

Wireless B2B Mobile Commerce:
A Study on the Usability, Acceptance, and Process Fit

Submitted to: The Workshop on Ubiquitous Computing Environments

Michele L. Gribbins, Judith Gebauer, Michael J. Shaw
Department of Business Administration
University of Illinois at Urbana-Champaign
339 Wohlers Hall, MC-706
1206 South Sixth Street
Champaign, IL 61820

{ mgribbin | gebauer | mjshaw } @uiuc.edu

May 14, 2003

Wireless B2B Mobile Commerce: A Study on the Usability, Acceptance, and Process Fit

Mobile technologies have gained much attention recently, not only as part of consumer-oriented products and applications, but also as a tool to augment business strategies and to support organizational processes, in particular when integrated with Internet-based technologies (Economist 2001, Varshney and Vetter 2001, Barnes 2002, Smith et al. 2002). Using such devices as cell phones, personal digital assistants (PDAs) and laptops with built-in wireless modems, employees now have the possibility to remain connected to the company's network at times when they are away from the office and would otherwise be unable to access the system, thus eliminating the need for location-dependent connections to corporate information systems.

Although wireless technologies have primarily been applied in consumer-oriented areas (Barnes 2002), there is a growing interest in increasing the usage of wireless technology in the enterprise environment (Varshney et al., 2002). Leung & Antypas (2001) suggest that mobile commerce can enhance business efficiency by distributing information to the workforce remotely and by offering new channels on which to interact with customers. Varshney et al. (2002) further suggest that organizations that are capable of harnessing the power of mobile technologies to automate and streamline business processes may reap the benefits of improved productivity, lowered operational cost, increased customer satisfaction, and improved decision-making.

Despite that mobile technologies show great promise in improving the productivity and effectiveness of an increasingly mobile workforce, many questions remain unanswered regarding the success factors and specific impacts, as well as the applicability of established concepts from information systems research. For example, what processes and tasks would most benefit from the mobile solution? Will employees be willing to use mobile commerce technologies given their

existing habits and experiences with technology? What level of maturity of the mobile systems will users require? If employees are willing to use mobile commerce technologies, what applications will they most utilize? What impact will these technologies have on the organization and its processes? How can we assess the value of wireless technology to the organization? The answers to these questions can ultimately guide the development and implementation of mobile solutions at vendor and user organizations.

In this paper, we present an empirical study that investigates employees' initial acceptance of mobile commerce solutions, as well as the relationships between organizational tasks and the use of different mobile applications in an enterprise setting. We address some of these unanswered questions through our investigation of the interplay between mobile technology, employees, job-related tasks, and underlying business processes and its organizational impacts as organizations consider the development and implementation of mobile commerce solutions that support corporate processes. The study is based on data that was collected at a Fortune 100 company in the telecommunications sector over a period of three months at the end of 2002.

Our framework applies technology-related and user-related constructs, which are commonly considered in studies derived from the Technology Acceptance Model (Davis et al., 1989), as well as task-related constructs, which are commonly considered in studies derived from the Theory of Task/Technology Fit (Goodhue & Thompson, 1995). Adoption research confirms the importance of understanding the user and the impact that usage requirements has on individuals' acceptance of IT applications (Davis, 1989). This understanding is especially important in the context of mobile commerce, as various technological design factors can impact the potential usability of a mobile application. When compared to the wired methods of

connecting with an information system, mobile devices possess smaller display screens, awkward methods for inputting data, limited processing power, lower bandwidth capabilities, and the need for greater security and user identification (Zhang et al., 2002). These disadvantages may impact an employee's willingness to use the device, despite any benefits attributed to using the solution, particularly given that alternative methods of access are available (e.g., the use of existing non-mobile desktop systems) and could be contributing factors to the slow acceptance of mobile commerce in the business-to-consumer marketplace.

Furthermore, research on technology innovation and diffusion has long pointed out the importance of matching information systems with the organizational tasks to be supported or automated (Tornatzki and Klein 1982, Kimberly 1981), as a precursor to system use and subsequent benefits. Thus, our framework is expanded to consider the overall business processes, including process-related factors (e.g., complexity, frequency, volume, and intensity) and situational-related factors (e.g., urgency, mobility) that could influence usage and the impact of technologies on the organization. As companies incorporate mobile capabilities into their existing systems and business processes, the individual's usage decision incorporates other organizational factors such as the effect one's usage has on organizational processes (e.g., faster requisition approval) and the negative ramifications associated with non-usage (e.g., delays in ordering needed supplies). The availability of alternative technologies also comes into consideration in situations where employees have the option of using the mobile device or its non-mobile alternative (to which they have become accustomed to using). Therefore, the acceptance decision also becomes a trade-off of the two alternatives, each having its own benefits and disadvantages.

Thus, our framework encompasses the interplay among (a) organizational processes, (b) the specific tasks that make up the processes, (c) the technology that is utilized for each task, and (d) the users' technological capabilities and attitudes towards using the technology. Accessing this interplay can be especially important when new technologies come along, such as mobile commerce technologies, as organizations must have its employees' acceptance of the technology and the technology must fit well with the underlying business tasks and processes before it will achieve intended benefits. The impact that this interplay has on technology usage and resulting organizational benefits and impacts will also be addressed.

We surveyed employees and observed the rollout of the wireless solution to a group of pilot users within the company over a three-month period. Two surveys were administered prior to the rollout (before and after a training session), while a third survey was administered after the implementation, and, thus, after the actual system usage had begun. Many survey items were adapted from prior literature and used a seven-point Likert scale. Open-ended items were also included to provide additional insights. Actual usage data was also collected. An initial testing of hypotheses in our empirical study found that:

- (1) The usage decision for mobile solutions is not simply based on technology-related and user-related factors, as considered by the Technology Acceptance Model. Rather, situational and process-related factors also influence the acceptance of mobile commerce solutions.
- (2) Employees have an interest in having on-demand access to their applications, but they view wireless technologies to be more suitable for certain organizational applications and

the processing of certain tasks, such as approving requisitions & checking e-mail, than it is for others tasks, such as creating e-mails & requisitions.

- (3) Process effectiveness and task characteristics affect the users' intention to use, which together with technical form factors affect the actual usage.
- (4) Significant benefits can indeed be derived from the usage of mobile business applications.
- (5) Usability factors as perceived by the users play a major role, in particular system performance. This result yields significant insights for the management of emerging technologies, in particular throughout the early phases of technology development.

The research project is ongoing. Results from our research emphasize the importance of the interplay between technologies, processes and tasks, and users, when accessing and developing information systems. The current focus includes the development and testing of a model of *Process-Technology Fit*. Among the factors we identified as potentially significant are the network effects due to peer usages as well as complementary applications. We hope that the understanding of this interplay can help organizations improve process performance, as processes are made more efficient. In addition to providing more insight for adopting mobile technology for enhancing enterprise processes, this research also can help advance IS research and theory. Our findings will uniquely add the consideration of processes-- their characteristics, effectiveness, and information needs, to the theory with respect to technology acceptance. We feel that such a research perspective, which put an emphasis on the links between IT and business processes it supports, is long overdue.

References

- Barnes, S. J. (2002) "The Mobile Commerce Value Chain: Analysis and Future Developments" *International Journal of Information Management* 22 (2), 91-108.
- Davis, F. (1989) "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology" *MIS Quarterly* 13 (3), 319-340.
- Davis, F., Bagozzi, R., and Warshaw, P. (1989) "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models", *Management Science*, 35(8), pp. 982-1003.
- Economist (2001) "The Internet, Untethered – A Survey of the Mobile Internet" *The Economist* October 13.
- Gebauer, J., Shaw, M., and Zhao, K. (2003) "The Efficacy of Mobile e-Procurement: A Pilot Study" *Proceedings of the 36th Hawaii Conference on Systems Sciences*, IEEE Computer Society Press, Los Alamitos, CA.
- Goodhue, D. L., and Thompson, R. L. (1995) "Task-Technology Fit and Individual Performance" *MIS Quarterly* 19 (2), 213-236.
- Kimberly, J. R. (1981) "Managerial Innovation" *Handbook of Organizational Design*, P. C. Nystrom, and W. H. Starbuck (eds.), Oxford University Press, London, U.K.
- Leung, K., and Antypas, J. (2001) "Improving Returns on M-Commerce Investments" *Journal of Business Strategy* 22 (5), 12-13.
- Smith, H. A., Kulatilaka, N., and Venkatraman, N. (2002) "Developments in IS Practice III: Riding the Wave: Extracting Value From Mobile Technology" *Communications of the Association for Information Systems* 8, 467-481.
- Tornatzki, L. G. and Klein, K. (1982) "Innovation Characteristics and Innovation Implementation: A Meta-analysis of Findings", *IEEE Transactions Engineering Management* 29 (1), 28-45.
- Varshney, U., and Vetter, R. (2001) "A Framework for the Emerging Mobile Commerce Applications" *Proceedings of the 34th Hawaii International Conference on System Sciences*, IEEE Computer Society Press, Los Alamitos, CA.
- Varshney, U., Mallow, A., Jain, R., and Ahluwalia, P. (2002) "Wireless in the Enterprise: Requirements and Possible Solutions." *Proceedings of the Workshop on Wireless Strategy in the Enterprise: An International Research Perspective*, University of CA, Berkeley. October 15-16.

Zhang, J., Yuan, Y., and Archer, N. (2003) "Driving Forces for M-Commerce Success E-Business Management: Integration of Web Technologies with Business Models." *Business Management: Integration of Web Technologies with Business Models*, Michael J. Shaw (ed.), Kluwer's Academic Publishers, Boston, 51-76.