2005

Examining User Technology Interaction: Toward a Sociotechnical Theory for Understanding User Adjustment to Mobile Technologies

Mike Gallivan
Georgia State University, mgallivan@cis.gsu.edu

Yide Shen
Georgia State University, yshen@cis.gsu.edu

Examining User-Technology Interaction: Toward a Sociotechnical Theory for Understanding User Adjustment to Mobile Technologies

Mike Gallivan
CIS Department
Robinson College of Business
Georgia State University
Atlanta, GA, USA 30302
mgallivan@cis.gsu.edu

Yide Shen
CIS Department
Robinson College of Business
Georgia State University
Atlanta, GA, USA 30302
yshen@cis.gsu.edu

ABSTRACT

Researchers from organization, management, and information systems areas have studied the impact of information technology (IT) on users in organizations for several decades. As a form of emerging technology, mobile computing has raised new research directions, as well as challenges for both computer scientists and social scientists. In this paper, we explore the issues of how well the emerging mobile computing technologies conform to past models and predictions that have been offered for explaining the impacts of IT. In particular, this paper identifies the general lack of attention to individual-level differences that may interact with contextual factors to shape organizational users' reactions to this new computing paradigm. We thus propose that IS researchers consider a specific sociotechnical theory – Theory of Work Adjustment (TWA) – to investigate how individual users adjust to technology-initiated changes in work practices resulting from mobile technologies. By highlighting the insights offered by TWA, we believe that this model is useful for analyzing individual responses to the adoption of mobile computing technologies.

Keywords

Theory of Work Adjustment, work life, social impacts of computing, mobile computing.

INTRODUCTION

Understanding the so-called "impacts" (Attewell & Rule, 1984) of IT on managers and employees within organizations has been a longstanding research endeavor for IS and management researchers (Miller et al. 1991). For 40 years, scholars have sought to understand the impacts of various technologies on organizational structure, control, productivity, and other dependent variables (Woodward, 1965). Among the diverse technologies open to investigation, a newly emerging technology employed in many organizations is mobile computing. By providing access to information and computing "anytime anyplace," mobile computing is reported to bestow numerous benefits on organizations, such as increased personal productivity and effectiveness (Gartner 2001), instantaneous access to critical decision makers, and removal of time and space constraints for performing knowledge work (Davis 2002).

Despite the reported benefits of mobile computing, some researchers also describe its potential challenges, including worker's perception of being controlled by the organization through their mobile devices, and the resulting blurred boundaries between work and non-work. These observations remind us that it is inappropriate to generalize about the effects of new technologies on their users without considering important individual and contextual differences that may distinguish various *social actors'* (Lamb & Kling, 2003) responses to such innovations.

In this paper, we review recent studies on mobile computing, identify the gap whereby researchers have neglected to pay attention to individual-level differences that may shape users' responses to the new mobile computing paradigm, and we propose a conceptual framework that was first mentioned in the IS literature over 15 years ago (Goodhue 1988), but which has received limited attention from IS researchers in subsequent years.

LITERATURE REVIEW

Recently, the volume of people working outside of their central offices has risen steadily, driven by recent advances in mobile technologies and standards. With mobile computing systems, mobile users can gain access to computing and communication capabilities when they move from place to place, through means that are transparent, integrated, convenient,

and adaptive (Kleinrock 2001). Because mobile computing users have access to information and computing services regardless of their physical location or movement behavior, some literature suggests that the technology bestows possible beneficial effects such as increased personal productivity and effectiveness (Gartner 2001), access to critical decision makers at any time, elimination of time and space constraints for performing knowledge work, and increased ability to receive and process rich streams of signals about the organization and its environment (Davis 2002).

On the other hand, the literature indicates that mobile computing users may face many challenges triggered by this new computing paradigm. These challenges stem from the various unique characteristics of mobile computing technologies and the resulting changes in user's job skill requirements and work environment.

The introduction of mobile technologies in organizations requires mobile users to have certain new skills, or to increase the level of certain skills they already have. First, mobile workers need to manage distributed objects. Kleinrock (2001) mentioned that "nomads" (i.e., mobile users) experience resource replication (having files spread across multiple locations and devices), a changing physical environment, and they confront the general need to manage all kinds of distributed objects (applications, files, passwords, and other distributed resources).

Second, mobile users need to maintain a high level self-discipline. Mobile technologies expand the territory of work places. Professional work can take place in what were once public place such as airport lounges, train stations and hotel lobbies, and what were once private places, such as at home. The flexibility enabled by the technology, in terms of working from home or other locations, also requires a certain level of self-discipline for these workers (Davenport & Pearlson 1998). Employees working in these environments need to have a higher level self-discipline, in order to deal with the increased interruptions and distractions, as compared to working in traditional office settings. Davis (2002, p. 72) also comments that "unlimited access computing introduces new demands for attention and new capabilities for interruptions.".

Third, mobile users have to deal with high cognitive load. Cognitive load refers to the total amount of mental activity imposed on a person's working memory at one time (Berthold & Jameson 1999). While working in diverse environments, the mobile user may not only perform a main task, but also conduct other concurrent tasks and take care of distractions from the environment. Lee and Benbasat (2004) observe that the employee involved in performing a peripheral task assigns only limited cognitive resources to the mobile task. For example, consider a bank loan officer talking to a customer by cell phone while driving to the customer's site. This employee cannot devote his full attention to the customer, because his attention is consumed, in part, by driving his car, the traffic signals, other drivers on the road, etc. Thus, using mobile applications within diverse surroundings introduces new demands for handling a high cognitive load.

Fourth, employees using mobile technologies face the challenge of balancing work and personal life. Access to perform work "anytime anyplace" blurs the boundaries between work life and personal life (Davis 2002). Devices such as laptops, PDAs, mobile phones, and Internet access allow people to perform many of their work activities at all time, anywhere they may be. In their study of PDA use, Geisler and Golden (2003) found that PDAs are regularly crossing the boundary between the workplace and personal life. The 2002 National Technology Readiness Survey (NTRS), co-sponsored by the Center for e-Service at the University of Maryland's Robert H. Smith School of Business and Rockbridge Associates, Inc., reported that those with online access both at home and at work spend an average of 5.9 hours per week online at home for work-related purposes. Some workers have the ability to set boundaries between work and life, in spite of the use of mobile applications. In the same PDA usage study, results suggested that for those workers who showed a work-intensive or a life-intensive PDA usage pattern, PDAs can be used as instruments to minimize boundary crossing (Geisler & Golden 2003). However, for individuals who lack the ability to balance their personal and professional lives within such a pervasive computing context, problems such as decreased job satisfaction, stress, and marital discord may occur – despite the employee's initial satisfaction with the convenience of doing work anytime anyplace. A previous study conducted with IBM telecommuters reached similar conclusions, noting that employees who could not manage their work-life balance felt dissatisfied with their new work arrangement after just 12 months of telecommuting (Davenport & Pearlson 1998).

The introduction of mobile technologies in organizations brings changes in the work environment as well. Many mobile workers feel that their employers use technologies to control them to a greater degree (Davenport & Pearlson 1998). Enabled by mobile technologies such as mobile voice calls, mobile text, and videoconferencing, traditional forms of supervision and instruction (which usually rely on face-to-face meeting, instructional courses, and on-site presence of experts or supervisors) are being transformed into virtual forms (International Telecommunication Union 2004). Under such conditions, centralized institutional control can be difficult to maintain, and has to be sustained by constant management procedures to prevent employees from using these mobile resources for personal use (International Telecommunication Union 2004), as well as to monitor employees' productivity and location (Davenport & Pearlson 1998). To mobile workers, it sometimes triggers a perception of being over controlled by the company. In contrast, some employees working away from offices have a sense of isolation or exclusion (International Telecommunication Union 2004). Since people don't see each other everyday, they lose

the opportunity to socialize with colleagues, for example, during break or lunch hours. The "relationship-building communications" can easily be lost (Davenport & Pearlson 1998). In addition, the managers who lack the new virtual management skills tend to fall into communication patterns dominated by task-oriented communication, which may be demotivating for remote workers (Davenport & Pearlson 1998). Addressing these issues requires significant cultural and managerial changes in various aspects in the company. Some of the aspects involve how managers and employees communicate, how managers evaluate and reward employee's work, and how firms define levels of empowerment and trust between managers and workers (International Telecommunication Union 2004).

In summary, the above review indicates that the workers who use mobile technologies must adapt to the new mobile computing environment and must learn skills for coping with the unique opportunities and challenges that it brings.

Besides the examination of the benefits and liabilities posed by mobile computing, a few researchers conducted empirical studies to investigate mobile computing adoption in organizations. For example, Gebauer and Shaw (2004) employed the Task-Technology Fit model (Goodhue & Thompson 1995) to assess the impact of a mobile e-procurement system. The results indicated the need to develop simple yet functional mobile solutions to complement existing applications and infrastructures. Wang and Cheung (2004) proposed a multi-level model to explain mobile computing adoption by service firms, identifying four factors associated with adoption: competitive pressure, innovation orientation, financial slack, and availability of IT resources.

Some researchers, on the other hand, realize that old theoretical frameworks (those developed for studying prior generations of IT) may not apply to this new computing paradigm. For instance, commenting on mobile business (m-business), Dekleva (2004, p. 113) suggested that different interpretations and models may be required for m-business. He notes that the "mobile Internet is at a similar stage as wired Internet was in 1995… One of the known mistakes is a perception that mobile Internet is the same as its wired version, only mobile. It will, however, be something different, used in new and unexpected ways."

In a special issue of the *International Journal of Electronic Commerce*, Liang and Wei (2004) call for new frameworks to study the outcomes of mobile commerce. Recognizing that the success of mobile commerce depends on both the capability of wireless technologies and how they are used, Liang and Wei (2004, p. 10) remark that such a "framework must address task requirements, technology, and the environment in which the technology is applied." Moreover, in discussing ubiquitous computing, Jessup and Robey (2002, pp. 88, 91) advise researchers and practitioners to reconsider their existing notions of how to manage employees in organizations, given the differences between ubiquitous and traditional computing:

> What if technology was literally un-tethered by any physical connection to a network, to a workspace, or to an organization? What new ways to communicate, collaborate, coordinate, organize and manage would we see? We can rely only partially upon what we [already] know about people and organizations…. The challenge is to make theory relevant to organizations as they exist now and in the future, not as they existed 50 years ago.

Another aspect that has not been adequately addressed is the individual-level differences that may interact with contextual factors to shape managers' and employees' responses to the innovations of mobile computing. As suggested by Gebauer and Shaw (2004), in addition to technology and task characteristics, we need to better understand user characteristics in order to develop better insights into mobile computing behavior. The next section describes the need for a comprehensive framework to explain how individuals react to changes brought by technology, and the insights that such a framework can provide.

A THEORY OF INDIVIDUAL RESPONSES TO MOBILE COMPUTING TECHNOLOGIES

Given the potential differences between mobile technologies and traditional IT applications, it is important to consider a perspective that takes account of both the context of IT use as well as individual-level differences in motives, skills, and abilities. While there is a longstanding tradition within the IS literature of examining potential users' beliefs regarding a technological innovation (e.g., perceived usefulness and ease-of-use), we believe that individuals' beliefs and behavior with regard to mobile technologies will have more to do with how the technology changes various characteristics of their work environment and their jobs. Thus, a clear understanding of potential users' responses to mobile technologies will depend on how the nature of their job tasks are modified or transformed, including any requisite changes in their knowledge, skills, and abilities for leveraging the benefits of the technology. In examining the implications of change IT for employees' job stress, Nelson (1990) argues that we must pay attention to changes in the job, rather than focusing solely on the attributes of the IT:

> There is a common assumption that the introduction of new technology in the workplace is stressful for individuals. Based on this assumption, it is to be expected that individuals undergoing [IT-related] transitions would report greater symptoms of distress, and some studies have found this to be true... [however] Increased strain appears to result not from the introduction of technology itself but instead from the changes that occur in job characteristics and the

> psychological aspects of [performing] work. The organization itself may undergo alterations in structure and climate in the wake of innovation (Nelson, 1990, pp. 85-86).

Several theories have been proposed to explain individuals' specific beliefs and behavioral intentions to use new technologies, such as the *Theory of Planned Behavior* (Ajzen 1985) and the *Technology Acceptance Model* (Davis, Bagozzi & Warshaw 1989). While such theories identify adopters' core beliefs as relevant to their intention to adopt the technology, there are several limitations of these traditional models. First, these established frameworks are adequate for evaluating potential adopters' responses to voluntary innovations, but they are inappropriate for mandatory innovations that are assigned or mandated by the organization (Gallivan 2001; Rawstorne 2000). Thus, when adoption of the innovation is mandated, the constructs featured in these models of technology acceptance are irrelevant to employees' actual use. Second, IS researchers seldom look beyond users' beliefs about the technology itself to consider how it alters the nature of work, and hence, adopters' responses to changes in work-related norms, routines, skills, and culture. Moreover, the existing theories neglect to account for individual differences that may underlie different technology-related beliefs (e.g., why one employee is more likely to regard a technology as *useful* or *easy to use* than another employee). We propose that IS researchers studying mobile technologies consider a theory of individual work adjustment to technology-initiated changes in work practices – one that was introduced to the IS community by Goodhue (1988) over 15 years ago, but which has been largely neglected in the IS literature.

In a conceptual paper, Goodhue urged researchers to examine how potential adopters respond to a technological innovation, as a function of how it alters the knowledge and skills required for them to perform their jobs, or how it alters the types of psychological rewards they receive from performing their work (i.e., "reinforcers"). These concepts derive from the *Theory of Work Adjustment*, developed by psychologists Lofquist and Dawis (1969). While this theory has been widely employed within the psychology and management literatures, it has been largely overlooked in the IS literature with the exception of Goodhue's (1988) early paper. We believe that this theory focuses attention on several factors that influence how mobile technology users will adjust to using the technology in their jobs.

The Theory of Work Adjustment

The Theory of Work Adjustment (TWA) proposes a model of person-environment fit that explains individual job satisfaction, job performance, and other downstream factors, as a result of the fit between the person, the task, and the work environment. Based on the degree of fit, the TWA predicts various outcomes such as employee satisfaction, job performance, and downstream results such as job turnover. (Job performance is labeled *satisfactoriness* in TWA terminology.) The TWA is an example of a class of theories called "correspondence theories," which have been widely used in the organizational behavior literature (Caldwell & O'Reilly, 1990; Chatman, 1989; Edwards 1994) to predict various outcomes as resulting from the fit between the person and the work environment. Several studies have used the TWA to evaluate employees' adaptation either retrospectively or prospectively. Certain "fit" constructs from the framework have been adapted and used in the literature on IT careers (McLean, Tanner & Smits, 1991; Smits, McLean & Tanner 1993) and in research examining task-technology fit (Goodhue & Thompson 1995). The TWA was originally developed by Lofquist and Dawis (1969) to assess the fit between a prospective employee and a specific job at a given point in time; however, the theory has since been expanded to serve as a dynamic theory explaining individuals' adjustment to changes in work practices over time.

The relationships among constructs in the TWA are illustrated in Figure 1. The model assumes that two dependent variables (employee satisfaction and performance) are each determined by the fit between a pair of independent variables: employee satisfaction is determined by the fit between an employee's needs and values and the job reinforcement patterns provided by the job and the work environment; similarly, job performance is determined by the fit between the employee's skills/abilities and the job's skill requirements. The model does not posit a direct link from job satisfaction to performance (or vice-versa), although both satisfaction and performance can affect other, secondary outcomes, such as job turnover intentions. Because the TWA was developed as a theory of individual fit to the work environment (rather than as a theory of technological innovation), IT is not explicitly represented in the framework, however it is implicitly represented since three of the independent variables may be influenced by IT adoption (e.g., employees' skills/abilities, job requirements, and job reinforcement patterns). The TWA is an equilibrium model and, as such, it assumes that equilibrium is desirable and should be maintained. Equilibrium implies a dynamic "correspondence" (Edwards 1994) among the model's components. This equilibrium can be disturbed, in the short term, by adoption of a new technology, which alters the equilibrium among the framework's components.

Applying the TWA to understanding mobile computing technologies

Referring to Figure 1, we first consider the implications of the adoption of mobile technologies on the constructs at the bottom of the figure. The TWA has several attributes which make it useful for analyzing individual responses to the adoption of mobile technologies. For example, the scenario below demonstrates how the TWA can be used to explain individual adjustment to mandatory mobile computing applications in the workplace. Once the new mobile application is adopted, skill requirements change, leading to a potential mismatch between an employee's existing skills and those skills required to learn and employ the new technology in their work. The skills in question may be technical skills (e.g., knowing how to recharge one's batteries while on the road) or psychosocial skills (e.g., being able to define a manageable boundary between one's work life and personal life). If no action is taken to remedy such skill gaps, the discrepancy between required skills and employees' existing skills may lead to deterioration of employee's performance. Managers often take steps to remedy such skill gaps during implementation — for example, offering training classes to employees, hiring new employees already experienced with the technology, or providing support through a competence center (Markus, Axline, Petrie & Tanis, 2000). These remedial actions may serve to reconcile the skill gap. It is only for those employees who are unable or unwilling to learn the new technology such skill gaps may persist, leading to a deterioration in performance (and possibly enhanced likelihood of involuntary job turnover).

When new technologies are introduced into the workplace, they may also alter the tasks, work processes, and even the culture of the organization. Using Figure 1, there is an analogous equilibrium process that occurs between the constructs at the bottom of the figure. Equilibrium normally exists between employees' needs and values and the *job reinforcers* that ensure that these needs are satisfied in the workplace. When a new mobile technology is implemented in the organization, various changes in work processes will ensue – changes which may either satisfy or conflict with employees' needs and values in the TWA framework. For example, such changes in work processes, power dynamics, and social relationships resulting from new technologies have been demonstrated in various field studies as a result of prior generations of IT (Barley 1986; Orlikowski 1997; Zuboff 1988). These changes in the *job reinforcers* may be positively or negatively perceived by different employees, depending on their individual needs and values which will, in turn, alter employee job satisfaction, leading, in turn, to changes in motivation and job turnover. In the case of mobile technologies, Davis (2002) notes several undesirable effects that are likely to occur:

> [U]ndesirable effects of anytime/anyplace computing may be found [causing], weakening of desirable boundaries between work and personal life for knowledge workers, bias in decision making, and dysfunctional organization behaviors … [Mobile computing] may enable unnecessary and unproductive interruptions …. In fact, pervasive access may change organization expectations, making interruptions and immediate responses to them appear to be the norm. Individuals may be [expected] to accept and process interruptions. Productivity may drop as knowledge workers attend to interruptions and are distracted from concentrating on important activities (Davis, 2002, p. 70).

This description suggests many numerous ways in which the job reinforcers will likely change, in response to mobile computing. Some employees may accept these changes, because they do not conflict with their personal needs and values, while other employees may be less receptive to these changes. Employees who are dissatisfied with the changes to their work routines may become unhappy, increasing their risk of job turnover. Similarly, employees who lack the skills required for adapting to the new technology may be unable to perform well due, for example, to insufficient boundaries between their work and personal lives.

Insights Offered by the TWA

The TWA does not assume that all employees are identical, but allows for individual differences in terms of their knowledge, skills, and abilities, as well as in terms of the needs and values for which they seek reinforcement from the job. Second, the TWA includes outcome measures that are meaningful to both IS employees and to managers (including job satisfaction, performance, motivation, and turnover intentions). The TWA can represent the dynamic shifts that occur due to a firm's mandatory adoption of a new mobile technology, leading to changes in job requirements, employees skills, and job reinforcer patterns. Unlike other theories that have sought to prove a direct causal linkage between satisfaction and performance (and failed to do so), the TWA acknowledges the *lack* of a direct causal link between satisfaction and job performance, while nevertheless reflecting their mutual importance in predicting secondary consequences, such as employees' job turnover intentions. Given that the TWA distinguishes between the antecedents of job satisfaction and of performance, it recognizes the differences between one employee whose performance suffers as a result of being unable to learn the new skills required by the new technology, versus another employee who successfully acquires the necessary skills but who is dissatisfied with other job-related changes, such as the requirement for employees to work more in an isolated manner (Zuboff 1988) or for employees to share their knowledge cross-functionally (e.g., Skok & Legge, 2002), as mandated by the new technology. In

the first example (where an employee is unable to learn to use the new technology), the TWA predicts that the employee's performance will deteriorate due to inadequate skills, and the employee may be asked to leave the job involuntarily; in the latter case, the model predicts that the employee will become dissatisfied with the job and will be more likely to leave voluntarily.

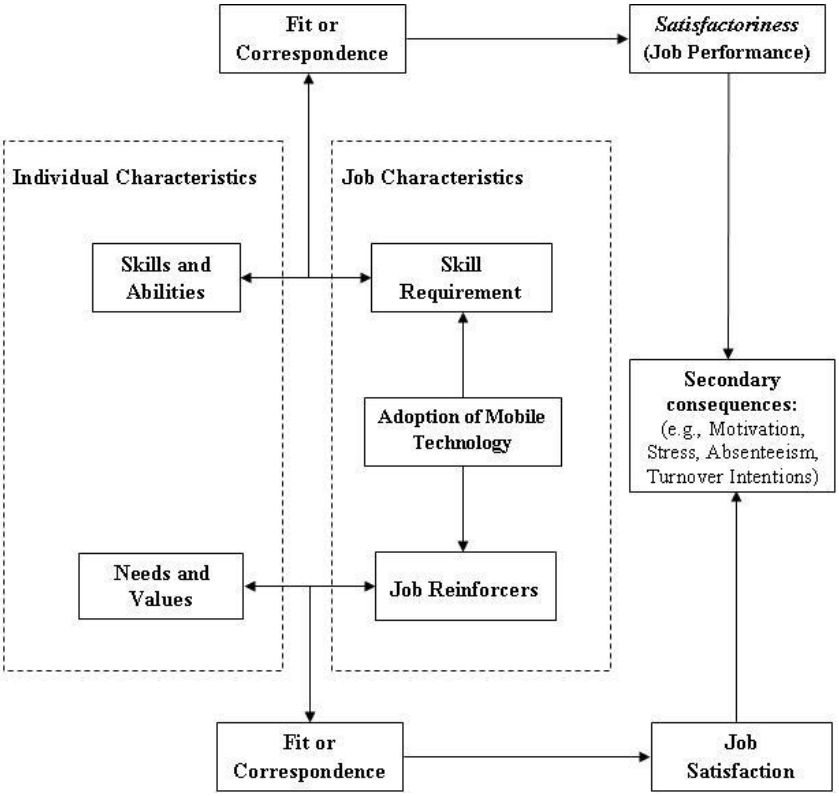

Figure 1. The Theory of Work Adjustment (adapted from Dawis & Lofquist, 1984)

SUMMARY

In this study, we emphasize the importance of understanding the consequences of new mobile computing technologies, drawing on existing studies that show how prior generations of technology have altered various organizational dimensions, including the skills required to perform specific tasks and the level of control that employees can exert over their work. We have argued, moreover, that many of our assumptions about how organizations operate may not be valid in the future, and that, as IS researchers, we need to explore new assumptions and models of workplace behavior in order to understand the impacts of mobile technologies. We have proposed the Theory of Work Adjustment (Dawis & Lofquist 1984) as a framework that is well-grounded in the psychology literature, and which can be borrowed and expanded by IS researchers seeking to understand the responses of employees and managers to mobile computing technologies. We advocate use of this framework as a lens to identify how new technologies change the nature of work life, focusing on the importance of individual-level differences in knowledge, skills, and abilities as well as changes in work-related needs and values that may influence how employees respond to this new computing paradigm.

REFERENCES

1. Ajzen, I. (1985) From Intentions to Action: A Theory of Planned Behavior, in J. Kuhl and J. Beckmann (eds). *Action Control: From Cognition to Behavior*. New York: Springer-Verlag, 11-39.
2. Attewell, P. and Rule, J. (1984) Computing and Organizations: What We Know and What We Don't Know, *Communications of the ACM*, 27,12, 1184-1192.

3. Barley, S. (1986) Technology as an Occasion for Structuring: Evidence from Observation of CT Scanners and the Social Order of Radiology Departments, *Administrative Science Quarterly*, 31, 1, 78-108.
4. Berthold, A. and Jameson, A. (1999) Interpreting symptoms of cognitive load in speech input. In: Kay J (ed) User modeling: *Proceedings of the Seventh International Conference (UM99)*, Springer-Wien New York, Vienna, 235–244.
5. Caldwell, D.F. and O'Reilly, C.A. (1990) Measuring Person-Job Fit with a Profile-Comparison Process, *Journal of Applied Psychology*, 75, 6, 648-657.
6. Chatman, J. (1989) Improving Interactional Organizational Research: A Model of Person – Environment Fit, *Academy of Management Review*, 14, 3, 333-349.
7. Davenport, T.H. and Pearlson, K. (1998) Two Cheers for the Virtual Office, *Sloan Management Review*, 39, 4, 51-65.
8. Davis, F. D., Bagozzi, R.P. and Warshaw, P.R. (1989) User Acceptance of Computer Technology: A Comparison of Two Theoretical Models, *Management Science*, 35, 8, 982 - 1003.
9. Davis, G. B. (2002) Anytime/Anyplace Computing and the Future of Knowledge Work, *Communications of the ACM* 45, 12, 67-73.
10. Dawis, R.V. and Lofquist, L.L. (1984) A Psychological Theory of Work Adjustment: An Individual Differences Model and Its Applications, Minneapolis, MN: University of Minnesota Press.
11. Dekleva, S. (2004) M-Business: Economy Driver or a Mess?, *Communications of the AIS*, 13, 1-46.
12. Edwards, J. (1994) The Study of Congruence in Organizational Behavior Research, *Organizational Behavior & Human Decision Processes*, 58, 1, 51-100.
13. Gallivan, M.J. (2001) Organizational Adoption and Implementation of Complex Technological Innovations: Development and Application of a New Framework, *Data Base for Advances in Information Systems*, 2, 3, 51-85.
14. Gartner (2001). Benefits and TCO of Notebook Computing, Intel. 2003.
15. Gebauer, J. and Shaw, M. (2004) Success Factors and Impacts of Mobile Business Applications: Results from a Mobile e-Procurement Study, *International Journal of E-Commerce*, 8, 3, 19-42.
16. Geisler, C. and Golden, A. (2003) Mobile Technologies at the Boundary of Work and Life. *National Communication Association, Human Communication and Technology Division*, http://www.rpi.edu/~geislc/Manuscripts/Mobile.pdf.
17. Goodhue, D.L. (1988) IS Attitudes: Toward Theoretical and Definitional Clarity, *Data Base*, 19, 3-4, 6-15.
18. Goodhue, D.L. and Thompson, R. (1995) Task-Technology Fit and Individual Performance, *MIS Quarterly*, 16, 4, 213 - 236.
19. International Telecommunication Union (2004) ITU Background Paper: Social and Human Considerations for a More Mobile World, retrieved May 6, 2005 from http://www.itu.int/osg/spu/ni/futuremobile/SocialconsiderationsBP.pdf.
20. Jessup, L.M. and Robey, D. (2002) The Relevance of Social Issues in Ubiquitous Computing Environments, *Communications of the ACM*, 45, 12, 88-91.
21. Kleinrock, L. (2001) Breaking Loose, *Communications of the ACM*, 44, 9, 41-45.
22. Lamb, R. and Kling, R. (2003) Reconceptualizing Users as Social Actors in Information Systems Research, *MIS Quarterly*, 27, 2, 197-227.
23. Lee,Y.E. and Benbasat, I. (2004) A Framework for the Study of Customer Interface Design for Mobile Commerce, *International Journal of Electronic Commerce*, 18, 3, 79-102.
24. Liang, T.-P. & Wei, C.-P. (2004) Introduction to the Special Issue: Mobile Commerce Applications, *International Journal of Electronic Commerce*, 8, 3, 7-17.
25. Lofquist L.H. and Dawis, R.V. (1969) Adjustment to Work: A Psychological View of Man's Problems in a Work-Oriented Society, New York: Appleton-Century-Crofts.
26. Markus, M.L., Axline, S., Petrie, D., and Tanis, C. (2000) Learning from Adopters' Experiences with ERP: Problems Encountered And Success Achieved, *Journal of Information Technology*, 15, 4, 245-265.
27. McLean, E.R., Tanner, J.R and Smits, S.J. (1991) Self-Perceptions and Job Preferences of Entry-Level IS Professionals: Implications for Career Development, *Computer Personnel*, 13, 3, 33-43.
28. Miller, C.C., Glick, W.H., Wang, Y.-D., and Huber, G.P. (1991) Understanding Technology-Structure Relationships: Theory Development and Meta-analytic Theory Testing, *Academy of Management Journal*, 34, 2, 370-398.

29. Nelson, D.L. (1990) Individual Adjustment to Information-Driven Technologies: A Critical Review, *MIS Quarterly*, 14, 1, 79-98.
30. Orlikowski, W.J. (1997) Evolving with Notes: Organizational Change around Groupware Technology, in C. Ciborra (ed.) *Groupware & Teamwork, Invisible Aid or Technical Hindrance?* New York: John Wiley & Sons.
31. Rawstorne, P., Jayasuriya, R., and Caputi, P. (2000) Issues in Predicting and Explaining Usage Behaviors with the TAM Model and the Theory Of Planned Behavior When Usage is Mandatory, *Proceedings of the 21st International Conference on Information Systems*, Brisbane, Australia, 35-44.
32. Skok, W. and Legge, M. (2002) Evaluating Enterprise Resource Planning Systems Using an Interpretive Approach, *Knowledge and Process Management*, 9, 2, 72-82.
33. Smits, S., Tanner, J. and McLean, E. (1993) Job Characteristic Preference-Reality Discrepancies and the Job and Career Attitudes of IS Professionals, *Proceedings of the ACM Special Interest Group on Computer Personnel Research*, 120-130.
34. Wang, S. and Cheung, W. (2004) E-Business Adoption by Travel Agencies: Prime Candidates for Mobile e-Business, *International Journal of E-Commerce*, 8: 3, 43-64.
35. Woodward, J. (1965) Industrial Organization: Theory and Practice, London: Oxford Press.
36. Zuboff, S. (1988) In the Age of the Smart Machine: The Future of Work and Power, New York: Basic Books.