technology Behavior, and (9) Demographic Information of College and University Foodservice Administrators. A total of 221 surveys were returned for a 34.6% response rate. The number of usable responses was 207 for a 32.4% net response rate.

Summary of Findings

The participating college and university foodservice administrators in this study:

1. were male (59.0%),
2. were in the age group between 40 and 49 years old (44.9%),
3. were Caucasian/Euro American (88.3%),
4. had bachelor's degree (52.7%)
5. worked as director/general manager (77.3%),
6. had an annual income of $70,000 or more as a foodservice administrator (52.2%),

7. worked more than 20 years in college and university foodservices (37.7%),
8. worked less than 5 years in their current foodservice operations (33.3%),
9. managed less than 5 separate foodservice facilities (44.1%),
10. used a computer at home (94.7%),
11. had access to the Internet at home (87.9%),
12. used a computer 11-15 years at work (33.8%),
13. had access to the Internet 5-10 years at work (75.8%),
14. had an average level of computer/Internet expertise (54.9%), and
15. perceived computer/Internet very important in today's dining operation (53.9%).

General Technology Behavior

The majority of the college and university foodservice administrators showed relatively positive attitudes and perceptions towards computer/Internet. More specifically, most of the participating college and university foodservice administrators used a computer and Internet access at home. Approximately 85% of the administrators evaluated their own computer/Internet expertise average or higher. In addition, the majority of the respondents thought computer/Internet is very important (53.9%) or extremely important (32.2%) in today's campus dining operations. Not surprisingly, none of the respondents indicated that computer technology is not at all important or slightly important in their foodservice operations.

As for the methods to access work-related software outside the workplace, such as at home and while traveling, most of respondents utilized Internet/email, different types of disk drive (floppy disc and CD-ROM), and a PDA/cellular phone for their

communication needs. Surprisingly, a significant proportion of the participating college and university foodservice administrators didn't use a laptop computer to access work-related information at home and while traveling. In addition, most of the respondents did not prefer to visit various types of technology user supporting facilities (e.g., business center, public library, Internet cafe) at home and while traveling.

With respect to their prior technology learning experiences, most of the respondents received their technology learning opportunities from in-house company courses, fellow workers, and self-study or self-taught, while only a small proportion of them received technology learning opportunities from supervisors and distance learning. Unexpectedly, about half of the college and university foodservice administrators didn't have opportunities to learn about technology in formal courses at a college or university.

Perceived Importance and Satisfaction Level of Information Technology Applications

Research question one asked, "How do college and university foodservice administrators perceive information technology applications currently adopted by college and university foodservice organizations?" The top three most important attributes were "email", "personal computer", and "order entry/ point-of-sale (POS)." Similarly, the top three most satisfied attributes were "personal computer", "email", and "Internet/ Web browser", as perceived by the college and university foodservice administrators. The grand mean was 4.33 for importance and 3.72 for satisfaction ratings. Overall importance values exceeded satisfaction values in 28 of the total 29 technology attributes. This indicated that, overall, college and university foodservice organizations did not offer satisfactorily advanced and sophisticated information technology (IT) applications to the

administrators for their enhanced job-related tasks. Based on the results, H_{1o} was rejected and it can be concluded that there was a significant difference between perceived level of importance and perceived level of satisfaction of the technologies.

Importance-Performance Analysis (IPA) was conducted to create some insights regarding the present importance level and satisfaction level of technology applications when performing job related tasks. For instance, a person perceived his/her printer important, because he/she used it everyday. However, he/she might not be satisfied with the equipment, because it showed low level of performance (e.g., slow, outdated). Thus, foodservice managers or administrators should make an effort to eliminate the perceived gap between importance and satisfaction by purchasing new equipment or upgrading. An IPA grid illustrated that 10 attributes were identified in the Concentrate Here quadrant, 7 in the Keep up the Good Work quadrant, 8 in the Low Priority, and 4 in the Possible Overkill quadrant.

First, the *Concentrate Here* quadrant captured 10 IT applications, particularly used in performing specific foodservice functions, student services, and essential administrative tasks (e.g., recipe analysis software, order entry/point-of sale, meal plan system, payroll report system, etc.). These IT applications were directly related to the core functions of college and university foodservices. Accordingly, foodservice administrators rely heavily on those technology applications in their daily basis and then, their perceived level of expectations of those technologies can be relatively high. Therefore, it is suggested that improvement efforts and special attention should be directed at and concentrated on the enhanced performance (e.g., speedy operation,

increased availability, improved durability, etc.) of the IT applications included in this quadrant by investing in purchasing or upgrading them.

Secondly, the *Keep up the Good Work* quadrant identified a total of 7 information technology (IT) applications. All technology items in the factor of "Daily Use" and other essential technology applications were included in the quadrants, such as "Internet/Web browser", "email", "personal computer", "word processor package", "spreadsheet package", "printing equipment", and so forth. These IT applications were considered satisfactorily in meeting college and university foodservice administrators' needs in relation to personal communication, daily documentation, and records management. Notably, "email" and "personal computer" were perceived as the most important as well as the most satisfied technology attributes. It indicated that "email" and "personal computer" were considered key technologies for foodservice administrators at work and loaded in this quadrant with other "compatible" most frequently used software packages. Resources should be directed to improving and maintaining the quality of those essential IT applications to ensure daily administrative tasks and communication activities.

Third, the *Low Priority* quadrant identified 8 information technology (IT) applications where foodservice administrators were not adequately satisfied with as well as they perceived them to be less important when compared with other IT attributes. These information technologies were "production scheduling software", "employee training tool", "employee scheduling software", "digital camera", "Personal Digital Assistant (PDA)", and so forth. Importantly, "digital camera" and "Personal Digital Assistant (PDA) were perceived as least important attributes by the college and university foodservice administrators for their job-related tasks, since they can be used for their

personal use (e.g., personal enjoyment, daily scheduling) at work and at home or while traveling. This implied that relatively fewer efforts and resources should be expended in the low priority cell. However, this does not mean that the foodservice organizations should reduce its efforts to improve these technology aspects. Since the quadrant includes a range of sophisticated software designed for performing managerial functions in foodservice operations (e.g., production scheduling software), poor performance in these areas would cause dissatisfied individual computing experiences.

The fourth quadrant, *Possible Overkill*, captured 4 information technology (IT) applications, including "presentation/graphics package", "database management package", "CD/DVD ROM", and "fax machine." This indicated that they were rated as lower than the average of importance, and that the satisfaction level was higher than average. These technologies represented software packages for information/data organization as well as technological devices for information/data dissemination and storage. They tend to be relatively highly standardized across foodservice organizations, not showing a strong variation of their quality and performance. Therefore, in order to take advantages of those technologies in improving the process of job-related tasks, efforts should be focused towards maintaining high standards without over-utilizing resources in the area, while maintaining the current satisfaction level.

Individual Perceptions of Technology

Research question two asked, "What are the individual perceptions of technology that affect the adoption of new information technology by college and university foodservice administrators?" The respondents indicated that "I think it is appropriate for

my organization to adopt new information technology" was the strongest agreement that would influence the way one would feel about their inclined technology adoption behavior. On the other hand, the majority of the respondents disagreed with the statement "My superiors expect me to use new information technologies", "My boss does not require me to use new information technologies", and "Among my peers, I am usually the first to try out new information technology."

Thirteen items out of fourteen items were factor analyzed, resulting in four underlying dimensions. As proven in prior studies (e.g., Agarwal & Prasad, 1998a; Agarwal & Prasad, 1998b; Moore & Benbasat, 1991), all four underlying dimensions were grouped as the same factors. The factors were termed "Perceived Innovativeness" (factor 1), "Perceived Voluntariness" (factor 2), "Perceived Compatibility" (factor 3), and "Perceived Awareness" (factor 4).

The multiple regression analysis results in this study suggested that "Perceived Innovativeness", "Perceived Voluntariness", and "Perceived Awareness" showed an influential impact on the probability of adopting new information technology (IT) at work. Importantly, "Perceived Innovativeness" had the strongest impact on the inclined technology adoption behavior of college and university foodservice administrators.

Organizational Computing Supports

Research question three asked, "How do organizational computing supports influence the desire to adopt new information technology?" The statements highly evaluated by respondents included "A specific person or group is available for assistance with hardware difficulties", "A specific person or group is available for assistance with

software difficulties", "Guidance is available to me in the selection of hardware, software, printers, and other equipments." Relatively, the statements with the lowest mean scores, rated by the participating college and university foodservice administrators, were "Community agencies/businesses provide incentives for the adoption of new information technologies" and "Technology vendors promote new information technologies by offering free training sessions."

The principal component analysis with VARIMAX rotation procedure was used to generate the factors underlying the 13 statements of internal and external organizational computing supports. The derived four factors were labeled as "Internal Support" (factor 1), "University Support" (factor 2), "Practical Support" (factor 3), and "Technical Support" (factor 4).

In this study, there was no statistical relationship between the inclined technology adoption behavior and the overall level of organizational computing support. The results were consistent with prior empirical evidence (e.g., Igbaria, 1990; Igbaria, Guimaraes, & Davis, 1995; Igbaria, Parasuraman, and Baroudi, 1996; Henry and Stone, 1995; Srinivasan, Lilien, & Rangaswamy, 2002). Organizational computing supports, such as top management support and internal support, had a significant impact on encouragement and allocation of adequate resources for creating a favorable computing environment rather than a direct impact on the technology adoption behavior. Rather, the organizational-level supports were directly related to the formation of individual users' constructive perception and attitudes towards information systems by creating a supportive climate and providing sufficient resources for future technology adoption behavior.

Technology Motivations

Research question four asked, "What are the motivational factors of college and university foodservice administrators when adopting new information technology?" The important factors that would motivate foodservice administrators to adopt new technology applications for their job-related tasks were "faster information/data processing", "easier access to information/data", and "faster retrieval and delivery of documents." On the other hand, the majority of the respondents were not motivated by the following items: "reduced travel expenses", "reduced operational costs", and "increased opportunities for advancement."

Six underlying dimensions comprising 24 attributes were derived from the factor analysis. The six factors were termed: "Enhanced Information Access" (factor 1), "Attractive Working Environment" (factor 2), "Strategic Initiatives" (factor 3), "Enhanced Communication" (factor 4), "Reduced Costs" (factor 5), and "Improved Daily Operation" (factor 6).

The multiple regression analysis results in this study suggested that "Enhanced Information Access", "Strategic Initiatives", and "Reduced Costs" showed a significant impact on the adoption of new information technology for job-related tasks.

Technology Inhibitors

Research question five asked, "What are the inhibiting factors college and university foodservice administrators face that de-motivate the intention to adopt new information technology?" The respondents indicated that "lack of funding", "too costly", and "difficulty of obtaining financing for technology investment" were most important

inhibitors that would limit them to adopt new IT applications at work. On the other hand, they were not limited by the item "lack of confidence in computerized systems", "low security and privacy", and "personal resistance to new technology."

The factor analysis indicated that a seven-factor solution was appropriate. The derived seven dimensions of technology inhibitors were "Financial Consciousness" (factor 1), "Lack of Perceived Assurance" (factor 2), "Lack of Computing Support" (factor 3), "Inadequate Awareness" (factor 4), "Personal Opposition" (factor 5), "Inactive Involvement" (factor 6), and "Insufficient Hardware" (factor 7).

According to the results of regression analysis, "Financial Consciousness", "Inadequate Awareness", and "Inactive Involvement" showed a significant negative influence on the college and university foodservice administrators' inclined behavior of new technology adoption. The high ranking of "Inadequate Awareness" and "Inactive Involvement" suggested those to be powerful predictive elements in determining the likelihood of adopting new information technology at work.

Differences by Demographic Profiles and Behavioral Characteristics

Research question six asked "Are there any significant differences in the dimensions of individual perceptions of technology, organizational computing supports, technology motivations, and technology inhibitors between college and university foodservice administrators with different demographic profiles and behavioral characteristics?" The results of the one-way analysis of variance (ANOVA) reported that college and university foodservice administrators with different demographic profiles and behavioral characteristics showed significantly different levels of perceptions towards the

four individual-level factors and organizational-level factors. There were several inconsistencies among the respondents' perceptions with respect to different demographic profiles and behavioral characteristics.

For instance, respondents with a relatively shorter period of Internet usage at work showed more positive perceptions towards "Perceived Voluntariness", while respondents with longer period of Internet usage at work indicated more constructive perceptions towards "Perceived Compatibility." The results implied that users who relatively less exposed to technology felt a high level of enjoyment which might influence a voluntary use of technology. While users who were relatively more exposed to technology tended to consider whether a particular technology fits existing value and workstyle.

As for the motivations and inhibitors, the results of the ANOVA provided somewhat consistent research outcomes based on gender, age, educational level, and prior Internet experience at work. According to the results of the ANOVA tests, female administrators were highly motivated by "Enhanced Information Access" and "Attractive Working Environment" more so than their male counterparts. In addition, relatively younger administrators tended to be motivated by "Enhanced Information Access", "Attractive Working Environment", "Reduced Costs", and "Improved Daily Operation", than their relatively older counterparts. Regarding the perceived differences of the inhibiting factors, female respondents were more discouraged by "Lack of Computing Support" than their male counterparts. In addition, relatively younger respondents were also highly discouraged by "Lack of Computing Support" more so than their relatively older counterparts.

Hypotheses Tests

The intentions to adopt new information technology (IT) at work were directly related to individual-level factors (i.e., individual perceptions of technology), motivational factors (i.e., technology motivations), and inhibiting factors (i.e., technology inhibitors), but not to the organizational-level factors (i.e., organizational computing supports). The variables and underlying dimensions of the four technology factors (i.e., individual perceptions of technology, organizational computing supports, technology motivations, and technology inhibitors) are shown in Tables 14 through 21. The statistical relationship between the intentions to adopt new information technology (IT) and the four technology factors are shown in Tables 22 through 25. Furthermore, the regression analysis results are shown in Table 26, which indicates the collective impacts of the four technology factors on the adoption behavior. The level of significance was set at $p<0.05$. Null hypothesis of $H_{3o,}$ failed to reject, but null hypotheses of H_{2o}, H_{4o}, and H_{5o} were rejected. The findings of the results indicated that the college and university foodservice administrators' likelihood of adopting new information technology at work was statistically predicted by individual perceptions of technology, technology motivations, and technology inhibitors, but not by organizational computing supports.

The one-way analysis of variance (ANOVA) was used to determine whether there was a significant mean difference in the four technology factors across respondents with different demographic profiles and behavioral characteristics. To empirically test the difference, the results of the ANOVA tests are shown in Tables 27 through 30. Based on a series of the ANOVA test results, it is was found that significant difference exist with some demographic profiles or technology behaviors; while no significant differences

were also found with other demographic profiles or behavioral characteristics. Thus, the null hypothesis of H_{6o} which proposed that "there is no significant difference in the technology dimensions among foodservice administrators with different demographic profiles and technology characteristics" was rejected for this study.

Implications

This study investigated the human-aspects of information technology related to individual perceptions and organizational environments. First, this study identified a demonstrated relatively considerable gap between the perceived importance and satisfaction level of information technology applications. With respect to the factors affecting the adoption behavior, the study examined a series of relationships that previously had either been posited with little proof or had created ambiguity in response to the foodservice professionals' actual needs and perceptions. In particular, this study showed that individual perceptions of technology, technology motivations, and technology inhibitors played a significant role in forming the administrators' behavioral intentions to adopt new technologies. The findings have critical implications for university administration, technology vendors/marketers, and higher educational institutions.

For university administration, information resulting from this study can be used to understand campus dining administrators' preferences, perceptions, and behavioral intentions associated with technology usage, adoption, and implementation. The findings in the study suggested that campus dining professionals were frequently discouraged by realizing the financial situation of their own foodservice units as well as their institution

(e.g., lack of funding, too costly, difficulty of obtaining financing), their lacking participation in technology implementation (e.g., lack of user participation in technology planning), and their existing inadequate hardware (e.g., outdated hardware, lack of compatible hardware), when adopting a new innovation. A process of budgeting or strategic planning for an educational institution should be designed to appeal to the foodservice administrators' concerns to initiate financial supports along with performance-based incentives in purchasing or upgrading IT applications as well as to be professionally involved with the planning of campus-wide technology developments.

This study also determined the perceived level of importance and satisfaction of currently adopted information technology (IT) applications through an Importance-Performance Analysis (IPA). Based on the shown importance and satisfaction level, university administration should strategically allocate resources and spend efforts in developing information technology (IT) applications to offer an "extensive" as well as "balanced" selection of IT applications contributing to campus dining operations.

For technology vendors and markers, as indicated above, the foodservice administrators hesitated to adopt new innovations when recognizing the financial limitation of spending with a predetermined budget. Similarly, they were highly motivated by the expectations of reducing costs (e.g., reduced operational costs and travel expenses) as well as strategic initiatives (e.g., easier new products/services additions, improved customer relations, enhanced utilization of existing equipment). The findings implied that technology vendors and marketers should be concerned with their cost-conscious and strategy-oriented attitudes towards technology adoption, even if the foodservice administrators should spend and invest for technology adoption within a pre-

approved budget limit. The technology offerings based on reasonably priced, simply upgradeable, and easily compatible with their existing hardware and devices will greatly appeal to their desire to adopt new job-related technology innovations.

For higher educational institutions, surprisingly, about half of the participating college and university foodservice administrators didn't receive any learning opportunities regarding technologies through formal courses at a college or university. Approximately 77% of the respondents were not exposed to distance learning opportunities. That implied that there was much room for developing an educational or certificate programs in the areas for foodservice professionals, including, managerial-level professionals, staff assistants, and frontline employees in a wide range of foodservice organizations. In addition, individual perceptions and attitudes towards technology (e.g., personal innovativeness, perceived voluntariness, and perceived awareness to innovations) had a significant impact on their inclined technology adoption behavior. Consistent with the importance of individual attitudes in an innovation diffusion process (Rogers, 1985; 1994), technology learning program developers in the institutions made a concentrated effort to develop continuing education programs in the areas of building technology competency and expertise as well as improving self-assurance level in computerized systems.

Thus, a set of related parties, university administration, technology vendors/marketers, and higher educational institutions can utilize findings of this research in developing favorable computing environments which would improve and develop the needs for college and university foodservice professionals as well as the potentials of campus dining operations in the industry's competitive situation.

Conclusions

A total of 207 voting delegates of the National Association of College and University Food Services (NACUFS) participated in this study. Their positions encompassed various types of administrative roles as director, general manager, assistant manager, and so forth. It is significant to determine the behavioral intentions to adopt new technological innovations of the administrators who actually plan, implement, adopt, and operate technology-oriented systems. Through understanding of the human-aspects of information technology related to individual perceptions and organizational environments, it is probable to predict and explain the inclined behavior of new technology adoption in the future.

As a result, the study provided new insights into the technology adoption behavior in the institutional environment. The first primary concern was "How college and university foodservice administrators perceive their current technologies for foodservice operations?" Unfortunately, they were not satisfied with the information technology (IT) applications currently adopted in their organizations. University administration should focus on IT applications related to the core functions of campus dining operations, such as foodservice/nutrition software packages and cafeteria operation package, rather than overspending resources in relatively standardized IT applications, such as CD/DVD ROM and fax machines. The second primary concern for this study was "Given the unfavorable perceptions of currently utilized technologies, what drives the foodservice administrators' inclined behavior of new technology adoption?" Three factors, individual perceptions of technology, technology motivations, and technology inhibitors, affected

their behavioral intentions. Importantly, as indicated above, since it has been reported that the insignificant factor, organizational computing supports, had some positive relationships with individual perceptions and attitudes towards new innovations, all factors virtually have been directly or indirectly related to the adoption behavior in the study. Additionally, inconsistencies occurred between the user's demographic profiles and behavioral characteristics and the four dimensions of technology attributes.

In conclusion, the foodservice industry is highly competitive, as the products and facilities are relatively homogenous compared with various types of establishments in the foodservice industry, particularly commercial foodservice organizations. What differentiates one setting from another is not only the actual services and products, but also the quality of services and products provided by foodservice professionals. To ensure patronage from the "captive" campus dining customers versus outside commercial foodservices, all aspects of the quality of foodservice outcomes should be thoroughly and consistently maintained by providing "well-updated" and "well-compatible" information technology (IT) applications.

Recommendations

Based on the findings of this study, the following four recommendations are offered for consideration:

1) University administration might need to reallocate financial resources and strategic efforts in developing information technology (IT) applications based on the demonstrated level of perceived importance and satisfaction, as perceived by college and university foodservice administrators.

2) More college and university foodservice administrators should attempt to professionally and voluntarily participate in a strategic planning process of campus-wide technology developments. Since the foodservice professionals identified the lack of participation in the process as one of barriers in accepting new technological innovations as well as the role of campus foodservices has dramatically emerged as one of most significant resource-generating units throughout a campus, an influential voice from the foodservice operation should be needed.
3) Since a significant portion of college and university administrators did not received formal technology learning opportunities from a college or university, higher educational institutions should develop various types of courses or certificate programs in the area supporting a high quality knowledge and expertise of technology.
4) Technology vendors/marketers need to advertise and promote the recognition of expected benefits of a particular technology application relative to invested costs. Persuading and convincing college and university foodservice administrators to believe that technology is cost-effective and compatible with existing hardware or devices would be the most important component in the promotion. Since the college and university foodservice administrators were concerned about financial limitation in the institutional environment, a variety of discounts or incentives involving practicability and effectiveness would be helpful in creating a high level of repeated patronage by the foodservice administrators.

Future Research

This study explored the determinants of the adoption of new information technology (IT) in the context of college and university foodservices. First, the study determined the perceived importance and satisfaction level of a wide range of information technology applications currently adopted in the foodservice operations, as perceived by the foodservice administrators. Given the perceptions of their existing IT applications, this study aimed to assess the impact of individual perceptions of technology, perceived internal and external computing support, motivation factors, and inhibiting factors on the adoption of new technology applications in the future. A series of the findings of the research led to several recommendations for future research.

First, qualitative inquiry fits to develop an initial understanding and sound pedestal for further decision making, based on the quality, meaning, context, and image of reality in what people actually do. Since quantitative analysis could not provide a more in-depth examination of attitudinal changes and behavioral patterns of college and university foodservice administrators regarding technology adoption, usage, and implementation behavior, qualitative research could be an effective methodology in the situation. A series of interviews and focus group discussions with the NACUFS annual conference or the National Restaurant Association (NRA) show, for example, would be a method to obtain critical information for building well-structured computing environments for the college and university foodservice professionals.

Second, this study provided new insights into the determinants of behavioral intentions to adopt new information technology (IT), particularly in the context of college and university foodservices. Importantly, the study attempted to include two

distinguishable factors in the conceptual model, motivations and inhibitors of technology adoption. The strongest motivating factor in the study was faster information/data processing. The strongest inhibiting factors were lack of funding, too costly, and difficulty of obtaining financing for technology investment. These factors need to be validated in other settings, for example, in commercial foodservice firms, and in other service-oriented firms, such as hotels, resorts, theme parks, as well as in firms that have moved more recently into IT, and even in other countries (Cragg & King, 1993).

Third, a future study might replicate this study with different levels of managers and employees in noncommercial foodservices as well as in commercial foodservice segment to discern if perceived similarities or differences exist between managerial level IT users and non-managerial level users and their commercial segment counterparts. Since this study focused on the higher managerial level IT users in the institutional foodservice setting, it could be contributory and meaningful to apply the same conceptual model to different populations within the foodservice industry for multi-level comparisons.

Finally, organizational-level factors (i.e., internal computing support, university support, external technical support, and external practical support) did not show any direct significant influence on the adoption behavior. However, as indicated in prior empirical evidence, it has been noted that, for example, the factors related to internal computing support offered by information center (IC) (e.g., Amoroso & Cheney, 1991; Bergeron, Rivard, & De Serre, 1990; Shaw, DeLone, & Niederman, 2002) have contributed to creating some favorable computing environments within an organization rather than a direct relationship with the inclined adoption behavior. Thus, the

organizational-level dimensions are expected to help individual users shape further positive perceptions towards technology (e.g., perceived voluntariness) which subsequently affect technology adoption behavior. To hypothesize causal relationships among variables and to test the complicated causal models with a linear equation system, structural equation modeling (SEM) method will be applied for the future study.

REFERENCES

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly*, 24(4), 665-694.

Agarwal, R., & Prasad, J. (1997). The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. *Decision Sciences*, 28(3), 557-582.

Agarwal, R., & Prasad, J. (1998a). The antecedents and consequences of user perceptions in information technology adoption. *Decision Support Systems*, 22(1), 15-29.

Agarwal, R., & Prasad, J. (1998b). A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research*, 9(2), 204-215.

Agarwal, R., & Prasad, J. (2000). A field study of the adoption of software process innovations by information systems professionals. *IEEE Transactions on Engineering Management*, 47(3), 295-308.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice-Hall.

Aladwani, A. (2002). Organizational actions, computer attitudes, and end-user satisfaction in public organizations: An empirical study. *Journal of End User Computing*, 14(1), 42-49.

Alavi, M. (1993). An assessment of electronic meeting systems in a corporate setting. *Information & Management*, 25(4), 175-182.

Amoroso, D., & Cheney, P. (1991). Testing a causal model of end-user application effectiveness. *Journal of Management Information Systems*, 8(1), 65-89.

Ayres, K., & Partlow, C. (1999). Application of telemarketing in university foodservices. *Journal of Restaurant & Foodservice Marketing*, 3(2), 37-47.

Baddoo, N., & Hall, T. (2002). Motivators for software process improvement: an analysis of practitioners' views. *Journal of Systems and Software*, 62(2), 85-96.

Baddoo, N., & Hall, T. (2003). De-motivators for software process improvement: an analysis of practitioners' views. *Journal of Systems and Software*, 66(1), 23-33.

Baker, W. H. (1987). Status of information management in small businesses. *Journal of Systems Management*, 38(4), 10-15.

Bartlett, A. L., Probber, J. K., & Scerbo, F. B. (1999). Student employees in university food service: Job design, job characteristics and job satisfaction. *Journal of the National Association of College & University Foodservices*, 21, 14-29.

Bednar, C., & Pangan, T. (1997). Computer use in foodservice departments of small hospitals in Texas. *Journal of Foodservice Systems*, 10, 1-7.

Bergeron, F., Rivard, S., & Serre, L. (1990). Investigating the support role of the information center. *MIS Quarterly*, 14(3), 247-260.

Brancheau, J. C., & Wetherbe, J. C (1990). The adoption of spreadsheet software: Testing innovation diffusion theory in the context of end-user computing. *Information Systems Research*, 1(2), 115-143.

Breiter, D., & Hoart, H. (2000). Competencies in foodservice information technology expected by the foodservice industry of graduates of hospitality bachelor's degree programs in the United States. *Journal of Hospitality & Tourism Education*, 12(2), 11-17.

Buzalka, M. (2003). 2003 state of the industry: A cross-segment business forecast. *Food Management*, 38(2), 34-50.

Chapman, R. (1993). Brand performance comparatives. *Journal of Product and Brand Management*, 2(1), 42-50.

Chau, P., & Hu, P. (2001). Information technology acceptance by individual professionals: A model comparison approach, *Decision Sciences*, 32(4), 699-719.

Cheney, P., Mann, R., & Amoroso, D. (1986). Organizational factors affecting the success of end-user computing. *Journal of Management Information Systems*, 3(1), 65-80

Cheron, E., McTavish, R., & Perrien, J. (1989). Segmentation of bank commercial markets. *International Journal of Bank Marketing*, 7(6), 25-30.

Chi, C., & Brown, N. (1996). Attributes affecting purchase of residence hall meal plans by Pacific-Asian students at a land-grant institution. *Journal of the National Association of College & University Foodservices*, 18, 27-41.

Chiasson, M, & Lovato, C. (2001). Factors influencing the formation of a user's perceptions and use of a DSS software innovation. *Data Base for Advances in Information Systems*, 32(3), 16-35.

Chin, W., & Gopal, A. (1995). Adoption intention in GSS: Relative importance of beliefs. *Data Base for Advances in Information Systems*, 26(2&3), 42-64.

Churchill, G. (1996). *Basic marketing research* (3rd ed.). Orlando, FL: The Dryden Press.

Cobanoglu, C. (2001). *Analysis of business travelers' hotel selection and satisfaction.* Unpublished doctoral dissertation, Oklahoma State University, Stillwater, Oklahoma, United States.

Cobanoglu, C., Corbaci, K., Ryan, W. (2001). A comparative study: The impact of technology in lodging properties in the United States and Turkey. *International Journal of Hospitality Information Technology*, 2(1), 23-40.

Cobanoglu, C., Warde, B., & Moreo, P. (2001). The comparison of mail, fax, and web-based survey methods. *International Journal of market research*, 43(4), 441-452.

Collins, G. (1994). *Hospitality information technology: Learning how to use it.* (2nd ed.). Dubuque, IA: Kendall/Hunt Publishing Company.

Compeau, D., & Higgins, C. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19(2), 189-211.

Cooper, R. B., & Zmud, R. W. (1990). Information technology implementation research: A technological diffusion approach. *Management Science*, 36(2), 123-139.

Cornyn, J., & Coons-Fasano, J. (1995). *Noncommercial Foodservice: An administrator's handbook*. New York, NY. John Wiley & Sons.

Couper, M., Traugott, M., & Lamias, M. (2001). Web survey design and administration. *Public Opinion Quarterly*, 65(2), 230-253.

Cragg, P. B., & King, M. (1993). Small-firm computing: Motivators and inhibitors. *MIS Quarterly*, 17(1), 47-60.

D'Ambra, J. & Rice, R. (2001). Emerging factors in user evaluation of the World Wide Web. *Information & Management*, 38(6), 373-384.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.

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

Deeks, J. (1976). *The Small Firm Owner-Manager*. New York, NY: Praeger

Delone, W. (1981). Firm size and characteristics of computer use. *MIS Quarterly*, 5(4), 65-77.

Delone, W. (1988). Determinants of success for computer usage in small business. *MIS Quarterly*, 12(1), 51-61.

Department of Agriculture (2002). *Agricultural Statistics*. retrieved November 20, 2003, from http://www.usda.gov

Dillman, D. (1999). Mail and Internet surveys: The tailored design method (2nd ed). New York, NY: John Wiley and Sons.

Dillman, D., & Tarnai, J. (1988). Administrative issues in mixed mode surveys. In Groves, R. M., Biemer, P. P., Lyberg, L. E., Massey, J. T., Nicholls, W. L., & Wakesberg, J. (Eds.). *Telephone survey methodology*. New York, NY: John Wiley and Sons.

Eggers, D. M., Villani, J., & Andrews, R. (2000). Third-party information providers and innovative environmental technology adoption. *American Behavioral Scientist*, 44(2), 265-276.

Essex, P., Magal, S., & Masteller, D. (1998). Determinants of Information Center Success. *Journal of Management Information Systems*, 15(2), 95-117.

Ettlie, J.E., & Vellenga, D.B. (1979). The adoption time period for some transportation innovations. *Management Science*, 25(5), 429-443.

Farhoomand, F., & Hrycyk, G. (1985). The feasibility of computers in the small business environment. *American Journal of Small Business*, 9(4), 15-22.

Fichman, R.G., & Kemerer, C.F., (1993). Adoption of software engineering process innovations: The case of object-orientation. *Sloan Management Review*, 34(2), 7-22.

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

Flynn, L., & Goldsmith, R. (1993). A causal Model of consumer involvement: Replication and critique. *Journal of Social Behavior and Personality*, 8(6), 129-142

Food Management (1997, October). Colleges & universities, 32(10), 32-45.

Garand, M., & McCool, A. (1985). Computer technology in college and university foodservices. *Journal of the National Association of College & University Foodservices*, 11(1), 11-14.

Gatignon, H., & Robertson, T. (1989). Technology diffusion: An empirical test of competitive effects. *Journal of Marketing*, 53(1), 35-49.

Gay, L. R., & Airasian, P. (2000). *Educational research: Competencies for analysis and application* (6th ed.). Upper Saddle River, NJ: Prentice Hall.

Ghorab, K. (1995). The relationship between bank managers' beliefs and perceptions towards automation of services: a comparative study of the UAE national vs foreign banks. *International Journal of Information Management*, 15(6), 437-450.

Go, F., & Zhang, W. (1997). Applying importance–performance analysis to Beijing as an international meeting destination. *Journal of Travel Research*, 35(4), 42–49.

Grover, V., & Goslar, M. (1993). The initiation, adoption, and implementation of telecommunications technologies in U.S. organizations. *Journal of Management Information Systems*, 10(1), 141-163.

Guimaraes, T., & Yoon, Y., & Clevenson, A. (1996). Factors important to expert systems success a field test. *Information & Management*, 30(3), 119-130.

Hair, F., Anderson, R., Tatham, R., & Black, W. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Hartwick, J., & Barki, H. (1994). Explaining the role of user participation in information system use. *Management Science*, 40(4), 440-465.

Henry, J. W., & Stone, R. W. (1995). A structural equation model of job performance using a computer-based order entry system. *Behaviour and Information Technology, 14*(3), 163-173.

Hoffer, J. A. & Alexander, M. B. (1992). The diffusion of database machines. *Data Base*, 23(2), 13-20.

Hurst, A. (1997). Emerging trends in college and university food service. *Journal of College & University Foodservice*, 3(3), 17-32.

Igbaria, M. (1990). End-user computing effectiveness: A structural equation model. *Omega International Journal of Management Science*. 18(6), 637-652.

Igbaria, M. (1993). User acceptance of microcomputer technology: An empirical test. *Omega International Journal of Management Science*. 21(1), 73-90.

Igbaria, M., & Chakrabarti, A. (1990) Computer anxiety and attitudes towards microcomputer use. *Behavior and Information Technology*, 9(3), 229-241.

Igbaria, M., Guimaraes, T., & Davis, G. (1995). Testing the Determinant of microcomputer usage via a structural equation model. *Journal of Management Information Systems*, 11(4), 87-114.

Igbaria, M., Parasuraman, S., & Baroudi, J. J. (1996). A motivational model of microcomputer usage. *Journal of Management Information Systems*, 13(1), 127-143.

Igbaria, M., Zinatelli, N., Cragg, P., & Cavaye, A. (1997). Personal computing acceptance factors in small firms: A structural equation model. *MIS Quarterly*, 21(3), 279-305.

Jones, M. C., & Berry, R. L. (2000). Knowledge about information technology: A cross-cultural comparison. *Journal of Education for Business*, 75(3), 173-177.

Kaiser, K., & Srinivasan, A. (1982). User-analyst differences: An empirical investigation of attitudes related to systems development. *Academy of Management Journal*, 25(3), 630-646.

Kasavana, M., & Cahill, J. (1992). *Managing computers in the hospitality industry* (2nd ed.). East Lansing, MI: American Hotel & Motel Association.

Kennedy, K. N., & Deeter-Schmelz (2001). Descriptive and predictive analyses of industrial buyers' use of online information for purchasing. *Journal of Personal Selling & Sales Management*, 21(4), 279-290.

Kerwin, K. (2002). The role of the Internet in improving healthcare quality. *Journal of Healthcare Management*, 47(4), 225-236.

Kettinger, W., & Grover, V. (1997). The use of computer-mediated communication in an interorganizational context. *Decision Sciences*, 28(3), 513-555.

King, J., & Schrems, E. (1978). Cost-benefit analysis in information systems development and operation. *ACM Computing Survey*, 10(1), 19-34.

King, M., & McAulay, L. (1989). Information technology and the accountant: a case study. *Behaviour and Information Technology*, 8(2), 109-123.

King, W. R., & Grover, V., & Hufnagel, E. (1989). Using information technology for sustainable competitive advantage: Some empirical evidence. *Information & Management*, 17(2), 87-93.

King, W. R., & Teo, T. (1996). Key dimensions of facilitators and inhibitors for the strategic use of information technology. *Journal of management Information Systems*, 12(4), 35-53.

Kirton, M. J. (1976). Adaptors and innovators: A description of a measure. *Journal of applied Psychology*, 61(5), 622-629.

Kwon, T. H., & Zmud, R. W. (1987). Unifying the fragmented models of information systems implementation. In *Critical Issues in Information Systems Research* (Eds, Boland, R. J., & Hirschheim, R. A.). Chichester, UK: John Wiley.

Kudyba, S., & Diwan R. (2002). *Information technology, corporate productivity, and the new economy*. Westport, CT: Quorum Books.

Lederer, A., Maupin, D., Sena, M., & Zhuang, Y. (2000). The technology acceptance model and the World Wide Web. *Decision Support Systems*, 29(3), 269-282.

Lederer, A., & Spencer, V. (1988)**.** The effective information center: targeting the individual user for success**.** *Journal of Systems Management*, 39(1), 22-27.

Leonard-Barton, D., & Deschamps, I. (1988). Managerial influence in the implementation of new technology. *Management Science*, 34(1), 1252-1265.

Lucas, H. (1978). Empirical evidence for a model of implementation. *MIS Quarterly*, 2(2), 27-42.

Lucas, H. (1999). *Information technology and the productivity paradox*. New York, NY: Oxford University Press.

McBride, N., & Wood-Harper, T. (2002). Towards user-oriented control of end-user computing in large organizations. *Journal of End User Computing*, 14(1), 33-41.

McCool, A., & Garand, M. (1986). Computer technology in institutional foodservice. *Journal of the American Dietetic Association*, 86(1), 48-56.

McCool, A., Smith, F., & Tucker, D. L. (1994). *Dimensions of noncommercial foodservice management*. New York, NY: Van Nostrand Reinhold.

McDermott, C., & Stock, G. (1999). Organizational culture and advanced manufacturing technology implementation. *Journal of Operations Management*, 17(5), 521-533.

McLean, E. R., Kappelman, L. A., & Thompson, J. P. Converging end-user and corporate computing. (1993). *Communications of the ACM,* 36(12), 79-92.

McManus, D. J., Sankar, C. S., Carr, H. H., & Ford, F. N. (2002). Intraorganizational versus interorganizational uses and benefits of electronic mail. *Information Resources Management Journal*, 15(3), 1-13.

Magal, S., Carr, H., & Watson, H. (1988). Critical success factors for information center managers. *MIS Quarterly*, 12(3), 413-425.

Malone, S. (1985). Computerizing small business information systems. *Journal of Small Business Management*, 23(2), 10-16.

Martilla, J. A., & James, J. C. (1977). Importance-performance analysis. *Journal of Marketing,* 41 (1), 77-79.

Martin, J., Sneed, J., & White, G. (1992). School food service in the year 2000 and beyond. *School Food Service Research Review*, 16(2), 101-106.

Mathieson, K. (1991). Predicting user Intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research*, 2(3), 173-191.

Matsumoto, J. (2001, October). Colleges/Universities. *Restaurants and Institutions*, 111(25), 48.

Midgley, D. F., & Dowling, G. R. (1978). Innovativeness: the concept and its measurement, *Journal of Consumer Research*, 4(4), 229-242.

Miller, J. (1989). Survey of computer technology in foodservice management education. *Journal of the American Dietetic Association*, 89(4), 1279-1281.

Millman, Z., & Hartwick, J. (1987). The impact of automated office systems on middle managers and their work. *MIS Quarterly,* 11(4), 479-491.

Mirani, R., & King, W. (1994). The development of a measure for end-user computing support. *Decision Sciences*, 25(4), 481-498.

Mirani, R., & Lederer, A. L. (1998). An instrument for assessing the organizational benefits of IS projects. *Decision Sciences*, 29(4), 803-838.

Mitchell, M. & Jolley, J. (2001). *Research design explained* (4th). Fort Worth, TX: Harcourt College Publishers.

Montazemi, A. (1988). Factors affecting information satisfaction in the context of the small business environment. *MIS Quarterly,* 12(2), 239-256.

Moore, G. C. (1987). End user computing and office automation: A diffusion of innovations perspective. *INFOR*, 25(3), 214-235.

Moore, G. C., & Benbasat, I. (1991). Developing of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, 2(3), 192-222.

Nunnally, J. C. (1967). *Psychometric theory*. New York, NY: McGraw Hill.

Nunnally, J. C., & Bernstein, I. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw Hill.

O'Hearn, D. L. (1998). *Computer skills needed by entry-level clinical management and foodservice systems management dietitians*. Unpublished master's thesis, Texas Woman's University, Denton, Texas, United States.

Oh, H. (2001). Revisiting importance–performance analysis. *Tourism Management*, 22(6), 617-627.

Parks, S. (2002). The fractured ant hill: A new architecture for sustaining the future. *Journal of the American Dietetic Association*, 102(1), 33-38.

Pérez, M., Sánchez, A., & Luis Carnicer, M. (2002). Benefits and barriers of telework: perception differences of human resources managers according to company's operations strategy. *Technovation*, 22(12), 775-783.

Pitt, L. F., & Jeantrout, B. (1994). Management of customer *expectations* in service firms: A study and a checklist. *Service Industries Journal*, 14(2), 170-189.

Premkumar, G., & Potter M. (1995). Adoption of computer-aided software engineering (CASE) technology: an innovative adoption perspective. *Data Base for Advances in Information Systems*, 26(2-3), 105-124.

Premkumar, G., & Ramamurthy, K. (1995). The role of organizational and interorganizational factors on decision mode for adoption of interorganizational systems. *Decision Sciences*, 26(3), 303-336.

Premkumar, G., Ramamurthy, K., & Nilakanta, S. (1994). Implementation of Electronic Data Interchange: An innovation diffusion perspective. *Journal of Management Information Systems*, 11(2), 157-186.

Premkumar, G., & Roberts, M. (1999). Adoption of new information technologies in rural small businesses. Omega *International Journal of Management Science*, 27(4), 467-484.

Qu, H., & Tsang, N. (1999). Service quality gap in China's hotel industry: A study of tourist perceptions and expectations. *Journal of Hospitality and Tourism Research*, 22(3), 252-267.

Raghunathan, B., Raghunathan, T., & Tu, Q. (1998). An empirical analysis of the organizational commitment of information systems research. Omega *International Journal of Management Science*, 26(5), 569-580.

Rai, A., & Patnayakuni, R. N. (1996). A structural model of CASE adoption behavior. *Journal of Management Information Systems*, 13(2), 205-234.

Ranchhod, A., & Zhou, F. (2001). Comparing respondents of e-mail and mail surveys: understanding the implications of technology. *Marketing Intelligence & Planning*, 19(4), 254-262.

Raymond, L. (1985). Organizational characteristics and MIS success in the context of small business. *MIS Quarterly*, 9(1), 37-52.

Rhoades, P. (1995). The personal productivity and use of technology of Louisiana dietitians. *Journal of Foodservice Systems*, 8, 155-164.

Rivard, S., & Huff, S. (1988). Factors of success for end-user computing. *Communications of the ACM*, 31(5), 552-561.

Rivers, L. & Dart, J. (1999). The acquisition and use of sales force automation by mid-sized manufacturers. *Journal of Personal Selling & Sales Management*, 19(2), 59-73.

Rockart, J., & Flannery, L. (1983). The management of end-user computing. *Communications of the ACM*, 26(10), 776-784.

Rogers, E. M. (1983). *Diffusion of innovations*: New York, NY: The Free Press.

Rogers, E. M. (1995). *Diffusion of innovations (*4th ed.). New York, NY: The Free Press.

Ryan, W. (1992). *Identification and comparison of management skills required for single and multi-unit management in independently operated college and university food services*. Unpublished doctoral dissertation, Oklahoma State University, Stillwater, Oklahoma, United States.

Ryan, W. (2000). Enhancing the partnership: Campus dining and hospitality education programs. *Journal of the National Association of College & University Foodservices*, 22, 72-84.

Shaw, N., C., DeLone, W. H., & Niederman, F. (2002). Sources of dissatisfaction in end-user support: An empirical study. *The DATA BASE for Advances in Information Systems*, 33(2), 41-56.

Siguaw, J., Enz, C., & Namasivayam, K. (2000). Adoption of information technology in U.S. hotels: Strategically driven objectives. *Journal of Travel Research*, 39(2), 192-201.

Simmers, C. A., & Anandarajan, M. (2001). User satisfaction in the Internet-anchored workplace: An exploratory study. *Journal of Information Technology Theory and Application*, 3(5), 39-61.

Speier, C., & Venkatesh, V. (2002). The hidden minefields in the adoption of sales force automation technologies. *Journal of Marketing*, 66(3), 98-111.

SPSS (2003). *Statistical package for social sciences*, SPSS Institute.

Srinivasan, R., Lilien, G. L., & Rangaswamy, A. (2002). Technological opportunism and radical technology adoption: An application to e-business. *Journal of Marketing*, 66(3), 47-60.

Stewart, R. A., & Mohamed, S. (2003). Evaluating the value IT adds to the process of project information management in construction. *Journal of Automation in Construction*, 12(4), 407-417.

Stock, G., & McDermott, C. (2001). Organizational and strategic predictors of manufacturing technology implementation success: an exploratory study. *Technovation*, 21(1), 625-636.

Sutherlin, D., & Badinelli, K. (1993). The future of college and university foodservice: An environmental perspective. *Journal of College & University Foodservice*, 1(1), 53-61.

Tallon, P. P., Kraemer, K. L., & Gurbaxani, V. (2000). Executives' perceptions of the business value of information technology: A process-oriented approach. *Journal of Management Information Systems*, 16(4), 145-173.

Tayce, E., Gassenheimer, J., & Ingram, R. (1999). The necessity of a market segmentation strategy in a university food service setting. *Journal of the National Association of College & University Foodservices*, 21, 56-65.

The Chronicle of Higher education. (2002). *The Chronicle of Higher Education's 2002 Almanac*. Retrieved November 10, 2003, from http://www.chronicle.com

The National Association of College & University Food Services. (1998). *Professional Practices in College and University Food Services* (3rd ed.). East Lansing, MI: The National Association of College & University Food Services (NACUFS).

Thong, J., & Yap, C. (1995). CEO characteristics and information technology adoption in small businesses. *Omega The International Journal of Management Science,* 23(4), 429-442.

Thompson, R., & Cats-Baril, W. *Information technology and management* (2nd ed). New York, NY: McGraw Hill.

Tornatzky, L. G., & Klein, R. J. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *IEEE Transactions on Engineering Management*, EM-29, 28-45.

U.S. Government Printing Office. *The Economic Report of the President, 2001*. Retrieved December 20, 2003, from http://frwebgate.access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=162.140.64.45&filename=erp_b18.wais&directory=/diskb/wais/data/2001_erp

Van Hoof, H., & Combrink, T. (1998). U.S. lodging managers and the Internet. *Cornell Hotel & Restaurant Administration Quarterly*, 39(2), 46-54.

Venkatesh, V., & Davis, F. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186-204.

Walker, J. R. (1999). *Introduction to hospitality* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Warner, M. (1994). *Noncommercial, institutional, and contract foodservice management.* New York, NY. John Wiley & Sons.

Watkins, C. (2000, June). *The future of campus dining*. Food Management, 36(6), 22.

Winnans, C., & Brown, D. S. (1992). Some factors affecting elementary teachers' use of the computer. *Computers & Education*, 18(4), 301-309.

Yang, H. & Mason, R. (1998). *The Internet, value chain visibility, and learning.* Paper presented at the 31st Annual Hawaii International Conferences on System Sciences, Maui, HI.

Zaltman, G., Duncan, R., & Holbek, J. (1973). *Innovations and Organizations.* New York, NY: John Wiley & Sons.

Zhang, H., & Chow, I. (2004). Application of importance-performance model in tour guides' performance: Evidence from mainland Chinese outbound visitors in Hong Kong. *Tourism Management*, 25(1), 81-91.

Zienert, L. (1995). *Strategic uses of electronic mail in contemporary organizations: An exploratory study*. Unpublished doctoral dissertation, Auburn University, Auburn, Alabama, United States.

Zikmund, W. (2003). *Exploring marketing research* (8th ed.). Mason, OH: Thomson/South-Western

Zmud, R. W. (1979). Individual differences and MIS success: A review of the empirical literature. *Management Science*, 25(1), 966-979.

Zmud, R. W. (1984). Design alternatives for organizing information systems activities. *MIS Quarterly*, 8(2), 79-93.

APPDNDICES

APPENDIX A

COVER LETTER

COVER LETTER FOR WEB-BASED SURVEY METHOD

OKLAHOMA STATE UNIVERSITY

College of Human Environmental Sciences
School of Hotel and Restaurant Administration
210 HES West
Stillwater, Oklahoma 74078-6173
405-744-6713; Fax: 405-744-6200

December 4, 2003

Greetings,

We are asking you to participate in a study entitled "**Factors Influencing the Adoption of New Information Technology in College and University Foodservices**." Would you please share approximately 20 minutes of your time to complete this survey by **December 15, 2003**? Your input is extremely important to the outcome of the study. It will impact the planning and development of future technology learning programs in the context of college and university foodservices.

This study is being undertaken by an Oklahoma State University graduate student Kevin Kim, as he pursues his Ph.D. degree in the School of Hotel and Restaurant Administration. Your response is completely **voluntary** and will be kept strictly **confidential**. There will be no association between your information and the result of the study.

Thank you for participating in this project. If you have any questions regarding this survey, please feel free to contact Kevin Kim at (405) 332-0223 or e-mail at hyeonch@okstate.edu or you may contact Dr. Carol Olson, Institutional Review Board (IRB) Chair, 415 Whitehurst, Oklahoma State University, Stillwater, OK 74078, (405) 744-5700. If you want to receive a summary of the results of this study, please click at the end of this survey. We look forward to receiving your response. Thank you again.

To begin the survey, please click on the following link:
http://fp.okstate.edu/cheshrad/nacufs

Once you open the website, please be sure to maximize your browser window.

Sincerely,

Bill Ryan, Ed.D., R.D., L.D.
Associate Professor & Associate Director
School of Hotel and Restaurant Administration
Oklahoma State University
E-mail: bilryan@okstate.edu

Kevin Kim, M.S., M.B.A.
Doctoral Candidate
School of Hotel and Restaurant Administration
Oklahoma State University
E-mail: hyeonch@okstate.edu

COVER LETTER FOR MAIL SURVEY METHOD

OKLAHOMA STATE UNIVERSITY

College of Human Environmental Sciences
School of Hotel and Restaurant Administration
210 HES West
Stillwater, Oklahoma 74078-6173
405-744-6713; Fax: 405-744-6200

December 11, 2003

Greetings,

We are asking you to participate in a study entitled "**Factors Influencing the Adoption of New Information Technology in College and University Foodservices**." Would you please share approximately 20 minutes of your time to complete this survey by **December 23, 2003**? Your input is extremely important to the outcome of the study. It will impact the planning and development of future technology learning programs in the context of college and university foodservices.

This study is being undertaken by an Oklahoma State University graduate student Kevin Kim, as he pursues his Ph.D. degree in the School of Hotel and Restaurant Administration. Your response is completely **voluntary** and will be kept strictly **confidential**. There will be no association between your information and the result of the study.

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Please return your completed survey in the enclosed self-addressed envelope

Sincerely,

Bill Ryan, Ed.D., R.D., L.D.
Associate Professor & Associate Director
School of Hotel and Restaurant Administration
Oklahoma State University
Email: bilryan@okstate.edu

Kevin Kim, M.S., M.B.A.
Doctoral Candidate
School of Hotel and Restaurant Administration
Oklahoma State University
Email: hyeonch@okstate.edu

COVER LETTER FOR FIRST FOLLOW UP SURVEY (WEB-BASED)

OKLAHOMA STATE UNIVERSITY

College of Human Environmental Sciences
School of Hotel and Restaurant Administration
210 HES West
Stillwater, Oklahoma 74078-6173
405-744-6713; Fax: 405-744-6200

December 16, 2003

Greetings,

We are asking you again to participate in a study entitled "**Factors Influencing the Adoption of New Information Technology in College and University Foodservices**." Would you please share approximately 20 minutes of your time to complete this survey by **December 23**, 2003? If you have previously submitted a survey within the last month, please disregard. Your input is valued, and when combined with other responses should provide beneficial information for other ***NACUFS*** members. Information gathered to date has proven useful in refining this study.

This study is being undertaken by an Oklahoma State University graduate student Kevin Kim, as he pursues his Ph.D. degree in the School of Hotel and Restaurant Administration. Your response is completely **voluntary** and will be kept strictly **confidential**. There will be no association between your information and the result of the study.

Thank you for participating in this project. If you have any questions regarding this survey, please feel free to contact Kevin Kim at (405) 332-0223 or e-mail at hyeonch@okstate.edu or you may contact Dr. Carol Olson, Institutional Review Board (IRB) Chair, 415 Whitehurst, Oklahoma State University, Stillwater, OK 74078, (405) 744-5700. If you want to receive a summary of the results of this study, please indicate at the end of this survey. We look forward to receiving your response. Thank you again.

To begin the survey, please click on the following link:
http://fp.okstate.edu/cheshrad/nacufs

Once you open the website, please be sure to maximize your browser window

Sincerely,

Bill Ryan, Ed.D., R.D., L.D.
Associate Professor & Associate Director
School of Hotel and Restaurant Administration
Oklahoma State University
Email: bilryan@okstate.edu

Kevin Kim, M.S., M.B.A.
Doctoral Candidate
School of Hotel and Restaurant Administration
Oklahoma State University
Email: hyeonch@okstate.edu

COVER LETTER FOR SECOND FOLLOW UP SURVEY (WEB-BASED)

OKLAHOMA STATE UNIVERSITY

College of Human Environmental Sciences
School of Hotel and Restaurant Administration
210 HES West
Stillwater, Oklahoma 74078-6173
405-744-6713; Fax: 405-744-6200

January 29, 2004

Greetings,

We are asking you again to participate in a study entitled "**Factors Influencing the Adoption of New Information Technology in College and University Foodservices**." Would you please share approximately 20 minutes of your time to complete this survey by **February 10, 2003**? If you have previously submitted a survey within the last month, please disregard. Your input is valued, and when combined with other responses should provide beneficial information for ***NACUFS*** members. It would be most grateful if you could take out a few minutes from your busy schedule to help us with this research. It's only with the generous help of ***NACUFS*** members like you that our study can be successful.

This study is being undertaken by an Oklahoma State University graduate student Kevin Kim, as he pursues his Ph.D. degree in the School of Hotel and Restaurant Administration. Your response is completely **voluntary** and will be kept strictly **confidential**. There will be no association between your information and the result of the study.

Thank you for participating in this project. If you have any questions regarding this survey, please feel free to contact Kevin Kim at (405) 332-0223 or e-mail at hyeonch@okstate.edu or you may contact Dr. Carol Olson, Institutional Review Board (IRB) Chair, 415 Whitehurst, Oklahoma State University, Stillwater, OK 74078, (405) 744-5700. If you want to receive a summary of the results of this study, please indicate at the end of this survey. We look forward to receiving your response. Thank you again.

To begin the survey, please click on the following link:
http://fp.okstate.edu/cheshrad/nacufs

Once you open the website, please be sure to maximize your browser window

Sincerely,

Bill Ryan, Ed.D., R.D., L.D.
Associate Professor & Associate Director
School of Hotel and Restaurant Administration
Oklahoma State University
Email: bilryan@okstate.edu

Kevin Kim, M.S., M.B.A.
Doctoral Candidate
School of Hotel and Restaurant Administration
Oklahoma State University
Email: hyeonch@okstate.edu

APPENDIX B

QUESITONNAIRE

Factors Influencing the Adoption of New Information Technology (IT) in College and University Foodservices

Thank you for agreeing to participate in this research. Your answers will be kept confidential and will be destroyed after the study is complete. Please answer the following questions by choosing only ONE answer for each question or by filling in the blank. For the purpose of this study, please use the following definition.

***Information Technology (IT)*:** The hardware, software, and telecommunications that create, store, retrieve, exchange, transform, analyze, and communicate data and information used in your foodservice operations. For example, it includes computer, e-mail, Internet, word processors, and various types of software.

SECTION 1. YOUR INSTITUTION PROFILE

Please choose only ONE answer or fill in the blank for each of the following questions.

Your institution's membership classification in *NACUFS* is (Based on new classifications* as of 2003)

Northeast	1
Mid-Atlantic	2
Southern	3
Midwest	4
Continental	5
Pacific	6

* ***Northeast****: CT, ME, MA, NH, NY, RI, VT, NB, NS, PE, ON, QC*
Mid-Atlantic*: DE, DC, MD, NJ, PA, VA, WV*
Southern*: AL, AR, FL, GA, KY, LA, MS, NM, NC, OK, SC, TN, TX, PR, VI*
Midwest*: IL, IN, IA, KS, MI, MO, NE, OH, WI*
Continental*: CO, ID, MN, MT, ND, SD, UT, WY, AB, MB, SK*
Pacific*: AK, AZ, CA, HI, NV, OR, WA, BC, Australia, China, Fiji, Mexico, New Zealand, Taiwan*

Your institution is

Public	1
Private	2

Your institution is located in

Urban	1
Suburban	2
Rural	3

Total average annual foodservice revenue of your institution

Up to $500,000	1	$4,000,001-$5,000,000	6
$500,001-$1,000,000	2	$5,000,001-$6,000,000	7
$1,000,001-$2,000,000	3	$6,000,001-$7,000,000	8
$2,000,001-$3,000,000	4	$7,000,001-$10,000,000	9
$3,000,001-$4,000,000	5	Over $10,000,000	10

Approximately what is the total enrollment of your institution?

_____

SECTION 2. INDIVIDUAL FACTORS

The following is a list of individual factors which might influence your desire to adopt new information technology (IT) applications in your workplace. Please indicate your level of agreement by choosing only ONE number for each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I believe that new information technology represents an important innovation.	1	2	3	4	5
I believe that new information technology is critical for my organization to get a competitive edge.	1	2	3	4	5
I think it is appropriate for my organization to adopt new information technology.	1	2	3	4	5
If I heard about a new information technology application, I would look for ways to experiment with it.	1	2	3	4	5
In general, I am hesitant to try out new information technology.	1	2	3	4	5
Among my peers, I am usually the first to try out new information technology.	1	2	3	4	5
I like to experiment with new information technologies.	1	2	3	4	5
Using new information technology would be compatible with all aspects of my work.	1	2	3	4	5
I think that using new information technology fits the way I like to work.	1	2	3	4	5
Using new information technology does not match with my work style.	1	2	3	4	5
My superiors expect me to use new information technologies.	1	2	3	4	5
My use of a new information technology application is required by job description.	1	2	3	4	5
My boss does not require me to use new information technologies.	1	2	3	4	5
Although it might be helpful, using new information technology is certainly not compulsory in my job.	1	2	3	4	5

SECTION 3. ORGANIZATIONAL FACTORS

The following statements refer to organizational factors which might influence your desire to adopt new information technology (IT) applications at work. Please choose a number from the scale which represents how strongly you agree or disagree with each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

A specific person or group is available for assistance with hardware difficulties.	1	2	3	4	5
A specific person or group is available for assistance with software difficulties.	1	2	3	4	5
Specialized instruction and education concerning new information technology is available to me.	1	2	3	4	5
Guidance is available to me in the selection of hardware, software, printers, and other equipments.	1	2	3	4	5
University administration really wants to see that we are happy using new information technology.	1	2	3	4	5
University administration has provided most of the necessary help and resources for us to get quickly used to new information technology.	1	2	3	4	5
I am always supported and encouraged by my boss to use new information technology in my job.	1	2	3	4	5
I am convinced that university administration is aware of what benefits can be achieved with the use of new information technologies.	1	2	3	4	5
There are businesses in the community which provide technical support for effective use of new information technologies.	1	2	3	4	5
Community agencies/businesses provide incentives for the adoption of new information technologies.	1	2	3	4	5
There are agencies/businesses in the community which provide training on new information technologies.	1	2	3	4	5
Technology vendors actively market new information technologies by providing incentives for adoption.	1	2	3	4	5
Technology vendors promote new information technologies by offering free training sessions.	1	2	3	4	5

SECTION 4. MOTIVATIONAL FACTORS

The following attributes refer to motivation factors which might influence your desire to adopt new information technology (IT) applications in your workplace. These factors are related to expected values and benefits from adopting new information technologies. Please choose your level of agreement from 1 to 5 for each factor.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

The benefits from adopting new IT applications in your foodservice operations include…

Increased access to people	1	2	3	4	5
Improved internal coordination and communication	1	2	3	4	5
Reduced multiple call-back/phone tag	1	2	3	4	5
Enhanced useful linkages with other organizations	1	2	3	4	5
More accurate and reliable information/data available	1	2	3	4	5
Faster information/data processing	1	2	3	4	5
Easier access to information/data	1	2	3	4	5
Faster retrieval and delivery of documents	1	2	3	4	5
Improved document quality	1	2	3	4	5
Expedited projects	1	2	3	4	5
Reduced multiple handling of documents	1	2	3	4	5
Increased opportunities for advancement	1	2	3	4	5
Enhanced the credibility and prestige of organization	1	2	3	4	5
Interesting and enjoyable working environment	1	2	3	4	5
Reduced operational costs	1	2	3	4	5
Reduced travel expenses	1	2	3	4	5
Quicker and easier to work	1	2	3	4	5
Enhanced utilization of existing equipment	1	2	3	4	5
Easier new products/services additions	1	2	3	4	5
Timely information for decision making	1	2	3	4	5
Improved monitoring of the quality of products from suppliers	1	2	3	4	5
Better relationships with suppliers	1	2	3	4	5
Providing better products or services to customers	1	2	3	4	5
Improved customer relations	1	2	3	4	5

SECTION 5. INHIBITING FACTORS

The following is a list of inhibiting factors which might limit your desire to adopt job-related new information technology (IT) applications at work. Please indicate your level of agreement by choosing one number for each factor.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

The constraints of adopting new IT applications in your foodservice operations include…

Lack of managerial enthusiasm	1	2	3	4	5
Disagreement among managers regarding the need of potential benefits of new technology	1	2	3	4	5
Lack of funding	1	2	3	4	5
Too costly	1	2	3	4	5
Difficulty of obtaining financing for technology investment	1	2	3	4	5
Lack of direct benefits of technology relative to investment	1	2	3	4	5
Lack of time to learn new technology	1	2	3	4	5
Lack of time to establish a computerized system	1	2	3	4	5
Fear of new technology	1	2	3	4	5
Lack of confidence in computerized systems	1	2	3	4	5
A low degree of personal control over computerized systems	1	2	3	4	5
Lack of user participation in planning of technology developments	1	2	3	4	5
Personal resistance to new technology	1	2	3	4	5
Lack of knowledge about new technology	1	2	3	4	5
Not necessary for job-related tasks	1	2	3	4	5
Low security and privacy	1	2	3	4	5
Lack of social contact of technology	1	2	3	4	5
Feel that technology is changing too rapidly to make investment	1	2	3	4	5
Lack of sufficient user training opportunities	1	2	3	4	5
Unfriendly support staff	1	2	3	4	5
Slow support staff response time	1	2	3	4	5
Lack of adequate technical competence of support staff	1	2	3	4	5
Lack of compatible hardware	1	2	3	4	5
Inadequate/outdated hardware	1	2	3	4	5

SECTION 6. INFORMATION TECHNOLOGY (IT) APPLICATIONS

The following is a list of selected information technology (IT) applications that may be currently adopted in your foodservice operations. For each of following information technology applications please choose the level of "Importance" AND "Satisfaction" from 1 to 5. Please use the following TWO scales, importance and satisfaction:

Whether the IT application is **Important** for you when you perform your job-related tasks? (e.g., priority, frequency, preference)	How **Satisfied** with the IT applications adopted by organization when you utilize them? (e.g., speed, update, availability)
1. Not at all important 2. Little important 3. Neutral 4. Important 5. Very important N/A Not Applicable	1. Not at all satisfied 2. Little satisfied 3. Neutral 4. Satisfied 5. Very Satisfied N/A/Not Applicable

IT Applications	IMPORTANCE						SATISFACTION					
Voice mail system	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Fax machine	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Email	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Internet/Web browser	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Digital camera	1	2	3	4	5	N/A	1	2	3	4	5	N/A
CD/DVD ROM	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Printing equipment	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Personal Digital Assistant (PDA)	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Personal computer	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Word processor	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Spreadsheet package	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Database management package	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Presentation/Graphics package	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Statistical analysis package	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Desktop publishing package	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Menu planning/analysis software	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Food cost analysis software	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Recipe analysis software	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Nutritional analysis software	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Production scheduling	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Inventory/Purchasing software	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Ingredient room issues software	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Accounting/Billing/Budget report	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Meal plan system	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Debit card system	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Order entry/Point-of-Sale (POS)	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Employee training tool	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Payroll report software	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Employee scheduling software	1	2	3	4	5	N/A	1	2	3	4	5	N/A

SECTION 7. GENERAL OPINIONS

Please choose only ONE answer for each of the following questions.

Overall, are you satisfied with information technology (IT) applications currently adopted by your organization?

1	2	3	4	5
Very Unsatisfied	Unsatisfied	Neutral	Satisfied	Very Satisfied

Given the overall cost, how successful have your information technology (IT) applications been in helping you fulfill the needs and requirements of your job?

1	2	3	4	5
Very Unsuccessful	Unsuccessful	Neutral	Successful	Very Successful

If new information technology (IT) applications were available for your foodservice operations, how willing would you be to adopt them in the future?

1	2	3	4	5
Highly Unlikely	Unlikely	Neutral	Likely	Highly Likely

I intend to increase my use of new information technology (IT) applications for work in the future.

1	2	3	4	5
Highly Unlikely	Unlikely	Neutral	Likely	Highly Likely

If there were an information technology–focused education program offered by a professional organization (such as NACUFS) or a higher educational institution (such as Oklahoma State University) would you consider taking the program in the future?

Yes No

SECTION 8. General Technology-Related Behavior

Please choose only ONE answer or fill in the blank for each of the following questions.

How many total years of experience do you have using a computer at work? _____ year(s)
How many total years of experience do you have using Internet at work? _____ year(s)

Do you use a computer at home?	Yes	No
Do you have an Internet/e-mail access at home?	Yes	No

For each method below, please indicate whether you access work-related software programs at home and while traveling.

	At home		While traveling	
1) Internet/E-mail	Yes	No	Yes	No
2) Floppy disc/CDs/Local Hard Drive	Yes	No	Yes	No
3) Laptop	Yes	No	Yes	No
4) PDA/Cellular phone	Yes	No	Yes	No
5) Internet Café/Business Center/Library	Yes	No	Yes	No

Have you ever participated in the following computer/Internet learning opportunities?

1) Formal course(s) at a college or university	Yes	No
2) Vendors or outside consultants/organizations	Yes	No
3) In-house company course (On-the-job training)	Yes	No
4) By supervisors	Yes	No
5) By fellow workers	Yes	No
6) Self-study; self-taught	Yes	No
7) Distance (on-line) learning	Yes	No

How would you rate your level of computer/Internet expertise?

1	2	3	4	5
Low	Below Average	Average	Above Average	High

How important do you feel computers/Internet to be in today's dining operations?

1	2	3	4	5
Not at all	Slightly Important	Moderately Important	Very Important	Extremely Important

SECTION 9. INDIVIDUAL PROFILE

Please choose only ONE answer or fill in the blank for each of the following questions.

Your gender

Male	1	Female	2

Your age

Under 30	1	50-59	4
30-39	2	60 and above	5
40-49	3		

Your race/ethnicity

Caucasian/Euro American	1	Asian/Pacific Islander	4
African American	2	American Indian/Alaskan Native	5
Hispanic	3		

Your highest degree earned

High School Diploma/GED	1	Master's Degree	4
Associate Degree	2	Educational Specialist/Doctoral Degree	5
Bachelor's Degree	3		

Your current position

Director/General manager	1	Purchasing/Retail manager	4
Assistant director	2	Production manager	5
Foodservice/Dining/Catering manager	3	Executive chef	6
		Other	7

Your total current ANNUAL income in your present position

Under $40,000	1	$60,000 - $69,999	4
$40,000 - $49,999	2	$70,000 or more	5
$50,000 - $59,999	3		

How many total years have you been working in college/university foodservices?
____year(s)

How many total years have you been working in your present college/university foodservices?
____year(s)

Approximately how many separate foodservice facilities fall under your responsibility?
____unit(s)

Thank you very much!

Would like to have the results of this study? Yes _____ No _____

As a token of our appreciation for your participation in this study, we will enter your name in a drawing on December 15, 2003 for three cash prizes ($40/$30/$25). For this opportunity, please leave your name and e-mail address below and click the submit button.

Name : _____ **E-mail :** _____@_____

Or, if you do not want to be included in the drawing, you don't need to provide your name and e-mail address.

APPENDIX C

APPROVAL FORM FOR RESEARCH INVOLVING HUMAN SUBJECTS

Oklahoma State University
Institutional Review Board

Protocol Expires: 10/26/2004

Date: Monday, October 27, 2003 IRB Application No HE0429

Proposal Title: Factors Influencing the Adoption of New Information Technology in College and University Foodservices

Principal Investigator(s):

Hyeon-Cheol Kim
210 HES West
Stillwater, OK 74078

Bill Ryan
210 HESW
Stillwater, OK 74078

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Dear PI :

Your IRB application referenced above has been approved for one calendar year. Please make note of the expiration date indicated above. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved projects are subject to monitoring by the IRB. If you have questions about the IRB procedures or need any assistance from the Board, please contact me in 415 Whitehurst (phone: 405-744-5700, colson@okstate.edu).

Sincerely,

Carol Olson

Carol Olson, Chair
Institutional Review Board

VITA

Hyeon-Cheol Kim

Candidate for the Degree of

Doctor of Philosophy

Thesis: FACTORS INFLUENCING THE ADOPTION OF NEW INFORMATION TECHNOLOGY IN COLLEGE AND UNIVERSITY FOODSERVICES

Major Field: Human Environmental Sciences

Biographical:

Personal Data: Born in Cheju City, Korea, August 5, 1974; the son of Yoo-Taek Kim and Kye-Sung Park.

Education: Graduate from DayKey High School, Cheju City, Korea, in February 1993; received Bachelor of Science degree in Business Administration from Chung-Ang University, Seoul, Korea, in February 1997; Master of Business Administration degree in Organizational Behavior/Human Resource Management from SungKyunKwan University, Seoul, Korea in August 1999; Master of Science degree in Hotel, Restaurant, and Travel Administration (HRTA) from University of Massachusetts, Amherst, Massachusetts in May 2001; completed the requirements for the Doctor of Philosophy degree with a major in Human Environmental Sciences at Oklahoma State University, Stillwater, Oklahoma, in July, 2004.

Professional Experiences: Research Assistant, the Graduate School of SungKyunKwan University, 1997-1999; Bellman, Hotel Lotte World, Seoul, Korea, 2000; Teaching Assistant, University of Massachusetts, Amherst, 1999-2001; Research Assistant, Oklahoma State University, 2001-Present.

Professional Organizations: Eta Sigma Delta, Council on Hotel, Restaurant, and Institutional Educators, The National Association of College and University Foodservices (NACUFS), Oklahoma State University Hospitality Administration Graduate Student Association.