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An Empirical Assessment of the Business Value Derived from Implementing Mobile Technology: A Case Study of Two Organizations

Helana Scheepers
Monash University, helana.scheepers@sims.monash.edu.au

Judy McKay
Monash University, judy.mckay@sims.monash.edu.au

AN EMPIRICAL ASSESSMENT OF THE BUSINESS VALUE DERIVED FROM IMPLEMENTING MOBILE TECHNOLOGY: A CASE STUDY OF TWO ORGANISATIONS

Scheepers, Helana, School of Information Management and Systems, Monash University, 26 Sir John Monash Drive, Caulfield East, Victoria 3145, Australia, Helana.scheepers@sims.monash.edu.au

McKay, Judy, School of Information Management and Systems, Monash University, 26 Sir John Monash Drive, Caulfield East, Victoria 3145, Australia, Judith.mckay@sims.monash.edu.au

Abstract

Mobile technologies are argued to offer unprecedented opportunities for organizations and individuals. In order for organizations to be persuaded that investment in mobile technologies is not only worthwhile, but also important to the achievement of corporate goals and objectives, then it is important to evaluate the potential of mobile technology so that the derivation of business value and the related risks involved in implementing mobile devices and services in an organization can be understood. This paper aims at understanding the organizational value that could be derived from investments in mobile technology. We present two in-depth case studies of mobile technology implementation in health care organizations. These studies show that deriving business value from the adoption and implementation of mobile devices does not seem at all certain, but is contingent upon clear business objectives and a willingness to make business changes to embrace the transformation to core business processes which are driven by the mobile technologies.

Keywords: Mobile technology, M-Commerce, Business value.

1 INTRODUCTION

The adoption and diffusion of mobile technologies (defined here to include mobile phones, personal digital assistants and other handheld devices) and the use of such devices have been described as the third wave of the computer revolution (Weiser 1998). These mobile technologies are argued to offer unprecedented opportunities for organizations and individuals to access and exchange information and engage in commercial transactions free from the constraints of time and location, wherever and whenever such needs might occur (Lyytinen and Yoo 2001, 2002). This technology push is further supported by a business pull for the implementation of mobile technology with the need for information and commercial transaction capabilities 'anywhere anytime' (Davis 2002). The opportunities that exists is tempered by detractors such as security of corporate data on mobile devices (Tsalgatigou and Pitoura 2001), a lack of standards (Barbero 2001), bandwidth and interoperability concerns (Leung and Antypas 2001), and limitations of existing hand held mobile devices (small displays, length of time required to activate the mobile device and difficulty in completing lengthy tasks, and so on) (Leung and Antypas 2001, Tsalgatigou and Pitoura 2001).

The main marketing strategy for mobile devices to date has been for personal use and the figures for penetration suggests that these devices are hugely popular with consumers (Flisi 2000). Organizations, on the other hand, have been slower to adopt and use these devices as part of their business and information technology strategy (Flisi 2000). In order for organizations to be persuaded that investment in mobile technologies is not only worthwhile, but important to the achievement of corporate goals and objectives, then it is important to evaluate the potential of mobile technology so that the benefits and the related risks involved in implementing mobile devices and services in an organization can be understood. The research reported in this paper was designed to do just that: it was aimed at understanding the organizational value that could be derived from investments in mobile technologies. To facilitate an understanding of the potential of mobile technology for business application, a framework was adapted from the one developed by AvantGo (2003) and was used to study and evaluate the business benefits of the implementation of mobile technologies in two organizations.

This paper will describe the potential of mobile technology and reasons for mobility; this will be followed by an analysis of the notion of business value with respect to mobile technology from the perspective of value propositions. Two case studies of actual implementations of mobile technologies will be considered to better appreciate the risk and business value that such technologies potentially offer to organizations. Some of the shortcomings in these implementations will be used to support reflection as to appropriate managerial actions that might result in even greater benefits being derived for the organization.

2 NOTION OF BUSINESS VALUE AND INFORMATION TECHNOLOGY

For many organizations, IT is now inextricably bound up in day-to-day organizational routines and activities, and is often touted as the way to benefit from the promises and opportunities of the digital, networked world (Sambamurthy 2002). Despite the orgy of investment in IT in the decade of the 1990s, there are comparatively few organizations who feel confident that they have reaped the full benefits of these investments (Manyika and Nevens 2002), nor that they are achieving an acceptable payoff from IT investments (Willcocks 1996), with the literature reporting findings of the failure of organizations to reap the anticipated business benefits from IT (Thorp 1998, Ward et al. 1996). Thus, understanding the business value derived from considerable investments in IT becomes a pressing issue in contemporary, IT-intensive business environments (Lee 2001). This matter becomes even more complicated as the nature of benefits potentially derived from IT investments change with successive waves of computing. Benefits with modern investments are often geared more towards revenue increases and other more esoteric benefits than with cost displacement (van der Zee 2002),

and hence potential business benefits tend to be intangible, less direct, and interwoven and diffused across a range of organizational activities. As more and more investments are made in mobile, pervasive and ubiquitous computing, reconsidering notions of business value, and developing frameworks with which to identify the benefits of proposed investments, becomes more important and impelling.

Organizations invest in portfolios of IT primarily to support the achievement of a range of business objectives through support for the implementation of business strategy, and to build IT capabilities required for success both now and in the future (Weill and Broadbent 1998). Achieving alignment between the business strategy and the portfolio of IT investments has been demonstrated to be linked to superior organizational performance and deriving better payoffs from IT (Chan et al. 1997), but is nonetheless difficult to achieve and maintain (Hirschheim and Sabherwal 2001). The benefits derived from IT can vary quite dramatically according to the internal organizational processes and activities that shape how the technology is used and managed (Tallon et al. 2000). Thus, converting IT spending into effective utilisation of a corporate resource is a vexing and challenging problem for managers (Lee 2001). The types of value derived from appropriate investments in IT may include the direct value associated with cost reductions through greater efficiencies and/or increased throughputs, increased revenues through increased sales, increased customer loyalty and access to larger markets, and so on, together with a range of benefits associated with integrating key business processes and activities, building flexible infrastructures, and the like (van der Zee 2002). A challenge for most organizations, however, is to convert these potential benefits of IT into actual realised benefits once the technology is implemented (Ward et al. 1996). Adequately identifying upfront the potential value that could be derived for the organization is in itself a challenging issue: managing the range of business changes required to ensure that potential value is translated into a realised return on investment is an even harder task, and one that is comparatively poorly done in organizations (McKay and Marshall 2003).

2.1 Business value and mobile technologies

Leung and Antypas (2001) argue that m-commerce applications and technologies can offer business value in two main areas: operational efficiency, through the ability to distribute information to the workforce remotely; and customer service, through the provision of an additional channel through which interactions can occur, in effect adding to the customer value proposition.

Value propositions are derived from the relationships between the bundle of product, service and information that an organization offers, and a consumer purchases, and the extent to which this bundle satisfies consumer needs (Clarke 2001). In comparing the particular value associated with mobile technologies with other information technologies such as e-Commerce, Clarke (2001) identifies four unique value propositions which could be derived from mobile technologies. These include exploiting the concepts of ubiquity (the exchange of information, and performance of transactions from any location in real time), convenience (activities can be performed at the users' convenience), localisation (contacts and exchanges can be based around knowing the location of a particular mobile device), and personalisation (the ability to receive and access personalised information and services). These four value propositions are seen to derive from exchange between an organization and a consumer, with the conceptualization resting upon the use of mobile technologies on the part of the consumer. Our interest in this research, however, was on the adoption of mobile technologies by organizations, rather than individuals, and thus, the applicability of these value propositions needs to be rethought on this basis (see Figure 1 below).

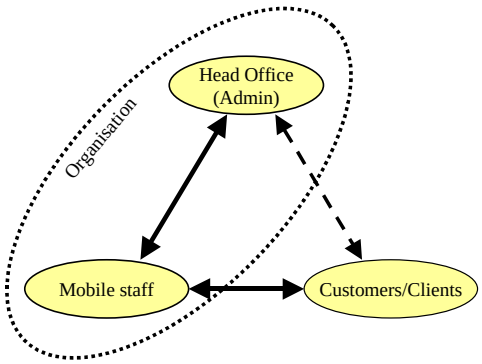

Figure 1: The internal value proposition derived through B2E exchanges

In many organizational contexts, internal members of staff are using mobile technologies to accomplish their tasks, which may or may not involve direct interaction with the customer. For example, warehouse staff may use mobile devices to monitor and control inventory levels and movements. In the situation in Figure 1, mobile field staff use mobile technologies to support their interactions with customers, with the mobile device serving almost as a conduit between the mobile staff member and head office, in order to support the service delivery to the customer. Thus, the mobile device may not be adopted to create value directly from the customer's perspective, but rather to create value from a purely internal perspective (between mobile staff and head office), as a result of which, value is added for the consumer. In considering the business value derived from mobile technologies then, this is an important consideration.

This position is supported and further illustrated by the service profit chain (Heskett et al. 1994). The logic of the service profit chain is that profitability and growth are dependent on customer loyalty, which in turn is directly derived form customer satisfaction, itself dependent on the perceived value of customer service. Heskett et al. (1994) further assert that the level of service provided is contingent on satisfied, loyal and productive staff, with staff satisfaction deriving from having adequate resources, systems and tools, support structures, rewards, and recognition to enable the staff member to deliver excellent service to customers.

In terms of mobile technologies and their uptake in organizations, we argue that an important source of business value is derived from what we have labeled the internal value proposition. In other words, when mobile technologies support mobile staff in the performance of service delivery to consumers (i.e. they act as a "tool for serving customers" (Heskett et al. 1994)), direct value is created for the mobile staff member, who is then empowered to deliver services to consumers more effectively or more efficiently. We thus reject the contention of Leung and Antypas (2001) that the benefits of mobile technologies are operational efficiency and customer service via an alternate channel for interaction only, and will demonstrate a much broader range of benefits through our analysis of the case study data in subsequent sections of this paper.

3 RESEARCH METHOD AND DESIGN

Case study research is especially appropriate in new topic areas (Eisenhardt 1989) and is a research strategy that allows for an in-depth description of the relationships in a particular situation (Galliers 1991). The case research strategy was chosen here due to the novelty of the implementation of mobile technology within organizations. The case studies reported here were based on an explorative multi-site case study design (Yin 1994) and focused on the mobile technology implementation processes and

outcomes of two healthcare organizations in Australia. The case organizations reflect a mixture of private and non-profit organizations in the healthcare environment. The research was conducted in one of the centers of a non-profit organization called NurseCo (a pseudonym) and in a privately owned paramedical organization SlimCo (a pseudonym). The data for this study was collected between 2000 and 2003. Formal and intensive rounds of data collection were interspersed with periods of informal data collection. The first round of formal interviews were held in September-October 2000 at SlimCo and April-May 2001 at NurseCo before the implementation of the mobile technology. Follow-up interviews (mostly with the same interviewees) where held in December 2000-February 2001 at SlimCo and September – December 2001 at NurseCo after the mobile technology has been implemented and used for two to three months. Data were also collected on a more informal basis over the duration of the study by means of regular e-mail and phone contact, lunch meetings, discussions and by attending presentations at the organizations. Brief follow-up informal interviews were conducted in 2003.

After gaining initial access to the organization, the interviewees were identified with the help of the managers, who identified interviewees in three categories: those that were indifferent to the implementation; those that did not want the implementation to take place; and those that "could not wait" for the new technology. Almost 90 formal and 10 informal interviews with various stakeholders were conducted across the two organizations over the period of the study. Interviewees included executives of the organizations (who were involved with the implementation), middle managers, project leaders, individuals using the mobile technology and administrative personnel that were affected by the use of the technology, but did not use the mobile technology directly.

The interviews were semi-structured and comprised of open-ended questions derived from the implementation literature and similar research studies. Before-implementation and after-implementation interview guides (for use by the interviewers) were used in a small pilot study and were subsequently refined to improve understandability and comprehension. Interviews were transcribed and shared with the interviewees to correct possible errors and omissions and to evaluate the validity of the interpretation of their "story" (Benbasat et al., 1987; Klein & Myers, 1999). Furthermore, each of the organisations provided information about the business activities, technology available, and implementation process in the organisation. Based on all the data and transcripts, rich descriptions of the various roles and considerations were obtained at each case organization. For the purposes of this paper, our focus was on all utterances related to their perceptions of benefits or value derived from the mobile technology implementation, to their perceptions of success of the implementation and the impact the implementation had had on the organization. An organizing framework for these notions of benefits and value was heavily adapted from one developed by AvantGo (2003), and was based around three broad types of benefits. Type 1 benefits were those associated with encouraging and motivating the mobile staff to adopt and use the technology, a fundamental hurdle to be overcome if organizational benefits are to be derived. Type 2 benefits had to do with efficiency gains, in most instances associated with reduced costs or decreased time to complete a task. Type 3 benefits were associated with effectiveness gains that resulted from the mobile technology. For each identified benefit, an attempt was made by the researchers to decide whether or not this outcome was a direct or indirect result of the implementation of the mobile technologies (mobile impact), and whether or not the benefit would have a direct or indirect impact on costs or revenues (P/L impact) (see Appendix A). Both the researchers classified the available data in the categories as outlined above independently. The one researcher conducted all of the interviews and the second researcher did not take part in the interviews, but only performed the categorisation. The two researchers then compared the outcomes of their categorisation and discussed differences.

4 CASE STUDIES

4.1 NurseCo

NurseCo is a non-profit organization with 1200 personnel, operating in Melbourne, Australia. The organization has a central head office which is an administrative center only, and has a number of centres located around the suburbs which serve as the point of contact for their mobile nursing staff. The organization provides home health services to the community such as aged care, post-operative care, palliative care and the like. NurseCo is currently investing heavily in mobile infrastructure, and this case concerns one of the suburban centers that was implementing mobile technologies.

In early 1999 NurseCo investigated the possibility of using mobile devices to replace their paper-based core business process. A pilot project was run and a decision was made that handheld wireless computing devices would be implemented. A formal requirements specification and systems development process followed. The proposed wireless handheld system allows client appointment schedules together with clinical data to be downloaded to the handheld computer. The system also allows updates to this information to be uploaded to the client information system. The information provided to the nursing staff on the handheld is more comprehensive than the old paper based system, and is argued to be more secure. To date, the implementation of the mobile technologies has not been completed. The implementation has been affected by rapidly evolving and improving technology: NurseCo is now in its third generation of mobile devices, and organization wide implementation is still not complete. The budget for this complete project was A$6 million, and no information is available as to whether or not the project is tracking on budget.

4.2 SlimCo

SlimCo is a small organization based in Melbourne, Australia specializing in weight loss. SlimCo's aim is to provide doctors with a weight loss program for their patients that allows them to retain a supervisory role over each patient's weight loss program. At the same time, SlimCo supports the clients who want to lose weight by way of a healthy program based on nutrition education. SlimCo consultants visit the clients at their home for consultation. In early 2000 SlimCo decided to implement mobile devices to support their consultants during consultations, for their weekly and monthly reporting, and also for invoicing. In October 2000 they embarked on a training program where the device was introduced to the consultants. The proposed mobile system handles all transactions done by consultants. On a daily basis these transactions are synchronized with the central database at head office. Furthermore, information about marketing activities during the week is synchronized on a weekly basis through e-mail. Compared to the previous paper-based system a number of tasks have been eliminated. They are currently saving on time and other costs such as postage and printing. In addition to the savings, credit card transactions are processed on a daily basis instead of a weekly basis. The total investment by SlimCo in implementing these mobile technologies was approximately A$50,000, of which approximately A$35,000 was devoted to purchasing the devices and modems. The consultants are charged A$8 per week (including insurance) which helps the owner recoup initial outlays on the technology.

5 RESEARCH FINDINGS

The categorised benefits are contained in Appendix A. Much of the discussion in this section and the next is based around that data, and also on the transcribed interviews with participants.

It was previously mentioned that benefits were categorized into three main types. Type 1 benefits were those types of benefits that were likely to have increased the chance of adoption of the technology. Participants from both organizations in all roles interviewed acknowledged that a major

benefit had been an improvement in the accuracy of the data captured and then transferred or communicated between the mobile employee and the organization and vice versa, with the associated benefit of a reduction in time spent ironing out misunderstandings and inaccuracies, rekeying faulty data, and so on. In the case of NurseCo, other related benefits were that they were able to gather an increased amount of data about their clients and the services required and performed than they had using the previous manual paper system, and in addition, had been able to reduce the amount of clerical time spent on data entry. Another benefit for NurseCo was to gain accurate information about the time spent with clients and the time spent travelling between clients. Similarly, both organizations reported that benefits from an increase in frequency of data exchanges facilitated by the mobile technology, and hence the more timely receipt of messages, client information, and so on. The consultants at SlimCo were generally well satisfied with the new devices, and even those who had been slightly negative or indifferent to the concept presented to them, had generally been converted to the new technologies. Consultants reported that the devices were easy to learn, and were very satisfied that the mobile devices markedly reduced the time they spent on paperwork each week, increasing their earning potential by enabling them to visit more clients, and they also valued the fact that the mobile devices were available for personal use. By contrast at NurseCo, there were mixed views about the mobile technologies. The consultants generally perceived that these devices were not very easy to use, and that they were thus more difficult to use than the previously existing manual paper-based system. They were also concerned by their perception that their time spent in doing data entry and similar clerical tasks had increased with the introduction of these devices. By contrast, the management staff asserted that the new systems were easier to use than the old, and that the consultants were required to use less time on data entry. Overall, we can conclude that there was ready adoption at SlimCo, with all stakeholders acknowledging benefits of the new system, whereas at NurseCo, there was acknowledgment of some benefits, but there was much more uncertainty about the effects of these devices, and the adoption by NurseCo consultants could be described, at best, as somewhat reluctant.

Both organizations reported the type 2 benefits of efficiency gains and some reductions in operating costs. Both organizations reported the benefits of a decrease in paper documentation, a decrease in data entry errors, fewer errors for which to seek correction or clarification, an increase in the accuracy of client records, and less manual copying of information. In SlimCo's case, there was an increase in consultant productivity through their ability to handle more clients as a direct result of the reduction in administrative tasks. Notable efficiencies had been achieved at NurseCo, with consultants being able to reschedule appointments if they were running late, and the consultant to whom the client was reassigned could access full client details, required services and so on. Both of these could be accomplished without consultants having to return to administrative centres which had not previously been the case. In SlimCo's case, infrastructure costs (caused by the initial purchase of hardware & software) had initially increased, but had subsequently returned close to pre-implementation levels. However, the benefit to the company of receiving payments within 24 hours as opposed to 10 working days with the old system more than offset the slight increase in infrastructure costs. NurseCo, being the larger organization and attempting the much more ambitious implementation, had experienced a substantial rise in infrastructure costs, which could not be offset by higher charges to clients or by nurses attending more clients. Furthermore their concerns were compounded by the fact that the new mobile technologies and systems caused degradation in performance of some of their existing legacy, but core business systems, such as the critical nurse scheduling system. Overall, then, we see positive increases in efficiency at SlimCo, whereas the picture at NurseCo is not completely clear. There were efficiency gains, but the issues and problems that the mobile implementation caused elsewhere in the business at least at the present time, seem to offset many of the efficiency increases.

The third type of benefits were associated with effectiveness gains. In the case of SlimCo, consultants were more effective in the sense that they could generate more consulting fees, due to the reduction in administrative loads, and they could more easily make contact with lapsed clients to enquire as to their welfare and encourage their return to the programme. They did not generally avail themselves of the more integrated view of the client that was available via the system. From a management perspective

however, there were definite gains perceived in terms of their ability to manage the consultants and improved management of their core business processes. Management in effect gained much more control of these processes via the new system. From the client perspective, there has been no added value from the system. There is no evidence available that client satisfaction has increased, nor of increased revenues per client, nor of increased loyalty and retention of clients. By contrast, the consultants at NurseCo were potentially made more effective in their treatments and interventions with clients via the better access to client details and case histories, and visits could be rescheduled remotely according to the consultant's assessment of the client's requirements. However, there is no evidence available that this had translated into greater client satisfaction, increased revenues per client, nor to increased client retention. In contrast to SlimCo, some aspects of the management of consultants and some of the major business processes had deteriorated due to technical difficulties with system integration.

Overall, in the case of SlimCo, there is clear evidence of benefits and corporate gains as a direct result of the implementation of the mobile technologies to support the activities of mobile workers. The picture is much more hazy in the case of NurseCo, as gains in some areas seem to be offset by impediments and losses in others, some of which may be resolved through the full implementation and the resolution of technical issues, but this is certainly not completely clear at this stage.

6 DISCUSSION

We conclude that for SlimCo, the implementation of mobile technologies could be judged a success, which matches the assessment of both management and the consultants, whereas at this point in time, it would be impossible to view the NurseCo situation with the same degree of confidence. There are significant issues yet to be resolved, and care must be taken to ensure that benefits were not overwhelmed by perceived disadvantages. What can be learned from these cases?

The CEO at SlimCo approached this IT investment with very clear business objectives: he was absolutely clear on what he wanted to achieve. Although there was no formal cost benefit analysis or any other financial appraisal of the proposed investment, like many small business owner/managers, he seemed to have an excellent intuitive 'feel' for the business, and he had a surprisingly accurate mental approximation of the costs: he 'knew' that this project was viable and was confident that it would deliver benefits. He opted for an uncomplicated, low cost solution which was adequate to achieve his business purposes and could be relatively quickly implemented: there was no sense in which he was aiming for state of the art wizardry. Furthermore, he maintained control of the project, and did not hand responsibility to IT vendors or consultants. Key stakeholders (administrative staff, consultants) were consulted about the project and its impact on work practices, processes, and the like. The outcome has been an organizational change enabled by mobile technologies which has more than met the objectives and expectations of the CEO of SlimCo.

It is difficult to ascertain exactly what the objectives are in the move to mobile technologies, and stories seem inconsistent between head office, local centres, administrative staff and nursing staff (consultants). The researchers were left with the impression that there was a rhetorical function in some of the words used to express the objectives, as opposed to a focused business objective. Certainly the espoused objective is not shared by all of the nurses who perceive more sinister aims of increasing control over their activities, and shifting workload onto them (increasing their administrative tasks) without increasing their remuneration. In addition, NurseCo opted to go for much more elaborate and evolving technology (in fairness, partly a necessity given the much greater volumes of data being exchanged), and had experienced a protracted, and as yet, incomplete implementation, and the need to upgrade on three occasions to subsequent generations of hand held devices. There have been some benefits from the implementation to date, but there has also been some degradation in work conditions and performance of some of the core business processes.

The mobile devices employed by SlimCo are Palms, which are compact, readily portable, and switch on instantly ready for use. Data inputs were such that the small screen size did not become a major impediment. Data synchronization can be effected quite simply via modems once per day, when the consultant returns home. The hand held computers adopted by NurseCo are relatively bulky (the initial devices was the Sharp PV5000A (Windows CE handheld computer) and currently they are utilising the Compaq Tablet PC TC1000), hence much more difficult to carry around, and need to go through a relatively protracted booting up procedure several times per day, indeed, every time they are required to support the nurse-client consultation. In addition, the data transfers that are necessary are relatively slow. This seems to indicate that speed, convenience and ease of operation may translate into more ready adoption, from which both organization and mobile staff member (and in some contexts, the customer) can benefit. Mobile staff may be more willing and likely to 'buy in' and readily adopt such technologies without it being mandated and the like from head office.

Ready and willing adoption thus seems helpful to support the achievement of the benefits associated with operating efficiencies, such as reduced paperwork, the elimination of paper based processes, reduction (or elimination) of errors and audit activities, and the like. Furthermore, reducing the time spent by mobile staff in both traveling to and from administrative centres, and in performing routine paper-based administrative work, can, in many circumstances, increase the productivity of the mobile worker by increasing opportunities to service additional clients. In addition, in many circumstances, mobile staff may become more effective by an ability to access vital information relating to the provision and scheduling of services to customers or clients, thus resulting in greater personalisation or tailoring of services. Effectiveness gains may also be achieved through the improvement in activities and processes associated with managing both the mobile staff member (for example, more timely information is available to management about mobile staff performance, travel times, revenues generated, and the like) and core business processes (scheduling of visits, receipt of payments and so on).

Manyika and Nevens (2002) identify key characteristics of organizations that perceived that benefits were derived from their IT investment outlays (see Table 1 below). It is interesting to note that SlimCo displayed all these characteristics, whereas in NurseCo, confirmatory evidence of these is difficult to find. Furthermore, in the SlimCo case, there was clear development of the internal value proposition, whereas this was not the case at NurseCo. Deriving business value from the adoption and implementation of mobile devices does not seem at all certain, but is contingent upon a clear business objective, and a willingness to make business changes to embrace the changes to core business processes which are driven by the mobile technologies.

Organizational characteristics for realizing benefits from IT	**SlimCo**	**NurseCo**
Simultaneous technological & managerial innovation	Yes	Technological only
IT focus to cut interaction costs (between head office and mobile worker)	Yes	Yes
Focused investments on productivity drivers	Yes	?
Planned investment carefully, correct sequence to acquire capabilities over time	Yes	?
Reengineered core processes & transformed other functions to exploit potential of IT	Yes	Partly

Table 1: Organizational characteristics associated with IT benefit realisation

References

AvantGo (2003) Know your ROI…Building the business case for mobile SFA. AvantGo White Paper. (available form www.avantgo.com).

Banavar, G. and Bernstein, A. (2002) Software infrastructure and design challenges for ubiquitous computing applications. Communications of the ACM, 45(12): 92-96.

Barbero, M. (2001) Preparing to ride the wireless wave. Journal of Business Strategy, September/October 2001:10-12.
Benbasat, I., Goldstein, D.K. and Mead, M. (1987) The case research strategy in studies of information systems. MIS Quarterly, 11(3): 369-386.
Chan, Y.E. Huff, S.L., Barclay, D.W. and Copeland, D.G. (1997) Business strategic orientation, information systems strategic orientation, and strategic alignment. Information Systems Research, 8(2): 125-150.
Clarke, I. (2001) Emerging value propositions for m-commerce. Journal of Business Strategies, 18(2): 133-148.
Davis, G.B. (2002) Anytime/anyplace computing and the future of knowledge work. Communications of the ACM, 45(12): 67-73.
Eisenhardt, K.M. (1989) Building theories from case study research. Academy of Management Review, 14(4): 532-550.
Flisi, M. (2000). Smart handheld devices: The emergence of convergence. Mobile Trends.
Francis, L. (1997). Mobile Computing - A fact in your future, Proceedings of SIGDOC '97, Snowbird, Utah, USA.
Galliers, R.D. (1991) Choosing appropriate information systems research approaches: a revised taxonomy. In H.E. Nissen, H.K. Klein and R. Hirschheim (eds.) Information Systems Research: Contemporary Approaches and Emergent Traditions. Elsevier Science Publishers, North Holland.
Heskett, J.C., Jones, T.O., Loveman, G.W., Sasser, W.E. and Schlesinger, L.A. (1994) Putting the service-profit chain to work. Harvard Business Review, 72(2): 164-174.
Hirschheim, R. and Sabherwal, R. (2001) Detours in the path toward strategic information systems alignment. California Management Review, 44(1): 87-108.
Klein, H.K. and Myers, M.D. (1999) A set of principles for conducting and evaluating interpretive field studies in information systems. MIS Quarterly, 23(1): 67-94.
Lee, C.S. (2001) Modeling the business value of IT. Information & Management, 39(2001): 191-210.
Leung, K. and Antypas, J. (2001) Improving returns on m-commerce investments. Journal of Business Strategy, September/October 2001:12-13.
Lyytinen, K. and Yoo, Y. (2002) Issues and challenges in ubiquitous computing. Communications of the ACM, 45(12): 63-65.
Lyytinen, K. and Yoo, Y. (2002) Research commentary: the next wave of nomadic computing. Information Systems Research, 13(4): 377-389.
Manyika, J.M. and Nevens, T.M. (2002) Technology after the bubble. McKinsey Quarterly, No. 4, 17-27.
McKay, J. and Marshall, P. (2003). Strategic management of E-Business. John Wiley and Sons, Brisbane, 2003.
Sambamurthy, V. (2002) Business strategy in hypercompetitive environments: rethinking the logic of IT differentiation. In Zmud, R.W. (ed.) Framing the Domains of IT Management. Pinnaflex Educational Resources, Ohio.
Scheepers, H. 2002. Mobile Technology Use Landscape – Convergence of the Organisation and Personal Context. Proceedings of Information Resource Management Association International Conference, Seattle, USA, May 19 - 22, 2002, pp. 767 - 770.
Tallon, P.P., Kraemer, K.L. and 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.
Thorp, J. (1998) The Information Paradox: Realizing the Business Benefits of Information Technology. McGraw-Hill, Toronto.
Tsalgatidou, A. and Pitoura, E. (2001) Business models and transactions in mobile electronic commerce: requirements and properties. Computer Networks, 37(2001): 221-236.
Van der Zee, H. (2002) Measuring the Value of Information Technology. Idea Publishing Group, Hershey.
Ward, J., Taylor, P. and Bond, P. (1996) Evaluation and realisation of IS/IT benefits: an empirical study of current practice. European Journal of Information Systems, 4(1996): 214-225.

Weill, P., & Broadbent, M. (1998). Leveraging the Infrastructure: How market leaders capitalize on information technology. United States of America: Harvard Business School Press.
Weiser, M. (1998). The future of ubiquitous computing in campus. Communications of the ACM, 41 (1), 41-42.
Wiberg, M., & Ljundberg, F. (Eds.). (1999). Exploring the vision of "anytime, anywhere" in the context of mobile work: The BizTech Network.
Willcocks, L. (1996) Introduction: beyond the IT productivity paradox. In L.Willcocks (ed.) Investing in Information Systems: Evaluation and Management. Chapman and Hall, London.
Yin, R.K. (1994) Case Study Research: Design and Methods. 2nd ed. Sage, Thousand Oaks, CA.

Appendix

(Key: S = SlimCo, N = NurseCo, C = Consultant, D = direct, I = indirect, P/L Impact = Impact on costs or revenue)

Type 1 Benefits: Improve adoption	SlimCo (S)	Mobile impact	P/L impact	NurseCo (N)	Mobile impact	P/L impact
Data exchange quality	Cs get accurate details of new potential clients (reduction in potential for errors in recording details) in timely fashion	D	I	C receive accurate information about clients and schedule of visits	D	I
	S gets increased accuracy in reporting of client details, financial transactions, etc.	D	D	N get direct data input (& therefore can reduce need for data entry clerks)	D	D
				N gets additional information on clients, and services performed and/or required	D	I
				N get accurate information on length of visits		D
Data exchange frequency	Increased frequency of bi-directional data exchanges (more timely receipt of data)	D	I	Increased frequency of bi-directional data exchanges (more timely receipt of data)	D	I
Consultant satisfaction	New system is easy to use for C (few training requirements)	D	D	Not perceived as being easy to use by some C* (more difficult than previous manual system)	D/I	D
	Decrease in time taken to complete administrative tasks, & therefore, increase in time available to serve clients	D	D	Increased time spent on administrative tasks by C*(data entry)	D/I	D
	Technology available for personal use	D	I	*(*Management take the opposite perspective)*		
Outcomes	*Ready adoption*			*Reluctant adoption*		
Type 2 Benefits: Reduce Operating Costs						
Consultant management	Increase C productivity (more clients can be handled, before S needs to employ another C)	D	D	Cs can reschedule client visits if delayed, running late / change client scheduled times / update schedule on the road	D	D
	Decrease time taken to seek clarifications,	D	D	If redirected to another	D	D

	resolve errors on financial transactions			job, Cs can obtain client details without needing to return to office		
Management of corporate information	Decrease paper documentation Increased accuracy of records Decrease data entry errors (less rekeying of data required)	D D D	D D D	Decrease paper documentation Less manual copying of information (fewer errors) Increased accuracy of records about patients and interventions performed for both N and Cs	D D D	D D D
Management of Operations	Infrastructure costs increased temporarily initially, then returned to previous level More timely receipt of payments (payments received within 24 hrs as opposed 10 days) New business venture started interstate	D D D	D- D D	Infrastructure costs increased Need to move to new generation of hand held devices (now on 3rd generation) Decrease in efficiency of nurse scheduling system	D D D	D- D- D-
Outcomes	*Quantified and achieved reductions in operating costs*			*Some cost reductions, probably balanced against increases in costs, uncertainty as to net position*		
Type 3 Benefits: Increase organisational effectiveness						
C effectiveness	No change in capabilities of C No improvement in C's performance with client Increased consultancy fees More timely contact with prospective clients More integrated view of client is available (but not utilised)	- - D D D	I - D I I	Capabilities of C improved through better access to client details and case history Can change scheduled visits according to C's assessment of client More integrated view of services delivered	D D D	I I I
Increased effectiveness in management processes	Cs able to access information about lapsed clients and send out letters Improved management of C Improved management of core business processes	D D D	I I I	More integrated view of client is available and utilised by all Cs – Cs can access full patient record (as opposed to previous card system) Decrease in effectiveness of nurse scheduling system (critical to business operations)	D D	I D-
Client value	No increased loyalty & retention No increased	- -	- -	No increased loyalty & retention No increased	- -	- -

	revenue/client No improved client satisfaction	-	-	revenue/client No improved client satisfaction	-	-
Outcomes	*Some definite effectiveness gains, but no attempt yet to quantify gains*			*Some strong gains in effectiveness in terms of client care, but these do not seem to translate into financial benefits. Some decrease in effectiveness of core business systems.*		
Overall	***Strong gain***			***Jury is still out***		