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# Supporting the Sales Force through Mobile Information and Communication Technologies

*Focusing on the Pharmaceutical Sales Force*

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# Supporting the Sales Force through Mobile Information and Communication Technologies:

*Focusing on the Pharmaceutical Sales Force*

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*To the Memory of*
*My Father*

ٱلْحَمْدُ لِلَّهِ ٱلَّذِى هَدَىٰنَا لِهَٰذَا
وَمَا كُنَّا لِنَهْتَدِىَ لَوْلَآ أَنْ هَدَىٰنَا ٱللَّهُ *

* *Praise to God who has guided us to this; and we would never have been guided, if God had not guided us." (Translated from Quran)*

Abstract

This dissertation sets out to explore how mobile information and communication technologies (M-ICT) could provide the pharmaceutical sales force with a value adding support when operating within a mobile work setting.

Investments in information and communication technologies to support the sales force, though costly, have not been always successful. Firms face the challenge to predict the impact of specific technologies and productively apply new technologies to enhance the performance of their sales force.

In this dissertation, two normative models that would support managers in proactively determining how M-ICT could provide their sales force with a value adding support when operating within a mobile work setting, have been developed.

To examine the functioning of the normative models developed, an in-depth case study involving the sales force of a multinational pharmaceutical company (Pharma) operating in Finland has been carried out.

The results of the empirical study allowed to demonstrate the usability of the models developed and to refine those models based on the case study's findings. In particular, the models developed showed how M-ICT could provide a value adding support to the sales force of the case company. Additionally the case study's findings indicated the nature of the accompanying organisational factors that would ensure a successful implementation of M-ICT for the pharmaceutical sales force.

**Keywords:** Mobile information and communication technologies, sales force, technology acceptance, barriers to performance, training

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4. BenMoussa, C. (2006): <u>“Mobile Information and Communication technologies in the Context of the Pharmaceutical Sales Force Work”</u>. TUCS Technical Reports Publications, No. 749, ISBN 952-12-1692.

5. BenMoussa, C. (2004): <u>“A Task-based Framework for Mobile Applications to Enhance Salespersons’ Performance</u>”, In Proceedings of IFIP TC8 Conference on Mobile Information Systems, Oslo Norway, 15-17 September 2004.

6. BenMoussa, C. (2003): <u>“The effects of mobile commerce on salespersons’ performance”</u>, In Proceedings of the Second International Conference on Mobile business, Vienna, Austria, 23 th-24 th June, 2003.

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# Chapter 1

# Introduction

*"Too often technology is used only to automate production and thus reduce skill and labour requirement. But its potential to inform organizational members about the work process and thus improve operations and increase innovation is the aspect of technology that will be most important to long-term organizational success." Zuboff, S, (1985)*

## 1.1 Motivation and general overview

The impact of information technology (IT) on productivity remains a subject of debate among both academics and practitioners alike. Researchers have expended great effort in attempting to understand the impact of IT on productivity at the economic, organisational and individual levels. A number of those research endeavours have delivered controversial results. For certain researchers, IT has a positive impact on productivity. While others claim that there is a paradox when it comes to the relationship between IT and productivity. According to the productivity paradox of information technology, investments in IT do not improve productivity (Brynjolfsson ,1993).

Brynjolfsson & Hitt (1998) took a moderate position when they claimed that IT does not necessarily increase productivity, but it is a major component of a broader system of organisational changes that increase productivity (Brynjolfsson & Hitt, p. 55). They suggested shifting the focus from merely computerisation into exploring ways to understand the transformative potential of IT and making the introduction of those technologies to organisations effective.

Zubboff (1985) in her influential study about information technology in the workplace coined the term "informate" as a key characteristic of information technology. She argued that IT is characterised by a fundamental duality. First, the technology can be applied to automate operations with the aim of replacing human efforts and skills. Second, technology can be used to "informate", i.e. to generate information about the underlying process. According to Zubboff (1985) companies could achieve certain short-term economic benefits through automation. However, the most powerful and unique contribution of information technology rests on its "informating" capacity, which can enhance comprehension of the operations through which an organisation does its work. She wrote "*A strategy that emphasizes automation focuses on the smart machine. An* *informating strategy recognizes the value and function of the smart machine, but only in the context of its interdependencies with smart people"* (Zubboff, S, 1985, p.12).

The application of information technology to the sales force's work has long been characterised by the automotive view of IT. Companies have invested significant sums in what is referred to as Sales Force Automation Systems (SFA), with the assumption that providing their sales force with information technology will contribute to enhancing productivity, communication and relationships.

The concept of SFA refers to the application of information technology to the selling and administrative activities of the sales force. According to Morgan & Inks (2001), regardless of their form, SFA systems aim at achieving one overriding goal: enhancement of the collection, assimilation, analysis and distribution of information to improve the productivity of the sales force, while enhancing customer relationships.

SFA technologies have been applied to automate many of the routine information flows associated with the sales process (Speier & Venkatesh, 2002). This includes such activities as contact management, sales routes planning, sales calls targeting, enhancement of sales presentations, automation of administrative tasks (e.g. sales calls and expenses reporting), prospecting, retrieving products' information, configuring products to customers' specifications, checking inventory, and information access and exchange with different stakeholders such as colleagues, supervisors or the customers (Widmier et al. 2002).

Common SFA includes the use of e-mail, mobile phones, presentation creation, word processing, financial management, lead management, training, order management, customer profiling, market information, forecasting capabilities, report generations, and access to Internet services as well as to corporate databases (Mirani et al. 2001; www.salesforce.com; www.siebel.com).

SFA technology is currently a large market involving more than 600 vendors (Speier & Venkatesh, 2002). The forecast sales of SFA software for 2004 is US$4.05 billion, and Customer Relationship Management (CRM) systems are predicted to reach US$74 billion in sales by 2007 (Honeycutt, 2005).

However, studies have shown that the adoption and use of SFA technologies by the sales force have been less successful than originally expected (Blodgett 1995; Rigby et al. 2002). The failure rates of SFA implementations have been reported in some cases to be as high as 55–80% (Honeycutt, 2005; Rigby et al. 2002).

Given the magnitude of SFA investments and failures, the academic community has called for more research in the area. According to Ahearne & Schillewaert (2001) organisations need justifications for substantial investments in IT for their sales force and cannot continue investing in such technologies as a matter of blind faith alone. Jones et al. (2002) point out that, given the level of SFA failures, firms cannot afford to invest in SFA technology while getting lacklustre results. This may, in turn, result in the sales force becoming stagnant and obsolete. Similarly Buehrer (2005) suggested that the pressing question now seems to be how we can prevent repetition of any firm's failures in information technology investment for their sales force.

### 1.1.1 Sales force's adoption of SFA technologies

The adoption of SFA technologies has been a more recent topic of interest among researchers, although the literature has shown that adoption and use of SFA has been less successful than originally hoped (Buehrer, 2005).

Researchers identified a number of possible reasons for underutilisation of the technology by the sales force. Jones et al. (2002) performed a longitudinal study to investigate what individual variables influence both sales representatives' intention to use and the extent of usage of a new SFA system. They found that three variables explained sales representatives' intention to use a new system: perceived usefulness, attitude towards the new system, and compatibility with the existing system. They also found that only the innovativeness of sales representatives influences the extent of their usage of the new system.

Avlonitis et al. (2005) investigated the antecedents of SFA acceptance and its impact on sales representatives. They found that among the antecedents, the most prevailing effect comes from salespersons' beliefs regarding the system. That is, sales representatives who perceive a system to be useful and easy to use in performing their everyday work tasks are more likely to adopt and use it in their work routines.

A study by Buehrer et al. (2005) investigated reasons why sales representatives use technology and barriers that may impede their successful adoption of SFA systems. Their findings indicated that sales representatives use technology because it is useful. They also found that the lack of organisational support, like training, is the main barrier that hampers the sales force adoption of SFA systems.

Indeed, a number of studies showed how SFA technologies, once adopted, have failed because management has either failed to provide adequate support (e.g. training and technical support) of the technology or was unaware of the complexity of the system (Buehrer et al. 2005).

Speier & Venkatesh (2002) conducted a longitudinal study on the sales force's adoption of SFA systems. Their study revealed that sales representatives reacted favourably to SFA immediately after release. However, negative perceptions of SFA emerged six months after implementation. The technology was widely rejected by the sales force. In addition, absenteeism and voluntary turnover had significantly increased. They also reported a significant decrease in perceptions of organisational commitment, job satisfaction, person-organisation fit, and person-job fit. The authors conclude that for a SFA project to succeed; sales representatives should be actively involved with management in understanding the degree to which SFA will augment their sales activities before purchase and implementation.

An exploratory study by Erffmeyer & Johnson (2001) revealed that almost half of the SFA initiatives were initiated by management and improved efficiencies were the main organisational objective for automation. The authors were surprised that in some cases SFA planning efforts were made with little or no input from representatives of the sales force.

A study by Gohmann et al. (2005 a) investigated the difference between the perceptions of SFA systems held by management and the sales force. Their findings revealed a discrepancy between the management and the sales force in terms of their perceptions of SFA. This led to the management having productivity expectations higher than what the sales force can achieve with the system.

### 1.1.2 IT acceptance theory

The information systems literature is characterised by a long-standing tradition of research that focuses on explaining users' adoption of information technology (e.g. TAM, DeLone & McLean model of IS success, task technology fit theory).

The technology acceptance model (TAM) attempts to explain the determinants of computer use across a broad range of end-user computing technologies and populations. According to TAM, an individual's acceptance of information technology is based on two beliefs: perceived usefulness and perceived ease of use. Perceived usefulness is defined as the prospective user's subjective probability that using a specific technology will increase his/her job performance (Davis et al. 1989). Perceived ease of use refers to the degree to which the prospective user expects the technology to be free of effort (Davis, 1989).

Venkatesh & Davis (2000) introduced TAM 2. It extended the original model by defining the external variables of perceived usefulness in terms of social influence processes (subjective norm, voluntariness, and image) and cognitive processes (job relevance, output quality, result demonstrability and perceived ease of use). According to TAM 2, subjective norms influence perceived usefulness via both internalisation, a process by which, when one perceives that an important referent thinks one should use a system, one incorporates the referent's belief into one's own belief; and identification, in which people use the system to achieve status and influence within their work group and thereby improve their performance.

Venkatesh et al. (2003) developed a unified model of user acceptance of information technology (UTAUT) based on studies of eight prominent models in IS adoption.

UTAUT posits three direct determinants of intention to use: performance expectancy, effort expectancy and social influence as well as two direct determinants of usage behaviour (intention and facilitating conditions).

UTAUT was empirically examined and found to outperform the eight individual models, including TAM. However, despite its strong explanatory power the model has a number of limitations. One limitation is that UTAUT, like TAM, remains incomplete in terms of linking the individual usage and adoption of an IS to the bottom-line impact. This was recognised by UTAUT's authors themselves when they called for more research investigating the relationship between an IS success in terms of individuals' adoption and the success of the same system from an organisational perspective (Venkatesh et al. 2003).

In their model of information systems (IS) success, DeLone & McLean (1992) linked individuals' use of information systems to the impact at the organisational level. They argued that the quality of an information system together with the quality of information would lead to both use of the system and user satisfaction. This use then leads to an individual impact resulting in some organisational impact.

Recently DeLone & McLean (2003) have provided an update of their original model of IS success. They extend it by adding a new construct, service quality, and combining the individual and organisational impact constructs into a single variable, "net benefits".

The task technology-fit (TTF) framework offers another way of looking at IS utilisation and performance. It allows us to assess the system value in a pragmatic way. That is in relation to users' tasks, which the system developed is meant to support. Goodhue (1992) observed that many existing user evaluations blurred the distinction between task needs and personal needs and thus would provide less clear linkage to performance. He suggested that user evaluation of system success based on task-system fit would be more closely linked with task performance.

Goodhue (1992) developed and tested a model that determines IS success based on users' evaluation of TTF. According to his model, users will evaluate more highly an IS based not only on the system's characteristics (technology) but also on the extent to which that system meets their tasks needs and their individual abilities (task-technology-fit). He performed an empirical study in order to test his model. The result of his study provides support for the relevance of the concept of TTF as a measure of users' evaluations of IS success. He found that the value of the technology appeared to depend on the users' tasks characteristics. His study also showed that users seem to be capable of evaluating the task-technology fit of their technologies. He concluded that users' evaluation of IS success can be inconclusive if task characteristics are not included in the analysis.

Zigurs & Buckland (1998) developed a theory of task-technology fit to support the development and deployment of group support to back up groups' tasks. They proposed that the type of task and characteristics of group support systems (GSS) technology should fit in such a way as to enhance group performance.

The above literature suggests that sales representatives' adoption of SFA systems is not always guaranteed. In addition, even if firms can get sales representatives to adopt the technology, there remains the problem of how much of this technology is actually used by the sales force. For sales technologies to yield any benefits for the organisation, the sales force must utilise them. As a result, how SFA implementation should be effectively managed is a key question facing companies' management. According to Ingram et al. (2002) predicting the impact of specific technologies and productively applying new technologies within a sales organisation is a challenge that firms have to deal with in the new millennium.

### 1.1.3 Sales force and sales activities

Marshall & Moncrief's (1999) taxonomy of sales representatives' activities in the 1990s revealed that the single great change in selling activities has been the increase in the use of advanced information technology in the day-to-day activities of sales representatives.

The advent of customer relationship marketing, where sales representatives play a vital role, has led to the development of technologies aimed at enhancing sales representatives' customer orientation.

The concept of customer-oriented selling was brought to the forefront in research conducted by Saxe & Weitz (1982). They define customer-oriented selling as "the degree to which salespeople practice the marketing concept by trying to help their customer make purchase decisions that will satisfy customers need". Salespeople who are customer-oriented take actions aimed at increasing long-term customer satisfaction and avoid behaviours that may lead to customer dissatisfaction. Saxe & Weitz (1982) characterise customer orientation as (i) the desire to help customers make satisfactory purchase decisions; (ii) helping customers assess their needs; (iii) offering products that will satisfy those needs; and (iv) describing products accurately.

Numerous studies have examined the concept of customer orientation and found it to be an important characteristic of salespersons with high performance (Keillor et al.1999).

In a study involving 487 business-to-business insurance salespeople, Boles et al. (2000) examine the effects of relationship selling activities on salespersons' performance. The results of their study indicate that regular contacts of the salesperson with the customer are associated with increased sales. They also found that disclosure of information by the salesperson about him/ herself or the selling firm can lead to a stronger relationship

between the salesperson and the customer and to superior sales performance.
In another study Boles et al. (2001) examined the relationship between retail salespersons' selling orientation, customer orientation and job performance. The results of their study indicate that salespersons' customer orientation was positively related to their job performance, while selling orientation was not related. They also found that a firm's customer orientation and employee perceptions of support from individuals in the organisation were positively related to a salesperson's degree of customer orientation and negatively related to selling orientation.

Keillor et al. (1999) examined the relationship between relational selling and sales performance from the perspective of salespersons' satisfaction with their individual performance. The results of their work show that the sampled salespersons, who see themselves at a high level of performance, reported a high level of customer and service orientations.

William & Attaway (1996) investigated the effect of salespersons' customer orientation from an organisational perspective. Their study indicates that the salespersons' customer orientation appears to help both the salesperson and his or her firm.

The existing sales literature generally agrees that customer orientation selling leads to increased sales and customer satisfaction. However, as Saxe & Weitz (1982) noted, the practice of customer orientation selling has its costs, though salespeople can realise long-term benefits from using such approach. One source of the costs that salespeople incur as a result of using the customer orientation approach comes from the time they have to spend in collecting information about customers' needs and demonstrating how their products fit with the customer requirements. According to Saxe & Weitz (1982), the time the salespersons devote to information-gathering activities might be spent more productively on attempting to persuade the customer or in calling on other customers. As a result, firms are constantly looking for effective information technology support that would enhance their sales representatives' customer orientation, while freeing them from spending time in information-gathering tasks at the expense of selling.

### 1.1.4 Mobile commerce

The advent of mobile information and communication technologies (M-ICT) has been seen as a revolution that will mark the way of doing commerce. A number of analysts suggest that the first decade of the 21$^{st}$

century will be the era of mobile computing and mobile commerce (Han, 2005).

Broadly defined mobile commerce (m-commerce) is the extension of electronic commerce (e-commerce) from wired to wireless computer and telecommunications and from fixed locations to anytime, anywhere and anyone (Keen & Mackintosh, 2001). For this dissertation m-commerce refers to any service that can be provided through mobile devices over a wireless telecommunications network in a wireless environment. Hence, from the demand side perspective, m-commerce can involve actors within the areas of B2B (business-to-business), B2E (business-to-employee) and B2C (business-to-consumer).

M-commerce continues to trigger an ongoing debate in both the academic and the practitioner communities. For some analysts m-commerce marks a new era that will revolutionise the way of doing commerce and they believe in the "mobile commerce killer applications". Others, on the other hand, express reservations about its value potential and see the costly UMTS licences and the downfall of the stock quotes of m-commerce companies in Europe as symptoms of m-commerce failure. Yet another group of analysts takes a more realistic position. They believe that the business value of m-commerce exists and it is huge; but the hunt for m-commerce killer applications is a vain endeavour. Companies should rather start by understanding the "target users" needs and then work back to develop m-commerce products and services that would respond to such needs, i.e. shifting the focus from production and supply (e.g. offering what can be produced) to demand and market (e.g. producing what can be sold). How to detect prospective m-commerce users' needs and develop value-adding responses to such needs are key questions firms operating in the m-commerce industry face.

Carlsson & Walden (2001; 2002a and 2002 b) developed a conceptual framework for m-commerce products and services from three perspectives: the customer, the producer, and management. From the customer perspective, the authors described m-commerce products and services as durable technological products and technology-based-services where repeat purchases are triggered by an increase in user-perceived functionality.
From the producer perspective, m-commerce products and services are new-concept products that will boost companies' profits. From the management perspective, they are new information systems for decision-making or business models that need a new strategy to push companies ahead of their competitors in the future.

Lee & Benbasat (2004) developed an extended framework for interface design for m-commerce that has the potential to reduce customers' reluctance to adopt m-commerce applications and services. The elements of their framework include the mobile setting; mobile device constraints; context; content; community; customisation; communication; and commerce.

Keen & Mackintosh (2001) identified three areas where m-commerce has the potential to provide value to mobile users: customer relationship management, logistics and knowledge mobilisation. They argued that in customer relationship, m-commerce can provide a value-adding support to mobile users through safety, location responsiveness and moment of value. M-commerce safety provides customers with freedom from anxiety, and worry (e.g. car breakdown in a dark rural area). It also allows them to be more flexible in their routines, take more risks and deal with unexpected situations. Locations responsiveness adds freedom to customers by removing the need to know their location when they are in a crisis situation. Moreover, the knowledge of their location allows targeted support to come to them instead of them looking for the information. The moment of value dimension of m-commerce frees the customers from delay, hassles and bureaucracy. The support is provided to customers exactly when they need it and irrespective where they are.

In logistics Keen & Mackintosh (2001) argued that m-commerce could provide companies with value by placing intelligence anywhere along the logistic chain. Information travel with the goods and processes, and even stored in the goods, e.g. remote monitoring of goods through smart tags.

In the area of work, they stated that m-commerce could provide value to workers through knowledge mobilisation. M-commerce liberates the workforce from the constraints of location and limited access to information and knowledge. Knowledge mobilisation puts the user at the centre of the knowledge's value chain by liberating mobile users from the need to be tied to their desks. M-commerce could provide workers with information and communication at the moment of relevance; despite their intensive work mobility (Keen & Mackintosh, 2001).

### 1.1.5 Mobility and mobile work

In recent years, there have been numerous research endeavours tending to focus on mobility and mobile work issues especially in the research fields of Computer-Supported-Cooperative-Work and mobile informatics. Some of these studies have produced significant results. For example, Kristoffersen and Ljungberg (1998) proposed a generic model of mobile IT use that aims at understanding mobile work and designing new mobile technologies to support it. By identifying what they call “typical instances of a type of mobility”, they created a classification with three distinct types of mobility: travelling, visiting and wandering.

Fagrell (2000) investigates ways of designing applications in order to provide news journalists with timely knowledge despite their high work mobility. He suggested a complementary approach to IT-support for mobile knowledge management emphasizing that (i) there is a need to step away from the focus on problem solving and instead incorporate knowledge management support in the task, (ii) that the information architecture should consider records from sources internal as well as external to the organization, and (iii) that direct communication should be actively favoured and based on people’s current context.

Wiberg (2001) focuses on exploring collaboration among service technicians whose work is dispersed and mobile. The results of his studies showed a number of practical limitations of the “anytime, anywhere” vision of mobility. First “anytime, anywhere” does not by necessity mean “every time, every where”. The ideal mobile situation is not to work continually without any stops. Field workers need to meet to get some breaks and socialize. Second, mobility goes beyond mobile support for “here and now”. Mobile workers need support also regarding both the place where to go and the place left behind. Third, the mobile worker is to some extent a “stationary worker”. The technicians participating in his studies always have to stop the car in order to carry out “office” tasks including scheduling work and reporting activities.

Weilenmann (2003) investigated the nature of mobility in very different mobile settings ranging from practically stationary work to truly mobile work: in a traffic information central, workers cleaning runways from snow, a group of ski instructors using a mobile awareness device, mobile phone use among young people in public places, and recording of real mobile phone conversations. The results of her studies questioned the assumption that the advent of mobile technologies have made people independent of place. She found that in mobile situations the “place” and “local” are still important in a number of ways: (i) a lot of work needs to be done in order to negotiate a mutual understanding of the situation at hand. Context, including the part of it that is location, is not something which is easily provided; it is interactionally and continually negotiated, (ii) the local is often used as a resource in the communication, between co-located and distributed participants, and (iii) there is not one part in the communication that has the overall perspective, the localities of both parties are relevant. Coordination is then achieved through negotiations between different localities.

Bellotti and Bly (1996) studied collaboration in product design teams and coined the term “local mobility”. They found that collaboration among team members was not done statically at their desk offices but through walking between rooms and building at local sites. They coined local mobility: short-distance mobility in the local environment, such as walking between rooms and buildings. Such local mobility, they argued, provides a certain level of access to colleagues that enable them to keep up to date on what is going in the organisation.

Luff and Heath (1998) made ethnographic observations at a number of sites including medical consultations, construction and underground train control and discussed not only the local mobility of people but also the mobility of artefacts (micro-mobility). They define micro-mobility as “the way in which an artefact can be mobilized and manipulated for various purposes around a relatively circumscribed, or at hand domain (e.g. blueprint or a doctor’s journal).

In a study involving 17 mobile workers in the UK Perry et al. (2001) looked at the various social implications of mobility and mobile technology in human interaction. They identified different facets of access to remote people and information, and different facet of anytime, anywhere. Their study also identified common features that characterise mobile workers’ behaviour when they are away from their stationary work setting. These features include the preparation for a trip and planning for the unpredictable, effective use of “dead time” by mobile workers, use of mobile phone as a device “proxy”, and use of technologies for remote awareness monitoring.

Sørensen & Pica (2005) investigated mobility within the context of mobile police work. Specifically, they explored the role of mobile technologies for operational policing. Their study highlighted a number of general activity types where mobile technologies apply to police work including providing legitimacy by symbolically representing the institution; rendering the officers accountable through documentation and control actions; providing a sense of security through connecting control rooms and colleagues; and providing some emancipation of officers through the ability to provide global and individually tailored views of police database and activity logs.

In a study involving more than sixty mobile professionals in Tokyo, Kakihara & Sørensen (2003) demonstrated that the conventional understanding of mobility, confined to geographic aspects, does not suffice for grasping the dynamic work practices of contemporary mobile professionals. They suggested that emerging mobile professional work should be studied from three interrelated aspects of mobility: *location* mobility related to workers' extensive geographical movement, *operational* mobility concerned with their capability for flexible operation as an independent unit of business, and *interactional* mobility associated with their intense and fluid interaction with a wide range of people.

## 1.2 Research focus and research questions

Hitherto, information systems adoption and the evaluation of their effects have been two main foci of information systems research (Hevner et al.2004).
Orlikowski and Iacono (2001) concluded, from their analysis of 177 articles from the first ten years of Information Systems Research Journal, that around a quarter of all papers did not have any explicit view of the IT artefact. Most studies concentrate mainly on the effects of IT; or abstract it from practice and context of use to focus mainly on their computational capabilities. They propose that IS researchers should begin to conceptualize and theorize IT artefacts and to incorporate such conceptualisations and theories of IT artefact expressly into their studies (Orlikowski and Iacono 2001, p. 130). They also suggested developing and using greater interdisciplinary theories to inform studies about IT artefact. They wrote "*The diversity of IS researchers uniquely qualifies our field to pay special attention to the multiple social, psychological, economic, historical, and computational aspects of an evolving array of technologies and the way in which they are developed, implemented, used and changed*" (Orlikowski and Iacono, 2001, p.130).

The overall focus of this dissertation is to investigate how mobile information and communication technologies (M-ICT) could provide a value adding support to pharmaceutical sales representatives when they are operating within a mobile work setting. This dissertation defines M-ICT as information and communication applications run over a wireless network using a mobile device and in a wireless environment. A mobile device is any lightweight device connected to the Internet or other networks through wireless networking using any standard wireless communication protocol. They may include such devices as PDAs, communicators or smart-phones.

Pharmaceutical sales representatives play a vital role in the marketing and selling of pharmaceutical products. Unlike traditional industries, the decision maker in the pharmaceutical market is the physician who decides on the best therapeutic treatment for the patient who ultimately pays for and takes the medications. The main work duty of pharmaceutical sales representatives is to target physicians in an effort to provide them with accurate and the latest product information, and to encourage them in prescribing the presented drugs for their patients who fit the specific diagnosis criteria. Hence, in the pharmaceutical market the sales force is used as both a marketing medium and an information source for physicians.

### 1.2.1 Context description

After enjoying the glory of being the most profitable legal industry in the 1990s, the pharmaceutical industry is coming under growing pressure. Pharmaceutical companies are faced with margin pressure, the treat from generic products, a hostile regulatory and economical environment, increasing media and public scrutiny and limited opportunities to deploy sales force to influence prescribing decision makers (i.e. physicians).

In a way to deal with the above disruptors, most pharmaceutical firms have moved towards a larger sales force in order to secure greater market penetration and to maximize revenues from products that are already on the market. In the US alone there were more than 70 000 pharmaceutical sales representatives by the end of 2000, up from about 40 000 in 1994. In the UK, it is now estimated that there is one medical representative for every three general practitioners (Mackintosh, 2004).

Although the sales force expanded in size, there has only been a marginal rise in the number of contacts. According to a study by IBM Business Consulting Services (2002), every dollar spent in the sales force in 2002 generates just US$10.3 in sales, a 22% decrease since 1996. Similarly in Europe the number of pharmaceutical sales representatives doubled during the last five years. Yet the productivity of the sales representatives had declined by 25% during the same period (Skelton, 2004).

The decline of the pharmaceutical sales force productivity has been explained by a number of challenges in conventional detailing including:

- **Increasingly busy doctors with little time to see the sales representatives.** Doctors are under increasing time pressure and make a limited amount of time available to see an ever growing number of sales representatives. Detailing visits last on average between three and four minutes in the US; in Europe around nine minutes. With a constantly increasing number of drugs to sell, these lengths of time are inadequate to provide a doctor with a comprehensive product presentation. In Finland, some hospitals forbid physicians to meet pharmaceutical sales representatives during working hours. This situation is problematic for pharmaceutical companies knowing that studies have showed that in Europe physicians will remain the main decision makers regarding drugs' selection although the affluence of other stakeholders (i.e. pharmacists, patients, and health authorities) is increasing.

A survey conducted by the European Institute of Business Administration (INSEAD) in conjunction with Cap Gemini Ernest & Young (2003) brought to the fore a number of issues that face the marketing and sales teams of pharmaceutical companies. The survey's finding showed that physicians still regard contacts with pharmaceutical sales representatives as an important way of learning about diseases and treatments and building a relationship trust with the pharmaceutical company. However according to the same survey, 38% of the surveyed physicians have decided, over the past two years, to make less time for sales representatives. The survey also showed that physicians want most of all unbiased, evidence-based scientific information about products including head-to head comparison as well as risks and side effects (Mackintosh, 2004). Moreover, the survey showed that 57% of physicians are willing to spend more time with representatives who bring additional information and value adding service (Mackintosh, 2004).

- **Large intervals between sales calls.** The low visit frequency associated with the limited opportunities to meet physicians mean that it may be several months after the launch of new products that a pharmaceutical representative is able to present them to the doctor.

- **High costs.** High costs associated with travelling and waiting time mean that an effective hour of detailing time incurs costs of up to £625 in the UK and US$2,000 in the USA (Heutshi et al. 2003).

- **Raised regulatory pressure on physicians' prescribing freedom**. The primary criterion that applies to drug selection by physicians is the therapeutic need to patients (Kvanov, 2002). However, physicians' freedom to access all available medicines is increasingly restricted by health authorities. Health authorities increasingly monitor physicians' prescribing practices to make sure that the patient was treated cost-effectively. They also charge patients higher co-payments if they purchase a pharmaceutical product when a generic version is available or if the drug is in the list of products which are excluded from reimbursement. This trend has increasingly reduced the physicians' decision-making role over the years. Thus reducing their sensitivity to the sales force's promotion efforts (Yi et al. 2003).

Information technology is expected to play a dual role in pharmaceutical sales representatives' work. First, information technology could support pharmaceutical sales representatives for a better performance during their sales encounters with physicians. Second, IT (e.g. e-detailing) could compliment the work of pharmaceutical sales force by allowing physicians to keep abreast of the developments in the pharmaceutical companies' products in their own time and their own pace (IBM Consulting Services, 2002).

### 1.2.2 Research questions

Since my focus is on how M-ICT could provide pharmaceutical sales representatives with value-adding support when they are operating within a mobile work setting, the dissertation seeks to address the following research questions (table 1):

**Question 1:** What factors would influence the pharmaceutical sales force's adoption of M-ICT?

**Question 2:** Could M-ICT provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting?

**Question 3:** If yes, what accompanying organisational factors would ensure successful implementation of M-ICT for the pharmaceutical sales force?

**Table 1.1 Research questions**

By answering those questions I aim:

- to study the important factors that might influence pharmaceutical sales representatives' adoption of M-ICT;

- to propose an approach that would allow management to assess how M-ICT could provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting;
- to explain the organisational support factors that might allow pharmaceutical sales representatives to successfully integrate M-ICT into their everyday mobile work.

## 1.3 Outline of the dissertation

In this dissertation the focus is on studying how M-ICT could provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting.

The literature about both users' adoption of information technology (chapter 3) and the sales force's acceptance of the SFA systems (chapter 4) allowed me to answer the research question 1. That is to understand the factors that might influence pharmaceutical sales representatives' adoption of M-ICT.

In addition, studying the key characteristics of M-ICT and reviewing empirical studies about the factors influencing their adoption (chapter 5) allowed me to assess the suitability of M-ICT support to the sales force's everyday tasks. This review indicated that perceived usefulness is a major factor that influences mobile users' behaviours. The review also showed that given the limitations of mobile technologies, they should not be examined as stand-alone devices to support prospective users in carrying out their job related tasks. Rather, their potential support should relate to other technological support available to the users and that can support certain dimensions of their tasks better than mobile technologies.
In order to answer question 2, i.e. could M-ICT provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting? I constructed two models. The first model that I labelled, the Barrier-to-Support Framework (BTS) for a new IT artefact, draws upon Fernand Braudel's view of technology adoption by people in his study of the economic, social and technological changes in the 15th -18th century. The BTS framework aims at finding the targeted needs where a new IT support is required, based on both prospective users' barriers that hamper their performance and the effectiveness of existing IT support available to them. The purpose is to uncover the areas where a new IT is needed and could provide a value adding support to users. The ultimate objective is to ensure that the new technological support offered to people makes sense to them, and that they find it useful to integrate into their every

day life routines. The BTS framework is based on two dimensions: (i) the barriers individuals face during the structures of their everyday life, and (ii) the limit of the possible of existing technologies in terms of supporting people to deal with the barriers they face.

The second model, which I labelled the Barriers-Technology-Fit Framework (BTF), builds upon Goodhue & Thompson's (1995) general theory of task technology fit as well as Zigurs & Buckland's (1998) specific theory of task-technology fit for group support systems. The BTF framework aims at providing guidance on how to select the appropriate technology support for the target barriers detected through the BTS model. Hence the BTF framework builds upon the output of the BTS framework.

To understand better how M-ICT could provide pharmaceutical sales representatives with value-adding support when they are operating within a mobile work setting, I conducted a case study involving the subsidiary of a multinational pharmaceutical company (Pharma) in Finland. The results of the empirical study allowed me both to demonstrate the usability of the BTS and BTF models I developed and to refine those models based on the case study's findings. In addition, the case study enabled me to collect insights that would allow me to answer the research question 3, i.e. what accompanying organizational factors would ensure a successful implementation of M-ICT for a pharmaceutical sales force?

The empirical work at Pharma was conducted in two stages: (i) the pre-implementation stage of the mobile system and (ii) the post-implementation stage.
The purpose of the empirical work at the *pre-implementation stage* was to study, with the aid of the BTS and BTF frameworks, how M-ICT could provide value-adding support to Pharma's sales force when they are operating within a mobile work setting.

*Firstly,* in order to learn about the nature of the barriers to performance Pharma's sales representatives (sales reps) face when they are operating within a mobile work setting, I collected data with the aid of field sales trips. In the field, observations and informal interviews with the sales representative constituted the primary mode of investigation. The purpose of the field sales trips was twofold: (i) to assess the nature of barriers to performance the sales representative faces in the field, and (ii) to observe the sales representative's application of the information technology support available to him in order to deal with the barriers. Then, in order to both validate and complement the qualitative study's findings, I conducted a

survey involving all Pharma’s sales representatives. Based on the results of those two studies I was able to build a list of the barriers that the sales representatives face in the field together with their occurrence’s frequency.
*Secondly,* in order to identify the barriers requiring new IT support, I used the BTS framework as a tool. The analysis involved examining both the frequency of each barrier and the effectiveness of the existing IT support available to the sales representatives to deal with those barriers. This analysis led to a list of barriers that require new IT support. I labelled those barriers as target-barriers.

*Thirdly,* to examine whether or not M-ICT could provide appropriate support to the sales representatives for dealing with target barriers, I used the BTF framework. I first constructed a predefined profile for the barriers’ requirement in terms of a new IT support. Then I examined how well M-ICT fits with that predefined profile of IT support for the target barriers. As I will show in detail in chapter 7, the analysis showed that M-ICT fits the barriers’ requirements in terms of the new IT support. Based on the results of those studies, Pharma management decided to implement M-ICT support for its sales force.
The purpose of the field work at the *post-implementation stage* was to assess the success of the mobile system implemented in terms of supporting the sales representatives to deal with the barriers they face in the field. To this end, I performed a follow-up study. Firstly, I carried out a qualitative study in order to both observe the sales representative’s application of the implemented mobile system to deal with the barriers and to identify implementation issues associated with the mobile system implemented. Then I carried out a survey involving all Pharma’s sales force to both validate and complement the findings derived from the field study with regard to the sales representatives’ adoption of the mobile system and the nature of the organisational support required in order to ensure a successful implementation of the mobile system developed.

The dissertation consists of two major parts: *first* the introduction, where I identify the research questions, the methodology, the literature and the normative models I constructed in order to approach the question of how M-ICT could provide a value adding support to pharmaceutical sales representatives when they are operating within a mobile work setting, and *second*, six research papers. An outline of the dissertation is shown in Fig. 1-1 where I point out how the topics addressed in the dissertation are related to the objectives and questions.

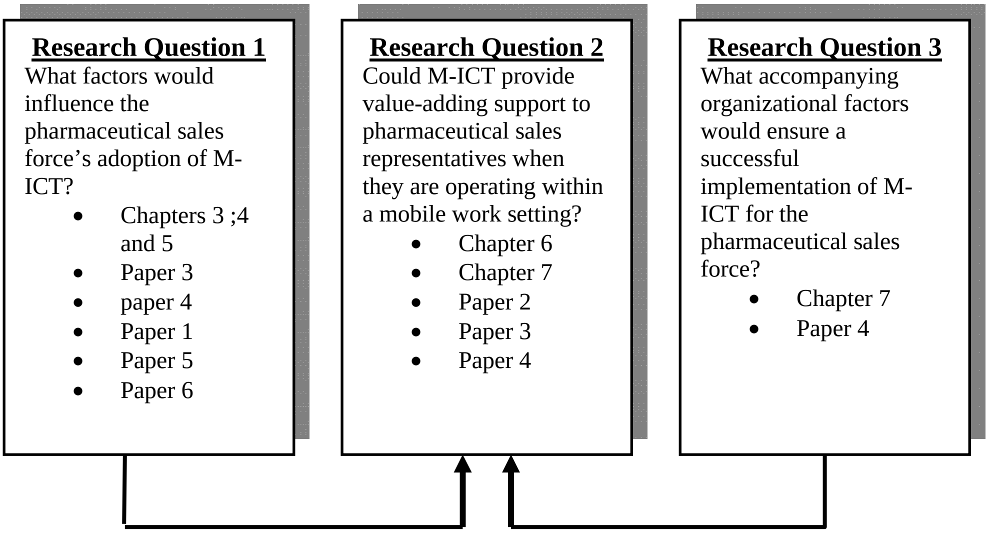



**Figure 1.1 Interrelationship among the topics discussed in the two parts of the dissertation**

The introduction part, Chapter 1, starts with en explanation of the objectives, motives and the primary research question. It is followed by an outline of the structure of the dissertation.

*Chapter 2* provides the methodological basis for the dissertation and explains the approach I followed in my research process.

*Chapter 3* presents a literature review of key models dealing with information systems adoption and success. Specifically, I reviewed the technology acceptance model (TAM), the unified theory of acceptance and use of technology (UTAUT), the DeLone & McLean information systems success model and task-technology-fit theory (TTF). Those models provided me with a theoretical basis that helped me to understand the dynamics of information systems adoption and success. Paper 4 reviews this briefly.

*Chapter 4* presents a literature review on the barriers that impede the adoption of information technology by the sales force. This chapter helped me to understand the dynamics of IT adoption by the sales force. Papers 3 and 4 review this briefly.

*Chapter 5* discusses the key characteristics of M-ICT. It also gives a review of the literature in terms of the factors influencing adoption of mobile technologies. Such reviews enabled me to identify areas where M-ICT has the potential to provide value-adding support to salespeople during the course of their everyday mobile work. Papers 1, 5 and 6 discuss this briefly.

*Chapter* 6 introduces the normative models that I developed and used in order to understand how M-ICT could provide pharmaceutical sales representatives with value-adding support when they are operating within a mobile work setting. In this chapter I also revisited the primary research question presented in Chapter 1.

*Chapter* 7 explains how I applied and refined the models I developed and introduced in Chapter 6, through a case study. Papers 2, 3 and 4 discuss the results of the empirical work.

*Chapter 8* summarises the research results and the contribution of the dissertation. The limitations of the dissertation are pointed out and some avenues for future research are also discussed

Part two of the dissertation consists of a collection of six original papers. In the following I will present a summary of each research paper.

**Paper 1(*)** BenMoussa, C. (2005): "Supporting Salespersons' CRM efforts through Location-based Mobile Supports Systems", published in the Journal of Systems Science and Systems Engineering. The paper examines how location-based mobile information support systems could provide value-adding support to salespersons' CRM activities when they are operating within a mobile work setting. Based on both the categorisation of salespersons' tasks in relation to their potential to be supported by location-based mobile information support systems and the examination of the key characteristics of location-based mobile information and communication support system, the paper identifies several location-based mobile applications and services that could support the sales force in their CRM activities. The paper then showed how those applications could enhance salespersons' performance.

**Paper 2** BenMoussa, C. (2005): "Supporting Sales Representatives on the Move: A Study of the Information Needs of Pharmaceutical Sales Representatives". Presented and published after a blind peer review process in the proceedings of the 18th Bled e-conference, Bled, Slovenia: June 6-8, 2005. This paper reports initial empirical results on the nature of the barriers to performance pharmaceutical sales representatives face when operating in a mobile work setting. It also discusses both the implications of such barriers on the sales force information needs and the nature of the information and communication support systems that could support the pharmaceutical sales force in dealing with those barriers.

**<u>Paper 3</u>** BenMoussa, C. (2006): “Supporting the Pharmaceutical Sales Force through Mobile Information and Communication Technologies: An Exploratory Investigation”. Presented and published after a blind peer review process in the proceedings of the Helsinki Mobility Roundtable, Helsinki, Finland: June 1-2, 2006. This paper presents, based on a survey involving a pharmaceutical company’s sales force, the barriers to performance that the sales force faces when operating in a mobile working setting, The paper also explores the perception of the sales force with regard to a number of mobile solutions that could provide the sales representatives with the necessary support to deal with the barriers to performance they face in the course of their everyday mobile work.

**<u>Paper 4</u>** BenMoussa, C. (2006): “Mobile Information and Communication technologies in the Context of the Pharmaceutical Sales Force Work”: TUCS Technical Reports Publications. No. 749, ISBN 952-12-1692. This paper presents a case study about the implementation of M-ICT to support pharmaceutical sales representatives to deal with the barriers to performance they face in the field. The paper investigates the mobile system’s adoption by the sales force and examined issues associated with its implementation.

**<u>Paper 5</u>** BenMoussa, C. (2004): “A Task-based Framework for Mobile Applications to Enhance Salespersons’ Performance”. Presented and published after a blind peer review process in the proceedings of IFIP TC8 Conference on Mobile Information Systems, Oslo Norway, 15-17 September 2004. This paper elaborates on the task technology fit theory, and introduced a research model for developing mobile applications that could enhance the sales force’s performance. The model serves as a preliminary framework in designing the field work.

**<u>Paper 6</u>** BenMoussa, C. (2003): “The effects of mobile commerce on salespersons’ performance”, presented and published after a blind peer review process in the proceedings of the Second International Conference on Mobile Business, Vienna, Austria, June 23-24. The paper proposes a conceptual model of the effects of mobile commerce on salespersons’ performance. The paper identifies variables that have been shown to be important to salespersons’ performance and linked them to the properties of m-commerce in terms of information, location and interaction.

It is important to note that each paper was written separately and communicated to the academic community as the research progressed. However, the whole is a cumulative report of a single research endeavour. Enhancing the readability of each article independently of the others necessitated some duplication of the general sections (e.g. the sections on theoretical background, research methodology, study context and company background and some discussion of the results).

*An earlier version of that paper has been presented and published after blind peer review process, in the proceedings of the 13E: Fourth IFIP Conference on e-Commerce, e-Business, and e-Government, 18TH IFIP World Computer Congress, Toulouse, France, 22-27 August 2004, Kluwer Academic Publishers.

# Chapter 2

# Research approach

The overall focus of this dissertation is to investigate how M-ICT could provide a value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting. The research objectives that I have set in the introduction are: (i) studying the important factors that would influence pharmaceutical sales representatives' adoption of M-ICT, (ii) proposing an approach that would allow management to assess how M-ICT could provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting, and (iii) explaining the organisational support factors that would allow pharmaceutical sales representatives to integrate successfully M-ICT into their everyday life mobile work.

In this chapter I will discuss the methodological foundation for the research programme and present my own research framework.

## 2.1 The constructivist approach

Generally defined, the constructivist research deals with problem-solving through the construction of organisational procedures or models (Kasanen et al.1993). It involves the creation of entities (e.g. models, diagrams, plans, etc.) that produce solutions to explicit problems, and their usability can be demonstrated through the actual implementation of the solution. In the case of information systems, the construction is not necessarily technical (e.g. artefact, systems, software), it can be also conceptual e.g. conceptual, intellectual or social constructs, models and frameworks (Livari et al. 1998).

March & Smith (1995) proposed a research framework that distinguishes between research output and research activities (c.f. Fig. 2.1). In terms of research outputs they make the distinction between constructs, models, methods and instantiation. Constructs help conceptualise a research problem and its solution. Models are composed of constructs and depict the relationships among them. A method is a set of steps used to perform a task, and is based on a set of underlying constructs and the model of solution.
Finally, an instantiation refers to the realisation of an artefact in its environment. The purpose is to demonstrate the feasibility and the effectiveness of the models and the methods they prescribe. According to March & Smith (1995), especially in IT research instantiation might precede the underlying constructs, models and methods. This might happen in

situations where the artefact needs to be studied and used in order to formalise the constructs, models and methods on which it is based.

With regard to research activities, within the framework of design science, March & Smith (1995) made a distinction between two types of activities: build and evaluate. *Build* refers to the actual construction of the artefact and the demonstration that the artefact can actually be constructed. *Evaluate* on the other hand concerns the development of evaluation criteria and the assessment of the performance of the artefact with respect to the established goals. The authors suggested a list of metrics for the evaluation of artefacts. They propose five evaluation criteria for evaluating models. These are their fidelity with real world phenomena, completeness, level of detail, robustness and internal consistency.

Hevner et al. (2004) stated that the result of design-science research in IS research is an IT artefact created to address an important organisational problem. They argued that the IT artefact does not include only instantiations but also constructs models and methods applied to the development and use of information systems. In addition they define seven guidelines for design science (constructive research) in IS research: (i) the construct must be innovative and purposeful, (ii) it must be applied to a specified problem domain, (iii) evaluation is crucial, (iv) the construct must solve a heretofore unsolved problem, or solve a known one in a more effective or efficient manner, (v) the artefact must be rigorously defined, formally represented, coherent, and internally consistent, (vi) problem-solving should use available means to reach desired ends while satisfying laws existing in the environment, and (vii) the results must be effectively communicated to an academic audience as well as practitioners and managers.

According to Kasanen et al. (1993) the constructivist approach can be divided into the following six phases:

1. Find a particularly relevant problem, which also has a research potential,
2. Obtain a general and comprehensive understanding of the topic,
3. Innovate, i.e. construct a solution idea,
4. Demonstrate that the solution works,
5. Show the theoretical connections and the research contributions of the solution concept,
6. Examine the scope of applicability of the solution.

| | | Research Activities | | | |
|---|---|---|---|---|---|
| | | Design Science | | Natural Science | |
| | | Build | Evaluate | Theorise | Justify |
| Research Output | Constructs | | | | |
| | Models | | | | |
| | Methods | | | | |
| | Instantiation | | | | |

**Figure 2.1 March & Smith's Research Framework (March and Smith, 1995)**

## 2.2 The case-study approach

A case study is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin 1994, p.13).

Galliers (1992) provides an extensive review of different information systems research approaches, and developed a taxonomy where the different approaches are classified as either scientific or interpretive. He classified the case study as a scientific method which has the strength of capturing the real world in greater detail compared to experiments in a controlled environment.

Benbasat et al. (1987) identified three reasons why the case study is a viable IS research method: (i) it enables the researchers to study information systems in a natural setting, learn about the state of the art, and to generate theories from practice, (ii) it allows the researcher to understand the nature of the complexity of the process taking place in the organisation, and (iii) case research is an appropriate way to research an area in which few previous studies have been carried out.

Eisenhardt (1989) developed an 8-step iterative model for building theories from case-study research (c.f. table 2.1)

| Step | Activity |
|---|---|
| 1. Getting started | -Definition of research questions<br>-Possible *a priori* constructs |
| 2. Selecting Cases | -Neither theory nor hypothesis<br>-Specified population |
| 3. Crafting instruments and Protocols | -Multiple data collection methods<br>-Qualitative and quantitative data combined<br>-Multiple investigators |
| 4. Entering the field | -Overlap data collection and analysis, including field notes<br>-Flexible and opportunistic data collection |
| 5- Analysing the data | - Within case analysis<br>-Cross-case pattern search using divergent techniques |
| 6. Shaping hypothesis | -Iterative tabulation of evidence for each construct<br>-Replication, not sampling, logic across cases<br>-Search evidence for "why" behind relationship |
| 7. Enfolding literature | -Comparison with conflicting literature<br>-Comparison with similar literature |
| 8. Reaching closure | -Theoretical saturation |

**Table 2.1 Eisenhardt's 8-step model of building theories based on case studies (1989, p.533)**

The major criticism of the use of case-study research concerns the bias of the researcher and the difficulty of generalising results. The first point is related to the issue of the researcher's involvement in the research process, which may put the validity of the results of the research in doubt. The second point concerns the difficulty of drawing conclusions and making generalisations to other case settings.

Based on Popper's ideas of falsifiability, logical consistency, relative explanatory power and survival, Lee (1989) demonstrated the legitimacy of conducting case studies to test theories in addition to theory generation. He identified four methodological problems raised by case-study research: (i) making controlled observations, (ii) making controlled deductions, (iii) allowing for replicability, and (iv) allowing for generalisability. In order to deal with those problems he recommended that that case researchers (i) use natural control in order to make controlled observations, (ii) use the formal rules of formal logic in order to make controlled deductions, and (iii) apply the same theory as tested in the original case study to a different set of initial conditions. Consequently, even though the observations in a particular case study are not replicable, the case study's finding in terms of confirmation or disconfirmation would be replicable, and (iv) achieve generalisability by conducting additional case studies to test the theory (Lee, 1989).

Gummesson (2000) argued that an important advantage with case-study research is the opportunity for a holistic view of a process. Holism may be viewed as the opposite of reductionism. Reductionism consists of breaking down the object of study into small, well-defined parts. This leads to a large number of fragmented, well defined studies of parts in the belief that they can be fitted together to form a whole picture. In the holistic approach, the whole is not identical to the sum of its parts. Consequently, the whole can be understood only by treating it as the central object of the study.

According to Gummesson (2000) case-study research seeks to obtain a holistic view of a specific phenomenon. However, he observed that such research is time-consuming and it is generally not possible to carry out more than one or a very limited number of in-depth case studies in a research project.

Walsham (1995) proposed four types of generalisations from interpretive case studies: (i) development of concepts; (ii) generation of theory; (iii) drawing of specific implications and; (iii) contribution of rich insights.

Gummesson, (2000) argued that generalisation from case studies should be approached in a different way from generalisation from statistical samples. Generalisation from case studies is closely related to validity. Validity means that a theory, model, concept or category describes reality with a good fit. He advocated that theories in management be validated in action. In addition, he observed that there is a risk that generalisation in the social context can act as a prejudice that blocks understanding rather than constituting supportive pre-understanding. Hence, he argued that in a social context, it would be more appropriate to speak about particularisation rather than generalisation. Particularisation means that social phenomena are parts of a specific situation and are far too liable to change to allow meaningful generalisation. In social contexts, theories become "local theories" and knowledge arises when one is able to deal with a specific situation. Gummesson (2000) wrote *"As long as you keep searching for new knowledge and not believe you have found the ultimate truth, but rather, the* *best available for the moment, the traditional demand for generalisation becomes less urgent"* (Gummesson, 2000, p. 97).

## 2.3 Choosing a research strategy

Fitzgerald & Howcroft (1998) distinguished between four strategies that a researcher can adopt to carry out his or her research endeavours: (i) isolationist, (ii) supremacist, (iii) integrationist and (iv) pluralistic strategy. An *isolationist* strategy requires from the researcher that he or she operates strictly according to the chosen paradigm and ignores other alternatives. The problem of that strategy is that the researcher may discard issues that are "not researchable" under the paradigm he or she selected. The *supremacist* strategy strives to establish one paradigm that would universally provide the best possible ways of handling all situations. This is the case of the positivist research approach that has long dominated IS research. The downside of this approach is that by focusing on one "imperialist" approach, it prevents itself from benefiting from the strengths of other research approaches. The *integrationist* strategy aims to integrate alternative approaches into a single coherent analytical approach. The adoption of this strategy allows the researcher to use the strength of several approaches. However, its weakness is that it requires a fair degree of tolerance of incommensurability between paradigms, which could lead to each approach sacrificing its particular strength. The *pluralistic* strategy allows different paradigms and methods to be applied in a research situation. In this strategy research approaches are viewed as not mutually exclusive.

This dissertation addresses how M-ICT could provide pharmaceutical sales representatives with value-adding support when they are operating within a mobile work setting. Specifically, it aims at: (i) studying the important factors that would influence pharmaceutical sales representatives' adoption of M-ICT, (ii) proposing an approach that would allow the management to assess how M-ICT could provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting, and (iii) explaining the organisational support factors that would allow pharmaceutical sales representatives to integrate M-ICT successfully into their everyday life mobile work.

To fulfil the above research objectives, I adopted a pluralist approach and used a combination of qualitative and quantitative methods. Several authors recommend the use of a combination of research approaches in order to compensate for the limitation of each individual approach (Eisenhardt, 1989, Mingers, 2001; Lee, 1991).

The dissertation followed a combination of the constructivist and the case-study approaches. I believe that the two approaches should be used in a mutually supportive way in order to enhance the research output. The main aim of the constructivist approach is to provide solutions to real-world problems and the quality of its research output lies in the contribution of the constructed solution to solving the problem identified. On the other hand, one of the strengths of the case-study approach is that it allows the researcher to capture the real world in greater detail. Hence, the case-study approach allows the constructivist researcher not only to demonstrate the usability of his or her solution in solving the problem within its natural environment but also the enhancement of the solution constructed. Such enhancement would happen through the iterations between the case-study material and the normative constructions, which in turn can enhance the usefulness and the fidelity of the normative models developed.

First, I followed the constructivist research approach to produce normative models (i.e. BTS and BTF frameworks) that would support companies' management in determining how M-ICT could provide a value-adding support to their sales force when it is operating in a mobile work setting.

Then I used the case-study approach to (i) evaluate the normative models developed, and (ii) to enhance the models based on the insights collected from the case study.

Therefore to design the research process I followed a combination of Kasanen's et al. (1993) constructive research process, and Eisenhardt's (1989) 8-step iterative model for building theories from case-study research. Eisenhardt's (1989) model can be seen as a combination of the grounded theory approach and case-study approach designed for business and organisational research. Moreover, her model offers a detailed and iterative framework for designing the research process. The following sections discuss how this research applied the two frameworks to coordinate the research process.

### 2.3.1 Getting started

This step involves finding a particularly relevant problem, which also has a research potential and povides a general and comprehensive understanding of the topic (Kasanen et al. 1993). The relevant problem in this research is that companies' management face the challenge that sales representatives reject or underutilise the technology implemented when its usefulness is not apparent to them. Hence management needs a feasible tool to analyse how a particular technology such as M-ICT could provide support that sales representatives would perceive as useful and thus integrate it into their everyday life routines.

The *priori* definition of constructs helped my research at the initial stage. The literature review on information systems adoption and success (chapter 3), the barriers that impede the sales force's adoption of information technology (chapter 4) provided me with useful theoretical ground to identify the problem tackled in my research programme.

### 2.3.2 Innovate

This step involves constructing a solution to the problem identified in stage 2.3.1. According to Kasanen et al. (1993), in a constructive approach innovation is the core of a successful constructive study because if the researcher is not able to produce any solution to the problem under investigation, then there is no point in going on with the study. The solution in this research consists of two normative models, the BTS and BTF frameworks that I introduced in Chapter 1 and will discuss in more detail in Chapter 6.

It is important, however, to recognise that the initial definition of the research questions and the construct are only tentative. Eisenhardt insists that “no construct is guaranteed a place in the resultant theory”. Also, the research questions may shift during the research programme. Important shifts of focus and/or changes of the research direction might happen in the iterative process between data collection and data analysis. Moreover, new constructs might emerge even at a late stage of the research.

### 2.3.3 Demonstrate that the solution works

This step involves the real-world exposure of the normative models developed through a case study. The purpose of this step is twofold: (i) to demonstrate the usability of the normative models developed, and (ii) to refine the models based on the case-study findings. As discussed in 2.3.2 at that stage the constructs in the models are only tentative. According to Hevener et al. (2004), as a design is inherently an iterative and incremental activity, the evaluation phase provides feedback on the construction phase.

## 2.4. Design of empirical work

The design of the empirical work involved the following steps (c.f. Table 2.2).

### 2.4.1 Selecting the case

To examine the functioning of the normative models that I constructed, I chose Pharma, a subsidiary of a multinational pharmaceutical company, as a single fieldwork site for my research. The reasons for choosing that particular site are twofold. *First*, at the time I gained access to Pharma, the company's management was considering investing in a mobile information support system in order to support the sales force in the field. However, it questioned the viability of such an investment. They were not sure whether or not M-ICT support would bring an added value to the sales force in terms of enhancing its performance. Hence, such a research site proved to be an ideal research setting for applying my normative models, which aim at helping management to determine how M-ICT could provide value-adding support to the sales force.

*Second*, the pharmaceutical selling context is highly information-intensive and mobile. The pharmaceutical sales representatives spend their working day in the field visiting physicians and interacting with their colleagues. Thus information technologies such as M-ICT would be relevant for supporting them throughout the sales process.

With regard to the choice of a single case-study frame, Yin (1989) suggests that a single case study is an appropriate research approach under any of the following conditions:

- Where the organisation can be considered a *critical case (*i.e. one which meets all the conditions needed to test the theory),
- Where an extreme or unique case can be defined,
- Where the organization can be considered a *revelatory case*, (i.e. one where there are very few examples, so that the investigation of even one can be considered valuable).

I decided to make use of a single, in-depth analysis of Pharma that would support both the first and the third of Yin's conditions. Firstly, as discussed earlier, in order to apply the normative models that I developed, it was critical that management in the potential case study has the authority to decide whether or not to provide the sales force with mobile support. Pharma meets that condition. Second, at the time when I needed to start the empirical research (i.e. March 2004), there were not a lot of companies considering providing M-ICT support to their sales force. Many companies were questioning the effectiveness of such technologies. As a result Pharma was quite an exception at that time as it considered giving M-ICT support to its sales force. Finally, the decision to conduct a single in-depth case study was motivated by the constraints imposed by time and limited funding.

### 2.4.2 Crafting instruments and protocols

Two complementary data collection methods were used in this research. The first method is observation (i.e. shadowing) in the field. According to Barley & Kunda (2001), although the interview method is especially useful for "understanding how people make sense of their work and the issues they believe important", it is not a credible source of information on "what people actually do or how they do it" (p.84). They argued that observation-based techniques should be mixed with interview methods.

However, applying an observation method raises some practical difficulties to the researcher. Observation techniques require the researcher to spend an extended period of time in the field (Myers, 1999) and be close together with the subjects. As Kakihara (2003) argued, this makes sense only if the field could be geographically defined and fixed (like office, factory, or home). The sales representatives, the main subjects of this field work, were operating in different regions of the country and they extensively move across various geographical areas. They rarely visit their head office. Furthermore, the sales representatives will constantly feel that the researcher will interfere with the sales process.

In order to deal with the above research constraints, I first collected data by shadowing one sales representative in the field. Then I used the material collected from observing the sales representative to design a survey involving all Pharma's sales force.

As Lyytinen & Yoo (2002) argued, studying emerging mobile and nomadic work environments requires considerable tailoring of the research methodology. In order to collect highly contextualised data of work practices, researchers need to adapt their research strategy in order to benefit from the strength of certain research methods while dealing with obstacles they may encounter especially in terms of the availability of informants.

Member validation (Linclon & Guba, 1984) was used as a part of the research method. Executive and detailed reports describing the findings of the case study and providing recommendations were presented to Pharma's management.

### 2.4.3 Entering the field

The empirical work at Pharma was conducted in two stages: (i) the pre-implementation stage for the mobile system, and (ii) the post-implementation stage.

The *pre-implementation* empirical work took place from April to December 2004. The purpose of the field work at the *pre-implementation stage* was to study, with the aid of BTS and BTF frameworks, how M-ICT could provide value-adding support to Pharma's sales force when operating within a mobile work setting.

First, in order to learn about the nature of the barriers to performance Pharma's sales representatives (sales reps) face when they are operating in a mobile work setting, I collected data with the aid of two field sales trips. In the field, observations and informal interviews with the sales representative constituted the primary mode of investigation. The purpose of the field sales trips was twofold: (i) to assess the nature of barriers to performance the sales representative faces in the field and, (ii) to observe the sales representative's application of the information technology support available to him in order to deal with the barriers. Then in order to validate the findings from the qualitative study, I conducted a survey involving all Pharma's sales representatives.

The *post-implementation* empirical work was conducted from May to August 2005. The purpose of the field work at the *post-implementation stage* was to (i) assess the success of the mobile system implemented in helping the sales representatives to deal with barriers they face in the field, and (ii) derive lessons regarding the accompanying organizational factors that would ensure a successful implementation of M-ICT for the sales force. To this end, I performed a follow-up study. Firstly, I carried out a qualitative study in order to both observe the sales representative's application of the implemented mobile system to deal with the barriers and to detect implementation issues associated with the M-ICT implemented. Secondly, I carried out a survey involving all Pharma's sales representatives in order to both validate and complement the findings derived form the field study with regard to the sales reps' adoption of the M-ICT and the nature of organisational support required in order to ensure a successful implementation of the mobile system developed.

### 2.4.4 Analysing the data

I performed the data-analysis work in two stages. Data collected prior to the implementation of the mobile information systems was analysed using the normative models I developed. The purpose was to determine (i) whether or not Pharma's sales force needs new ICT support to deal with the barriers it faces, and (ii) if so, to determine whether or not M-ICT could provide appropriate support to the Pharma's sales force.
Data collected after the implementation of the mobile information system was used both to test the usability and to refine the normative models that I developed.

### 2.4.5 Shaping hypothesis

Eisenhardt argued that one step in shaping hypotheses is the sharpening of the constructs. This is a two-stage process involving (i) refining the definition of the constructs and (2) building evidence which measures the construct in each case. This is an iterative process where the researcher compares systematically the emergent frame with the evidence derived from the case material in order to assess how well or poorly it fits with the case data. If the data and the theory fit well, then the construct converges and represents reality. According to Eisenhardt, such a process is "judgmental because researchers cannot apply statistical tests such as F statistic" (ibid. p.544).

In this research the normative models were first constructed and introduced in Chapter 6. They were then applied and iteratively adjusted based on the data collected in the case study (Chapter 7).

### 2.4.6 Show the theoretical connections and the research contributions of the solution

This step involves the comparison of the emergent concepts and theory or hypothesis with the existing literature. Eisenhardt insisted that "tying the emergent theory to existing literature enhances the internal validity, generalisability, and theoretical level of theory building" (ibid. p.545). Literature discussing both similar and conflicting findings is important. The literature used for the comparison with the developed models will be presented in Chapters 6 and 7.

### 2.4.7 Reaching closure

At this stage the researcher faces two problems in terms of reaching closure. The first one concerns when to stop adding cases and the second one is when to stop iterating between theory and data. Eisenhardt argued that in the first problem, the researcher has to rely on pragmatic considerations such as time and budget. In this research, there were time and budget constraints. In the second problem Eisenhardt suggested that generally the researcher stops adding new cases when theoretical saturation is reached.

In this research the iteration between the data and theoretical constructs continued until the patterns in the case material reached an adequate level of clarity. Those results will be presented in Chapter 7.

| Step | Activity |
|---|---|
| 1. Getting started | *Find a particularly relevant problem, which also has research potential.<br>*Definition of research questions.<br>* Obtain a general and comprehensive understanding of the topic.<br>* Possible *a priori* constructs. |
| 2. Innovate | *Constructing the normative models |
| 3.Demonstrate that the solution works | * Selecting cases.<br>*Crafting instruments and protocols for multiple data collection.<br>*Entering the field.<br>*Analysing the data.<br>*Shaping hypothesis. |
| 4.Show the theoretical connections and the research contributions of the solution | *Comparison with conflicting literature.<br>*Comparison with similar literature. |
| 5.Reaching closure | *Theoretical saturation.<br>*Examine the scope of applicability of the solution. |

**Table 2.2 Steps of the research process based on Eisenhardt (1989, p.533) and Kasanen et al. (1993)**

## 2.5 Rigour and relevance of the research

Within the IS discipline, the issues of rigour and relevance have been a subject of debate among researchers. For certain scholars, rigour should be emphasised for the research to qualify as academic. Others argued, on the other hand, that overemphasis on rigour in IS research has lessened relevance (Benbasat & Zmud, 1999; Davenport & Markus, 1999) and that rigour should be seen as subordinate to relevance (Keen, 1991). According to Moody (2000), for example, IS as an applied discipline that needs to address the problems determined by the need of practice and society, rather than issues driven by research. As a result, there has been a call in the IS field for adopting research approaches that make a balance between rigour and relevance.

Hevener et al. (2004) argued that the contributions of IS research efforts are assessed as they fill business needs in an appropriate environment and as they add to the content of the knowledge base for future research. They wrote "*a justified theory that is not useful for the environment contributes as little to the IS literature as an artefact that solves a nonexistent problem*" (Hevener et al. 2004, p. 81). However, they emphasised the role of rigour in establishing the credibility of the research results.

Davenport & Markus (1999) suggested that IS research ought to emulate research in medicine and law where the inquiry pursues the objective of effectiveness in action (Lee, 1999).

Carlsson (1991) advocated that in the context of management research, the ultimate aim of any serious research endeavour should be to develop effective theories as guidance and support for managers. He noted that for those theories to be effective they should prove to be valid scientifically.

Keen (1991) observed that in some of the mainstream thinking in the IS discipline, rigour is seen as equivalent to "science" and thus treated as an end rather than a means to achieve a good research output. He argued that rigour does not create relevance. Rather rigour reinforces relevance through grounding, evidence and persuasiveness. He also noted that relevance implies a particular style of rigour. He wrote "*In some instances, the type of hypothesis testing, experimentation, and statistical treatment most associated with scientific methodology may be absolutely essential to establish credibility of research results. In others, it may be totally inappropriate*" (Keen, 1991, p.28).

In order to achieve a balance between rigour and relevance in my research, I followed some of the recommendations formulated by Keen (1991) for improving (i) relevance, (ii) rigour and (iii) impact.
As recommended by Keen (1991) I set at the outset the target audience of my researcher programme. My target audience is sales managers, or IS managers, depending on the organisational structure of the company, who

have to select, justify, implement and evaluate ICT support for their sales force. The target audience faces the challenge of selecting a technology that the sales force can accept and integrate into the structure of their everyday work life in order to enhance its performance. As I discussed in the introduction, investment in information and communication technologies to support the sales force, though costly, has not been always successful. I developed two normative models (i.e. BTS and BTF frameworks) that would support the target audience in trying to provide effective ICT support for the sales force. I focused on one target technology, M-ICT, and applied the normative models that I developed to reveal how such technology could provide value-adding support to pharmaceutical sales representatives.

To improve the rigour of my research, as recommended by Keen (1991) I placed the study in its wider context and surveyed the relevant knowledge base within the IS discipline (i.e. adoption theories, information success models, mobile-technology characteristics and adoption); outside the IS discipline (i.e. history) and in terms of scientific research methodology (e.g. research approaches to develop and evaluate the normative models I constructed). Then, to assess the impact of my research output, I exposed the models I constructed to a real-world case study in order to both evaluate and assess them. I also communicated the results of my research to the IS research community in order to receive their feedback through a blind peer review process and presentations in conferences. By adopting this strategy I aimed to achieve a balance between relevance and rigour.

# Chapter 3

# Adoption and Success of Information Systems

The overall aim of this dissertation is to examine how M-ICT could provide a value adding support to pharmaceutical sales representatives when they are operating within a mobile work setting. It is important, therefore, to understand the dynamics of information systems adoption and success. Indeed the information systems literature has accumulated a variety of theoretical perspectives that have tackled the problem of users' adoption and usage of technology in the workplace.

The theories that I discuss here are: (i) the technology acceptance model, (ii) the information system success model, and (iii) the task-technology fit theory.

## 3.1. Technology Acceptance Model

Research into technology adoption has a long tradition in the area of information technology. The most widely used framework is the technology acceptance model (Davis, 1989). TAM (cf. Fig. 3.1) is theoretically derived from Fishbein & Ajzein's (1975) Theory of Reasoned Action, which posits that a person's performance in a specified behaviour is logically the result of his or her behavioural intention to perform the behaviour. A person's behavioural intention is jointly determined by the person's attitudes and subjective norms concerning the behaviour in question.

According to TAM an individual's acceptance of information technology is based on two beliefs: perceived usefulness and perceived ease of use. Perceived usefulness is defined as the prospective user's subjective probability that using a specific technology will increase his/her job performance (Davis et al. 1989). Perceived ease of use refers to the degree to which the prospective user expects the technology to be free of effort (Davis, 1989). TAM suggests that perceived ease of use influences perceived usefulness. Indeed, other things being equal, the easier the system is to use, the more useful it can be. Moreover, effort saved by improved ease of use may be reused to carry out more work for the same effort (Davis, 1989). However, TAM does not include subjective norms as determinants of behavioural intention. A subjective norm refers to the person's perception that most people who are important to him think he should or should not perform the behaviour in question (Davis, 1989).

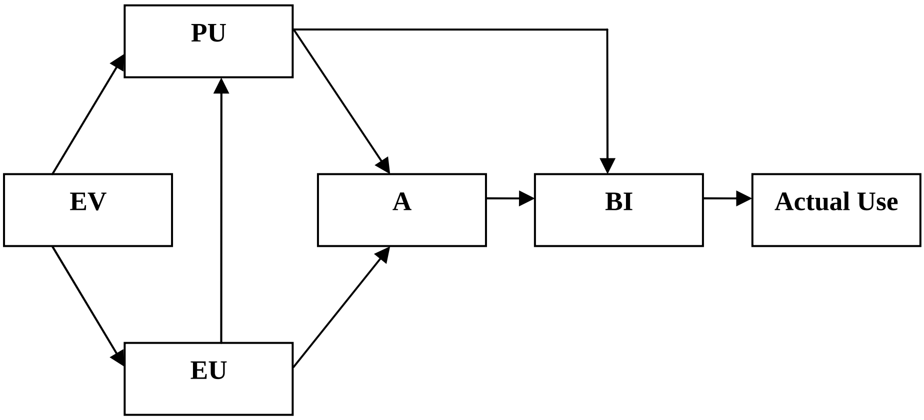



**Figure 3.1 Technology Acceptance Model (TAM)**
EV: external variables; PU: perceived usefulness; EU: perceived ease of use; A: attitude; BI: behavioural intentions.
Source: (Davis et al. 1989, Management Science, 35:8, p.985)

TAM has accumulated some strong empirical support. The validation of TAM has focused on both its instrument in order to prove its psychometrics properties and the causal links between constructs, e.g. Davis et al. (1989); Adams et al., (1992); Taylor & Todd, (1995); Chau et al. (2002); Hu et al. (1999); Karahanna et al. (1999); Subramanian (1994); Szajna, (1994); Venkatesh & Davis, (1996); Venkatesh et al. (2002). For example, Davis et al. (1989) found that perceived usefulness and perceived ease of use correlated significantly with both self-reported current usage and self-predicted future usage. Similarly, Adams et al. (1992) conducted two studies in order to evaluate the psychometric ease of use and perceived usefulness scales, and to empirically examine the relationship between the constructs of usefulness and ease of use and reported level of usage. The results of their studies demonstrate the validity of the scales employed to measure perceived ease of use and usefulness. They also found that usefulness relates to usage but ease of use is less important in determining use of the system.

Szajan (1996) tested TAM in both the pre-implementation and post-implementation stages of an information system (IS). The results of her study indicate that at the pre-implementation stage, perceived usefulness has significant effects on intentions, but ease of use did not. At the post-implementation, usefulness has again a significant direct effect on intentions, but ease of use affects intentions only through perceived usefulness. The author concludes that unless users perceived an IS as being useful, its ease of use had no effect on the formation of intentions.

However, despite many studies validating TAM, the model has been challenged in a number of dimensions. One limitation is related to the relationship between TAM constructs: perceived usefulness, perceived ease of use, behavioural intentions, and behaviour. For example, some studies minimise the role of perceived ease of use in predicting behavioural intention or behaviour toward a system, e.g. Subramanian, (1994); Chau (1996); Hu et al. (1999). Likewise, the use of behavioural intention as a proxy to understand and predict users' behaviour toward a particular system has not been proved by some studies. For example, Taylor & Todd, (1995 a) found that behavioural intention predicted behaviour more strongly for experienced users.

Another limitation of TAM discussed in the literature is that the original model does not include moderating variables that would enable a deeper understanding of the factors contributing to users' attitudes and behaviour towards a specific information system. For example, such factors as users' past experience with a specific system (e.g. Taylor & Todd, 1995a;), cultural differences (e.g. Straub et al. 1997), gender (Venkatesh et. al.2000; Gefen & Straub 1997), personal innovativeness (Agarwal & Prasad, 1997; Agarwal & Prasad, 1998); mandatory use versus voluntary usage (e.g. Moore & Benbasat, 1991; Hartwick & Barki, 1994) and subjective norms (Taylor & Todd, 1995b; Venkatesh & Davis, 1996) have been shown to influence users' attitudes and behaviour with regard to adopting a given information technology.

Another cited limitation of TAM is related to the approach used to conduct TAM studies. Lee et al. (2004) performed a meta-analysis of TAM research from 1986 to 2003, followed by a survey involving 32 leading IS researchers. The results of their study indicate ten major reported limitations of TAM studies: (1) using self-reported measures instead of actual usage, (2) the focus on only a single IS, (3) the use of student samples rather than potential adopters of the system operating in real work environments, (4) the dominance of collecting data via cross-sectional surveys, (5) low explanation of variances in human behaviour when testing the models, (6) ignoring external variables other than TAM variables, (7) not distinguishing between use under a mandatory compared to a voluntary situation, (8) the tendency to examine only one single task with the target information system and at one point of time, thus making it difficult to generalise the results of the study, (9) the problem of measuring new development scales, and (10) other limitations such as short exposure time to the new IS before testing and self-selection biases to the subjects. Other studies questioned the applicability of TAM to modern and complex technologies (e.g. Chau and Hu, 2002).

As a result, TAM has been revised and elaborated in various ways. One extension of TAM focuses on extending the perceived usefulness and perceived ease of use constructs. For example, Chau (1996) expands the construct of perceived usefulness into two different constructs: perceived near-term usefulness and perceived long-term usefulness. Near-term usefulness refers to how the user perceives the capability of the technology to improve his performance while long-term perceived usefulness refers to the user's career prospects or social status. His study revealed that near-term perceived usefulness has the most significant influence on intention. It also had a significant and positive influence on long-term usefulness. That is, a user who perceives the technology as useful in accomplishing his or her tasks is predisposed to believe it will help him or her in his future career.

Another extension of the original TAM goes to the definition of the antecedents of perceived ease of use and perceived usefulness. Venkatesh & Davis (2000) introduced TAM 2. It extended the original model by defining the external variables of perceived usefulness in terms of social influence processes (subjective norm, voluntariness, and image) and cognitive processes (job relevance, output quality, result demonstrability and perceived ease of use). According to TAM 2, subjective norms influence perceived usefulness via both internalisation, a process by which, when one perceives that an important referent thinks one should use a system, one incorporates the referent's belief into one's own belief; and identification, in which people use the system to achieve status and influence within their work group and thereby improve their performance. With increasing experience of using the system, users rely less on social information but continue to judge the system's usefulness on the basis of the benefits they could achieve in terms of their status by using the system (Venkatesh & Davis, 2000).

Venkatesh (2000) focused on the antecedents of ease of use in three studies involving employees from three different organisations. He developed a model of the antecedents of the perceived ease-of-use construct. The model suggests that control (defined as the individual perception of the availability of resources to perform the specific behaviour), intrinsic motivation (defined as the degree of a user's computer playfulness), and emotion (defined as the individual’s anxiety when he or she is faced with the situation of using a computer) are anchors that influenced users’ early perceptions of the ease of use of a new system.

Venkatesh et al. (2003) developed a unified model of user acceptance of information technology (UTAUT) based on studies of eight prominent models in IS adoption. According to Lee et al. (2004), UTAUT is the most intensive elaboration of TAM. UTAUT (cf. Fig. 3.2) posits three direct determinants of intention to use: performance expectancy, effort expectancy and social influence as well as two direct determinants of usage behaviour (intention and facilitating conditions). Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains on performance; effort expectancy is defined as the degree of ease associated with the use of the system; social influence refers to the degree to which an individual perceives that others of importance believe that he or she should use the new system. Facilitating conditions are defined as the degree to which an individual perceives that an organisational and technical infrastructure exists to support the use of the system. According to UTAUT, the effect of performance expectancy on a user’s behavioural intention is stronger for men and younger workers; the effects of effort expectancy on behavioural intention are stronger for women, older workers and those with limited experience; the effects of social influence on behavioural intention are stronger for women, older workers, under the condition of mandatory use and with limited experience. The effect of facilitating conditions on usage is significant only in conjunction with the moderating effects of age and experience.

UTAUT was empirically examined and found to outperform the eight individual models, including TAM. However, despite its strong explanatory power the model has a number of limitations. One limitation is that UTAUT, like TAM, remains incomplete in terms of linking the individual usage and adoption of an IS to the bottom-line impact. This was recognised by the UTAUT authors themselves when they called for more research investigating the relationship between IS success in terms of individuals’ adoption and the success of the same system from an organisational perspective (Venkatesh et al. 2003).

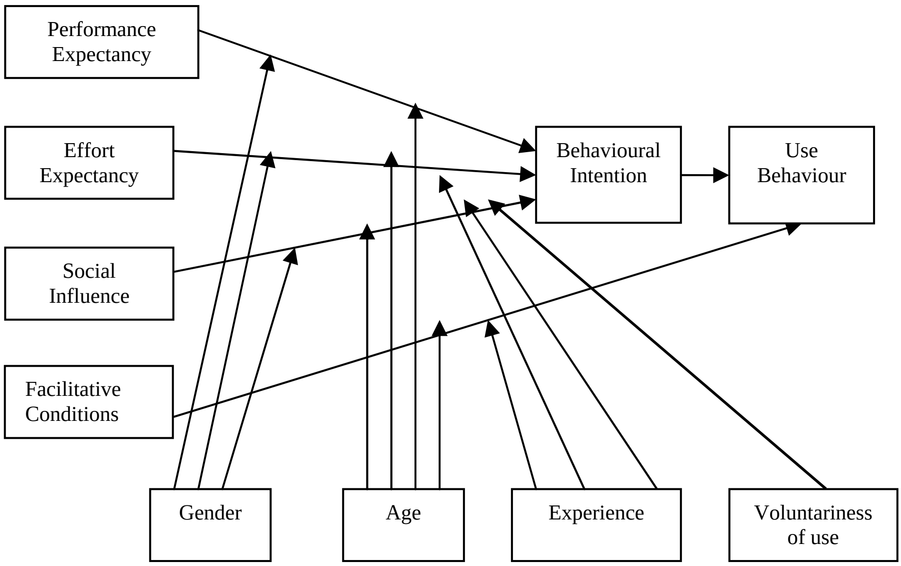



**Figure 3.2 Unified Theory of Acceptance and Use of Technology (UTAUT)**
Source: (Venkatesh et al., 2003, MISQ 27:3, P.447)

## 3.2 The Information Systems Success Model

DeLone & McLean (1992) developed a model of information systems success based on a review of 100 papers containing empirical IS success measures published in 1981-1987. They synthesise the success measures they identify into a six-factor taxonomy of IS success: system quality, information quality, IS user, user satisfaction, individual impact and organisational impact (cf. Fig. 3.3). DeLone & McLean (1992) conceptualise their model based on ideas developed by Shannon & Weaver (1949) about group communication problems. Shannon & Weaver defined the technical level of communications as the accuracy and efficiency of the communication system that produces information. The semantic level is the success of the information in conveying the intended meaning. The effectiveness level is the effect of the information on the receiver (DeLone & McLean, 1992).

According to the DeLone & McLean model (1992) the quality of an information system together with the quality of information will lead to both the use of the system and user satisfaction. This use then leads to an individual impact resulting in some organisational impact.

DeLone & McLean did not provide any empirical validation for their model. However, elements of the model have been subjected to empirical tests (Seddon & Kiew, 1994; Rai et al. 2002). For example, Seddon & Kiew (1994) tested five of the nine relationships and found them to be significant.

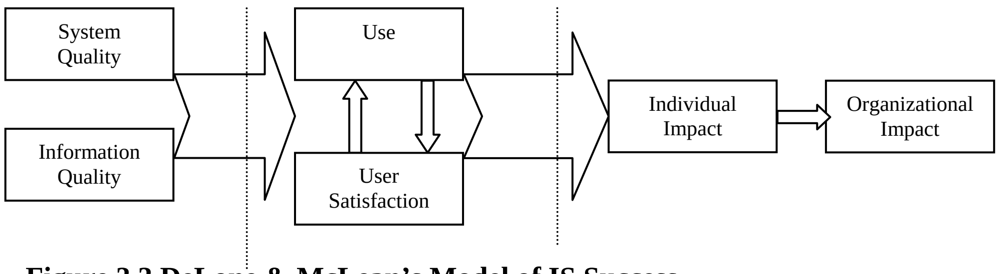



**Figure 3.3 DeLone & McLean's Model of IS Success**
Source: DeLone & McLean, 1992, Information System Research Vol.3, No.1, P. 87.

Despite being used widely, the model has been subject to criticism and calls for respecification and extension. For example, according to Alter (1999) the distinction between the work system and the information system that supports it does not appear clearly in the DeLone & McLean success model. As a result, the model's constructs can be interpreted differently depending on whether they are seen from the perspective of a work system or an information system. For example, while information quality can be measured in terms of the demands of a work system; the same construct can be measured from an information system perspective based on the information *per se* regardless of whether the information is needed or not by the work system.

Seddon (1997) observes that three distinct models are implicitly intermingled in DeLone & McLean's model, each reflecting a different interpretation of IS use. One is a process model of IS success that depicts the sequences of events that lead to IS success in terms of the consumption of the IS output. A second is a variance model of IS success, which links systems quality and information quality as independent variables to IS use and user satisfaction as dependent variables. A third, embedded model is a representation of IS use as a behaviour that is a consequence of IS success rather than an integral part of it.

According to Seddon (1997) the integration of the above three models in one model of IS success creates confusion concerning the interpretation of boxes and arrows in the DeLone & McLean model. In some cases the boxes and arrows suggest process interpretation and in other cases they suggest a causal link. As a result, Seddon (1997) suggests a respecification of the DeLone & McLean model by disentangling the process model from the variance models and separating the variance model of IS success from the variance model of behaviour that occurs as a consequence of IS success.

Seddon's (1997) argument is that use must precede impacts and benefits but it does not cause them. He considers IS use a consequence of IS success rather than an inherent characteristic of IS success. Therefore, in his effort to respecify the DeLone & McLean model, he argues that the expectation of net future benefits from using a system is the causal variable that drives IS use, rather than the three constructs of system quality, information quality and user satisfaction that could be implied from the DeLone & McLean model as variables predicting future use. According to Seddon (1997), system quality, information quality and the net benefits of IS use to individuals, organisations and society are independent variables that have direct causal links with two perceptual measures of net benefits: perceived usefulness and user satisfaction. Perceived usefulness in Seddon's model is similar to that of Davis' model (1989). However, it is assessed *ex post* (rather than *ex ante* as in the TAM model) and relates to the degree to which a person believes that using a particular system *has enhanced his or her job performance or organisational performance* (Seddon, 1997, pp.249). Perceived usefulness in Seddon's model provides, then, a measure of actualised net benefits. User satisfaction refers to the user's subjective evaluation of the consequences of IS use on a pleasant-unpleasant scale. Perceived usefulness has in turn a direct causal connection with user satisfaction. User satisfaction is linked to a behavioural measure of IS use indirectly through revised expectations concerning the net benefits that will result from future IS use.

Other extensions of the original DeLone & McLean's (1992) model of information systems success has undergone include adding a service quality measure to IS success (Wilkin & Hewitt, 1999); and work group impacts (Meyers et al. 1998; Ishman, 1998).

Based on the calls for respecification and extension of their original IS success model, DeLone & McLean (2003) have provided an update of the model (cf. Fig.3.4). They extend it by adding a new construct, service quality, and combining the individual and organisational impact constructs into a single variable, "net benefits". According to this updated model, information quality, system quality and service quality, singularly or jointly affect both intention to use and user satisfaction in a process sense. User satisfaction in turn affects intention to use in a causal sense, as increased

user satisfaction will lead to increased intention to use and thus use. Both use and user satisfaction will result in certain net benefits from the perspective of a system stakeholder (e.g. user, sponsor of the owner of the system) that would either reinforce subsequent use and user satisfaction in the event of positive benefits; or result in decreased use and potential discontinuance if the net benefits are negative. DeLone & McLean (2003) recommend that the researcher should carefully define the stakeholders and the context in which net benefits are to be measured. The same recommendation is provided by Seddon et al. (1999) in his discussion of the dimensions of IS success. Such authors argue that different measures of IS effectiveness or success are required for different contexts.
According to DeLone & McLean (2003), no single variable is better than another; the choice of success variables is often a function of the objective of the study as well as the organisational context.

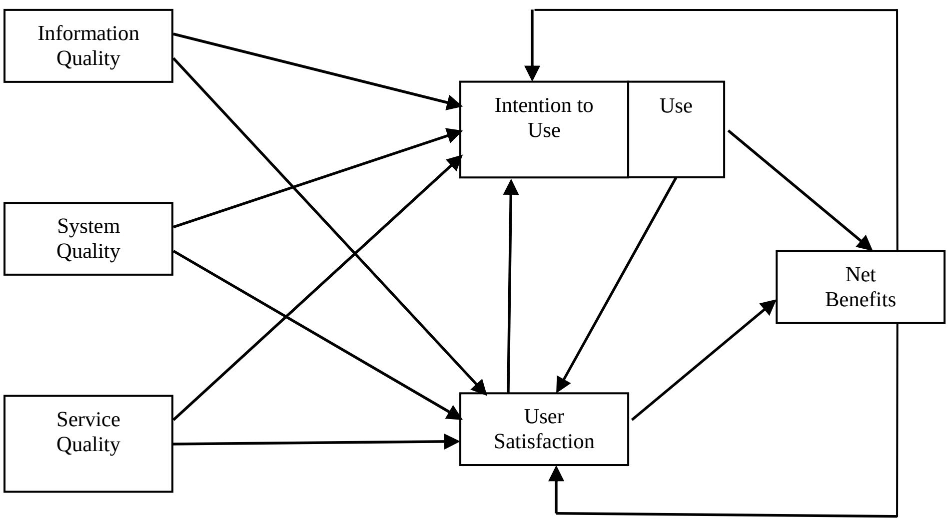



**Figure 3.4 DeLone & McLean's Reformulated Model of IS Succes**
Source: DeLone & McLean's, 2003, Journal of Management Information System, Vol. 19, No.4, pp.24

## 3.3 Task/technology fit theory

The theory of task/technology fit (c.f. Fig 3.5) offers another way of looking at IS utilisation and performance. Goodhue (1992) observed that many existing user evaluations blurred the distinction between task needs and personal needs, and thus would provide less clear linkage to performance.

He suggested that user evaluation of system success based on task/system fit would be more closely linked with task performance.

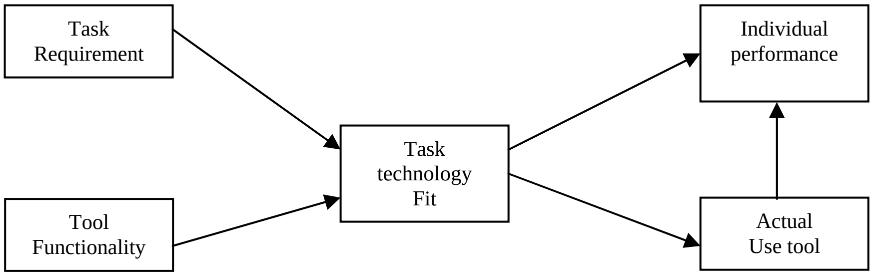



**Figure 3.5 A basic task-technology fit (TTF) model**
Source: Dishaw & Strong (1999), Information and Management, Vol.36, p.11

Goodhue (1988) proposed a model of IS "satisfactoriness". He defines IS satisfactoriness as "*the degree to which IS environment assists individuals in performing their job related tasks*" (Goodhue, 1988, p.13). According to Goodhue (1988) systems and functionality have no value in themselves, but only in their relation to tasks and that the correspondence between task requirements and system functionality is the mechanism by which system creates value (Goodhue, 1988).

Goodhue (1992) regarded task/system fit as an objective quantity, susceptible to an engineering analysis of task needs, system functionalities and the fit between the two. That is, all things being equal, changes to tasks that require the user to make greater demands on the systems' environment should reduce task/system fit. Likewise, changes in the system environment (more appropriate functionality or policies) along the lines needed for the tasks should increase the fit (Goodhue, 1992). According to Goodhue (1992) conducting an engineering analysis would be one way of measuring task/system fit. Asking users to express their beliefs about the extent of the task/technology system fit would be another way to measure it.

In his model of IS satisfactoriness, Goodhue (1988) argued that in evaluating IS success the focus should be on the beliefs, not the attitude of the users. That is, users should be asked to report their beliefs, as expert witnesses, on the objective correspondence between their tasks and the system they have access to, rather than eliciting attitudes or feelings about the system or its use (Goodhue, 1988). He wrote "*we should ask individuals not whether or not the system has accurate data (a question the individual may not be qualified to answer objectively), but rather whether it has data* *accurate enough for his tasks. We should not ask whether data on a system is accessible, but whether it is accessible enough for them in carrying out their tasks*" Goodhue (1988. p.13).

In distinguishing between beliefs and attitudes, Goodhue (1988) adopts the definition developed by Petty & Cacioppo (1981):

> "*The term attitude should be used to refer to a general and enduring positive or negative feeling about some person, object or issue…the term belief is reserved for the information that a person has about other people, object and issues. The information may be factual or it may be only one person's opinion. Furthermore, the information may have positive, negative, or no evaluative implication.*" (Goodhue, 1988, p. 9)

Goodhue (1995) developed and tested a model that determines IS success based on users' evaluation of TTF. According to his model, users will evaluate more highly an IS based not only on the system's characteristics (technology) but also on the extent to which that system meets their task needs and their individual abilities (task/ technology fit). He then performed an empirical study in order to test his model. The result of his study provides support for the relevance of the concept of TTF as a measure of users' evaluations of IS success. He found that the value of the technology appeared to depend on the characteristics of the users' tasks. His study also showed that users seem to be capable of evaluating the task-technology fit of their technologies. He concluded that users' evaluation of IS success can be inconclusive if task characteristics are not included in the analysis.

In an attempt to elaborate the TTF model, Goodhue & Thompson (1995) developed a model that they labelled the technology-to-performance chain (TPC). TPC combines theories focusing on TTF and utilisation studies. The model included such constructs as characteristics of technology, task characteristics, and the task/technology fit as explanatory variables for technology use and individual performance. According to TPC, for technologies to lead to a change in individual performance, they must be exploited and fit the tasks they support.

Goodhue & Thompson (1995) subjected a simpler version of TPC to an empirical test involving a sample of 662 users of multiple technologies to support multiple tasks, omitting individual utilisation from the analysis. The empirical test found strong evidence that TTF and utilisation together predicted performance better than each construct alone. However, they found an ambiguous causal link between TTF and utilisation and a strong effect of task characteristics on TTF only for non-routine tasks. Their conclusion is that users’ involvement in IS design influences not only their commitment but also the quality of fit of the resulting system. They recommend that in order for the TPC model to serve as a useful diagnostic tool for an IS system within a particular company, the focus should go beyond the general constructs of such a model to more detailed constructs that can clearly identify the gap between the users' needs and system capabilities. The identified gaps would then assist managers in making decisions about the system: (i) discontinue or redesign systems or policies, (ii) embark on training or selection programmes to increase the ability of users, or (iii) redesign tasks to take better advantage of IT potential (Goodhue & Thompson, 1995).

Goodhue et al. (2000) focused on user evaluations of task/technology fit for mandatory use of a system and developed a theoretical argument for the link to performance. They then test their hypothesis in a controlled experiment using two objective measures of performance: speed and accuracy. The result of their empirical study indicated that task/technology fit affects performance (speed, accuracy) and that users can evaluate the task/technology fit (consistency of data, adequacy of training), but there was mixed evidence regarding the issue of whether perceived task/technology fit predicts performance.

Dishaw & Strong (1999) presented a model that integrated the task/technology fit construct into the technology acceptance model developed by Davis et al. (1989). Their model provided greater explanatory power (51 per cent of variance explained) than the technology acceptance model alone (36 per cent of variance explained) or task/technology fit theory alone (41 per cent).

Mathieson & Keil (1998) presented the results of a laboratory experiment investigating the link between TTF and ease of use. They found that TTF affects perceived ease of use, independent of the system interface. In other words, a system that is difficult to use shows problems related to TTF that cannot be solved by merely changing the interface.

Another stream of research investigated TTF within group support systems environments. Zigurs & Buckland (1998) developed a theory of task/technology fit to support the development and deployment of group support to support groups’ tasks. They proposed that the type of task and characteristics of GSS technology should fit in such a way as to enhance group performance.

Murthy & Kerr (2004) employed Zigurs & Buckland's (1998) theory of task/technology fit to examine the relative effectiveness of alternative modes of audit team communication in tasks requiring the exchange and processing of uniquely held information. According to the authors, those tasks require computer-mediated tools that provide both high levels of communication support and information-processing support. In their experiments the authors examined two computer-mediated communication tools: chat tools and bulletin board: (i) chat tools allow synchronous communication with all comments stored in a single location and updated in real time; (ii) bulletin boards tools facilitate the organisation of comments by topic, with related comments stored together. Chat tools provide high communication support, as they allow a simultaneous input of all participants' comments. However, their level of information-processing support is low. On the other hand, bulletin board tools provide high communication support as they allow simultaneous conveyance of information. They also provide high information-processing support through their message-organising features. Using the TTF theory, the authors predicted that teams using the bulletin board tools would outperform teams using chat tools, which would outperform teams interacting face-to-face. The results of their study indicate that teams using the bulletin board tool significantly outperformed those using the chat tool or interacting face to face. However, they found no significant difference in performance between teams using chat tools and those interacting face-to-face.

Barkhi (2002) examined the effect of problem-structuring and modelling with a group support system on the coordinated decision-making of managers in a group faced with mixed-motive production-planning tasks. The results of their empirical study indicated that the groups using a group support system with a problem-modelling tool outperformed the groups using a system without a problem-modelling tool, but they were less efficient with respect to the time and number of messages it took the group to converge to a final solution.

Dennis et al. (2001) developed a fit appropriation-model for interpreting the effects of group support systems on performance. They suggested that the performance of group support is affected by (i) the fit between the task and GSS structures selected for use, and (ii) by the appropriation support the group receives in the form of training, facilitation, and software restrictiveness to help them effectively incorporate selected GSS structures into their meeting process. The results of their empirical study show that fitting the GSS to the task had the greatest impact on outcome effectiveness (e.g. decision quality and ideas); while appropriation support had the greatest impact on the process time (e.g. time required and process satisfaction).

Murthy & Kerr (2000) employed the TTF concept to investigate the difference in performance of teams using the GSS tools relative to teams interacting face-to-face when performing tasks of varying information richness requirements. The results of their experiment showed that teams performed better when communicating face-to-face for the problem-solving task. This would be due to the fact that an "intellective" task increases the need for member interdependence which may result in a poor "fit" between the task and the technology. On the other hand, they found that subjects perform better when communicating via GSS for the idea-generation tasks. Such kinds of tasks require reduced levels of interdependence and coordination resulting in a better "fit" between the tasks and the technology.

## 3.4 Summary and conclusions

This chapter presents theoretical frameworks and concepts about the adoption and success of information systems. The review of those models raised three observations that I will take into account in achieving my research aim which is to examine how M-ICT could provide a value adding support to pharmaceutical sales representatives when they are operating within a mobile work setting. Those observations are as followed.

*Firstly*, the frameworks presented suggest different views about the adoption and success of information systems. Such views can be regarded as mutually supportive rather than exclusive. TAM, TAM2 and UTAUT enhances our understanding of the mechanisms that influence an individual's decision to use a particular IT. However, those models do not elicit the consequences of the usage of the particular IT on individuals and their organisations. Rather, they predict individual use. However, does individual usage of an IS (technology) mean that the system succeeded in achieving the objectives that triggered its implementation?
As Goodhue (1992) argued, use is a problematic surrogate for MIS success. Depending on the task, more use can indicate that the system is "poor", since for a given task the longer it takes to complete it the less efficient the system. Use is also an ambiguous indicator of the efficacy of the system unless the alternatives to using the system are also considered. In some cases, the next alternative might be so poor as to justify the use of a specific

system though it is poorly designed and difficult to use. Goodhue (1992) then concluded that quantifying the amount of use as an absolute quantity (e.g. number of hours per day) may be inappropriate if we want to examine the performance impact of a particular system. He wrote *"It is not clear for a specific manager carrying out a set of tasks that his or her performance would double if he or she doubled the units of time he or she used the system"* (Goodhue, 1992, p.307). As a result, he suggested that it would be difficult to link use with performance by merely measuring the absolute amount of use.

Similarly, Seddon (1997) suggested that the critical factor for IS success measurement is not system use, but the net benefits that result from use.

DeLone & McLean's model of IS success (1992) enhanced our understanding of how an IS can lead to an impact from the both the individual and the organisational perspectives. They linked the IS use construct to user satisfaction, individual impact and organisational impact. However, the theoretical interpretation of the use construct in their models was not clear (IS use as an event versus use as an antecedent variable) as explained by Seddon (1997). Subsequently, DeLone & McLean's reformulated model of IS success attempted to address this problem by going beyond IS use and introduced the construct of net benefit, to the system's stakeholders, resulting from IS use as a measure of IS success.

The task/technology fit allows us to assess the system value in a pragmatic way. That is in relation to users' tasks that the system developed is meant to support.

The review also point to the importance, when making decisions about a particular IS, to set at the outset the dimension against which to carry out the analysis. Goodhue and Thompson (1995) recommend that the analysis should focus on identifying gaps between the users' work needs and system capabilities that are supposed to meet those needs. Indeed Alter (2000) made a point when he builds an analogy between the work system and the information system that supports it as Siamese twins that are distinguishable but still so deeply connected that examining them separately is meaningless.

*Secondly,* the above models, when they attempt to predict users' adoption of information technology or assess the success of a specific technology do not take into account the fact that prospective users have other technologies available to them to carry out their tasks other than the system under study.

In other words, they do not place the specific technology within the context of the "web of technologies" as coined by Nielson (2001).

*Thirdly*, the models, though they identified important variables that influence the adoption and success of information systems, provide only partial guidance to the practitioner. Practitioners are interested not only in knowing the dynamics between the pieces of the system implementation puzzle but also how such pieces should be arranged in order to attain the expected system success (Newman & Robey, 1992).

# Chapter 4

# Barriers to Adoption by the Sales Force of Sales Force Automation (SFA) Systems

In this chapter, I will present the state-of-the-art on barriers that impede the adoption of SFA technologies by the sales force.

The overall aim of this dissertation is to examine how M-ICT could provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting. It is important, therefore, to understand the barriers that hinder the sales force's adoption of SFA systems. The literature highlights a number of barriers as well as offers recommendations for avoiding the pitfalls when introducing technology into the sales force's work process.

I classify the barriers to the sales force's adoption of SFA systems that I identified based upon the literature review into two main categories:

- *Personal barriers.* Those are related to the attitudes and behaviours of individual salespersons in terms of adopting the technology.

- *Organizational barriers.* Such barriers are related to the organisational factors that hinder the sales force's adoption of SFA systems.

## 4.1 Personal barriers

Research on the sales force's adoption of SFA systems has uncovered several personal factors that hinder its adoption by members of the sales force.

In a study involving salespersons from a Fortune 500 company, Robinson et al. (2005) found that salespeople who believe that a technology tool will be useful will also have a positive attitude towards using that tool. They conclude that salespersons as autonomous workers, who are generally managed by outcome-based control mechanisms will not choose to adopt the technology if they do not believe that it will help them achieve their job-related goals, enhance their performance and achieve a desired reward. That is, they will use only those technologies with the highest cost /benefit ratio.

The results of their study also indicate that perceived ease of use indirectly impacts on the salespersons' willingness to use the technology through its impact on perceived usefulness. Salespersons may not consider adopting the new technology if they believe that the effort required to both master and use it is too much to be acceptable.

In another study involving the salespersons of five pharmaceutical companies, Avlonitis et al. (2005) found that salespersons are more likely not to adopt and use implemented information systems in day-to-day activities if they believe that such systems are not useful and/or are difficult to use.

Jones et al. (2002) examined factors leading to SFA use in a longitudinal study involving the sales force of a Fortune 500 insurance company. The results of their study show that usage of the technology may depend on its benefit as perceived by the individual salesperson. The authors also found that salespersons who demonstrate a low level of personal innovativeness may experience problems in adopting the technology.

Schillewaert et al. (2005) studied 229 salespeople from different industries in order to investigate their adoption of information technology. In their study the authors used the Technology Acceptance Model (TAM) to understand perceived usefulness and perceived ease of use of SFA systems. They also examined such constructs as personal innovativeness, computer self-efficacy, training, technical support, supervisor support, peer usage, and customer interest. The results of their studies indicate that usefulness is a fundamental driver of sales technology usage by the sales force and ease of use is a secondary driver. Also they found that salespersons' technological innovativeness and the role of supervisor are significant factors in the adoption of technology.

Rangarajan et al. (2005) examined the impact of SFA systems on technology-related stress, effort and technology usage among sales people. The results of their study show that the role conflict increases when salespersons believe that the time used to master the technology could be used better to talk to customers. They also found that the effort and cognitive resources that the salespersons are willing to invest in integrating a new technology into their everyday work routines will depend on the extent to which they perceive that the technology causes conflicting demands on their job. As a result, they encourage managers to clarify expectations tied to technology and to invest in a technology that salespeople perceive to be useful. They also recommend that sales managers minimise the complexity of integrating technology into the sales force's everyday work routines by providing support to reduce the increased work demand caused by the technology.

Increased work stress resulting from implementation of an SFA system has also been discussed by Honeycutt et al. (2005). According to those authors, upon implementation of an SFA system, salespersons may find themselves assigned other activities such as database analysis or report writing. This resulted in salespersons experiencing role ambiguity in terms of their role within the organisation. In other words, salespersons may question their new role within the organisation: were they salespersons, administrators or IT specialists?

Keillor et al. (1997) investigated salespersons' attitudes towards a new technology. The results of their study indicate that less experienced salespersons were positive to using the technology in the sales process. However, experienced salespeople, especially the less productive, perceived the technology as a threat to their sales job.

Another source of fear instilled in salespersons by technology comes from loss of independence in the field (Honeycutt et al. 2005). Indeed as Morgan et al. (2001) observed, most SFA systems will provide sales management with real-time access to salespersons' performance information. As a result, salespeople that enjoy working autonomously and with limited supervision in the field may perceive the technology threatens their freedom or even makes them constantly feel "monitored" by their sales managers.

Loss of power is another source of fear from technology that salespersons may experience. According to Honeycutt et al. (2005), salespersons may regard knowledge about customers as a competitive advantage over peers. As a result, they may fear losing their "expert" status if, as a result of an implementation of an SFA system, they are forced to share their knowledge, via a database, with anyone in the organisation. Furthermore, salespeople may perceive the SFA system as a threat if the technology makes it easier for a replacement to assume control of accounts.

The issue of salespersons fearing the loss of their power as a result of technology implementation has also been discussed by Morgan et al. (2001). According to those authors, to many salespeople the more information they possess about their customers, the more dependent their organisation becomes. As a result, salespeople may resist transferring their customer

knowledge base into a format that is standardised, readily accessible and easily transferable.
Buehrer et al. (2005) investigated barriers to the use of technology by the sales force in a study involving salespeople from two companies: an automotive dealership and a pharmaceutical firm. One key personal barrier that emerged from their study is the low computer skills of the sales force. That is, the sales force's members feel that they are not capable of using the technology.

## 4.2 Organizational barriers

Research on organizational barriers that impede successful adoption of SFA systems has focused on the role of the organisation prior to, during and after implementation of the technology. Erffmeyer et al. (2005) investigated companies' expectations and outcomes from SFA investment in a study involving 43 companies. They found that a very limited number of firms participating in their study were able to offer details with regard to the goals of their sales force automation. For example, the majority of the respondents mentioned improving the sales force efficiency as a goal of SFA. However, when asked what specific areas that need improvement, a typical response was "our goal is to get as many things automated as possible". They also observed that in some cases planning efforts were made with little or no involvement of the sales force. In addition, their study revealed that training is a major implementation issue. Some companies offer no training to support the SFA effort. They found that lack of training was a common characteristic to the majority of respondents who indicated that their organisation did not achieve their SFA goals. Their recommendation to managers is to set explicit goals for the SFA investment and make sure that they are accepted by both the sales force and the customers; involve a multidisciplinary team in the planning process; provide adequate training to the sales force members and develop evaluation measures for SFA outcomes.

Gohmann et al. (2005 a) investigated the difference between the perceptions of SFA systems held by management and the sales force in a study involving 2782 U.S. Army recruiters and 237 of their supervisors. The results of their studies showed that while the sales force perceives that the technology inhibited its productivity, management has a more positive perception of its productivity benefits. According to the authors, such a discrepancy in the perceptions may result in the management having productivity expectations that are higher than what the sales force can achieve with the system. Their study also revealed that the majority of the sales force members have the impression that the implemented system serves as a micro-management tool but does not result in increased productivity. The authors conclude that when salespeople are excluded from the decision-making process they may view the adoption of SFA technology as an imposition at best or an odious addition to a job at worst. Their recommendation is that managers should solicit input from the sales force during the initial stages of the decision-making process about the technology and communicate how the new technology will improve its performance. Sales force input may create a sense of ownership and increase the likelihood that the technology will be accepted and used. They also recommend that managers communicate consistently to the members of the sales force that the technology was implemented to support them in performing their tasks rather than to monitor their activities. The purpose is to counter any possibility that the sales force perceives that the technology is a micro-management tool, which may result in its unwillingness to use the system. Finally, they highlighted the important role of training in alleviating many of those issues associated with the technology implementations. According to Gohmann et al. (2005 a), the lack of effective training can negate any potential benefits the sales force may perceive in terms of the benefits of using the technology, especially if the sales force's members are novices or lacking in computer skills.

Bush et al. (2005) examined the sales force automation outcome from a managerial perspective in a study involving key executives from three companies. The results of their study indicate that the success of the SFA initiative depends on two factors: (i) whether or not the sales force accepts the process change that the new technology will cause, and (ii) the sales force's perception that the technology will help them to perform their tasks better under the new process. They recommend that managers (i) set concrete goals about what the technology is supposed to accomplish, (ii) assess the fit between the technology characteristics and objectives of the investment, (iii) discuss the benefits of the technology with the sales force, and (iv) provide the sales force with training during the early stages of the technology development.

The critical role of sales force training in using the technology was also investigated by Ahearne et al. (2005) in a study involving 108 sales representative of a large consumer packaged-goods firm in the US. The results of their study show that users' training and support moderate the relationship between technology usage and sales force performance measures. Indeed they found that when salespersons are provided with sufficient training and support, increased use of technology enhanced both their efficiency and effectiveness. On the other hand, under conditions of low support, the use of technology by salespeople resulted in decreased effectiveness and efficiency. One interesting finding of their study is that sufficient training does not moderate the relationship between the use of technology and efficiency. They also found that salespersons who had low technology usage and low training exhibit higher performance levels than those with low technology usage and high training. According to the authors this might be due to the fact that salespersons not using the technology will not seek to spend valuable selling time in training. As a result they are more productive than those who do not use the technology but devote some of their time to training and support.

In a study involving Canadian medium-sized manufacturers, Rivers & Dart (1999) investigated the factors relating to the adoption and effective use of sales force automation systems. A key finding of their study is that companies that look to the SFA investment as a means to achieve administrative efficiencies and strategic advantages are more likely to achieve better return than those who seek simply to automate existing tasks. That is, companies that simply apply the technology to day-to-day operational problems (e.g. existing tasks) without any attention to organ-isational issues such as training and delegation of responsibility are unlikely to generate a positive return on their SFA investment.

Speier & Venkatesh (2002) examined salespersons' perceptions and behaviour regarding a SFA tool both immediately after release and six months after implementation, in a study involving 454 salespeople from two firms. The results of their studies showed that immediately after training salespeople had positive perceptions of the technology. However, six months after implementation salespersons' reaction turned negative. The negative reaction manifested itself not only as a wide rejection of the technology but also in the form of increased absenteeism and voluntary turnover. According to the authors, the reason for such a reversal stems from the lack of fit between the SFA and the sales force, resulting in salespeople perceiving the technology as disruptive to the sales process. They also found that salespeople with stronger professional commitment indicate stronger negative job-related perceptions as experience with the technology increased. Their recommendation to managers is to provide the sales force with knowledge about the degree to which the technology will augment the sales role and sales process well before the design and implementation. They also recommend that management should manage appropriately any negative perception such as the feeling of being replaced by the SFA tool that the sales force may experience.

Parthasarathy & Sohi (1997) proposed a two-stage model of adoption of technological innovation by salespeople. The first part of the model outlines organisational issues that influence the decision to adopt the technology by the management. The second stage of the model explores factors that may influence the adoption of the technology by salespeople. This results in what they term as dual adoption first by the organisation and then by the sales force. According to the authors, following a firm's investment in SFA, salespeople will either accept the change or resist it. For those who resist, the technology adoption will be similar to forced adoption and thus they will tend to underutilise the system. Based on the literature, they classify the factors that may influence individual salespersons adoption into three categories (i) non-monetary costs of adoption; (ii) personal demographic and environmental factors (e.g. age, education and experience); and (iii) interpersonal communication. Non-monetary costs include the time and effort that the individual salesperson must devote to learning how to operate the technology. According to the authors, a busy salesperson may be reluctant to spend a long time learning the working of a technology, time that he or she can spend in more productive activities such as selling. They note that if non-monetary costs are high, the initial adoption of the technology by salespeople is likely to be low. They recommend managers to provide appropriate support and training in order to reduce the time and effort salespeople need to learn and use the implemented technology.

Ahearne et al. (2004) examined the effects of CRM technology usage on salespersons' performance in a study involving 131 sales representatives of a mid-sized pharmaceutical company. The results of their study indicate that the relationship between technology usage and performance is curvilinear. Increasing usage of the technology by salespersons will have a positive impact on their performance until a point of inflection where diminishing returns set in, and beyond that point the effect on performance tapers off to zero (Ahearne et al.2004). Their recommendation to mangers is to identify both over-users and under-users of the technology and provide them with training. Training will support under-users to reach the optimum point faster; while it will help over-users to reduce their extent of technology usage to the level that yields the highest performance.

Gohmann et al. (2005 b) examined how the sales force's perception of SFA can be affected by the accuracy of the information that the system can provide in a study involving 1647 sales representatives of US Army Recruiting Command. The results of their studies show that if the sales force members perceive that the accuracy of the information it receives from the SFA system is poor, they will be less likely to accept the system. They recommend that managers plan the SFA initiative well by bringing information accuracy issues to the fore. They also recommend including in the initial design such procedures as data cleansing and involving the sales force in the initial design phase in order to ensure its buy-in and know what information they want to access.

Pullig et al. (2002) investigated specific organisational factors that are likely to lead to an effective implementation of an SFA system. The results of their study indicate that four organisational factors are likely to be necessary conditions for the effective implementation of the SFA: (i) training (ii) encouragement (e.g. providing incentives to use the system) (iii) facilitative leadership (e.g. good climate for learning), and (iv) support. According to the authors, insufficient training is a major barrier that must be overcome in order to insure a “minimum” enabling condition necessary to the successful implementation of the SFA. Their results indicate that training should provide both general computing skills and knowledge capabilities.

The lack of continuous training and support has been found to be a major potential barrier to the sales force’s adoption of SFA systems in the studies performed by Buehrer et al. (2005); Jones et al. (2002); Morgan & Inks (2001); Schillewaert et al. (2005).

## 4.3. Summary and conclusions

In this chapter, I reviewed the state-of-the-art of the barriers that hinder the sales force’s successful adoption of SFA systems. In section 4.1 I reviewed the personal barriers. In section 4.2 I presented the organizational barriers to SFA adoption.

As shown in Table 4.1, if the usefulness of the SFA systems is not apparent to the sales representatives and if they receive inadequate training to use those systems, constitute the major barriers to the sales force’s adoption of SFA systems.
One observation is that the results of the above review are consistent with research findings about information technology adoption and success that I described in chapter 3. As advocated by TAM, perceived usefulness seems to be a strong factor that influences the sales force adoption. The review showed that when the usefulness of the information technology support is not apparent to the sales force, salespersons may regard the technology as a disturbing rather than a supporting factor for the sales process. Hence they either reject it or underutilized it. Moreover the lack of task-technology-fit would cause a number of adoption barriers such as usefulness not apparent

to the sales force, increased stress and lot of effort needed to learn the technology. Finally the lack of facilitative conditions (i.e. training) is also a strong barrier that hinders the sales force's adoption of SFA technologies.

A second observation is that both the personal and organizational barriers are interrelated. That is, the organizational barriers to the sales force adoption may cause a number of personal barriers. For instance the inappropriate planning of an SFA initiative would lead the management to investing in technologies that may not fit the sales force's work requirement. As a result, the sales force may not perceive the technology as useful for its work and thus regard it as an imposition from the management. Similarly, inadequate training of the sales force in the diverse capabilities of the technology and how it could support their work would make it difficult for the sales force members to assess its usefulness for their tasks and routines. Sales force members, especially the ones with low computer skills and/or low personal innovativeness, may lack the necessary expertise that would allow them to link the technology's capabilities with the needs of their job. Also poor technical support may cause the sales force to perceive the technology as difficult to use and to absorb too much of the time that can be devoted to more value-adding activities such as selling. Finally, lack of communication with the sales force about the benefits of the SFA investments regarding their jobs may cause the sales force to see the technology as a potential threat to their freedom in the field or even to the security of their job. Therefore, they may resist its adoption. In order to ensure the success of SFA implementation a number of authors recommend that sales force should be actively involved with management in understanding the potential value of the technology as to their everyday tasks, before purchase and implementation.

The focus of my research is to examine how M-ICT could provide a value adding support to pharmaceutical sales representatives when they are operating within a mobile work setting. The results of the literature review about the sales force's adoption of SFA allows me to conclude that for M-ICT to provide a value adding support to the sales force members, they should perceive it as useful regarding supporting their every day work routines. The review also point to the crucial role of management in ensuring the success of the M-ICT investment for the sales force. Management should involve the sales force in M-ICT investment decision. In addition management should deal with the problem of proactively determining how M-ICT could productively support its sales force in order to be able to communicate its benefits. The review also suggests that training is an important accompanying organizational factor that would ensure the success of M-ICT implementation for the sales force. In chapter 6 I will present an approach that would help management to deal with the problem of proactively determining how M-ICT could provide a value adding support to its sales force. Before that, in the next chapter I will discuss the characteristics of M-ICT and present relevant empirical studies that tackled users' adoption of mobile technologies.

| Author (s) | method | Barriers to adoption | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Information inaccuracy | Poor computer skills | Usefulness not apparent | Loss of power | Loss of independence in the field | Too much effort required | Low personal innovativeness | Increased stress | Inadequate Training | Poor technical support | Poor planning | Not involving the sales force |
| Robinson et .,(2005) | Survey | | | ✓ | | | ✓ | | | | | | |
| Avlonitis et al. (2005) | Survey | | | ✓ | | | ✓ | | | | | | |
| Jones et al. (2002) | Survey | | | ✓ | | | | ✓ | | ✓ | | | |
| Schillewaert et al. 2005 | Survey | | | ✓ | | | ✓ | ✓ | | ✓ | | | |
| Ranjarajan et al.(2005) | Survey | | | ✓ | | | ✓ | | ✓ | | ✓ | | |
| Keillor et al.(1997) | Survey | | | | | | | | ✓ | | | | |
| Honeycutt et al.(2005) | Literature review | | | | ✓ | ✓ | | | | | | | |
| Morgan et al. (2001) | Survey | | ✓ | | ✓ | ✓ | | | | ✓ | | | |
| Buehrer et al. (2005) | Survey | | ✓ | ✓ | | | | | | ✓ | ✓ | | |
| Errffmeyer et al. (2005´) | Personal Interviews | | | | | | | | | ✓ | | ✓ | ✓ |
| Gohmann et al.( 2005 (a) | Survey | | | ✓ | | ✓ | | | | ✓ | | ✓ | ✓ |
| Ahearne et al. 2005 | Survey | | | | | | | | | ✓ | ✓ | | |
| Bush et al. (2005) | Personal Interviews | | ✓ | ✓ | | | ✓ | | | ✓ | | | ✓ |
| Rivers and Dart (1999) | Survey | | | | | | | | | ✓ | | ✓ | |
| Parthasarathy and Sohi, (1997) | Survey | | | | | | ✓ | | | ✓ | ✓ | | |
| Ahearne et al. (2004) | Survey | | | | | | | | | ✓ | | | |
| Gohmann et al.( 2005 b) | Survey | ✓ | | | | | | | | | | | ✓ |
| Pullig et al.(2002) | Qualitative study & survey | | | | | | | | | ✓ | ✓ | | |
| Speier and Venkatesh, (2002) | Survey | | | ✓ | ✓ | | | | | | | ✓ | ✓ |
| **Total** | | (1) | (3) | **(9)** | (3) | (3) | (6) | (2) | (2) | **(12)** | (5) | (4) | (5) |

**Table 4.1 Barriers to the adoption of SFA systems by the sales force based on literature review**

# Chapter 5

# Mobile Information and Communication Technologies

The aim of this dissertation is to investigate how M-ICT could provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting. I need therefore to understand the key characteristics of M-ICT and make an account of the state-of-the-art about relevant empirical studies that tackled users' adoption of mobile technologies.

As this dissertation focuses on M-ICT for the sales force, in the following review I will focus mainly on mobile support for the workforce.

In recent years a sizeable body of research on mobile information systems has evolved. Ngai & Gunasekaran (2005) concluded from their review of research activities into m-commerce that such an area of research is becoming increasingly pervasive.

The longitudinal study performed by Scornavacca et al. (2005) on mobile business research revealed that research into mobile business more than doubled during the four-year period that they covered in their study. The main focus of research ranges from conceptualisation of business models, overviews of the industry value chain and mobile technology issues to m-commerce value-adding services as well as adoption and usage of mobile technologies. They also found that the largest body of research on mobile business was usually carried out from a consumer perspective. Recently the trend has started to converge on business-to-business and business-to-employee mobile information systems in such areas as field force automation, wireless applications in health care, mobile technologies for businesses and government.

In the following, I will first discuss the key characteristics of M-ICT and then I present the factors influencing the adoption of the various parts of the technology.

## 5.1 Characteristics of mobile information and communication technologies

### 5.1.1 Timely information support

Timely information support refers to the users' access to information resources they need when the information is relevant and needed.

M-ICT can allow users to have timely information support in a number of ways.

*First*, with a mobile device and a wireless connection (i.e. GPRS or UMTS), the mobile user can access the Internet as well as diverse databases whenever time is available and irrespective of location to get the information he or she needs.
Wireless bandwidth is increasing which supports the demands of business applications such as e-mail with attachments, multimedia contents and Web services. During the past decades mobile technologies leaders have deployed great efforts to achieve high-speed wireless networks. The mobile evolution was often depicted as a linear progression from analog to digital to multimedia to broadband: 1 G, 2 G, 3 G and 4 G (Steinbock, 2005). While analog technology represents the first generation of mobile communication, the digital represents the second (2G), the third generation (3G) provides more bandwidth. A speed of 384 Kbs could be possible while on foot and144 Kbs while travelling (Aungst and Wilson, 2005). 4G is the next generation of wireless networks to replace 3G through the use of satellites, GPS positioning and tight integration with wireless LAN (Aungst and Wilson, 2005).

Other enabling technologies such as the Bluetooth or W-LAN could also allow mobile users to have access to information within a specific area. Bluetooth is a chip that senses which other Bluetooth devices are within its radio range and can build a connection with them (Keen and Mackintosh, 2001). The W-LAN concept originates from local area networks. W-LAN can provide a wireless access (e.g. to the Internet) to mobile users within the limits of its network**.**

*Second*, the current development of positioning technologies has the potential to enhance the timely information support enabled by mobile technologies. Location-awareness has been regarded by many researchers as among the most distinctive features of M-ICT. Knowledge of the mobile user's current location makes it possible to establish the relevance of the information support and thus to provide the mobile user with information support adapted to his or her context (Keen & Mackintosh, 2001). A mobile user's location can be found with different positioning techniques. If the user's device has a Global Positioning System (GPS), the location can be identified relatively accurately. However, the mobile device must have visual contact with the satellites to get the position. Hence a GPS cannot be used indoors or in "urban canyons". A mobile phone can also be located by the telecom operator in the network. The positioning is based on identifying the mobile network cell in which the phone is located, or in measuring the distances of overlapping cells.

Balasubramanian et al. (2002) suggested that location-based mobile applications are interesting as they have the potential to be integrated into a wide range of everyday life (e.g. activate vending machines, pay for a car wash and taxi ride). They could also increase the product and service demand margin by offering customers alternative payment methods.

Rao & Minakakis (2003) identified four categories of location-based services (LBS), these are:

- *"Where am I" queries.* This type of LBS provides information about locations such as driving directions, information about location and navigation.
- *Point-of-need information delivery*. It relates to usable, personalised information delivered to the point of need. Such services include information about new products and services, promotions and targeting of customers based on their profiles and preferences.
- *Niche customer applications*. This type of services relates to specialised applications focused on certain segments such as individual customers or business and industrial buyers. An example of niche customer LBS includes the "People Finder" program that gives users of handheld devices maps with the location of other cell phone users.
- *Industrial and corporate applications*. These services include applications in such areas as fleet tracking, asset management, personal and asset safety.

Derekenaris et al. (2001) described a system offering a solution to the problem of ambulance management. Their solution is based on the integration of a geographical information system (GIS), a global positioning system and a global system for mobile communication (GSM). The system makes it possible to choose the appropriate ambulance to handle an emergency situation based on the ambulance's position, the type and location of the incident and traffic conditions. Then the system routes the ambulance to the incident site and from there to the closest appropriate hospital.

Oloufa et al. (2003) found that using Global Positioning System (GPS) and wireless communication significantly reduced collisions at a construction site.

*The third* enabler of providing mobile users with timely information support is the proactive delivery of information. Relevant information comes to the user rather than the user having to look for it (Keen & Mackintosh, 2001). One key enabler of delivering information support proactively to the user is the ubiquity and instant connectivity characteristics of the mobile device. Users have their mobile devices mobilised for action with them anytime and irrespective of location. The proactive delivery of information support has the potential to be more enhanced through notification cues that provide meta-information, i.e. information about information to their intended recipients (Tarasewich & Campbell, 2004, p. 2). The cue may be as simple as indicating an incoming mobile phone call or as complex as providing the priority, the sender, and a summary of a new e-mail message. Based on the information provided by the cue, the recipient can decide whether or not to seek additional details. According to Tarasewich & Campbell (2004), to be successful a cue must have four characteristics: (i) get the intended recipient information, (ii) clearly convey its information to the recipient, (iii) minimise the disruption of the recipient's current task(s), and (iv) minimise the disruption of other people near the recipient. Tarasewich et al. (2004) tested the use and effectiveness of a set of user-customised visual notification cues (e.g. three-colour lights) on pocket PCs where notification was viewed as meta-information about a waiting task, message or event. The results of their experiment indicate that most users correctly related the notification cues with the appropriate message and regarded the system as useful.

### 5.1.2 Ubiquitous terminals

Ubiquity is a key characteristic of mobile terminals. A mobile device in the form of a mobile phone, a mobile smart phone, Personal Digital Assistant (PDA) or a communicator can be mobilised to meet the users' demands for information access, storing and communication at any time and irrespective of location as they are at hand all the  time (BenMoussa, 2004; Tarasewich 2003).

- *Mobile phones* are designed mainly for voice calls and short-message services (SMS). These types of devices have limited memory capacity, processing speed and display.

- *Mobile smart phones*, on the other hand, are mainly designed to support both voice and data communication. These devices have larger displays which are more suitable for viewing hypertext pages, in the Wireless Markup Language (WML) or Extensible HyperText Markup Language (XHTML) formats (Casademont et al. 2004). Their memory, processing capabilities, and display size are higher than those of ordinary mobile phones. Smart phones support the creation of e-mail, Multimedia Message Services (MMS), send and receive e-mails, store contact, create and view Word and Excel documents, etc. The user can enter information using a stylus on the touch-sensitive screen. They provide connectivity to the Internet through a Wide Area Network (WAN) such as GSM/GPRS, CDMA or 3G. Other smart mobile phones include GPS functionalities (i.e. Benefon's TWIG) intended for several areas of use such as navigation, real-time traffic reports, SOS messages, family and friends finding and location.

- *PDAs* are small devices with the basic functions of organisers, providing the management with contact lists, calendars, diaries, calculators. They run on one of three major operating systems platforms: Palm OS, Windows CE, and EPOC OS. Compared to smart phones they have more memory, and more processing power and greater connectivity possibilities through WLAN and through the Bluetooth protocol.

- *The Communicator* is a combination of an advanced mobile phone and a PDA. Its displays are monochrome and they use a keyboard as well as a stylus to input data into the device.

The ubiquitous features of mobile terminals free the users from the time and space constraints that may impede their access to the information systems capabilities. This is a key characteristic of mobile information systems compared to traditional (wired) information systems, where users have to be in a specific place, e.g. the office or home in order to use the system's capabilities (Keen & Mackintosh, 2001). For instance technologically speaking mobile digital calendars are not very different from their PC based calendar systems, but they naturally incorporate portability benefits, a key desired feature in calendaring (Sell and Walden, 2006). Similarly, as the mobile device is “always on” it enables the user to get access to the mobile system’s functionalities at any time and with reduced booting time compared to laptop computers, especially in situations where the user has only little time to satisfy his or her information and communication needs.

### 5.1.3 Adaptive communication

Another attribute of M-ICT is that they provide flexibility in terms of the communication medium that the mobile user can select. The communication medium carrying the information support can take the form of SMS, MMS, e-mail, phone call, pushed alert or real-time access to a database.

The selection of the communication medium depends on both the environment where the mobile user is operating (e.g. face-to-face meeting with a customer, in a train or restaurant) and his or her information support value chain (provider versus receiver of the support). The fit between the communicative medium and the contextual environment has the potential to reduce the functional deficiency associated with information overload, where the amount of information the individual user encounters extends his/her cognitive processing capacity (Sørensen et al. 2002). Mobile location-community services such as Instant Messaging and Locator, Location-Based Chat and Anonymous Instant Messaging (AIM) have the potential to assist users in selecting the communication medium that fits their context. For example, Instant Messaging and Locator enable users to view their friends’ relative location. The vicinity can be depicted at four levels: very near (0-0.6 Km), moderate distance (0.6-1.3 km), far (1.3-2 km), and out of zone (more than 2 km). The user can also be presented with a textual description of the cell’s area, with the time of relevancy (Burak & Sharon, 2004).

### 5.1.4 Simple and natural input/output

A further key characteristic of M-ICT is the ability of the users to use speech and audio for their everyday interactions. Using the audio-based augmentation enables the mobile user to get information in an environment where his or her eyes are busy (e.g. when driving a car or walking).

## 5.2 Factors influencing the adoption of mobile technologies

There have been a number of studies that investigated what constraints may impede users’ adoption of mobile technologies.

Chan et al. (2002) conducted a study of usability issues for ten consumer Web sites across three form factors: Palm OS-based wireless PDAs, Internet-enabled WAP phones, and Windows CE-based Pocket PCs. The result of their study showed a number of usability issues:

- Long downloads and broken connections,
- Problems with vertical scrolling that prevent the user from working the button after entering the string,
- Information overload. They found that the system places too many demands on users' memory (e.g. entering the airport code rather than the airport name),
- Depth of site structure. Information in the wireless applications was organised as a hierarchical structure and thus requires a lot of time to connect to the server and download the pages,
- Problems of carrying out search in wireless areas,
- Lack of connection feedback and latency in terms of signal strength and the progress in downloading Web pages,
- Limited instructions were provided about how to browse the wireless sites, making it difficult for novice users to use the system in order to accomplish their tasks.

Tarasewish et al. (2002) identified numerous issues associated with m-commerce. They classified those issues into the following five categories:

- *Mobile client issues* such as user interface on devices with physical limitations, design of applications for use on different mobile client devices, control of personalisation of information presented to a mobile client;
- *Infrastructure issues* such as the efficient use of limited bandwidth, difficulties with mobile devices interfacing with multiple-communication environments, addressing compliance with current and future mobile phone standards and speeds;
- *Technology issues* including security of data travelling over wireless networks, virus management and the need for seamless transfer between locations and services;
- *Application issues* such as determining tasks users want to do without regard to temporal and spatial constraints, the appropriate use of devices and applications in social settings, the protection of users' privacy in location-based applications;
- *Global issues* including addressing the lack of global standards, identification of wireless services around the world and impact of access-pricing variations around the world on wireless service use.

In another study Tarasewich (2003), observed that compared to an office environment, mobile users tend to be distracted more often because many activities aside from the application itself compete for their attention when they are operating in a dynamic environment. He also pointed out other challenges to m-commerce such as the security of sensitive data stored in the mobile device, safety issues when the location and activities of the user can vary widely (e.g. web access in cars while driving) and social concerns such as the appropriateness of using mobile technologies in certain circumstances (e.g. in a theatre or restaurant).

Nah et al. (2005) examined the value of mobile applications in a major utility company. They conducted a study involving 425 employees; about half of them work in the field. The results of their study revealed several employees' expectations from mobile applications. Such expectations include (i) an ability to maximise efficiency (e.g. able to do the job quicker); (ii) to maximise effectiveness (e.g. make better decisions); (iii) to minimise cost (e.g. reduce business expenses); (iv) to maximise security (e.g. ensure security of data and business transactions); and (v) to maximise employee acceptance (e.g. user-friendly interface, appropriate form factors). They also identified three adoption conditions that were emphasised by almost all interviewees:

- Accessibility. That is, accessing information whenever the need arises and regardless of location,
- Real-time access and update. This refers to the ability to access and update data while on the move. This eliminates the need for driving back from the field to the main office in order to check minor details and,
- Integration with existing systems.

However, their study revealed many challenges that hinder the adoption of mobile applications. Those challenges include the limitations of mobile devices and quality of mobile services. The limitation of mobile devices (e.g. small screen, poor resolution, low memory and disk capacity) prevents certain information such as maps, blueprints and drawings being clearly displayed. Constraints related to mobile service quality include low speed, limited bandwidth, unstable connections and limited coverage areas (Nah et al. 2005).

Sarker & Wells (2003) discussed three determinants influencing the implementation and acceptance of wireless handheld phones. Those determinants include individual characteristics, technology characteristics, context, communication/task characteristics, and modalities of mobility. These can be described as follows:

- *Individual characteristics* include such factors as the age of the potential adopter, technology self-efficacy (difficulty in switching from existing technological frames) and cultural origins (e.g. impact of power-distance).

- *Technology characteristics* involve interface characteristics (e.g. physical limitation of the mobile device) and network capabilities (e.g. coverage, capability to communicate across networks, responsiveness in case of downtime).

- *Communication/task characteristics* refer to use patterns and include such factors as the number of interacting participants (unilateral versus multilateral use of data features using the mobile device); immediacy of response required; volume of communication desired (e.g. high-volume text exchange versus short messages); and communication's objectives such as conveyance, convergence and passive reception.

- *Context (*e.g. budget factor; social factors; size of a user's social network needed to be the same users of the wireless service).

- *Modalities of mobility* such as travelling, wandering or visiting. For example, size requirement of an optimal device is lower when wandering compared with travelling or visiting. Similarly, larger network coverage is needed more when travelling than when visiting (Sarker & Wells, 2003).

Gebauer & Shaw (2004) investigated success factors and the impacts of a mobile electronic procurement system implemented at a Fortune 100 company. The results of their study indicate that several factors inhibited the usage of the mobile application, especially by the managers that operate in a mobile work setting. The inhibiting factors include screen and keyboard size of the mobile devices, set up and login procedures, as well as training and support. In terms of the impact of task characteristics on usage, their study showed that users value notification especially in connection with high mobility and support for simple activities such as tracking. Their study also showed that mobility can predict the usage of the mobile applications. The mobile application was valued most highly by users who spent a long time on the move. or who occasionally left the office but reported high task frequency. Users also found the mobile applications useful in helping them to deal with handling emergencies, especially for managers who travel frequently and were the final decision-makers. The mobile application helped such users to handle the emergency situation by way of notification and system access. The authors' conclusions, based on the lessons derived from the case study, are that users of mobile applications need simple yet functional solutions. They argued that mobile technologies can compliment existing applications by adding an ad hoc element for data-processing, information access, communication and notification (Gebauer & Shaw, 2004).

Han (2005) examined in her doctoral dissertation the adoption of a medical mobile information system run over the Nokia Communicator by physicians in Finland. The results of her research showed that the physicians participating in her study had an overall positive attitude towards the mobile system. Her study also showed that perceived usefulness was the strongest and dominating factor that influenced physicians' behaviour towards the system. Ease of use influenced physicians during early exposure to the mobile system but its effects weakened as the physicians acquired more hand-on experience.

## 5.3 Summary and conclusions

In this chapter I presented the key characteristics of M-ICT. I also discussed several factors influencing the adoption of mobile technologies as discussed in the literature. Those factors include technology issues such as the limitations of mobile devices and network connectivity. Individual characteristics include age, culture and acceptance factors. Acceptance factors include the usefulness of the mobile applications, users' exposure to mobile technologies as well as the degree of fit between the mobile applications and the users' task characteristics.

The literature review on M-ICT allowed me to raise the following two observations that I will take into account in achieving my research aim, i.e. to examine how M-ICT could provide a value adding support to pharmaceutical sales representatives when they are operating within a mobile work setting.

The first observation is that a number of studies on M-ICT adoption show that the limitations of mobile technologies in terms of device constraints and network connectivity bandwidth are an issue for users' adoption of mobile applications. As Tarasewich (2003) observed, mobile devices continue to shrink in size and weight in order to provide higher portability. On the other hand, the usability of a device may suffer. However in many studies, the limitations of mobile technologies, though important, have not been seriously taken into account. A number of mobile applications have been used for certain tasks that are defined broadly and that have technological requirements (e.g. display, bandwidth, memory, length of battery, etc.) that mobile technologies cannot support appropriately compared with their wired counterparts. Thus prospective users may have too high expectations in terms of what the mobile application can be used for. As a result certain mobile users believe that a mobile system can replace the traditional information system run over a desktop or a laptop computer, in supporting their everyday routines. For example, in the Nah et al. (2005) study, the users were disappointed because the mobile system did not support them in carrying out certain tasks in the field. They expected the mobile system to allow them to display maps and blueprints in the field; as one user said "Everything can be displayed on these small devices" (Nah et al. 2005, p.89). However, the mobile device's small screen and poor resolution prevented the users from displaying maps, blueprints and drawings. Additionally, it is important to note that the advertising of a number of mobile industry players contributes to exaggerated perceptions of the capabilities of mobile technologies. For instance, certain manufacturers emphasise the fact that the mobile device would allow the user to finish his or her work even before getting to the office. As Nielson (2001) observed, this would leave the prospective mobile user with the perception that the mobile device is a small desktop computer that would allow him to run various applications with the same functionality.

The second observation is that a number of studies treated mobile devices as stand-alone technology to support the prospective users in carrying out their job-related tasks. They do not assess the value-adding potential of mobile technologies in relation to other technological support available to the users and which can support them better than mobile technologies. Gebauer et al. (2004) showed that mobile applications can complement rather than replace existing applications and provide support in terms of helping users to deal with specific tasks. Likewise, Nielson (2001) argued that mobile technology support should be examined as one component among the "web-of-technologies" available to support the user's tasks and routines. Hence, she suggested that mobile devices need to fulfil at least one of the following demands in order to be successful: (i) expand existing services or systems by giving them mobility and making it possible to solve a set of specific tasks in a specific context; (ii) offer a solution to a well-defined, targeted task, i.e. provide here-and-now related information.

# Chapter 6

# Research models

In Chapter 3 I reviewed key theories that the IS literature has proposed to explain the dynamics of IT adoption and usage in the workplace. Specifically, I reviewed the technology acceptance model, the DeLone & McLean (1992) model of information systems success and the task/technology fit framework. Those models provide useful insights into explaining variances in the adoption and success of information systems. My conclusions based on the review are that those models could be used in a mutually supportive rather than a mutually exclusive way, in order to avoid the pitfalls associated with IT introduction into the sales force's work.

In Chapter 4 I presented, based upon the literature review, the nature of the barriers that impede the sales force's adoption of IT. The review showed that perceived usefulness is a strong factor influencing the sales force's adoption of IT. The review also showed that when the usefulness of the information technology support is not apparent to sales representatives, they may regard the technology as a disturbing rather than a supporting factor for the sales process. Hence, they either reject it or underutilise it. As Jones et al. (2002) observed, adopting the technology is one of the many decisions independent sales representatives make regarding their work. Moreover, sales representatives are evaluated according to their sales results. Therefore, if they do not see a clear benefit from how use of the technology will enhance their productivity, they may choose to reject the SFA. The review also point out to the crucial role of management in ensuring the success of the M-ICT investment for the sales force. Management should involve the sales force in M-ICT investment decision. In addition management should deal with the problem of proactively determining how M-ICT could support its sales force in order to be able to communicate its benefits. The review also suggests that training is an important accompanying organizational factor that would ensure the success of M-ICT implementation for the sales force. In Chapter 5, I reviewed the state-of-the-art about M-ICT. The review of empirical studies about the users' adoption of mobile technologies revealed that perceived usefulness is a major factor that influences users' behaviours. Users of mobile applications need simple yet functional solutions. The review also showed that given the limitations of mobile technologies, they should not be examined as stand-alone devices to support prospective users in carrying out their job-related tasks. Rather their potential support should be assessed in relation to other technologies available to the users and which can support their tasks better than mobile technologies.

In this chapter I will present an approach that would help management to deal with the problem of proactively determining how M-ICT could provide a value adding support to its sales force when it is operating in a mobile work setting. As I will show later in this chapter, the approach is based on the fact that for M-ICT to be perceived as useful and value adding for the sales force, it has to provide solutions to clearly targeted sales force's needs. Additionally the approach takes into account the fact that given the limitations of mobile technologies, they should be assessed in relation to other technologies available to the users and which can support their tasks better than mobile technologies.

The first model called "the Barrier-to-Support (BTS) framework" for new ICT artefacts draws upon the work of Fernand Braudel and aims at determining whether or not users, given the existing technologies available to them, need new ICT support in order to carry out their everyday work routines.
The second model called the "Barrier-Technology-Fit (BTF) framework", builds on the BTS framework in terms of whether or not prospective users need new ICT support, and provides directions on how to select an appropriate technology that has the potential to be value-adding for the prospective users.

In the following I will first present the Barrier-to-Support framework, and then I will introduce the Barrier-Technology-Fit framework.

## 6.1 Technology adoption in Braudel's history of capitalism (15-18th centuries)

The BTS framework draws upon the work of Fernand Braudel, one of the most influential historians of the last century. In the following I will briefly introduce Braudel's view of how technology is adopted by people in his study of the economic, social and technological changes in 15$^{th}$ -18$^{th}$ century. In the next section the Keen and Mckintosh (2001) concept of the "Braudel rule", that links the technology and the freedom economy, will be discussed. I will then extend and translate the Braudel Rule as defined by Keen and Mckintosh (2001) into a general barriers-based framework for new IT artefacts.

Before introducing the mechanism of technology adoption in the 15-18$^{th}$ century as presented by Braudel (1979) some background about that great historian is worth to mention.

Fernand Braudel belongs to the line of historians from the annals school of history. He is known for his insistence on challenging the contemporary dominance of political and diplomatic history and builds the narrative of events in favour of social, economic, and cultural history. In Braudel's approach to history, all aspects of life from climate to topography to architecture, from popular culture to capitalist values to high art are sketched in order to create a comprehensive multidimensional Cubist portrait of society (Henretta, 1979). Instead of building history around the acts of "great men", political or military personalities, his approach involves detecting insights into history based on people's everyday life. For example, in the first of his three volumes about civilisation and capitalism in the 15-18$^{th}$ centuries, entitled *The Structures of Everyday Life: the Possible and the Impossible,* he began the book with a discussion of the world population during the 15$^{th}$ to 18$^{th}$ centuries. He followed with chapters on the major categories of consumer expenditure, e.g. bread and cereals, food and drink, clothing, fashion and housing. This chapter, enriched with fine illustrations, includes the diets of the poor, food fashions of the rich, the lack of the furnishing of the homes of the poor and middle classes and the increasingly elaborate interiors of the more affluent.

Braudel's interest in studying people's day-to-day life was motivated by his ambition to define "the limits of the possible" within the structure of people's everyday life and examine how those limits were expanding all the time (Halprin-Donghi, 2002).

Certain research centres have been created exclusively in order to focus on many aspects of his work. Examples of those centres include the Fernand Braudel Centre in Binghamton.

Braudel discussed a number of technological developments, or what he called "techniques" in such areas as the military, transport, and agriculture. According to him, those techniques pushed higher the limits of the possible for people, enabling them to achieve what was taught to be impossible. However, based on his examination of the various innovations, Braudel came to the conclusion that for a technological innovation to succeed it has to win the authorisation of society. Society can either trigger or stop what he labelled as "progress".

According to Braudel (1979) as long as everyday life runs without problems, within the structures inherited from the past, society will not have any economic motivation to adopt a new technology. Hence, inventions will remain locked in their “packages” as society sees no need to adopt them. However, people start examining new technological inventions when they face barriers, within the structure of their everyday life, and the technology they have fails to help them deal with those barriers.

As an illustration, Braudel gave the example of the 1979 oil crisis. He argued that the crisis put the developed world in front of a wall: either innovate or stagnate or even disappear. Faced with the “wall”, the developed countries turned to technology, the only solution to overcome the crisis and its consequences in terms of inflation and unemployment. Developing countries started to look for alternative sources of energy. Braudel observed that, prior to the 1979 oil crisis, there were a number of research discoveries related to alternative energy sources. Some of those research discoveries were used in World War II. However, after the war those inventions were neglected because at that time, there was no oil crisis that would motivate people to turn to those alternative energy innovations.

## 6.2 The Braudel Rule in Keen and Mackintosh’s freedom economy

In their book, the Freedom Economy, Keen & Mackintosh (2001) draw upon Braudel’s first volume of his Civilisation and Capitalism: 15$^{th}$-18$^{th}$ Century trilogy to define what they labelled the Braudel Rule. They specifically used Braudel’s two concepts of “the structures of everyday life” and “the limit of the possible”. They define the Braudel Rule as “changing the limit of the possible within the structures of everyday life”. They then use this rule as a tool to analyse the value of a number of technologies for people, based on the extent to which those technologies can change the limit of the possible within the structures of individuals’ everyday life, i.e. to provide people with new sources of freedom. For example, according to Keen & Mackintosh (2001), ATMs satisfy the Braudel Rule since they do not merely substitute for tellers in banks; they provide customers with valuable freedoms. Customers no longer have to worry about handling a sudden need for cash when they are away from home, at night, on the weekend or when they are in a supermarket doing their shopping (Keen & Mackintosh, 2001). Likewise, online securities trading fit the Braudel Rule as it enables customers to trade after hours, to get information and even to consult with other traders. By contrast Keen & Mackintosh (2001) regard interactive television as a technology that does not fit the Braudel Rule as it does not affect the limit of the possible in the structures of people’s everyday life. Interactive TV would allow people to participate in a vote or to order a pay-per-view movie. However, none of those services changes the structure of people’s everyday life. Most people like to use their TV as a TV and the PC as a PC (Keen & Mackintosh, 2001).

Using the “Braudel rule” as a framework, Keen & Mackintosh (2001) classified technology impacts into Freedom, Convenience and Features. Freedoms are technologies that pass the Braudel Rule. They change the limit of the possible in the structures of everyday life. Conveniences and features, on the other hand, do not fit the Braudel Rule. They are neat ideas that are solutions to problems that no one may care about (Keen & Mackintosh, 2001).

Within the m-commerce context, Keen & Mackintosh (2001) employed the Braudel Rule to identify freedom opportunities in three areas: customer relationships, logistics and knowledge mobilisation. They argued that in customer relationships, m-commerce can create freedom through safety, location responsiveness and moments of value. M-commerce safety provides customers with freedom from anxiety, and worry (e.g. a car breakdown in a dark rural area). It also allows them to be more flexible in their routines, to take more risk and to deal with unexpected situations. Location responsiveness adds freedom to customers by removing the need to know their location when they are in a crisis situation. Moreover, the knowledge of their location allows targeted support to come to them instead of them looking for the information. The value dimension of m-commerce frees the customers from delay, hassle and bureaucracy. The support is provided to customers when they need it and irrespective where they are.

In logistics Keen & Mackintosh (2001) argued that m-commerce changes the limit of the possible by placing intelligence anywhere along the logistics chain. Information travels with the goods and processes, and is even stored in the goods.

In the area of work, they stated that m-commerce can create freedom through knowledge mobilisation. M-commerce can liberate the workforce from the constraints of location and limited access to information and knowledge. Knowledge mobilisation puts the user at the centre of the knowledge world by liberating people who do the real work from the need to be tied to their desks and provides them with information and communication at the moment of relevance (Keen & Mackintosh, 2001).

## 6.3 The Braudel rule in action: the Barrier-to-Support framework for new ICT artefacts

As Keen & Mackintosh (2001) observed, though Braudel's studies do not address the era of modern technology and did not focus on computers and communications, his insights apply profoundly to this new aspect of civilisation and capitalism. However, their interpretation of Braudel's view of technology adoption by the members of society remains incomplete with regards to the mechanisms through which the Braudel Rule could be applied. For example, the Braudel Rule is based on the claim that a specific technology will bring value to people if it can change the limit of the possible within the structures of their everyday life. However, the phrase "limit of the possible" remains ambiguous. It does not explicitly clarify how the limit of the possible related to a specific technology could be defined, and, through which mechanisms a new technology has the potential to change the limit of the possible within people's structure of every day life.
In my opinion, the answer to the above question can be found in Braudel's studies of how people adopted technological innovations in the 15$^{th}$ -18$^{th}$ centuries, which I discussed in section 6.1. According to Braudel, as long as everyday life runs without problems, society will not have any economic motivation to adopt a new technology. However, people start examining new technological inventions when they face the "wall". That is, they face barriers, within the structure of their everyday life, and the technology they have fails to help them deal effectively with those barriers.

Hence according to Braudel, for people to consider adopting a new technology the following two conditions have to be met: (i) there should be barriers that hinder the structures of people's everyday life, and (ii) the existing technologies available to people have reached their "ceiling" in terms of helping them to deal with the barriers they face. Although used at their maximum capabilities, the existing technologies fail to provide the appropriate support to people in terms of dealing with the barriers that hamper their everyday life. In the following I will present how each of the above-mentioned conditions has been addressed by the literature.

### 6.3.1 Barriers within the structures of workers' everyday life

In studies of work, the concept that barriers within workers' structures of everyday life are a major driver for change has been highlighted by the activity theory framework.

Activity theory has its origin in the Russian psychologist Vygotsky's (1978) concept of tool mediation and Leont's notion of activity. It examines different forms of human practices as development processes, with both individual and social levels interlinked at the same time (Kuutti, 1996). In the areas of Computer-Supported Cooperative Work (CSCW) and Human Computer Interaction (HCI), activity theory has been employed to understand work practices (e.g. Nardi, 1996), as a theoretical foundation for the design of computer applications (e.g. Raeithel, 1992) and as a design paradigm for CSCW to analyse real work settings (e.g. Kuutti, 1996; Boldker, 1996)

Engeström's (1987) interpretation of activity theory provides a model for describing and analysing activities. His model depicts the process through which both language and technologies mediate the relationship between a worker (subject) and his or her object of activity (Boer et al. 2002).

Engeström's (1987) activity system incorporates the following components: subjects, objects, community, tools, rules and the division of labour. The *object* refers to the "raw material" or the problem to which the activity is directed and which is transformed to give an outcome with the help of mediating tools. The *subject* component of the model refers to both the individual and collective nature of human activity through the use of tools in a social context so as to fulfil the object of the activity. The *tool* component reflects both the mediating physical and psychological tools which are used to transform the object. They can take different forms including tools, machines, computer applications, language, visual representations and procedural tools (Boer et al. 2002). The *community* component represents stakeholders in a particular activity or those who share the same overall objectives. The rules component reflects the explicit and implicit norms and regulations that affect the means by which an activity is carried out. The *division of labour* is the allocation of responsibilities and power among subjects involved in carrying out a particular activity within a community.

According to Engeström's (1987) activity system, the relationship between subject and object is mediated by tools, the relationship between subject and community by rules, and that between object and community by the division of labour (cf. Fig. 6.1).

Activity theory uses the term contradiction to indicate misfits, disturbances, problems or breakdowns that occur in the activity system of human practices being examined (Kuutti, 1996, p.34). According to Engeström (1987), "contradictions" reflect a source of development and represent the presence of unfamiliar elements whose study is necessary to establish the kind of new developments that are taking place within an activity system. Breakdowns happen when the work process is interrupted by something, perhaps the tool behaved differently from what was anticipated, thus causing the triggering of inappropriate operations or not triggering any at all (Bodker, 1996).

In Engeström's model of work development, he sees contradictions in what he calls the activity system as the major driving force for a change. He looks at contradictions in how tools, objects, and subjects are seen. He suggests studying contradictions between for example, the tool currently used and the object created, and proposes that this may facilitate a change-oriented perspective in work.

Boldker (1996) emphasises the need to identify breakdowns in computer use as a means to understand the use situation. Breakdowns manifest themselves as contradictions or unexpected problems that occur when using a computer system to support everyday tasks. According to Boldker (1996) breakdowns are openings for learning.

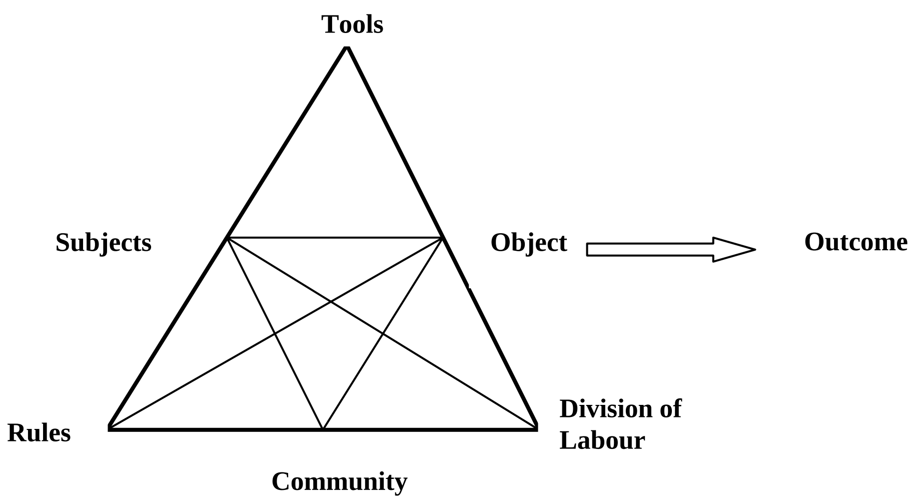



**Figure 6.1 the activity system (Engeström, 1987)**

### 6.3.2 The support of existing technologies to deal with the barriers

In Braudel's view of how technology is adopted by people, the effectiveness of existing technologies influences people's decisions to adopt a new technology. Individuals will consider switching to a new technology only if they think that the technology they use has reached its limit in terms of the support it can provide. This makes it important to look at the introduction of a new technology in relation to existing technologies to deal with the barriers people face. Hence, shifting from “examining how the new technology can support people to deal with the barriers they face in their work” to “examining how the new technology can support people to deal with the barriers they face in work in relation to what support existing technologies provide”.

From a technical design perspective, examining a new technology in relation to existing technologies has been advocated by several researchers. For example, Roman et al. (1999) explored the challenges of integrating a PDA in a distributed environment. They argued for the importance of using PDAs as “enabling bridges” to services rather than treating the PDAs as isolated entities.

May & Bogh (2000) investigated IT support for work on maritime bridges and found out that the user of the bridge may combine different instruments to better support the task he or she is engaged in.

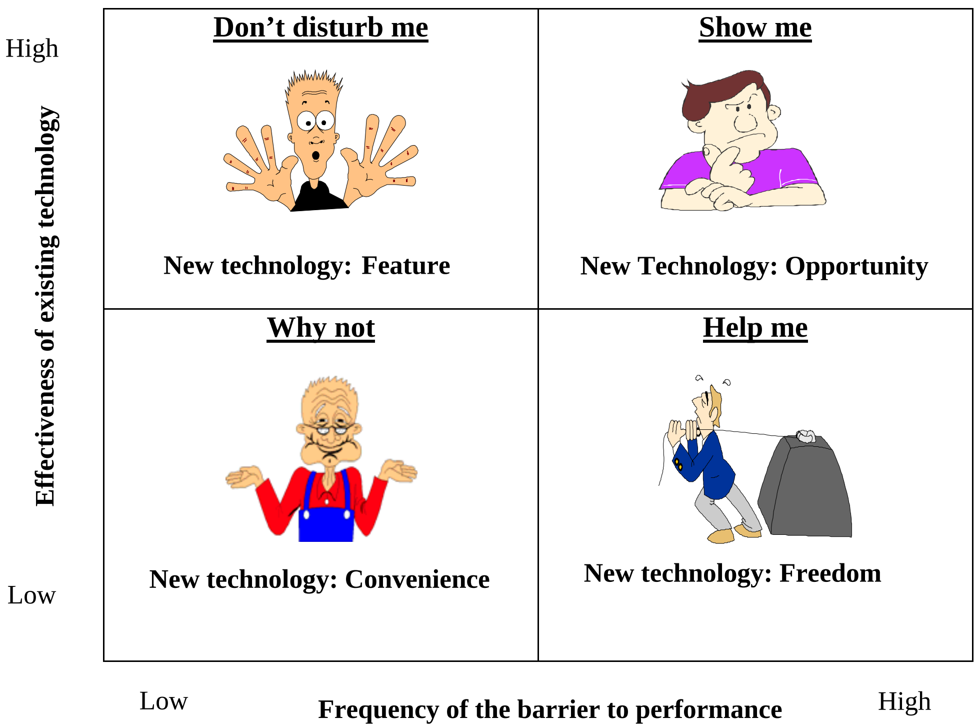
Nielson & Søndergaard (2000) introduced a mobile support system for workers at a wastewater treatment plant in Denmark. The result of their study showed that when operating within a mobile work environment, users require only an overview of the process rather than a detailed view. For a more detailed and cross-referential view they prefer the PC system. They thus introduced mobile support as an integrated part of what they labelled existing “web of technologies”, rather than as an independent device with the ability to access all system information (Nielson & Søndergaard, 2000). The researchers argued that placing the prospective technology within the array of existing technologies should be a natural part of any design process.

In Braudel’s view of technology adoption, the integration of existing technologies extends beyond being an integral part of the design process of the new technology to being a part of the motives that trigger the development of useful new technologies. The failures of existing technologies to help people to deal with the barriers they face make them look for alternative technologies that will provide them with the needed support.

### 6.3.3 The Barrier-to-Support matrix for new ICT artefacts

This section synthesises the theoretical elements presented in the previous sections. Using Braudel's insights with regard to the mechanisms of individuals' adoption of technology innovations as a framework, I developed a Barrier-to-Support framework for new ICT artefacts. The framework captures Braudel's two dimensions of individual adoption of technological innovations: (i) the barriers individuals face in the structures of their everyday life, and (ii) the limit of the possible of existing technologies in terms of supporting people to deal with the barriers they face. For the barriers dimension, using a simple "high, low" scale, I segment them based on the frequency with which people face the barriers within the structures of their everyday lives. For the existing ICT support dimension, I categorise it using a "high, low" scale, based on the effectiveness of the existing support available to users to deal with barriers. In the following I will outline the four analytical categories described by the metaphors: "help me", "show me", "do not disturb me" and "why not" (cf. Fig. 6.2).

**Figure 6.2 the barrier-to-support framework**



*6.3.3.1 Help me* (High barrier frequency; low effectiveness of existing ICT). This refers to situations where people frequently face certain barriers despite the support of the existing arrays of technologies they have. For those barriers, the available technologies have reached the limits of the possible without helping people to remove the barriers. Hence, a new technology is needed and its value-adding potential rests on its ability to free people from the barriers that still hamper them in their everyday life routines.

Detecting those barriers makes it possible to build value-based ICT support on the premise of freeing people from something negative, i.e. providing people with a useful ICT that has the potential to free them from the barriers that still hinder them within the structure of their everyday life. This is important within the context of a sales force's work where employee resistance has been identified by many researchers as a major risk associated with SFA implementation. According to Xu et al. (2002) in most companies, SFA efforts often never get off the ground because they encounter stiff resistance from users. Among the many reasons for resistance by the sales force to the technology is the failure to convince salespeople of the advantages and benefits of the new technology (Gilbert, 2004; Patton, 2001; Bush et al. 2005; Gohmann et al. 2005 ). Consequently, salespeople question the benefits of the SFA system. For example, according to Patton (2001), many SFA projects falter because the sales force needs to be sold on the idea. The nature of their job means that salespeople are autonomous decision-makers who are accustomed to assessing the features, advantages, and benefits of a new product or service. Therefore, they are more likely to be influenced by their own perceptions of the benefits of the technology than their peers, their superiors or their clients (Patton, 2001). Providing the sales force with new ICT support to free them from the barriers that hinder their every day life routines, would make it possible for management to show the sales force the benefits of the new ICT support. It would also enable the sales force's members to assess the potential usefulness of the new ICT support for freeing them from the barriers that hinder their sales job.

In terms of M-ICT, the identification of the barriers requiring new ICT support would allow organisations to assess, before the implementation, whether or not M-ICT, given its limitations could be an appropriate form of ICT support to help their sales force deal with those barriers. If M-ICT proved to meet the requirements of the barriers in terms of support, then its added value would be clear and rests on meeting an unanswered need among the members of the sales force since it provides them with freedom from the barriers that still impede their performance.

*6.3.3.2 Show me* (High barrier frequency; High effectiveness of existing ICT). In this situation, people frequently face certain barriers within the structures of their everyday life. However, the existing technology provides appropriate technology support. In this case the new technology must offer superior capabilities (e.g. easier use, better performance, lower cost) that would entice people to adopt it. In other words, people should be "sold" on the opportunities offered by the new technology compared with the existing one in order for them to consider a change.

In terms of M-ICT support for the sales force the question will be to assess, how M-ICT, given its key characteristics and limitations, could expand the possibilities of ICT support better than the technologies available to the sales force. If M-ICT can provide the sales force with better support than existing technologies, then its added value potential would rest on the expanding possibilities that an ICT support could offer to the sales force. Indeed, there would be no reason to provide the sales force with M-ICT unless doing so adds better possibilities in terms of support.

*6.3.3.3 Don't disturb me* (Low barrier frequency; High effectiveness of existing ICT). This refers to the situation where people occasionally face certain barriers and the existing technologies provide an appropriate support to deal with them. In this case, the new technology would have merely a feature impact. It would add new features to technologies that support people appropriately in dealing with the barriers that they face occasionally. Moreover, the new technology may have a disturbing impact on people if they have to spend time learning how to operate it.

For the sales force, a main goal of ICT support is to re-direct less productive time and effort toward the sales force's main priority: selling (Honeycutt et al.2005). However, if M-ICT support could provide solutions to barriers that the sales force face only occasionally and existing ICT support is effective in helping them deal with those barriers, then it would be difficult to justify its usefulness. Moreover, providing those technologies to the sales force may be value-eroding if the sales force has to spend time learning how to operate M-ICT at the expense of selling.

*6.3.3.4 Why not?* (Low barrier frequency; low effectiveness of existing ICT). In this situation people occasionally face certain barriers and the existing technologies do not provide them with appropriate support to deal with them. In this case the new technology would be merely a convenience for people by offering support for barriers that individuals do not care a lot

about. Hence, the new technology would be a "nice to have" rather than a "must have" technology.
In terms of M-ICT support for the sales force, providing it with M-ICT to deal with those barriers should not be seen as a priority. Moreover, in this case it would be difficult for companies to demonstrate the usefulness of the M-ICT to the sales force's members, especially if it requires time and effort from them in order to master the new technology. According to Honeycutt et al. (2005), organisations must understand that time devoted to learning a new technology is a sacrifice that salespeople will undertake only if they understand how the technology will help them serve their customers and meet their sales goals.

## 6.4 Research framework 2: The Barrier-Technology-Fit (BTF) framework

The barrier-to-support matrix (cf. Fig. 6.2) does not aim to specify which new technology would create freedoms or provide superior technology support for people. Rather, it enables a scan of the barriers people face in relation to the effectiveness of the technological support available to them to deal with those barriers. The goal is to sort out targets where new technology support is needed and has the potential to provide added value to people. The ultimate objective is to ensure that the new technological support offered to people makes sense to them, and that they find it useful to integrate it into the structures of their everyday life.

In the following I will present a model that depicts how to select an appropriate new technology, once the target barriers are sorted out through the BTS framework.

The BTF framework draws upon Goodhue & Thompson's (1995) general theory of task/technology fit, and Zigurs & Buckland's (1998) specific theory of task/technology fit for group support systems. I followed Goodhue & Thompson's (1995) recommendation that task/technology fit, when decomposed into its more detailed components, could be the basis for a strong diagnostic tool to evaluate whether information systems in a given organisation meet users' needs. In the proposed BTF framework, I focused on the barriers that impede workers' efforts to carry out their everyday tasks.

Fig. 6.3 depicts the BTF framework. The arrows in Fig. 6.3 indicate sequence in a process way. Starting at the top left of the figure, the BTF framework involves pre-defining a profile of ICT support for the target barriers. The next step in the model is to analyse the degree of fit between the constructed profile of the ICT support and the characteristics of the candidate ICT. If the fit is achieved, then useful ICT solutions will be designed to support the workers in dealing with the identified target-barriers; otherwise an alternative candidate for ICT support has to be considered. Moving clockwise in Fig. 6.3, as the prospective adopters will perceive the ICT applications as useful in supporting them to deal with the target barriers; they will integrate their usage into the structure of their everyday life routines. This is intended to be consistent with the work of Davis et al. (1989), and Adams et al. (1989), who have used perceived usefulness to predict IS use. In the BTF framework, however, perceived usefulness is interpreted in a process way (an event that necessarily precedes the outcome) rather than in a variant way (variance in the independent variable is necessary and sufficient to cause variance in the dependent variables). Moving again clockwise, if prospective users perceive ICT support useful, then they will use it to deal with the target barriers that hinder their performance within the structure of their everyday life.

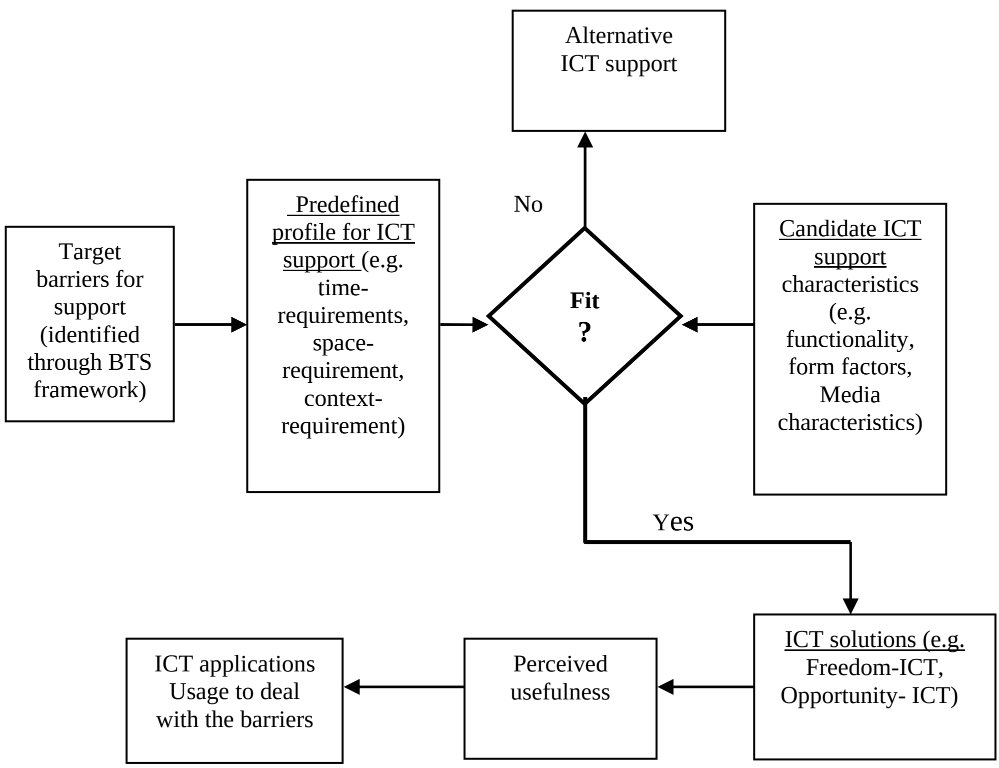



**Figure 6.3 The Barrier-Technology Fit framework (BTF)**

In the following I will discuss the constructs of the BTF framework described in Fig.6.3.

### 6.4.1 Target-Barriers

The target-barriers construct refers to the list of barriers detected as requiring new ICT support based on a scan through the BTS framework. They refer to the barriers that workers face frequently during the structure of their everyday life. However, the available ICT support reached the limit of the possible without providing the necessary support; new ICT support is therefore needed. Additionally, the target-barriers construct includes the barriers identified as frequently faced by people and for which existing ICT provides appropriate support for the workers. For those barriers, the value of a new technology rests on its ability to propose new and innovative support compared to the existing one.

### 6.4.2 Predefined profile for ICT support to deal with the target-barriers

This construct refers to building a predefined profile of the ICT support that can help the workers to deal with the target barriers identified through the BTS framework.

Depending on the nature of the identified barriers, the analysis might include such dimensions as time, space, and the context of the required ICT support. The *temporal* dimension concerns analysing the mobilisation urgency required for the support to create added value for the prospective users. As an example, these involve analysing the value of getting the support "Now" in order to establish the time relevance of the prospective ICT support (Keen & Mackintosh, 2001).

The *spatial* dimension refers to analysing the implications of the workers' spatial movement for the characteristics of the prospective ICT support. In the modern era, workers perform their work in different places including stationary work settings and mobile work settings. *A stationary work* setting means workers do their job mostly in a physical space that does not involve geographical movement locally or globally (Han, 2005). *Mobile work settings* involve different degrees of geographical movement, depending on the nature of the job. For example, Kristoffersen & Ljungberg (1998) propose a generic model of mobile IT use that aims at understanding mobile work and designing new mobile technologies to support it. By identifying what they call "typical instances" of a type of mobility, they created a classification with three distinct types of mobility: travelling, visiting and wandering. Travelling denotes the kind of mobility where you move from one place to another using a vehicle, like commuters. Visiting denotes the type of mobility where you spend some time at one physical location before going somewhere else, e.g. consultants. Wandering denotes local mobility within a smaller area such as a building with very little time spent in any one place e.g. the night watchman going on his round. Sarker & Wells (2003) pointed out that the modalities of users' mobility have implications in terms of the characteristics of the required mobile support. They suggested that the optimal size requirement of a device is lower when wandering compared to travelling or visiting. Similarly, larger network coverage is needed more when travelling than when visiting.

The *contextual* dimension refers to the characteristics of the use situation for ICT support, which may include cultural factors such as usage etiquette (e.g. you should not use the IT support during a face-to-face encounter with a customer) or power distance. Power distance refers to the symbolic meaning of what communication a medium carries depending on the nature of the relationship between individuals. For example, in countries with a high power-distance culture, such as Korea, text messaging to supervisors might be seen as a serious offence (Sarker & Wells, 2003). The contextual dimension may include distraction factors characterizing the use situation. Tarasewich (2003), for example, found that users operating in a mobile work setting tend to be distracted more often compared with those in a typical office environment. This is because in a mobile setting many activities compete for the attention of the mobile user. According to Tarasewich (2003) safety issues can also limit the attention that the user can give to the IT support (e.g. driving the car).

### 6.4.3 Candidate IT support characteristics

This involves analysing the key features of a candidate ICT in order to find out how well it fits the predefined multidimensional ICT profile constructed for the target barriers.The analysis might include such dimensions as functionality, form factors and media-richness.

The use of functionality as a dimension to characterise technology has been employed in applications of the task/technology fit theory. Dishaw & Strong (1998) used a functional view of technology and made a distinction of two dimensions of the technology's functionalities: production and coordination. Production refers to the functionalities that support the software development process; coordination within the organisation refers to the functionalities that support coordination among the software developers.

Zigurs & Buckland (1998) also used the functional view of technology and defined group support systems technology as “the set of communication, structuring, and information processing tools that are designed to work together to support the accomplishment of group tasks”. Goodhue & Thompson (1995) focused on functionality when they used information systems as a proxy for their technology construct.

Form factors may include the analysis of the candidate ICT in terms of portability and interface characteristics.

Media-richness as developed by Daft & Lengel (1986) is a prescriptive model positing that achieving a match between information-processing requirements (e.g. uncertainty and equivocality reduction) and communication media (e.g. face-to-face interactions and writing memos) is essential for organisational effectiveness (Markus, 1994). According to the media-richness theory rich media, including the telephone and face-to-face meetings, are needed to process complex situations, such as setting organisational goals, strategies, communicating managerial intentions, and managing employee motivation. Media low in information richness, such as written information sources, technical manuals and mathematical formula were best to deal with simple topics, such as inventory control. The media-richness theory has been validated in a number of studies. For example, Lim & Benbasat (2000) use the media-richness theory as a framework for investigating whether or not a rich representation of information (multimedia) can better support the information-processing needs of decision-makers. The results of their studies indicated that task analysability influenced both the type of information representation that was most appropriate for equivocality reduction, and the usefulness of an information system. Specifically, they found that multimedia support them in coping with less analysable tasks.

### 6.4.4 Fit

The concept of fit has been widely used in a variety of models that deal with contingencies among variables (Zigurs & Buckland, 1998). Within the framework of strategy research, Venkatraman (1989) identified six perspectives of fit: fit as moderation, as mediation, as matching, as gestalts, as profile deviation and as covariance.
In GSS research, achieving a fit between a group’s tasks and GSS technology was suggested as a principle for effective use of group support systems (Zigurs & Buckland, 1998). Dennis et al. (2001) performed a meta-analysis to summarise and synthesise the results of 15 years of research on

GSS effectiveness. The results of their study indicate that when there is a fit between the GSS structures and the tasks, GSS had the greatest impact on outcome effectiveness (decision quality and idea). They also found that the support the group receives had the highest impact on the process (time required and satisfaction).

Zigurs & Buckland (1998) applied the task/technology framework to examine GSS effectiveness. They considered the conceptualisation of fit as an adherence to an ideal profile to be the most appropriate for task/technology fit in a GSS context, compared with the other perspective of fit (fit as matching, moderation, gestalts and covariance). They argued that the perspective of fit as an ideal profile, allows for a holistic approach to examining complexity in an organisation (Zigurs & Buckland, 1998). Zigurs & Buckland's TTF theory in the context of group support systems was later tested by Zigurs, Buckland, Connolly and Wilson (1999) on a selected set of published GSS experiments. They found that GSS groups perform better than non-GSS groups when the GSS and the task fit. Their study also revealed that GSS either performs worse or the same as non-GSS groups, when there is a mismatch between the GSS and the task.

Dishaw & Strong (1999) used the task/technology fit framework to assess the fit between the characteristics of a maintenance task and a software maintenance tool. The fit was assessed by comparing the actual functionality of the maintenance tool with the anticipation of users regarding the functionality required to complete various tasks. The greater the number of anticipation functionalities available in an actual tool, the better the fit was determined.

In the area of mobile information systems, Gebauer & Shaw (2004) applied the theory of task/technology fit to assess the success factors and impacts of mobile information systems. They employed the concept of fit as a predefined ideal profile between the task characteristics (e.g. structure, frequency, mobility and need for emergency handling) and mobile information system characteristics in terms of functionality, portability and performance.

Liang & Wei (2004) used the concept of fit to develop a fit viability framework for assessing the likely success or failure of m-commerce applications. Their framework is based on the fit between three criteria for task requirements: location-sensitive, time-critical, and personal; and five m-commerce attributes: ubiquity, convenience, instant connectivity, personalisation and localisation.

Lee et al. (2005) use the concept of fit to explore factors affecting the effective adoption of PDA devices among insurance agents. The results of their study indicated that PDA technologies fit the tasks of insurance agents especially in post-contract customer services, tax and legal information.

I employed the concept of fit as a degree of adherence to a predefined ideal profile. Therefore the analysis of the fit in the BTF framework involves the following three steps: (i) predefining a multidimensional profile of ICT support for the target barriers; (ii) analysing the characteristics of the candidate ICT support, and (iii) finding out how well the candidate ICT fits the predefined multidimensional profile.

### 6.4.5 ICT solutions

This refers to solutions enabled by the selected ICT (e.g. M-ICT) that will help prospective users deal with the target barriers. Those solutions could be *freedom ICT*, designed to free the users from the barriers identified as frequently faced and for which the existing ICT fails to provide appropriate support. They could also be *opportunity ICT* developed to provide superior support to prospective users.

### 6.4.6 Perceived usefulness

Davis (1989) defines perceived usefulness for a specific IT to be "the degree to which a person believes that using a particular system would enhance his or her job performance". In the BTF framework, perceived usefulness is perceived *ex post* and is based on the Seddon (1997) definition as "*the degree to which a person believes that using a particular system* <u>*has*</u> *enhanced his or her job performance or his or her organizational performance*" (Seddon 1997 p.249).

### 6.4.7 ICT usage to deal with the barriers

ICT usage refers to the degree to which the users actually use the implemented ICT solutions to deal with the target barriers they face within the structure of their everyday life.

## 6.5 Research Questions Revisited

By combining knowledge from the previous chapters and insights from both the BTS and BTF frameworks, I am able to specify my research questions more precisely. The research questions revisited are summarised below (Table 6.1)

| |
|---|
| Research question 1: What barriers to performance do pharmaceutical sales representatives face when they are operating in a mobile work setting?<br>Research question 2: To what extent will existing ICT support help pharmaceutical sales representatives deal with those barriers?<br>Research question 3: What type of ICT support will help pharmaceutical sales representatives remove the barriers to performance they face when they are operating within a mobile work setting?<br>Research question 4: Will M-ICT fit the ICT support required to remove the barriers to performance that pharmaceutical sales representatives face when they are operating within a mobile work setting?<br>Research question 5: If yes, what accompanying organisational factors would ensure a successful implementation of the M-ICT? |

**Table 6.1 Research Questions Revisited**

## 6.6 Summary

This chapter presented an analytical framework for targeting areas where a new technology could bring an added value to prospective adopters. The BTS framework places users at the centre of the analysis. It starts from the potential user's everyday barriers, and works back to the technological support required to help them, while taking into consideration the effectiveness of existing technology support. The framework can be used as a diagnostic tool to scan areas where a new technology can provide value to people within the structures of their everyday life. Using the BTS framework as a diagnostic tool for a potentially new technology introduction, would allow distinguishing between:

- *Freedom technologies.* These free people from the barriers that hamper their everyday life routines; and for which existing technologies fail to provide the required support. Hence, for those barriers a new technology is needed in order to free people from the barriers that hinder their every day life routines (cf. lower- right quadrant in Fig.6.2),

- *Opportunity technologies.* These compete with existing technologies in terms of helping people to deal with their everyday life barriers. Their success rests on their abilities to provide new and innovative support that outperforms existing technologies and would thus justify their adoption (cf. upper-right quadrant in Fig.6.2),

- *Feature technologies.* These provide some new functions that help people to deal with certain barriers that they face occasionally and for which the support of existing technologies is appropriate. For these barriers, the new technology may have a disturbing rather than a supportive effect on potential adopters, if they have to invest time in learning how to operate a new technology that would not provide them with sufficiently tangible values (c.f. upper-left quadrant in Fig.6.3),

- *Conveniences technologies*. These are technologies that are merely a convenience to people. They offer support for barriers that individuals do not face frequently. Hence, a new technology would be “nice to have” rather than a “must have” technology (cf. lower-left quadrant in Fig 6.2).

The BTS framework does not specify which new technology would create value for people. Rather, it enables a scan of the barriers people face in their everyday life in relation to the effectiveness of the technological support available to them to deal with those barriers. The goal is to sort out targets where the new technology is needed by potential users.

The barrier-technology fit framework builds on the output of the BTS framework and aims at providing guidance about how to select the appropriate technology support for the target barriers detected through the BTS tool. The BTF framework involves pre-defining a profile of ICT support for the target barriers. Additionally the model involves analyzing the degree of fit between the constructed ideal ICT support and the characteristics of the candidate IT. If the fit is achieved, then useful ICT applications will be designed to support the workers in dealing with the identified barriers, otherwise an alternative candidate IT support has to be considered. As the prospective adopters will perceive the ICT applications to be useful in supporting them to deal with the target barrier; they will integrate their usage within the structure of their everyday life routines in order to deal with the target barriers

In the next chapter I will employ the frameworks developed in this chapter to examine how M-ICT could provide a value adding support to the sales force of a multinational pharmaceutical company.

# Chapter 7

# Empirical Studies on M-ICT support for the Pharmaceutical Sales Force

In this chapter I will present the findings of the empirical studies that I carried out in order to answer the primary research questions and the revisited research questions. The empirical studies were guided by the BTS and BTF frameworks presented in Chapter 6.

It is important to note that the results of the empirical studies are reported in the original papers 2; 3 and 4. However, as I want to show how I used the research models I discussed in Chapter 6, I need to duplicate some of the results in this chapter.

As can be seen in Fig. 7.1, the research design builds on several concepts that I covered in the previous chapter.

<u>*Firstly,*</u> in order to learn about the nature of the barriers to performance sales representatives (reps) face when they are operating within a mobile work setting, I collected data with the aid of two field sales trips with one Pharma sales representative. In the field, observations and informal interviews with the sales representative constituted the primary mode of investigation. The purpose of the field sales trips was twofold: (i) to understand the nature of the barriers to performance the sales representative faces in the field, and (ii) to observe the sales representative's application of the information technology support available to him in order to deal with the barriers.

In order to validate and compliment the findings derived from the field sales trips, I carried out a survey involving all Pharma's sales representatives. Based on the results of those two studies I was able to build a list of the barriers that the sales representatives face in the field together with the frequency of their occurrence.

<u>*Secondly,*</u> in order to identify the barriers requiring new ICT support, I used the BTS framework (cf. Fig. 6.2) as a tool. The analysis involved examining both the frequency of occurrence of each barrier and the effectiveness of the existing ICT support available to the sales representatives to deal with those barriers. This analysis led to a list of barriers that require new ICT support, i.e. target-barriers.

*Thirdly*, to examine whether or not M-ICT could provide appropriate support to the representatives to deal with target barriers, I used the BTF framework (Fig. 6.3). I first constructed a predefined profile for the ICT support required to resolve the target barriers. Then I examined how well M-ICT fits this predefined profile. As I will show in detail in the following sections, the analysis showed that M-ICT fits the requirements in terms of new ICT support.

Based on the results of those studies, the Pharma management decided to implement a M-ICT support (mobile system) that would help its sales force in dealing with the target barriers.

*Fourthly*, to assess the success of the mobile system implemented in achieving the objectives by helping the sales representatives to deal with barriers they face in the field, I conducted a follow-up study. First, I carried out a qualitative study with one sales representative in order to both observe the sales representative's application of the implemented mobile system in order to deal with the barriers and to detect implementation issues associated with the mobile system implemented. Then, I carried out a survey involving all Pharma'sales representatives. The purpose of the survey was to validate and complement the findings derived form the field study and to find out about the nature of accompanying organisational support required to ensure successful implementation of the mobile system.

In the following, I will first present background information about Pharma, then I will summarise the results of the empirical work.

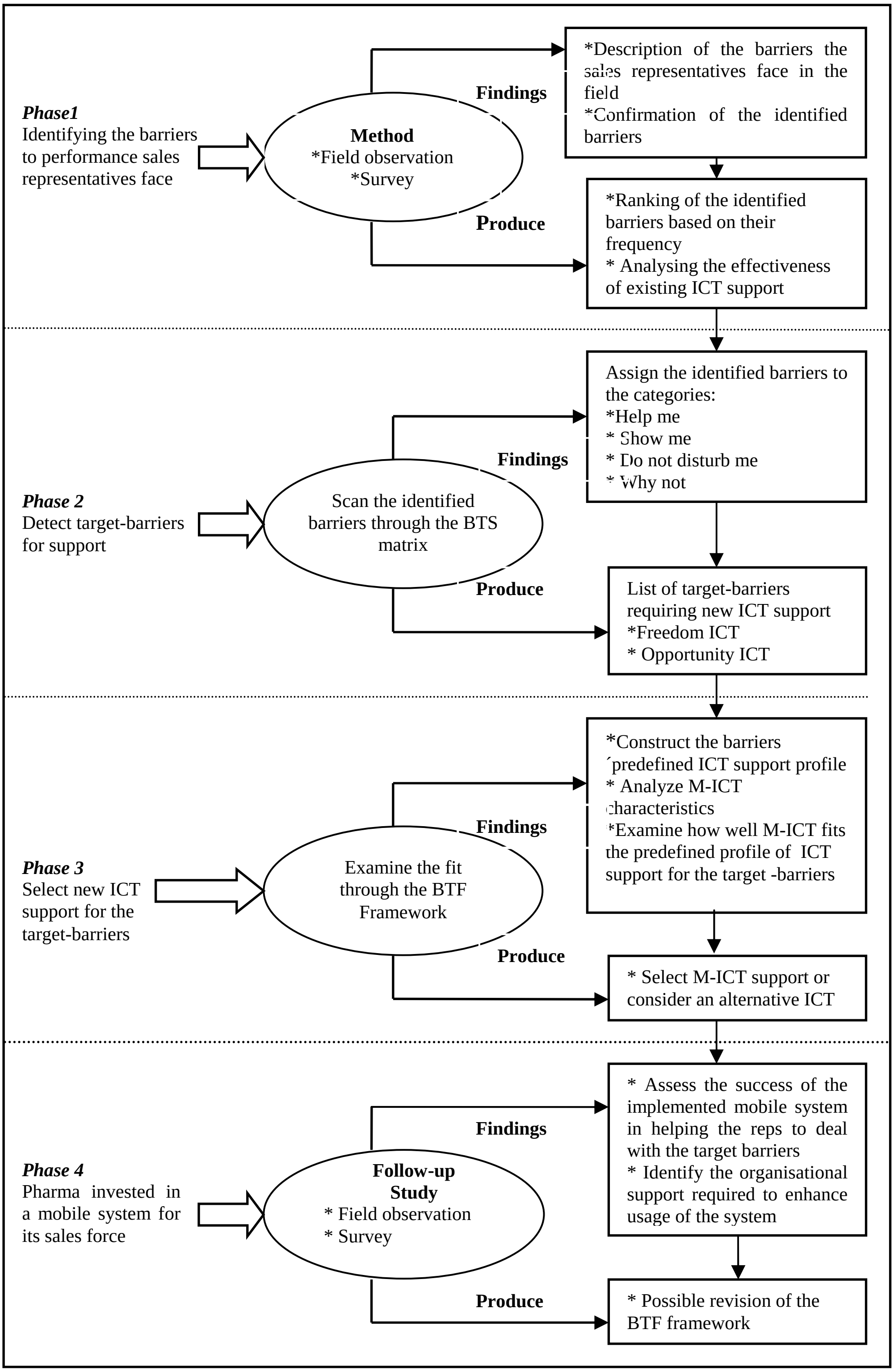



**Figure 7.1 Empirical studies design**

## 7.1 Company Background

The research project was undertaken in a subsidiary of a multinational pharmaceutical company (Pharma), employing 6000 people worldwide in 2003 with about half of them engaged in sales and marketing activities. Pharma is a relatively small company operating as a niche player with particular expertise in the area of psychiatric and neurological disorders.

The company has a national sales team consisting of 14 sales representatives. These sales representatives report to a sales manager who is ultimately responsible to the marketing manager.

The main role of a Pharma's sales representative is to meet physicians, nurses as well as prescribers in hospitals and pharmacies and provide them with information about the way the company's products operate. It is up to him/her to emphasise the clinical benefits to patients and health professionals in terms of disease management. The purpose is to encourage the health professionals to prescribe Pharma's products rather than those of the competitors.

In addition to their daily encounters with health professionals (mainly physicians), Pharma's sales representatives work duties include managing relationships with their customers. Relationship management with physicians involve providing them with any information they need related to the company's products, entertaining them in order to personalise the relationship with them as well as inviting and accompanying them to scientific conferences and congresses covering the scope of their medical interests. The duties of the sales representatives also include carrying out administrative work. Administrative tasks include preparing reports about both their daily sales encounters with health-care professionals and the expenses they incur during their sales visits (e.g. catering provided to health-care professionals during sales meetings).

Pharma's sales representatives are also responsible for categorising the health-care professionals they plan to visit into groups according to their prescribing potential. On the basis of this profiling the sales representative decides on the frequency of sales visits as well as the intensity of customer relationship effort he/she should devote to each targeted health professional. Once the sales representative groups the health professionals, he/she coordinates with field secretaries in order to book appointments with them. Pharma has four secretaries who coordinate with all the sales representatives. According to Pharma's sales manager, field secretaries are responsible for booking two-thirds of the appointments with health-care professionals; the sales representatives perform the rest.

The management of Pharma's sales force is based on a system of compensation as well as autonomy in the field. Pharma requires each sales representative to make five sales visits per day. The reward system is then based on the number of calls (face-to-face meetings held) with targeted customers as well as the level of the company's product sales within the territory where the sales representative operates. Pharma provides training to its sales force once a year. The course lasts three days and covers both sales and technical training programmes related to Pharma's products.

Before implementation of the mobile system, the information technology support that Pharma provides to its sales force included a mobile phone and a laptop computer. The sales representatives also have a sales support system that runs over their laptops and that enables them to store sales visits information and to access their company's corporate database via a dial-up system.

## 7.2 Applying the BTS and BTF frameworks to Pharma case

In this section I will show how I applied the BTS and BTF frameworks introduced in chapter 6 (cf. Fig.6.1 and Fig.6.2) in order to find out how M-ICT could provide a value adding support to Pharma's sales force.

### Step 1: Understanding the barriers to performance the sales representatives face in the field

In order to understand the nature of the barriers to performance the sales representatives face when they are operating within a mobile work setting. I first collected data through observation by the means of two field sales trips. The field sales trips lasted an entire day and represented "an ordinary day" in the life of a Pharma sales representative. The thematic analysis of the qualitative field material derived from the observations led to a list of emerging barriers to performance that the sales representative faces in the field. The findings from this qualitative study are reported in Paper 2. In order to validate and complement those findings, a survey involving all Pharma's 14 sales representatives was conducted. The instrument used was a questionnaire that was e-mailed to each of the sales representatives working in Pharma. The managers of Pharma regularly use e-mail to communicate with their sales force. Once the e-mail survey was completed by the sales representative, his/her response was sent directly to the researcher to maintain confidentiality. Respondents were assured that the information they provided would be treated as confidential and that only averaged and anonymous data would be used in any report. In the survey, the sales representatives were asked to rank the statements about the barriers to performance they encounter during the course of their work day on a five-point Likert-type scale; ranging from 1 to 5, where 1 = always facing the barrier to performance, 2 = often, 3 = sometimes, 4 = seldom and 5 = never. Responses were received from all 14 sales reps.

The data were collected and analysed prior to implementation of the mobile system. The results of the survey are reported in Paper 3.

The survey's results directly replicate the results of the qualitative study in terms of the barriers to performance the sales representatives face during the course of their work day. The sales representatives confirm the existence of most of the efficiency and effectiveness barriers to their performance identified in the qualitative study. Table 7.1 provides the results of the survey.

**Table 7.1 Survey results of leading sources of barriers to performance for the sales representatives , N=14**

| How frequently do you face the following barriers to performance | Always or often* % | Sometimes ** % | Seldom or never *** % | Mode | Mean | SD |
|---|---|---|---|---|---|---|
| 1. Performing administrative work at home | 92.9 | 7.1 | 0.0 | 2.0 | 1.6 | 0.6 |
| 2. Printing out documents before sales trips that might be useful during sales trips | 71.4 | 7.1 | 21.4 | 1.0 | 2.0 | 1.4 |
| 3. Making notes on paper about physicians' outstanding questions during sales visits | 71.4 | 7.1 | 21.4 | 1.0 | 2.0 | 1.2 |
| 4. Physicians requiring a call in advance before arranging a meeting | 64.3 | 0.0 | 35.7 | 2.0 | 2.8 | 1.6 |
| 5. Physicians requiring new information during each meeting | 50.0 | 42.9 | 7.1 | 2.0 | 2.5 | 0.8 |
| 6. Difficulty of identifying alternative contacts to visit if an appointment is cancelled | 57.1 | 28.6 | 14.3 | 2.0 | 2.6 | 0.8 |
| 7. Physicians appreciating hearing the opinion of other physicians about the company's products | 50.0 | 50.0 | 0.0 | 2.0 | 2.5 | 0.5 |
| 8. Spending time gaps between meetings just waiting for the coming meeting to take place | 50.0 | 28.6 | 21.4 | 2.0 | 2.7 | 1.1 |
| 9. Physicians not informing in advance in case they cancel an appointment | 42.8 | 50.0 | 7.1 | 3.0 | 2.6 | 0.8 |
| 10. Difficulty in accessing sales contacts in large hospitals | 42.9 | 28.6 | 28.6 | 2.0 | 2.7 | 1.1 |
| 11.Long delay in providing an answer to physicians' outstanding questions harms my relationship with him or her | 42.9 | 14.3 | 42.9 | 4.0 | 2.9 | 1.2 |
| 12.Difficulty in coordinating with field secretaries during sales trips | 21.4 | 50.0 | 28.6 | 3.0 | 3.1 | 0.9 |
| 13. Physicians do not like me to call them during their work hours | 21.4 | 35.7 | 42.9 | 3.0 | 3.3 | 0.9 |

*) Percentage of respondents who answered always = 1 or often = 2
**) Percentage of respondents who answered sometimes = 3
***) Percentage of respondents who answered seldom = 4 or never = 5

**Step 2: Detecting the target-barriers for support: The BTS framework in action**

In this section I will described the steps I followed in applying the BTS framework to the Pharma case.
In order to identify the barriers that require new ICT support, I used the BTS framework as a tool. The procedure involved three steps: (i) ranking the barriers based on the frequency of their occurrence within the structure of the sales representatives' mobile work life, (ii) examining the effectiveness of the existing ICT support available to the sales representatives in helping them deal with the barriers, and (iii) placing the identified barriers into the BTS matrix.

*Step 2.1: Determining the frequency of the identified barriers*

The frequency of the identified barriers was determined based on the results of the survey (cf. Table 7.1). The following table (cf. Table 7.2) shows the ranking of the barriers based on the frequency of their occurrence.

In terms of ranking the frequency of the barrier as high or low, I consider that the barrier's frequency is high if at least 40 per cent of the respondents report that they always or often face that barrier.

**Table 7.2 Ranking the barriers to performance based on the frequency of their occurrence**

| | | | Frequency | |
|---|---|---|---|---|
| **Barrier** | Percentage * | Mode | High | Low |
| 1.Performing administrative work at home | 92.9 | 2.0 | × | |
| 2.Printing out documents before sales trips that might be useful during sales trips | 71.4 | 1.0 | × | |
| 3.Making notes on piece of paper about physicians outstanding questions during sales visits | 71.4 | 1.0 | × | |
| 4. Physicians requiring me to call in advance before arranging a meeting | 64.3 | 2.0 | × | |
| 5. Physicians requiring new information during each meeting | 50.0 | 2.0 | × | |
| 6.Difficulty of identifying alternative contacts to visits if an appointment is cancelled | 57.1 | 2.0 | × | |
| 7.Physicians appreciating hearing the opinion of other physicians about the company's products | 50.0 | 2.0 | × | |
| 8.Spending time gaps between meetings just waiting for the coming meeting to take place | 50.0 | 2,0 | × | |
| 9.Physicians not informing in advance if they cancel an appointment | 42.8 | 3.0 | × | |
| 10.Difficulty in accessing sales contacts in large hospitals | 42.9 | 2.0 | × | |
| 11.Long delay in providing an answer to physicians' outstanding questions harms my relationship with him or her | 42.9 | 4.0 | × | |
| 12. Difficulty in coordinating with field secretaries during sales trips | 21.4 | 3.0 | | × |
| 13.Physicians do not like me to call them during their work hours | 21.4 | 3.0 | | × |

*) Percentage of respondents who answered always = 1 or often = 2

*Step 2.2: Examining the effectiveness of the existing ICT support*

The effectiveness of the sales representatives' existing ICT support was graded on a high or low basis. High means that the existing technology (e.g. laptop computer, mobile phone) is appropriate in helping the sales representatives to deal with the barriers. Low means that the technology is inappropriate for dealing with the identified barriers (cf. Table 7.3).

**Table 7.3 Analysis of the effectiveness of the existing ICT in helping the sales representatives to deal with the barriers identified**

| | **Laptop Support** | | **Mobile phone support** | |
|---|---|---|---|---|
| **Barrier** | High | Low | High | Low |
| 1.Performing administrative work at home | | × | | × |
| 2.Printing out documents before sales trips that might be useful during sales trips | | × | | × |
| 3.Making notes on piece of paper about physicians outstanding questions during sales visits | | × | | × |
| 4. Physicians requiring me to call in advance before arranging a meeting | | × | | × |
| 5. Physicians requiring new information during each meeting | × | | | × |
| 6.Difficulty of identifying alternative contacts to visit if an appointment is cancelled | | × | | × |
| 7.Physicians appreciating hearing the opinion of other physicians about the company's products | | × | | × |
| 8.Spending time gaps between meetings just waiting for the coming meeting to take place | | × | | × |
| 9.Physicians not informing in advance if they cancel an appointment | | × | | × |
| 10.Difficulty in accessing sales contacts in large hospitals | | × | | × |
| 11.Long delay in providing an answer to physicians' outstanding questions harms my relationship with him or her | | × | | × |
| 12.Difficulty in coordinating with field secretaries during sales trips | | × | | × |
| 13.Physicians do not like me to call them during their work hours | | × | | × |

The information technology support available to the sales representatives in the form of a laptop and a mobile phone does not seem to help them in dealing with the majority of the barriers they face during the course of their working day.

The laptop's physical characteristics (size, weight, boot-up time) prevent it from being carried everywhere. As a result, the majority of the sales representatives do not carry their laptop with them in the field. According to the survey results, 79 per cent of the sales representatives report that they seldom or never use their laptop computer, in the field, to find answers to physicians' questions that are difficult to answer. Furthermore, 92 per cent of the sales representatives report that they seldom or never take their laptop with them to sales meetings with physicians. In order to get access to information whenever needed, the sales representatives print out documents they think they may need before starting their daily sales trips. Indeed, 71 per cent of the sales representatives report that prior to starting their sales trips, they always or often print out all documents they may need during sales trips.

On the other hand, the laptop can provide an appropriate support for the sales representatives to deal with the barrier of giving physicians new information during sales trips. The sales representatives could, once at home use their laptop to search for new information to give to the physicians.

The sales representatives' mobile phones have limited technical functionalities and do not allow the sales representatives to deal appropriately with the identified barriers. For example, there are problems with coordinating in the field with secretaries. The sales representative can use his or her mobile phone to check the secretary's booking actions. Similarly, the secretary can call the sales representative to ask about his or her availability to meet doctors at certain dates. However, as the field study showed, when the sales representative faces un-booked hours in the field and wants to use them to call the secretary to discuss booking actions with physicians, he or she might find the telephone line busy as the secretary is coordinating with other sales representatives.

Similarly, the secretary may need to call the sales representative to check his or her availability to meet a physician at a specific date. However, she might not be able to reach the sales representative if he or she is meeting a physician and the mobile phone is switched off. In addition, if the sales representative faces an unexpected cancellation of an appointment, he or she may call the secretary to ask for her assistance in terms of identifying an alternative physician to visit. However as in most cases, the need may be short-lived, by the time the secretary finds an alternative contact, the sales representative's next meeting may be due.

*Step 2.3: Placing the barriers in the BTS matrix*

Based on the analysis of the identified barriers, in terms of the frequency of their occurrence and the effectiveness of the existing ICT support, I employed the BTS matrix in order to detect the barriers requiring new forms for ICT support (cf. Fig. 7.2). The BTS framework showed that the majority of the identified barriers belong to the lower-right quadrant (Help me quadrant). The sales representatives face those barriers frequently during their everyday life routines. However, the ICT support available to them in the form of a laptop and mobile phone does not provide them with appropriate support. Hence a new form of ICT support is needed to free the sales representatives from those barriers.

On the other hand, the BTS matrix shows that the sales representatives' barriers in terms of providing physicians with new information during each sales visit belong to the upper-right quadrant (show me quadrant). The sales representatives encounter this barrier frequently. But the existing laptop support is appropriate. The laptop, given its characteristics in terms of memory, speed and user interface, would appropriately support the sales representative, once at home, to gather new information for the physician by searching databases and downloading documents. For this barrier new ICT support would be required only if it could offer superior capabilities to deal with that barrier compared with the laptop.

The lower-left quadrant in the BTS matrix includes the barriers that the sales representatives do not face frequently and for which existing ICT support does not offer an appropriate support to the reps. They include the barriers associated with coordinating with secretaries when in the field and the physicians not appreciating the sales representatives calling them during work hours. For those barriers a new ICT solutions, though not urgently needed, have the potential to add more convenience in terms of the sales force's everyday work. Finally, no barriers were detected as belonging the upper-left square (Don't disturb me quadrant).

**Figure 7.2 Scan of the barriers faced by Pharma's sales representatives through the BTS matrix**

| Effectiveness of existing technology | | |
|---|---|---|
| High | **Don't disturb me**<br><br>**New technology: Feature** | **Show me**<br><br>5. Physicians requiring new information during each meeting.<br><br>**New Technology: Opportunity** |
| Low | **Why not**<br><br>13. Physicians do not like me to call them during their work hours.<br><br>12. Difficulty in coordinating with field secretaries during sales trips.<br><br>**New technology: Convenience** | **Help me**<br><br>1. Performing administrative work at home<br>2. Printing out documents before sales trips that might be useful during sales trips.<br>3. Making notes on a piece of paper about physicians' outstanding questions during sales visits.<br>4. Physicians requiring me to call in advance before arranging a meeting.<br>6. Difficulty of identifying alternative contacts to visits if an appointment is cancelled.<br>7. Physicians appreciating hearing the opinion of other physicians about the company's products.<br>8. Spending time gaps between meetings just waiting for the coming meeting to take place.<br>9. Physicians not informing in advance if they cancel an appointment.<br>10. Difficulty in accessing sales contacts in large hospitals.<br>11. Long delay in providing an answer to physicians' outstanding questions.<br><br>**New technology: Freedom** |
| | Low | High |

**Frequency of the barrier to performance**

**Step 3: Selecting the new ICT support: The BTF framework in action**

In this section I will apply the BTF framework that I introduced in chapter 6. I will apply the BTF framework to the target barriers identified through the BTS framework. Figure 7.3 depicts the BTF framework as applied to the Pharma case. In the following I will describe the steps in applying the BTF framework to Pharma case.

**Step 3.1: Predefining the IT support for the target-barriers**

This section presents the characteristics of the ICT support required to help the sales representatives to deal with the target barriers identified through the BTS matrix.

3.1.1 <u>Time-dependent ICT support</u>

The study shows that the sales representatives' information needs, when they are operating in a mobile work environment, are unpredictable. For example, the sales representative cannot predict in advance what kind of questions a physician may ask during the sales visits. The study shows that the sales representatives prior to starting their sales visits print out all documents they think might enable them to deal with unexpected information needs.

A further characteristic of the sales representatives' information need is that it is short-lived. When the sales representative faces an unpredictable information need, there is little time available to obtain the information and accomplish the task at hand. The sales representative mentally conducts a quick "cost/benefit analysis" of the time available and the time required to get the information and carry out the task. If he/she perceives that it is worth doing, he/she tries to access the needed information. If not, then the sales representative may decide not to try to get the information because of the risk of missing the next scheduled meeting. In this case the sales representative would delay both accessing the information and carrying out the task that triggered the information need. The sales representative thus ends up with dead time that may be quite prolonged. For example, if a meeting were cancelled at the last minute by a physician, the sales representative then has little time available before the next scheduled meeting to access information that would enable him/her to find an appropriate alternative contact and request a meeting. If the sales representative fails to access such information or it takes too much time to find it, then he/she may end up with the whole time scheduled for the cancelled meeting becoming dead time.

Another characteristic of the sales representatives' information need is that it is highly situational, for example, if the sales representative, just before a meeting, unexpectedly needs scientific information to refer to in discussion with a physician. The value of accessing such information and using it during the meeting with the physician decreases as the topics of the meeting change or the sales representative moves to another context (e.g. another meeting or driving the car).

The above characteristics of the sales representatives' information may have an implication in terms of how information support should be designed for them. The value of the information support for the sales representatives depends on whether or not it reaches them at the right point of time (relevance) and not using too much time to get it mobilised to support the sales representative. The marginal value of the information support decreases as it takes longer to reach the sales representatives or if they move from another context and thus the support loses its relevance. Although the sales representatives have a medium (laptop) enabling them to get information support irrespective of location, the time that the support may take to be mobilised for action may restrict its use. For example, during a meeting the sales representative may be faced with the need to provide a physician with an answer to a question. However, even though equipped with a connected, non-obstructive and portable device, the sales representative may find it inappropriate to use it to satisfy such a situational information need if, during the short sales visit, often not more than 15 minutes, it is necessary to search a database, retrieve and review documents. Likewise, the little time that the sales representatives may have between two meetings may prevent them from downloading and checking e-mails even with a connected and appropriate device, if the process requires too much time. As a result, the traditional knowledge management supply chain, with the standard pull-paradigm (e.g. databases and intranets), may be inappropriate for resolving the sales representatives' situational and short-lived information needs even if they have a network connection available irrespective of location and over a convenient device.

The information support the sales representatives need is time-dependent. It should be a form of information support that is accessible all the time and mobilised for action using the shortest possible amount of the sales representatives' working time.

### 3.1.2 Space-independent ICT support

Given the short-lived and situation-dependent characteristics associated with the sales representatives' information needs, the sales representatives need information support that can be mobilised anywhere. Having access to information support irrespective of location would make it possible for the sales representatives to work at any time, including when they face unpredictable dead time. The laptop constitutes an inappropriate medium for sales representatives because it supports the opposite. It may enable anytime access to information but fails to support anytime work. Indeed, a connected laptop can enable the sales representative to view and/or pull documents over a network to satisfy an information need. However, its physical characteristics (size, weight, boot-up time) prevent it from being carried anywhere to support unexpected information and communication needs. For example, the sales representative may need to make a report about a sales visit while sitting in the guest room waiting for the next meeting with a physician. To this end, the sales representative needs a form of information support to run on a device that is lightweight and flexible enough, to get mobilised for action in any space and for any time available.

### 3.1.3 Context-specific ICT support

The value of the information support for the sales representatives depends also on the flexibility the support provides to them in terms of how it can be tailored to changing work contexts.

The context where the sales representatives operate can have implications in terms of the appropriate communication medium that gives the support. For example, during sales visits the mobile phone is not appropriate for communication between the sales representative and his or her colleagues. Indeed, during their sales visits the sales representatives have to adapt to the situation of "technology etiquette" and turn off their mobile phone or put it in a meeting mode. In this case a text message would be more appropriate as the sales representative can read the information and potentially exploit it during his/her interaction with the customer. Likewise, as the sales representative moves to another context, such as driving the car, his or her physical and cognitive abilities become absorbed by the activity he/she is performing.

**Step 3.2: Analysing M-ICT support characteristics**

In this section I will discuss to what extent the key characteristics of M-ICT could fit the target-barriers requirements in terms of new ICT support (c.f. figure 7.3).

3.2.1 Timely information support

The timely information support attribute of M-ICT could enable the development of mobile solutions that would support the sales representatives in dealing with a number of barriers to efficiency and effectiveness they face in the field. For example, the study shows that identifying an alternative physician to visit in the event of an unexpected cancellation of an appointment is one major barrier to efficiency the sales representatives face. With a wirelessly connected mobile device, the sales representative could have access to sales contacts to identify other possible customers situated near the location of the physician who cancelled the meeting. With this sales contact information, the sales representative could then identify the contacts he or she knows in a large hospital situated nearby where he or she can do prospecting activities to find another physician to visit. In addition, the sales representative could receive, according to his/her location, information support about possible prospects to visit. In this case it would suffice for the sales representative to notify his or her request to the service provider to receive directions about possible physicians located nearby. Similarly, the ability of the sales representative to input into the corporate system the cancellation of a meeting with a physician as soon as it happened would enable the field secretaries to be aware of the problem as it occurred. As a result, the field secretaries, with their experience of booking meetings for the sales representatives with physicians, could help the sales representatives in identifying an alternative contact or prospect located in the same area as the location of the physician who cancelled the meeting. The field secretary could also help the sales representatives identify possible contacts in the area where the sales representative's coming meeting is situated. Furthermore, the sales representative can monitor the booking actions the secretary has undertaken or is planning to take, anytime he/she has time available.

Information alerts in the form of e-mails would enable both the sales management team and colleagues to share useful information on different topics including physicians' experiences with the company drugs, market and intelligence information. With a wirelessly connected device the sales representatives could read such alerts while on the move and proactively

reflect them during his or her face-to-face meetings in order to meet physicians´ information requirements.
The sales representatives' possibility of accessing the corporate database both before and during sales visits has the potential to enhance their ability to deal with physicians' questions that the sales representatives might find difficult. As the mobile device with a wireless connection is convenient to carry and does not require boot-up time in order to get it ready for action, the sales representative could connect to the corporate database during the sales meeting and try to find the information for the physician.

### 3.2.2 Ubiquitous terminals

A mobile terminal in the form of a PDA, smart phone or a communicator can be mobilised to meet the sales representatives' information access and communication needs irrespective of location as they are on hand all the time. A connected lightweight terminal on hand anywhere would enable the sales representative to work anywhere and whenever time is available. This would provide the sales representatives with solutions to the barriers they face especially in terms of enhancing the productivity of their working time in the field. For example, immediately after making a call, the sales representatives could complete all reporting by means of a handheld device. This could happen just after the meeting or, if the sales representative has some time available, before the following meeting. At the next available opportunity, the sales representative can upload the sales call information he or she has obtained to the corporate database.

Reporting information gleaned from sales visits after each sales meeting has a number of advantages for the sales representatives' performance. Firstly, the accuracy of the sales information would improve compared with reporting all information obtained from meetings at the end of the working day or the weekend. Secondly, doing all reporting activities during sales trips would obviate the need to do those tasks at home, at the expense of rest time. Furthermore, for the sales representatives to be able to upload their sales reports after each meeting would provide the sales team with quick insights into field activity and physicians' behaviour as well as give useful information about the physicians' experience with the company's drugs. With the insights collected from the sales representatives, the sales management team can provide the sales representatives with orientation such as rebuttals to prepare the sales representatives to deal effectively with physicians' questions and competition dynamics. Finally, quick reporting of information from sales visits by the sales representatives into the corporate database would enable the sales representatives to rapidly share useful information about physicians' experience with the company's drugs. They can then use such information in their interaction with the physicians they visit. This would have the potential to support the sales representatives when dealing with the challenges to both provide physicians with new information during each sales meeting and to disseminate useful experiences of company products among the physicians they visit.

A wirelessly connected mobile device would also enable the sales representative to check e-mails whenever he or she faces opportunities of free time in the field. The ability of the sales representative to access e-mail capabilities whenever time was available would enable him or her to make productive use of his or her time during sales trips. Instead of just waiting for the next meeting, the sales representative could check his or her e-mail and reply to urgent ones.
Access to e-mails during sales trips would shorten the time it takes the sales representative to submit a reply to a physician's question. The sales representative would not need to wait until reaching home and checking whether his or her colleagues at the home office had submitted the answer to the question he or she found difficult. The sales representative could check whether or not he/she had received an answer from colleagues, whenever there was time available. As soon as the colleague submitted the answer, the sales representative could forward it to the physician, which would shorten the process of dealing with physicians' questions. Additionally, the ability to check e-mails during sales trips would enable the sales representatives to be aware of the information the physician requested and reply to them as soon as he/she had some spare time. This would enhance his or her responsiveness as perceived by the physicians. With the possibility of checking e-mail during sales trips and replying to urgent ones, the sales representatives could make efficient use of the working day. Therefore he or she would have more time once at home, which he or she could devote to the family or to more value- generating activities such as updating his or her knowledge base.

3.2.3. Adaptive-communication

Another attribute of M-ICT is that it can provide flexibility to the sales representatives in terms of the communication medium that they could select when it comes to collaboration and coordination in the field with co-workers. The communication medium carrying the information support can take such forms as SMS, MMS, e-mail, phone call, pushed alert or real-time access to database.

The selection of the communication medium would depend on both the environment where the sales representative is operating (e.g. face-to-face meeting with a customer, in a train or restaurant) and his or her information support value chain (provider versus receiver of the support). For example, knowledge of a sales representative's current activity through a shared mobile calendar would enable co-workers to select the communication medium that fits his or her contextual environment. A co-worker could push a text message to the sales representative's smart phone if the sales representative is in a face-to-face meeting, thus enabling him/her to read the alert and potentially exploit it during his/her interaction with the physician. Likewise, depending on the time the sales representative has available for coordination, he/she could make a phone call to the secretary for coordination in terms of booking appointments with physicians, or just connect to the corporate database, check the secretary's booking actions and input his or her comments.

The fit between the medium and the context has the potential to reduce the functional deficiency of information overload, where the amount of information that the sales representatives encounter extends his/her cognitive processing capacity. For example, although information support could be highly relevant to the task on hand for the sales representative, unless it is provided using the appropriate communication medium, it may have an overloading rather than supporting impact (e.g. receiving market information via a phone call during a sales encounter with a physician).

### 3.2.4. Simple and natural input /output

A hands and eyes-free approach using audio-based augmentation would enable the user to perform simultaneously other tasks while listening or speaking (Martin, 1989). This is of great interest to the sales representative whose need for information support is both time-dependent and space-independent. Speech augmentation would provide the sales representatives with a simple and natural mechanism to enhance the productivity of their working time even in situations where their cognitive and physical capabilities are engaged in other activities such as driving the car. For example, with a speech-based data entry, after each sales visit the sales representative could make a voice entry of the information he or she had gained from the meeting with the physician. Likewise, as the sales representatives spend a large proportion of their time driving from one location to another, they can make voice-based entry of the sales reports while driving. They could also update their knowledge base by listening to market and technical information, e-mail notifications, news update and calendar events while driving from one location.

### Step 3.3: Analysing the Fit

The above analysis of M-ICT characteristics showed that M-ICT has the potential to fit the target-barrier requirements in terms of information support. Following the metaphors depicted in the BTS matrix (cf. Fig. 7.2), M-ICT can be freedom technology, opportunity technology, and convenience technology for the sales representatives. As discussed in the previous section, M-ICT has the potential to free the sales force from the barriers located in the lower-right quadrant of the BTS matrix (Fig. 7.2). It also has the potential to be an *opportunity ICT* for the barrier related to providing physicians with new information during each sales visit. Although the sales representatives could use the laptop system at home to gather new information for the physicians they plan to visit, M-ICT through alert systems can free the sales representative from such tasks. This would enable the sales representatives to update their knowledge base in the field without the need to devote time at home for knowledge updates, at the expense of family or rest time. Additionally, M-ICT could be a "convenience" for the barrier of coordinating with field secretaries in the field and the barrier of physicians who do not like the sales representatives to call them during work hours (cf. lower-left quadrant in Fig. 7.2). For example, an M-ICT solution could enable the sales representative to check in real time the booking the secretary has made. Similarly, for the barrier of the physicians who do not like the sales representatives calling them during working hours; a convenience mobile solution could be to construct a shared virtual space to link the sales representative with the physician. For example, each time the physician has a drug-related question he or she can enter it into the virtual shared space created, which may be running over the Internet. Then the sales representative would receive notification over his or her mobile device each time the doctor enters a question. When the sales representative has some time available (e.g. between two meetings), he or she may try to enter his answer on the shared page.

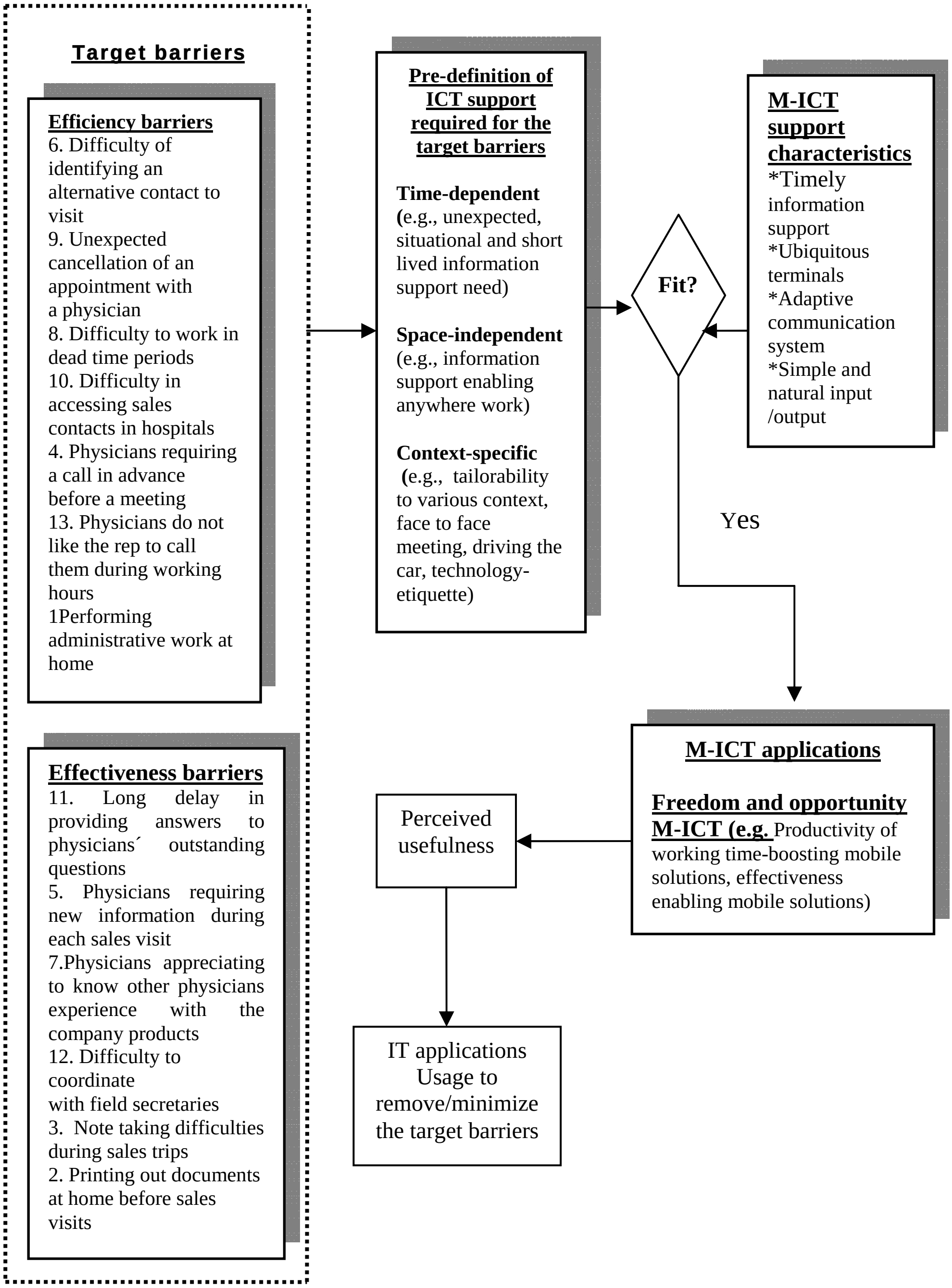



**Fig.7.3 the BTF framework applied to Pharma case**

**Step 4: Results of the analysis through the BTS and BTF frameworks**

The results of scanning the barriers to performance the sales force face during the course of their mobile work day through the BTS (cf. Fig 7.2) and BTF frameworks (c.f. 7.3 figure) enabled me to conclude that Pharma sales force needs a new ICT support and that M-ICT could provide them with an appropriate support to deal with the target barriers to performance. Hence as shown in the BTF framework (c.f. Figure 7.3) if the M-ICT is implemented, the sales representatives will first perceive it as useful and then integrate its usage into their everyday work life in order to deal with the target barriers.

## 7.3 Follow up study: Evaluating the success of the implemented mobile system in helping the sales representatives to deal with the barriers

As Pharma implemented a mobile system for its sales force, I carried out a follow-up study. The purpose of this study was to examine to what extent the sales representatives perceived the implemented mobile system useful and integrate it into their work day in order to deal with the target barriers. This study also aimed at refining the BTS and the BTF frameworks and at collecting insights about the nature of the accompanying organizational support that would ensure a successful implementation of the mobile system implemented.

### 7.3.1 The mobile system implemented

The mobile system implemented consists of providing members of the sales force with wireless access to the business information stored in their company's database, e-mail, calendaring, enterprise applications and to the Internet. Such mobile applications are run over a Nokia 9500 Communicator. In addition to office tools (e.g. Word and Excel, e-mail attachments, PowerPoint editor and viewer), the communicator includes Bluetooth and an integrated camera. It also supports both voice and messaging services such as multimedia messaging (MMS), e-mail, text messaging (SMS) and fax (see www.nokia.com for more details). The sales representatives can also synchronise data between their communicator and desktop. The mobile system runs over the GPRS network.
With the implemented mobile system the sales representatives can check e-mail, view and edit attachments. They can also create presentations, adjust their calendar, locate crucial customer information in the corporate database, instant-message colleagues, enter and upload sales visits reports to the company customer database.

Implementation of the mobile system was carried out by a software development company. In addition to implementing the system, the company was responsible for providing training to the sales force as well as support. The training was basically technical and consisted of introducing the mobile system to the sales force and teaching them how to operate its basic functionalities.

### 7.3.2 A qualitative investigation

In order to explore both the extent to which the implemented mobile system supported the sales representatives in dealing with the barriers to performance we discussed in section 7.2.2 and issues for the implementation of the system, I collected data through observation on two field sales trips with one sales representative. The results of this study are reported in paper 4.

The results showed that the mobile system has been used by the sales representative to deal with certain barriers for which the system's usefulness was apparent to him. However, the system remains under-utilised in terms of helping the sales representative to minimise or remove other barriers that affect his efficiency and effectiveness in the field (e.g. identifying an alternative physician to visit in the event of an unexpected cancellation of a meeting, providing physicians with both new information during sales visits and the experiences with other physicians). For those barriers it appeared that the sales representative lacks knowledge about how the mobile system could support him in dealing with them. As a result, although the system has the potential to provide the necessary support, it is not used, as its usefulness is not apparent to the sales representative.

The results of the qualitative study suggest that Pharma could increase the sales representatives' usage of the system by providing training that goes beyond the technology to focus on the sales representatives' work system. Training from a work-system perspective would demonstrate to the sales representatives how the various features of the system could support their tasks and help them deal with the barriers they encounter. In the light of such knowledge the sales representative could assess the usefulness of the system's features in connection with his or her tasks as well as the barriers to performance he or she faces, and decide which features of the system to integrate into his or her work day (c.f. figure 7.4). The constructs in Figure 7.4 represent the relationship between events and outcomes in a process way.

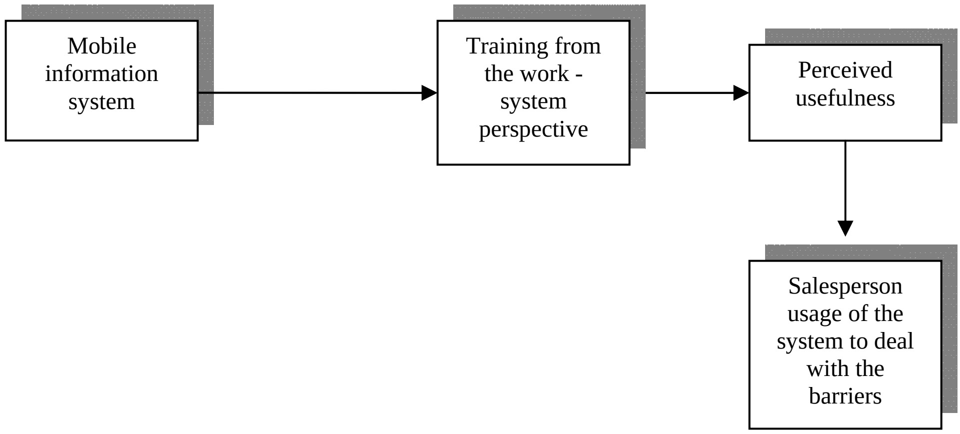



**Figure 7.4 Framework based on results of qualitative investigation**

### 7.3.3 Survey

In order to validate the findings derived from the qualitative investigation, a survey involving all Pharma's 14 sales representatives was conducted. The instrument used was a questionnaire. The design of the questionnaire was based on the information collected during the field sales trips, the literature about information technology adoption as well as input from the company sales managers. An initial draft of the questionnaire was sent to the company sales managers for input and approval. The initial version of the questionnaire was later refined with the help of a pre-test involving one sales representative, the sales representatives' sales manager and an academic expert, which led to some adjustments: some questions were modified to increase their clarity for the respondents, others were deleted or added.

The questionnaires were distributed as attachments via e-mail to all the company's sales representatives. Pharma managers regularly use e-mail to communicate with the sales representatives. The e-mail addresses of the sales representatives were provided by the company sales manager.

Once the e-mail survey was completed by the sales representative, his/her response was sent directly to the researcher to maintain confidentiality. Respondents were assured of the confidentiality of the information they provided and that only averaged and anonymous data would be used in any report. Out of the 14 members of the sales force, 13 responses were received.

In the following I will present a summary of the survey's results. It is important to note that those results are reported in more detail in paper 4.

The specific constructs included in the questionnaire are summarised in the following:

- **Perceived usefulness**

Seddon (1997) defines perceived usefulness as "the degree to which the stakeholder believes that using a particular system has enhanced his or her job performance or his or her group's performance." Perceived usefulness was measured by adapting Davis's instrument to specifically reference the usefulness of the mobile system in dealing with the barriers to performance the sales representatives face. Also, the future-orientation of Davis's instrument was changed to reflect past usage. Ratings were made on a five-point Likert-type scale, ranging from 1 to 5, where 1= I agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Perceived ease of use**

Davis (1989) defines perceived ease of use as "the degree to which the prospective user expects the technology to be free of effort". Perceived ease of use was measured by adapting Davis's instrument to specifically include factors observed in the field study that make the system difficult to use, such as a slow data connection, small screen and keyboard. Responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1= I agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Perceived ease of integration**

Ease of integration reflects the degree to which the representative perceives that he/she was provided with appropriate training and support to use the mobile system in order to deal with barriers to performance. Perceived ease of integration was measured by adapting the instrument developed by Jones et al. (2002). All the responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1= I agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Usage of mobile system**

System usage refers to the frequency with which the system was used by the sales representatives to carry out a list of operations in the field, on a scale of 1 to 5, where 1= always using the mobile system to carry out the operation described by the statement, 2 = often, 3 = sometimes, 4 = seldom, 5 = never. System usage was measured by adapting an instrument developed by Engel and Barnes (2000).

We also included in the questionnaire internal factors that have been shown to influence user information technology. Such factors include personal innovativeness, subjective norms, and compatibility with existing systems.

- **Personal innovativeness**

Personal innovativeness refers to the degree to which an individual is earlier in adopting new ideas than other members of a group (Jones et al. 2002). Personal innovativeness was measured by adapting a three-item instrument developed by Jones et al. (2002). Responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1= agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Subjective norms**

Subjective norms indicate the degree to which a person perceives that his or her superiors, peers and customers would want him or her to use a particular system (Jones et al. 2002). Subjective norms were measured by adapting an instrument developed by Jones et al. (2002). Responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1= agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Compatibility with existing systems**

Compatibility with existing systems is defined as the degree to which the innovation fits with the adopters' existing values, previous experiences, and current needs (Jones et al. 2002). Compatibility with existing systems was measured by adapting a three-item instrument developed by Jones et al. (2002). Responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1= agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

The questionnaire also included two open questions. One was related to suggestions about how the mobile system could be further improved to fit their job requirements. The other was about the number of weekly hours the sales force members carry out work-related tasks at home both before and after implementation of the mobile system.

#### 7.3.3.1 Survey's results

The survey results show that the majority of the sales representatives interviewed regard the mobile system as compatible with their work and they do not use it just because of the influence of their colleagues or supervisor The majority find it easy to use in general; despite some reported barriers such as slow data communication, small screen and keyboard, which were a problem for certain sales representatives.

Moreover, more than half report that they have access to the support they need if they face a problem in operating the mobile. Additionally, more than the half of the interviewed sales representatives agrees with the statement that when they need work-related information in the field about physicians they should visit, they find it available in their company database. The results also reveal certain innovativeness among the sales representatives in terms of using information technology

However, with regard to perceived usefulness, the results show that for certain barriers that do not require advanced training; the perceived usefulness for the majority of the sales representatives was high. Those barriers include making productive use of dead time during sales visits (e.g. sending and receiving e-mails, preparing sales reports), difficulty in coordinating with field secretaries in the field, enhancing the quality of reports on sales visits and carrying out work-related tasks at home. For those barriers the basic technical training the sales representatives received in operating the system (e.g. learning how to access the corporate database, enter and upload sales reports, compose e-mails), allows the representatives to assess how the capabilities of the system could support them in dealing with such barriers, and thus the usefulness of the system was apparent.
However, for other barriers such as unexpected cancellations, physicians' information requirements, and physicians' unanswered questions; the majority of the sales representatives do not regard the system as useful.

The results regarding the sales representatives' usage of the mobile system to deal with the barriers corroborate the findings about the sales representatives' perceived usefulness of the mobile system. The sales representatives use the mobile system in order to deal with the barriers for which the system's usefulness is quite obvious to them. Indeed, the sales representatives use the mobile system's solutions to deal with such barriers as making productive use of dead time during sales visits, difficulty in coordinating with field secretaries in the field, and carrying out work-related tasks at home. For those barriers the majority of the sales representatives perceive the mobile system support as useful.

However, the majority of the sales representatives interviewed do not seem to fully use the mobile system to deal with the other barriers such as (i) unexpected cancellations of appointments with physicians, (ii) dealing with physicians' information requirements in terms of providing them with both new information and the experiences of other physicians with the company's drugs and (iii) dealing with long delays in answering physicians' outstanding questions. For those barriers, the survey shows a similar pattern for the sales representatives' perceived usefulness of the mobile system. That is, the majority of the sales representatives do not perceive the mobile system to be useful in helping them deal with those barriers.

The above results suggested that the sales representatives need an advanced training which is not merely technical. The sales representatives need training from a work system perspective that would help them assess how the mobile system functionalities could help them deal with the barriers they face so that they can see its usefulness and integrate its usage into their everyday routines

This was further confirmed by the fact that more than the half of the sales representatives disagree with the statement that the training they received, which was merely technology-driven, was sufficient. Likewise, more than the half of the sales representatives disagree that the information about the capabilities of the mobile system sufficient. Also, more than half of the interviewees report that it would be useful if they could get help and support on how to use each feature of the mobile system to support their tasks and to enhance their performance. The sales representatives' answers to the open question about how the mobile system could be further improved to suit their job requirements strengthened such a pattern. More training in terms of using the system's capabilities was the second most frequently mentioned suggestion for improvements; as one rep wrote:

*Everybody knows the basic features. What now should be done is to organise a new training event to go through all the possibilities that you can use the communicator for. I doubt that very many of us truly know all that can be done with the communicator*

### 7.3.4 Revision of the BTF framework

The empirical study focused on the M-ICT success, and showed that the sales representatives were in general pleased with the initiative to use the mobile system. The majority reports that the mobile system is compatible with all aspects of their work, and fits well with both their work style and the way they like to work. They also used it in order to deal with certain barriers for which its usefulness was clear to them. However, in terms of dealing with other barriers the system was not fully exploited by all members of the sales force.

The study also raised a major implementation issue: training. Many IT scholars have indeed argued that facilitating conditions such as training and support have a favourable impact on technology use (see e.g. Good & Stone, 2000; Venkatesh et al., 2003; Davis, 1989; Igbiria & Tan, 1997). Research reports on adoption of information technology by sales forces also supported those propositions (Jones et al.2002; Pullig et al. 2002; Ahearne, 2005; Buehrer et al. 2005). The researchers recommend providing users with the necessary knowledge of how to operate the technology in order to enhance its adoption. However, to my knowledge none of those studies took the step to specify the nature of training that would enhance adoption by the sales force. In those studies training has been examined broadly together with other variables, such as support, and both included among the facilitating conditions. Moreover, training was approached in the technology adoption studies mainly from a technical perspective, i.e. providing users with instructions and guidelines on how to operate the technology (e.g. Ahearne et al. 2005)

The results of the follow up study suggest that the sales force needs not only technology-driven training (e.g. learning how to operate the technology) but also training from the work-system perspective. In other words, training needs to provide guidance to the sales force on how the various capabilities of the technology could support their tasks and performance. The majority of the sales representatives who participated in the study were not satisfied with the training (only technical) they had received. On the other hand, they wanted a training that would enable them to find out how the various capabilities of the implemented mobile system would support their everyday tasks. Indeed, in a number of information systems implementations, firms tend to provide the sales force with a quick technical training and leave them with the task of finding applications of the system to support their work, believing that their sales force already understands enough of PC basics to make it work. Erffmeyer's et al.(2001) study of firms' expectations from an investment in SFA, reveal that a limited number of firms participating in their study offer training to support their SFA efforts. They also found that a third of the sales representatives were frustrated by the way training was handled. Such an attitude was expressed in a comment by one national sales manager who participated in their study: "the owners think this is overvalued. They refer to my laptop and training as executive time suckers".

The empirical results I found on the need for training from a work-system perspective enable me to revise the BTF framework. That is done by integrating training from a work system perspective as an event that precedes the perceived usefulness construct (cf. Fig. 7.5).

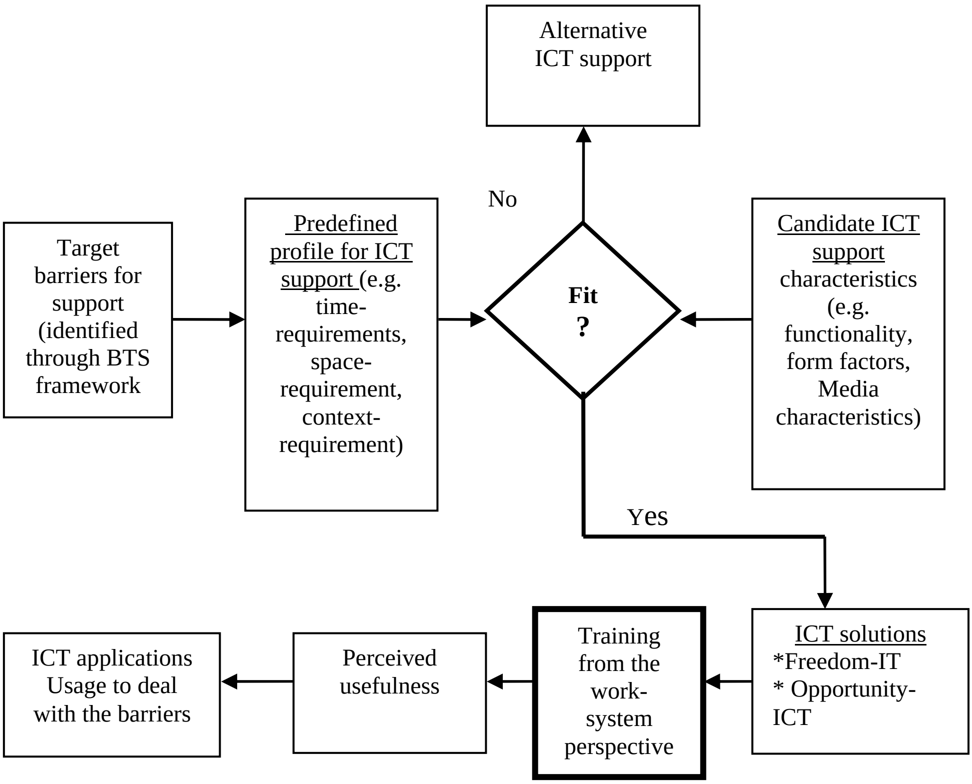



**Figure 7.5 The BTF framework revised**

# Chapter 8

# Conclusions

The overall aim of this dissertation has been to investigate how M-ICT could provide a value adding support to pharmaceutical sales representatives when they are operating within a mobile work setting. In the following I will summarize the answers to the primary and revisited questions based on my theoretical and empirical results.

**Question 1:** *What factors would influence pharmaceutical sales force's adoption of M-ICT?*

The literature review about the sales force's adoption of SFA technologies showed that perceived usefulness is a strong factor that influences the sales force adoption. When the usefulness of the information technology support is not apparent to the sales force, salespersons may regard the technology as a disturbing rather than a supporting factor for the sales process. Hence, they either reject it or underutilize it. As Jones et al. (2002) observed, sales representatives are evaluated based on their sales results. Therefore, if they do not see a clear benefit of how the technology use will enhance their productivity, they may choose to reject the SFA. The study carried out by Speier and Venkatesh (2002) showed that the negative reaction of salespeople after an implementation of the SFA system may be detrimental to the company. In their study the reaction manifested itself not only as a wide rejection of the technology but also as an increased absenteeism and voluntary turnover. According to the authors, the reason for such a reaction stems from the lack of fit between the technology and the sales force, resulting in salespeople perceiving the technology as disruptive to the sales process.

The review also showed that the role of management is crucial to ensuring the success of the ICT investment for the sales force. In order to ensure the success of SFA implementation a number of authors recommend that the sales force should be actively involved with management in understanding the potential value of the technology before purchase and implementation (Speier and Venkatesh, 2002). Similarly Rangarajan et al. (2005) encourage managers to clarify expectations tied to technology and to invest in a technology that salespeople perceive to be useful. Gohmann et al. (2005 a) recommend that managers should solicit input from the sales force during the initial stages of the decision making process about the technology and communicate how the new technology will improve its performance. Sales force input may create a sense of ownership and increase the likelihood that the technology will be accepted and utilized. The review also suggests that training is an important accompanying organizational factor that would ensure the success of M-ICT implementation for the sales force

**Question 2:** *Could M-ICT provide value-adding support to pharmaceutical sales representatives when they are operating within a mobile work setting*?

The literature review regarding the factor that would influence the sales force's adoption of SFA technologies allowed me to conclude that for M-ICT to provide a value adding support to pharmaceutical sales representatives, they should perceive it as useful regarding supporting their every day work routines. Additionally, management should involve the sales force in M-ICT investment decision. Management should also clearly determine how M-ICT could productively support its sales force in order to be able to communicate its benefits to the sales force members.

With this dissertation I have presented and tested an approach that would help management deal with the problem of proactively determining how M-ICT could provide their sales force with a value adding support when they are operating within a mobile work setting. This approach is based on the two models that I constructed (i.e. BTS and BTF frameworks).

The BTS framework (c.f. Fig.6.2 ) aims at finding the targeted gaps where a new ICT support is needed, based on both prospective users' barriers that hamper their performance and the effectiveness of existing ICT support available to them. The purpose is to sort out target barriers where a new ICT is needed and could provide a value adding support to users. A value-adding support means here freeing the users from something negative. That is, providing users with a *freedom ICT* that has the potential to free them from the barriers that they the face frequently and for which the ICT support they have fail in supporting them effectively (cf. Help-me quadrant in Fig. 6.2).

The identification of the barriers requiring new ICT (cf. Help-me quadrant in Fig. 6.2) would allow the management to determine proactively whether or not M-ICT could be an appropriate form of ICT to help their sales force deal with target-barriers. If M-ICT proved to meet the requirements of the barriers in terms of support, then its added value would be clear and rests on meeting an unanswered need among the members of the sales force since it provides them with freedom from the barriers that still impede their performance.

A value adding support would also rest on the expansion of possibilities that an ICT could give to the sales force in terms of support in order to deal with the barriers that they face frequently. However, the existing technology provides appropriate technology support (cf. show me quadrant in Fig 6.2). In this case the new technology would be an *opportunity ICT* and must offer superior capabilities (e.g. easier use, better performance, lower cost) that would entice people to adopt it. In other words, people should be "sold" on the opportunities offered by the new technology compared with the existing one in order for them to consider a change. In terms of M-ICT support for the sales force the question will be to assess, how M-ICT, given its key characteristics and limitations, could expand the possibilities of ICT support better than the technologies available to the sales force. If M-ICT can provide the sales force with better support than existing technologies, then its added value potential would rest on expanding possibilities that the ICT support could give to the sales force. Indeed, there would be no reason to provide the sales force with M-ICT unless doing so adds better possibilities in terms of support.

The BTS framework helps also to sort out barriers for which a new ICT is not urgently needed. Those are barriers that people face only occasionally and the existing technologies do not provide them with appropriate support to deal with them (cf. why not quadrant in Fig 6.2). In this case the new technology would be merely a *convenience ICT* for people by offering support for barriers that individuals do not care a lot about. Providing the sales force with M-ICT support to deal with those barriers should not be seen as a priority. Indeed, in this case it would be difficult for management to demonstrate the usefulness of the M-ICT to the sales force, especially if it requires time and effort from them in order to master the new technology.

Finally, the BTS framework helps to sort out barriers where a new ICT is not needed. This refers to the situation where people occasionally face certain barriers and the existing technologies provide an appropriate support to deal with them (cf. don't disturb me quadrant in Fig. 6.2). In this case, the new technology would have merely a *feature* impact. It would add new features to technologies that support people appropriately in dealing with the barriers that they face occasionally. Moreover, the new technology may have a disturbing impact on people if they have to spend time learning how to operate it. For the sales force, the main goal of ICT support is to re-direct less productive time and effort toward the sales force's main priority: selling (Honeycutt et al.2005). However, if M-ICT support could provide solutions to barriers that the sales force face only occasionally and the existing ICT support is effective in helping them deal with those barriers, then it would be difficult to justify its usefulness. Moreover, providing those technologies to the sales force may be value-eroding if the sales force has to spend time learning how to operate M-ICT at the expense of selling.

The BTF framework builds on the output of the BTS framework and aims at providing guidance about how to select the appropriate technology support for the target barriers, i.e. barriers requiring a new ICT, detected through the BTS tool. The BTF framework involves pre-defining a profile of ICT support for the target barriers. Then analyzing the degree of fit between the constructed predefined ICT support and the characteristics of a candidate ICT (e.g. M-ICT). If the fit is achieved, then useful ICT applications will be designed to support the sales force in dealing with the identified barriers, otherwise an alternative candidate ICT support has to be considered. As the prospective adopters will perceive the ICT applications to be useful in supporting them to deal with the target barrier; they will integrate their usage within the structure of their everyday life routines in order to deal with the target barriers.

With the approach I proposed, management could deal with a number of barriers that impede the sales force's adoption of ICT that I discussed in chapter 4. The usefulness is not apparent to the sales force has been shown as a major barrier that hinders the sales force adoption of ICT (cf. table 4.1). A number of researchers (e.g. Rangarajan et al. 2005; Gohmann et al. 2005 a) recommend that management invests in a technology that salespeople perceive to be useful and clearly demonstrates its benefits to the sales force. The proposed approach would help management to select an ICT support whose usefulness to the sales force is clear and could be communicated to the sales force members. For instance, by providing the sales force with a *freedom ICT* or an *opportunity ICT*, management can easily demonstrate the benefits of the selected new ICT investment to the sales force regarding supporting its everyday work. In case of *freedom ICT*, as I discussed above, the benefits rest on freeing the sales force members from the barriers that they face frequently and for which the ICT support they have fail in supporting them effectively. Similarly in the case of an *opportunity ICT*, management can show to the sales force its benefits in terms of providing a better ICT support compared to the existing one.

The approach would also allow the management to select an ICT that fits the requirements of the sales force jobs as recommended by Speier and Venkatesh (2002). Indeed the analysis through the BTS and BTF frameworks is based on the barriers that hinder the sales force performance. Removing the barriers would fit the sales force's work as it would benefit

many stakeholders: (i) the individual salesperson through enhancing his or her efficiency and effectiveness, (ii) the organisation which would achieve a better bottom line value from improving the performance of its sales force and (iii) the customers who would benefit from a better experience (e.g. better service, better information) as a result of the removal of the barriers that impede the performance of the sales force with whom they interact. Furthermore as shown in the BTF framework, the selection of the ICT support that would help the sales force deal with the targeted barriers is based on the analysis of the fit between the constructed predefined ICT support for the target barriers and the characteristics of a candidate ICT.
Finally the analysis through the BTS and BTF frameworks could be seen as a way of involving the sales force during the decision making process about the technology investment. The models put the sales force's needs, in terms of ICT support to deal with barriers they face, at the centre of analysis and then work back to select the ICT (e.g. freedom ICT, opportunity ICT) that would fit the requirement of the barriers the sales force faces.

*Research question3: What accompanying organizational factors would ensure a successful implementation of the M-ICT?*

The literature review about the sales force adoption of ICT showed that training is an important accompanying organizational factor that would ensure the success of M-ICT implementation for the sales force. The researchers recommend providing users with the necessary knowledge of how to operate the technology in order to enhance its adoption.
The follow-up study about the success of the implemented mobile system to help Pharma's sales force deal with the barriers they face, showed that training is a major accompanying organizational factor. However the sales representatives who participated in the study require an advanced training that would allow them to find out how the various capabilities of the implemented mobile system would support their everyday tasks. This training would help them to assess the usefulness of the system implemented, so that they can integrate its usage into their everyday routines. Additionally the follow-up study points out to the role of management in encouraging the sales representatives to share knowledge among each other.

Referring to the research question revisited in chapter 6 in order to validate the BTS and BTF frameworks through action as recommended by Gummesson, (2000), I summarise the answers, in light of the case study I carried out.

*Revisited research question 1: What barriers to performance do pharmaceutical sales representatives face when they are operating in a mobile work setting?*

The studies showed that Pharma's sales representatives face a number of barriers to performance before, during and after their daily sales trips.
Prior to starting their sales visits, the sales representatives have to find time to review the content of the previous meetings held with the physician and to find out new information not mentioned in previous meetings that the physician may find helpful and interesting. The sales representatives have also to adapt to the shortcomings associated with the technological support they have (the laptop) in order to make sure that the information they need during the working day is available when and where it is required. They make sure to print out in the evening all the documents they consider might be useful during the following day's sales trip.

In the field, the sales representatives face a number of barriers to efficiency and effectiveness. The barriers to efficiency include:

- Physicians not informing in advance in case they cancel an appointment.
- Spending time gaps between meetings just waiting for the upcoming meeting to take place.
- Difficulty of identifying alternative contacts to visit if an appointment is cancelled.
- Physicians requiring a call in advance before arranging a meeting.
- Difficulty in accessing sales contacts in large hospitals.
- Physicians do not like the sales representative to call them during their work hours.

The barriers to effectiveness include:

- Long delay in providing an answer to physicians' outstanding questions.
- Note-taking difficulties during sales visits.
- Difficulty in coordinating with field secretaries in the field.
- Physicians requiring new information during each meeting.
- Physicians appreciating hearing the opinion of other physicians about the company's products.

Once at home after their daily sales trips, the sales representatives have to accomplish work-related activities that they were not able to do during the day. The time that the sales representatives devote to accomplishing work-related tasks at home is used at the expense of their rest and family time.

Revisited research question 2: *To what extent will existing ICT support help pharmaceutical sales representatives to deal with those barriers?*

The analysis of the barriers, with the aid of the BTS matrix, showed that the majority of the identified barriers belong to the lower-right quadrant (i.e. Help-me quadrant) in the BTS matrix. The sales representatives face those barriers frequently during their everyday life routines. However the ICT support available to them in the form of laptop and mobile phone does not provide them with an appropriate support.

The lack of relevant information that could support the sales representatives' actions whenever needed appears to be the main source of most of the barriers the sales representatives face during their sales trips. Useful information that could support both the sales representatives' effectiveness and efficiency in the field might be available. However, they are not accessible when the sales representatives experience a need for them to support their actions. The information is either locked in the corporate database, which the sales representatives cannot access in the field or it is stored in a laptop computer that most of the sales representatives use as a "desktop" at home. Additionally, useful insights remain locked in the sales representative's heads and are not shared with other sales representatives or with the sales management.

The inability to work whenever time is available is the main factor underlying the barriers to efficiency facing the sales representatives. During their sales trips the sales representatives have many opportunities, i.e. time, where they can carry out some of their daily work activities (i.e. administrative work). However, the sales representatives' efforts to exploit such opportunities productively are hindered by the characteristics of the laptop, which does not support "any time work". As a result, the sales representatives extend their working day at the expense of their rest time and work at home to carry out tasks that they could do during the sales trips if they had access to an appropriate information technology support.

The analysis through the BTS framework showed that a new ICT support is needed to free the sales representatives from the target barriers they face.

Revisited research question 3: *What type of ICT support will help pharmaceutical sales representatives to remove the barriers to performance they face when they are operating within a mobile work setting?*

The analysis of the target barriers through the BTF framework showed that the information and communication support the sales representatives need is time-dependent, space-independent and context specific. That is an ICT support that could be accessible anytime and mobilised for action using the lowest possible units of the sales representatives' time. Also an ICT support which is run on a device that is lightweight and flexible enough to get mobilised for action at any place and any time, regardless of how little time is available. The information and communication support needed should also be adaptable to the sales representatives' changing work contexts.

*Revisited research question 4: Will M-ICT fit the ICT support required to remove the barriers to performance that pharmaceutical sales representatives face when they are operating within a mobile work setting?*

The analysis of M-ICT characteristics (i.e. timely information support, ubiquitous terminals, adaptive communication and simple and natural input/output) showed that M-ICT has the potential to fit the target-barriers requirements in terms of information and communication support the sales representatives need.

Following the metaphors depicted in the BTS matrix, M-ICT can be freedom technology, opportunity technology, and convenience technology for the sales representatives. M-ICT has the potential to free the sales force from the barriers located in the lower- right quadrant of the BTS matrix (e.g. performing administrative work at home, managing physicians´ outstanding questions, spending time gaps between meetings just waiting for the upcoming meeting to take place, etc.).
M-ICT has also the potential to be an "opportunity" technology for the barrier related to providing physicians with new information during each sales visit. Although the sales representatives could use the laptop system at home to gather new information for the physicians they plan to visit, M-ICT through alert systems can free the sales representatives from such tasks. This would enable the sales representatives to update their knowledge base without the need to devote time at home for knowledge update, at the expense of family or rest time. Additionally, M-ICT could be a "convenience" for such barriers as coordinating with field secretaries in the field and the barriers of physicians do not like the sales representatives to call them during work hours.

Revisited research question 5: *If yes, what accompanying organisational factors would ensure a successful implementation of the M-ICT?*

The follow-up studies about the success of the implemented mobile system to help the sales representatives to deal with the target barriers raised a major accompanying organisational factor: training.
The majority of the sales representatives who participated in the study were not satisfied with the training (only technical) they had received. On the other hand, they wanted a training that would enable them to find out how the various capabilities of the implemented mobile system would support their everyday tasks. This training from a work system perspective would help prospective users assess the usefulness of the system

The follow-up study also revealed that the mobile system can enhance knowledge-sharing among the sales representatives. However, management support is needed to encourage the members of the sales force to share knowledge with each other. For example, the study shows that sales visits reports are an information source where the sales representatives enter sales visits information, including the nature of questions that physicians they visit ask or useful information about physicians' experiences with company products. Then other sales representatives could access this information and use it as an argument during their sales encounters with physicians. However, the results indicate that the majority of the sales representatives report that they do not frequently retrieve team members' reports from sales visit in order to obtain useful information about physicians' experiences that they can use during their own sales visits. This could be explained by the fact that the current reporting system does not emphasise knowledge-sharing activities, such as storing a useful insight about a physician's experience with company drugs gleaned by one sales representative, for potential use by his/her colleagues. The current reporting system is mainly used as a medium to provide activity records to the sales management team and to enable the sales representatives to store and subsequently review issues discussed in his or her meeting with the physician. As a result, a sales representative may not think it is important to review another team member's sales report if the report contains mainly sales records or the sales representative's personal observations about his/her meeting with the physician. Therefore management should consider encouraging the sales representatives to see the reporting task as more of a knowledge-sharing activity than an administrative duty. The management team could encourage the sales representatives to include in their sales reports information that they perceive as useful about physicians' questions and experiences with the company drug. The company can then collect such insights based on the sales representatives ’ sales reports and re-distribute the useful insights to all the sales force in the form e-mail information alerts, after checking them for accuracy and adding their own comments and evaluations.

To sum up, central to my work has been that for M-ICT to provide a value adding support to pharmaceutical sales representatives, it has (i) to provide solutions to clear targeted needs (i.e. target barriers) of pharmaceutical sales representatives; (ii) to be understood not as a stand-alone technology but in relation to the effectiveness of other technologies, which are available to prospective users. Indeed the evaluation of the value adding mechanisms of M-ICT in relation to the support offered by other technologies is particularly important when we are dealing with M-ICT. The physical and computational limitation of mobile devices makes them unfit for some tasks, e.g. providing an overview of large amounts of information; and (iii) to be supported with training from a work system perspective when implemented, as technical training is not enough. That is, training users about the benefits of using the M-ICT implemented in terms of sharing knowledge and supporting their everyday work tasks. The training from a work system perspective would help prospective users assess the usefulness of the system implemented, so that they can integrate its usage into their everyday routines.

## 8.1 Contribution to research and practice

This dissertation makes a contribution to IS research by conceptualizing the IT artefact that Orlikowski and Iacono (2001) found as missing in IS research.

IS research has been characterized by a dominance of behavioural and information system evaluation work. Behavioural research in IS build on theories that seek to inform researchers and practitioners of the interaction among people, technology and organizations that must be managed if an information system is to achieve its stated purpose (Hevner et al.2004).

The second dominant direction, information systems evaluation, focuses on the effects of information systems implemented. In my opinion, between the two foci of research, there is a need for a third focus. This focus should build on the previous two foci and provide managers with normative models that show them not only the dynamics between the pieces of the system implementation puzzle but also how such pieces should be arranged in order to attain the expected system success (Newman & Robey, 1992). Indeed as discussed in chapter 2 a number of IS scholars are calling for more relevance in IS research.

This dissertation seeks to contribute to information systems research by drawing on previously published theories about information systems adoption and success to develop two models that would help managers select an ICT support that could respond to prospective users needs and has the potential to provide them with a value adding support during the course of their everyday work life.

The dissertation has implications for practice by providing managers with normative models that would enable them to identify how a M-ICT could provide a value adding support to their sales force.

## 8.2 Limitations and future work

The limitations of the study stem from the limited empirical material that is used to validate and refine the normative models developed. The empirical study focused on one technology (i.e. M-ICT) and one segment of workers (i.e. pharmaceutical sales representatives).

As always in science, limitations provide avenues for future work. The normative models developed could be tested with other cases studies with other technologies and/or segments of workers in order to increase their external validity. One avenue would be to apply the frameworks developed in this study to another setting in order to examine whether the normative models will survive another empirical sets of tests. Another interesting avenue would be to re-examine the adoption of the mobile system by the sales force after receiving training from the work system perspective in order to see how the sales representatives have been trained will have an influence on their adoption of the M-ICT. A third avenue of research would be to focus on other segments of knowledge workers (e.g. consultants, auditors) and use the model developed to assess how M-ICT could provide them with a value adding support within the structure of their everyday life.

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# Appendices

**<u>Appendix 1:</u> the questionnaire used in "Pharma's sales Force performance challenges and potential M-ICT support" survey,**

**<u>Appendix 2:</u> the questionnaire used in "Pharma's sales force usage of the mobile system study" survey.**

# Appendix 1

## Questionnaire on the Sales Force Productivity Challenges and Information Technology Support within a Mobile Work Setting

Dear recipient,

Your opinion and experience are very important in helping us to figure out the nature of the challenges sales representatives face when they are operating within a mobile work environment and how mobile technologies can support them. This study is conducted by researchers at the Institute for Advanced Management Systems Research. Filling out the questionnaire should take only 10-15 minutes to complete. We would be grateful if you can return the questionnaire by e-mail to cbenmous@abo.fi

### *Survey, Part 1*

Please complete the first set of the questionnaire by picking a number from the following five point scale that best show how frequently you face the productivity feature described by each statement, during the course of your everyday work.

| **Always** | **Often** | **Sometimes** | **Seldom** | **Never** |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

For example if you think that you always face when you are in the field the productivity feature described by the statement, you would indicate that by typing the number 1 in front of that statement. If you think that you never face the productivity feature described by the statement, you would indicate that by typing the number 5 in front of that statement. If your feelings are less strong type one of the numbers in the middle that best represent your opinion.

**(1)___** Doctors with whom I have booked meetings do not inform me in advance in case they want to cancel a meeting with me.

**(2)______** If a doctor, with whom I have booked a meeting, cancels that meeting, I find it difficult to find an alternative doctor to visit.

**(3)._____** Prior to starting my daily sales trips I print out all the documents (i.e. agenda) I think I would need during the day.

**(4)______** In each sales meeting doctors expect that I provide new information about the products I am promoting.

**(5)______** Doctors appreciate it when I provide them with the opinion of other doctors I have visited concerning the products I am promoting.

(6**)_____ _** Doctors like that I call in advance before arranging a meeting with them.

(7)_____ During my meetings with doctors I need to access information stored in my Laptop.

(8)_____ If a doctor asks me a question that I can not answer, it is difficult for me to know exactly when I can provide him/her with the answer.

(9)_____ The fact that I can not check my e-mail during my sales trips, increases the time it takes me to provide doctors with an answer to their difficult questions.

(10)______ A long delay in answering doctors´ questions harm my relationship with them.

(11) _____ During my meeting with the doctor, if he / she asks me a question I cannot answer, I make a note of it on a piece of paper.

(12)_____ When I have time during the day I enter the notes I have written into my Laptop.

(13)_____ During my meetings with doctors I put my mobile phone in a meeting status.

(14)______ Doctors call me during the day to ask questions about our company’s products.

(15)______ Doctors don’t like me to call them during their work hours.

(16)______ When I have meetings in a big hospital, I find it difficult to access information about the people I know in that hospital.

(17)______ 3When faced with a time gap between meetings I have to spend that time waiting for the next meeting.

(18)______ When faced with a time gap between my meetings, I carry out administrative work (i.e. reporting sales information) using my laptop.

(19)_______ During my sales trips, I find it difficult to coordinate with the field secretary about booking meetings with doctors.

(20)_______ I do my administrative work (i.e. sales reports) at home.

(21)________ I carry my laptop computer with me to each meeting with doctors.

Survey, Part 2

Please complete the next set of questions by picking a number from the following five point scale that represents your opinion.

| Extremely Unimportant | 1 | 2 | 3 | 4 | 5 | Extremely Important |
|---|---|---|---|---|---|---|

If you see that a statement is extremely unimportant for enhancing your performance in the field type the number 1 in front of that statement. If you see that the statement is extremely important for enhancing your performance in the field type the number 5 in front of it. If your feelings are less strong, type one the numbers in the middle that best represent your opinion

Please answer the following questions

**How important is for you?**

(1)______Identifying alternative doctors to visit when planned meetings are not possible,

(2) _____Accessing your company database for information before meeting with a doctor,

(3)______ Checking your e-mail during your sales trips,

(4)______ Recording and reporting meetings information just after each sales call,

(5)______ Accessing your company database during sales meeting in order to address difficult customer objection and issues adequately,

(6)______Learning about existing, new or competitive products while you are driving from one location to another,

(7)______Receiving alerts about displays and exhibition during your sales visits,

(8) ______Providing doctors with straight forward answers to their questions,

(9)_______Accessing doctors sales visit information before meetings,

(10)_______ Accessing field secretaries´ booking actions while you are in the field,

(11) ______Accessing other team members sales visits information while you are in the field,

(12)_______ Receiving alerts about cancellation of meeting with doctors,

(13)_______ Receiving information alerts about potential new customers to visit, during your sales trips,

(14) ______Receiving alerts about customers that have the highest potential in your territory, during your sales trips,

(15)_______ Receiving information alerts about important events in the pharmaceutical industry,

(16) ______Receiving information alerts about competition, during your sales trips,

(17)______ Receiving information alerts about potential traffic jams, during your sales trips,

Thank you for your participation!

# Appendix 2

## Questionnaire on the Usage of Mobile Information and Communication Support System for the Sales Force

Dear recipient,

Your opinion and experience are very important in helping us to figure out the nature of the barriers you face when using the mobile information and communication system (mobile system) that your company provided you with. This study is conducted by researchers at the Institute for Advanced Management Systems Research. Filling out the questionnaire should take only 10-15 minutes to complete. We would be grateful if you can return the questionnaire by e-mail to cbenmous@abo.fi

1. Year of birth _____ 2. Gender (Underline your choice)
- male
- female

**3. Education** (Underline your choice)
- Vocational/ /Technical/Trade school
- Institute
- Polytechnic
- University

**4. How many years have you been working as a sales representative (including the years you have been working for Lundbeck)?**
_______

**5. Estimate the number of hours you work at home <u>per week</u> to perform work related tasks (i.e. administrative tasks) <u>before</u> the implementation of the mobile system: ______**

**6. Estimate the number of hours you work at home <u>per week</u> to perform work related tasks (i.e. administrative tasks) <u>after</u> the implementation of the mobile system: _______**

### *Survey, Part 1*

Please complete the first set of the questionnaire by picking a number from the following five point scale that best represents your opinion. For instance if you totally agree with the statement, type number 1 next to that statement. If you do not agree at all with the statement, type number 5 next to that statement. If your feelings are less strong, type one of the numbers in the middle that best represents your statement.

| Agree | Partially agree | I don't know | Partially disagree | disagree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**(1)**______ If I heard about a new information technology, I would look for ways to experiment with it

**(2)**__ ____ Among my peers, I am usually the first to try out new information technology

**(3)**______ In general I consider myself quite innovative when it comes to information technology

**(4)**______ using the mobile system allows me not to print any documents (i.e. agenda) I think I would need, before starting the sales trips

**(5)**______ using the mobile system enables me to identify an alternative doctor to visit in case an appointment is unexpectedly cancelled

**(6)**______ using the mobile system enables me to provide doctors with new information about the company drugs during each sales visit

**(7)**______ using the mobile system enables me to update more often the targeting of doctors I should visit

**(8)**______ using the mobile system enables me to inform doctors about experiences other doctors have had with the company drugs I am promoting

**(9)**_____ using the mobile system enables me to do my administrative work (i.e. sales reports) when I face time gaps betweens meetings

**(10)**_____ using the mobile system enables me to better coordinate with field secretaries during sales trips

**(11)**______ using the mobile system enables me to respond quicker to the questions doctors ask during sales visits if I don't have an immediate answer

**(12)**______ using the mobile system enhances the quality of my sales visits reports

**(13)**______ using the mobile system frees me from spending time at home on doing work related tasks

**(14)**______ In general the mobile system helps me to perform better in my daily work

**(15)**_____learning to operate the mobile system was easy for me

**(16)** _____ I find it easy to become skilful in using the mobile system

**(17)______** I find the mobile system easy to use in accomplishing my everyday work duties

**(18)_____** Slow data communication (connection to the database and downloading of files takes too long) is a barrier for me in terms of using the mobile system

**(19)____** the small screen of the communicator (compared to the laptop) is a barrier for me in terms of using the mobile system in the field

**(20)_____** I find it difficult to type information using the communicator

**(21)_____** I find it difficult to read information I pulled from the database using the communicator

**(22)_____** It would be more convenient to report sales visits through voice input to the communicator rather than typing it

**(23)_____** It would be more convenient when driving the car to listen to updates about useful work related information using my communicator

**(24)_____** When I need work related information in the field about doctors I should visit I find it available in my company database

**(25)_____** It will be helpful for me if I can access non company databases to obtain work related information (i.e. market information) during sales trips

**(26)_____** I have access to the support I need in case I face a problem in operating the mobile system

**(27)____** I find the training I receive about operating the mobile system sufficient

**(28)_____** I find the information I got about the capabilities of the mobile system sufficient

**(29)_____** I find it difficult to know how all the capabilities of the mobile system could support my tasks in the filed

**(30)_____** It would be helpful for me if I can get help and support on how to use each feature of the mobile system to support my tasks and enhance my performance

**(31)_____** I use the mobile system because my colleagues think I should use it

**(32)_____** I use the mobile system because my superiors want me to use it

**(33)_____** Using the mobile system is compatible with all aspects of my work

**(34)_____** I think that using the mobile system fits well with the way I like to work

**(35)_____** I think that using the mobile system fits into my work style

***Survey, Part 2:***
Please complete the following set of the questionnaire by picking a number from the following five point scale that best shows how frequently you use the mobile system in each operation described by the statements.
For example if you think that you always use the mobile system in the operation described by the statement, you would indicate that by typing the number 1 in front of that statement. If you think that you never use the mobile system in the operation described by the statement, you would indicate that by typing the number 5 in front of that statement. If your feelings are less strong type one of the numbers in the middle that best represents your opinion.

| **Always** | **Often** | **Sometimes** | **Seldom** | **Never** |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

How frequently do you use the mobile system in the **field** to:

**(1)____** Retrieve sales reports before meeting the doctor

**(2)_____** Access the company's database before the sales visit in order to obtain useful information to provide to doctors

**(3)__ ___** Retrieve useful work related information from the Internet

**(4)_____** Retrieve information alerts received from team members

**(5)_____** Access your calendar during the visit with a doctor to book ahead future meetings with him or her

**(6)__ ___** Retrieve information alerts received from the office

**(7)_____** Provide useful information about doctors´ questions to team members

**(8)_____** Enter and send sales visits reports during sales trips when you have time gaps between meetings

**(9)_____** Provide information to doctors about the questions they ask during sales visits and for which you did not have an immediate answer

**(10)_____** Identify alternative doctors to visit when a planned visit is not possible

**(11)_____** Identify new doctors to visit in your territory (i.e. when you have meetings in large hospitals)

**(12)_____** Update the list of doctors you should visit in terms of their importance for visits and continuous targeting when you have free time between meetings

**(13)_____** Learn about the company products when you have free time in the field

**(14)_____** Learn about competitive products when you have free time in the field

**(15)_____** Learn about events in the pharmaceutical industry when you have free time in the field

**(16)_____** Retrieve team members' sales reports in order to obtain information about doctors' experiences with the company products that you can use during your own sales visits

**(17)___ __** Access field secretaries booking actions when you have free time in the field

**(18)_____** Access your calendar in the field to book meetings with physicians

**(19)_____** Use your communicator to build power point presentations when you have group meetings in a hospital

**(20)___** Read and answer e-mail messages

***Survey, Part 3:***

In your opinion how can the mobile system be further improved to fit your job requirements?..........................................................................................
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# Part 2

# Original research publications

1. BenMoussa, C. (2005): “Supporting Salespersons’ CRM efforts through Location-based Mobile Supports Systems”, Journal of Systems Science and Systems Engineering. Vol. 14, No.1, pp.97-114.

2. BenMoussa, C. (2005): “Supporting Sales Representatives on the Move: A Study of the Information Needs of Pharmaceutical Sales Representatives”. In Proceedings of the 18th Bled e-conference, Bled, Slovenia: June 6-8, 2005.

3. BenMoussa, C. (2006): “Supporting the Pharmaceutical Sales Force through Mobile Information and Communication Technologies: An Exploratory Investigation”, In Proceedings of the Helsinki Mobility Roundtable, Helsinki, Finland: June 1-2, 2006.

4. BenMoussa, C. (2006): “Mobile Information and Communication technologies in the Context of the Sales Force Work”. TUCS Technical Reports Publications, No. 749, ISBN 952-12-1692.

5. BenMoussa, C. (2004): “A Task-based Framework for Mobile Applications to Enhance Salespersons’ Performance”, In Proceedings of IFIP TC8 Conference on Mobile Information Systems, Oslo Norway, 15-17 September 2004.

6. BenMoussa, C. (2003): “The effects of mobile commerce on salespersons’ performance”, In Proceedings of the Second International Conference on Mobile business, Vienna, Austria, 23 th-24 th June, 2003.

# Paper 1

BenMoussa, C. (2005): “Supporting Salespersons’ CRM efforts through Location-based Mobile Supports Systems”, Journal of Systems Science and Systems Engineering. Vol. 14, No.1, pp.97-114.

# SUPPORTING SALESPERSONS' CRM EFFORTS THROUGH LOCATION-BASED MOBILE SUPPORT SYSTEMS

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## Abstract

This paper aims at assessing how location-based mobile support systems can support salespersons´ CRM efforts when they are operating within a highly mobile work environment. After briefly discussing the state-of-the-art issues associated with mobile location technologies, the paper conceptualizes key dimensions for location-based mobile support systems. The paper then discusses the dual role of salespersons in CRM. A fourth section suggests a categorization of salespersons´ CRM tasks based on both properties of location-based mobile support and the areas of salespersons' CRM-related tasks that may be affected by mobile location technologies. Finally, the paper suggests potential mobile location services and applications that can help salespersons perform effectively their everyday CRM tasks and links such applications to the determinant of salespersons´ performance. The paper concludes with a discussion of some critical issues and suggests areas for further research.

***Keywords***: Mobile location technologies, Customer relationship management, Salespersons tasks, salespersons' performance, Personalization.

## 1. Introduction

Effective customer relationship management (CRM) has emerged as a strategic imperative for companies in virtually every business. The rapid rates at which innovations can be made and copied have made product advantages brief (Shoemaker, 2001). However, as Day (2001) observed, because nurturing customer loyalty is usually resource-intensive, long-term and difficult to manage, loyalty relations can provide a durable competitive advantage.

Today many companies are trying to move closer to their customers by exploiting the wealth of available internal and external data to better understand their customers' needs, preferences and profitability and then leverage that knowledge in every customer contact. Recent studies show that the movement to CRM is gaining momentum. One study by the IDC Group forecasts that the worldwide market for CRM products and services will exceed US $125 billion while a survey of more than 1500 companies by the Data Warehousing Institute in 2000 found that 91 per cent either have or plan to deploy CRM solutions in the near future (Goodhue and Wixom, et al. 2002). The impetus for this interest in CRM came from Reichheld (1996), who demonstrated a dramatic increase in profits from small increases in customer retention rates. His study showed that as little as a 5 per cent increase in retention had impacts as high as 95 per cent in the net present value delivered by customers. Today's turbulent business environment, the availability of large amounts of data and the advances in information technology have also driven companies' emphasis on CRM in their quest for excellence.

A central activity in CRM is exploiting customer information and insights to create a "360o view" of customers.

Information technology has long been considered a key enabler for CRM applications. Early application of information technologies in the sphere of customer relationship management has taken the form of sales force automation (SFA). Broadly defined, SFA refers to the use of computer hardware, software and telecommunication capabilities by the salespeople in their selling and /or administrative activities (Morgan and Inks, 2001). SFA systems are designed to support the representatives in such things as managing contacts, scheduling sales calls, route planning, recording results from sales calls (calls reports), accessing customer database, sending and receiving sales data, generating proposals and receiving various training programs from the head office. Regardless of the form of any particular SFA system, its primary purpose is to free the sales force so it can engage in more direct selling by reducing the time the representatives spend in "non-selling" activities such as sales support tasks. Another purpose of SFA systems is to enable the sales force to enhance customer relationship through information access and sharing across the different actors within the customer value chain.

Companies have invested in SFA in order to benefit from what such technologies promise in terms of cutting costs (Taylor, 1993), reducing cycle time (Thetgy, 2000), improving organization and access to information. In 1996, it was estimated that in the

USA alone 2.2 million salespeople were using sales force automation systems with a yearly growth rate of 40 per cent (DeGarmo, 1996). However, the deployment of CRM applications, including SFA, has not always delivered the result that organizations expect. Studies show that for every two successful implementations of a sales force support system, there are three failures (Schafer, 1997). Moreover, given the cost in terms of both money and time associated with the implementation of such systems, some authors start questioning even the benefit of such investment. Thetgyi (2000), for example, believes that SFA has brought many companies more pain than profit.

The inability of CRM applications to deliver the expected benefits has been the subject of many studies. Reasons identified include the lack of robust implementation approaches (Rheault and Sheridan 2002), failure to develop a CRM strategy (Rigby and Reichheld, 2002) and firms' resistance to integrating all their disparate "siloed" data to form a business intelligence environment and mobilize that in every interaction with customers (Swift 2002, Goodhue and Wixom, et al., 2002). According to Swift (2002), for example, teaching salespeople to utilize tools is good, but using intelligence and knowledge to drive the sales force brings much higher rewards.

Salespersons play a dual role in CRM. On the one hand, forging close relationships between firms begins with the initial contact by a salesperson who spans the boundary between the selling firm and the customer. On the other hand, salespersons possess valuable market information that is frequently needed in strategic planning and CRM programs. However, crucial marketing information still remains locked in the heads of salespersons in the form of tacit knowledge.

Salespersons also represent a growing number of employees, with an estimated 1.9 million sales reps in the US alone in 2002 according to the U.S Department of Labor (www.bls.gov). In the UK and Ireland there are about 400 000 sales reps (Kodz and Atkinson et al., 1997), constituting approx. 1.4 per cent of the workforce.

The advent of access to services through mobile and wireless devices has resulted in rapid growth in a number of mobile applications and services. Mobile (or wireless) applications, despite being different in their nature, share a common characteristic that distinguishes them from their wire-line counterparts. They put the user at the centre of information and communication by providing location-specific information, personalization, immediacy, and service availability (Durlacher, 2001). These characteristics permit the development of innovative mobile applications to support firms´ salespersons in developing and nurturing committed customer relationships. How and what mobile applications can support these frontline ambassadors in their CRM-related tasks are key questions facing many stakeholders, including sales managers, today.

The purpose of this paper is to assess how can location-based mobile support systems support salespersons´ CRM efforts when they are operating within a highly mobile work environment.

The remainder of the paper is structured as follows. Next the paper discusses the state-of-the-art issues associated with positioning technologies. It then conceptualizes the key properties of location-based mobile support systems. A following section then introduces the dual role of salespeople in CRM through a brief literature review. A fourth section suggests a categorization of salespersons' CRM tasks based on both properties of location-based mobile support and the areas of salespersons' CRM tasks that may be affected by mobile location technologies. Finally the paper suggests potential mobile location services and applications that can help salespersons perform effectively their everyday CRM tasks and links such applications to the determinant of salespersons´ performance. The paper concludes with some remarks and suggests some areas for further research.

## 2. Technology for Location-based Mobile Support Systems

Positioning techniques can be divided into two main categories: GPS -based positioning techniques and network-based positioning. Each category has its own advantages and disadvantages.

In addition to positioning techniques, there are supporting technologies. Supporting technologies refer to the complementary technologies that provide the contextual and /or infrastructural environment within which mobile location services can be implemented in a value-added fashion (Giaglis and Kourouthanassi, et al.2003; Raatikainen and Christensen, 2002; BenMoussa, 2004).

### 2.1 GPS Positioning Technologies

The Global Positioning System is a satellite-based navigation system developed and operated by the US. Department of Defense. GPS operations rely mainly on 24 satellites that transmit signals. GPS receivers process the signals to compute positions in 3D latitude, longitude, and altitude with an accuracy of 10 meters or less. Therefore one of the main advantages of GPS technology is its great accuracy, when operating conditions are favorable. However, in order for GPS to accurately determine the location of a mobile user, the handset must be visible to at least three satellites all the times. As a result, GPS cannot be used in indoors and it may not work in "urban canyons". Yet these are often the areas where demand for location-based services is highest.

In order to overcome the problem of positioning in weak signal environments (i.e. indoors, tunnels); an assisted GPS method (A-GPS) has been developed. A-GPS uses the assistance of the mobile network that directs the handsets to look for specific satellites or collects data from the handset to identify and calculate locations.

### 2.2 Network-Based Positioning Techniques

The most common network based techniques for mobile positioning are cell of origin, time of arrival, Angle of Arrival and Observed Time Difference.

The Cell of Origin (COO) method is the most basic solution and uses cell identification information within the mobile telephony network to identify the approximate location of the caller. The COO method identifies the approximate location of the user by knowing which cell site the device is using at a particular time. The main advantage of the COO method is that no calculation is needed to obtain location information. Therefore position identification is fast and suitable for applications requiring high capacity. However, the accuracy of the COO method depends on cell radius, which can be very large especially in rural areas. Therefore the accuracy of this method is higher in dense urban areas and much lower in rural areas.

The Time of Arrival (TOA) method determines the position of a mobile device by measuring the time of arrival of the signal from a user's mobile device to at least three cell sites. TOA offers better accuracy (10-100 meters). Its main drawback is the additional investment needed by network operators to equip cell sites with location measurement units (LMU). The Angle of Arrival (AOA) method seeks to determine the location of the mobile device based on the angle at which signals transmitted from the mobile device reach the cell site (s). The AOA technique requires a line of sight between the cell sites and the mobile device in order to achieve accurate positioning results. Therefore it is not a suitable location method in dense urban areas where the lines of sight of two cell sites may not be possible.

The Observed Time Difference (OTD) technique determines the location of a mobile device by using location receivers that are geographically dispersed over wide areas. The OTD method determines a user's location by calculating the time it takes for a signal from at least three cell sites equipped with LMU to reach the mobile device. The main drawback of the OTD method is that it requires additional investment both for equipping network cell sites with Location Measurement Units (LMU) and for the required modification of the mobile's device software in order to enable it to perform the necessary positioning calculation (Laitinen. and Kyriazakos, 2001).

### 2.3 Supporting Location Technologies

Mobile location supporting technologies include standards, protocols and other technological capabilities that contribute to the value-added mechanism stemming from the ability to determine a user's location. Supporting location technologies include mobile communication protocols such as Wireless Application Protocols (WAP), standard technologies such as General Packet Radio Service (GPRS) or Universal Mobile Telecommunication Systems (UMTS) and other supporting capabilities such as Geographic Information Systems (GIS).

Wireless Application Protocol (WAP) provides efficient wireless access to the Internet. The purpose of WAP is to provide operators, infrastructure, terminal manufacturers and content developers with a common environment that should enable development of value-added services for mobile phones. Essentially, WAP is the technology that makes it possible to link wireless devices (such as mobile phones) to the Internet by translating Internet information so it can be displayed on the display screen of a mobile telephone or on other portable devices. Therefore WAP handles requests from WAP-enabled handsets and then passes such requests to and receives data from a server. The General Packet Radio Service (GPRS) is a 2.5G technology that supplements the existing GSM, TDMA networks. Data transmission speeds are expected to increase tenfold from 9.6 kbps to 115 kbps.

Geographic Information Systems (GIS) refers to the computer-based ability to manipulate geographical data (i.e. data that have spatial attributes). GIS includes functions to support such operations as acquisition, compilation, storage, update and management of geographically related information. (See e.g. Giaglis and Kourouthanassi, et al.,2003;Tarasewich and Nickerson et al., 2002 for a discussion of those technologies).

## 3. Key Properties of Location-Based Mobile Support Systems

### 3.1 Personalization

Personalization in information systems is about adapting content and services based upon the user's interests, preferences, and behavior. These allow further optimization, which results in a better experience for the user, (Setten, 2003). One key enabler of providing personalized services to users is ensuring the adaptivity of the system. System adaptivity is the process by which a system adjusts itself based upon some form of model of the user's needs. Location awareness can be a key feature in updating the mobile user's model based on the system's awareness of the user's current spatial context. Information about the user's current geographical position when combined with other elements such as the user's daily schedule of activities, or his/her predefined preferences in terms of content or interests would enable the service provider to proactively deliver a meaningful mobile support. Such support would be based on a continuous update of the user's changing spatial environment. For example, within the sales force work environment, the service provider can deliver, knowing the salesperson's geographical position, personalized support that has the potential to add value within the spatial context where the salesperson is located. Additionally, the service provider can deliver the information support in the form that matches the salesperson current work context (i.e. face-to-face meeting with a customer, in a train or restaurant). For example, the service provider can place an alert on the salesperson's smart phone in the form of a text message if the salesperson is in a face-to-face meeting, thus enabling him/her to read the alert and potentially exploit it during his/her interaction with the customer.

**3.2 Relevance**

Knowledge of the user's spatial position can be a key element in providing relevant support to him/her. Awareness of the user's geographical position can provide a good filtering mechanism in terms of determining the fit between the mobile support to be provided to the user and his/her current context. This has the potential of reducing the functional deficiency associated with information overload, where the amount of information the individual user encounters extends his/her cognitive processing capacity (Sorensen and Mathiassen et al. 2002). For example, combining knowledge of the salesperson's current geographical location with his/her calendar of daily activities can inform the service provider that the salesperson is about to meet customer X, whose address matches the geographical position where he/she is located. With the aid of such information, the service provider can give the salesperson relevant information that fits his/her predefined preferences about the customer he/she is visiting.

**3.3 Convenience**

If the service provider knows the geographical position of the mobile user, the process of providing such a user with the targeted support he/ she needs can be accelerated and simplified. Indeed, it will suffice for the mobile user to notify his/her request to the service provider to get the service needed as the service provider knows where the user is located. Indeed, the user's request can be automatically completed by the current location (i.e. if the user asks about a restaurant nearby, the system can infer from the user's geographic position what nearby means and select restaurants in the area). Similarly, a salesperson seeking road directions to get to a meeting with a potential customer in time can just ask the service provider "How can I get to address x?" The service provider can then locate his/her position and provide the requested directions, taking into account, if need be, potential traffic jams. This constitutes a unique feature of location-based mobile support as the question "How can I get to address x?" without mentioning the current location cannot be answered in a wired context.

**3.4 Timeliness**

Another key characteristic of location-based mobile support is the timeliness of the support that service providers can give users with the aid of the knowledge of their locations. The timeliness of location-based mobile support means that the service provider can offer the user support at the moment of value. The moment of value can be defined as "the moment when I, a service provider, can do something for you where you are and regardless of where I am or what time it is"(Keen and Mackintosh 2001). An example of a location-based service at the user's moment of value is when the service provider, using knowledge of a user's location, sends him/her an alert about an approaching traffic jam together with proposals for alternative paths. In the absence of such an alert at that specific moment (before the traffic jam is reached), the user would not be able to avoid the traffic jam. The possible consequences are time wasted and meetings delayed. Another example of timely location-based support is when a salesperson, during or just before his/her interaction with a major customer, receives a useful alert about this customer, sent by his/her market research department based on awareness of his/her location. The salesperson can then use this latest update about his/her customer during sales presentation and thus practice adaptive selling.

**3.5 Proactiveness**

Another key property of a location-based mobile support system is the ability of the service provider to proactively enable the user to react to changing trends in the environment. Using the user's situational context and changing environment, the service provider delivers content without receiving a request from him/her. Providing proactive support to users can be of great importance in terms of saving time (i.e. alerts about traffic jams), taking benefit from an opportunity (i.e. notifications about nearby tradeshows) or avoiding relationship-damaging problems (i.e. getting to a meeting with a new customers on time thanks to road directions or traffic information delivered by the service provider).

## 4. The Dual Role of Salespersons in CRM

Evidence indicates that salespeople play a central role in the evolution of quality business relationships (Crosby and Evans, et al, 1990). According to Kotler (1994), personal selling is evolving towards the salesperson as a "relational manager" who is able to build strong ties with important customers. Further, Swan and Nolan (1985) contend that firms are seeking closer relationships with their customers and that salespeople are important in helping to build these relationships. One reason for the critical nature of a salesperson's role in developing a quality relationship between the firm and the customer lies in the salesperson's ability to develop strong lines of communication with the customer.

In addition to their role as relationship builders, salespeople serve as CRM enablers by reason of the wealth of market information they possess and which can serve as a basis for developing effective CRM programs. The following discusses such a dual role of salespersons in CRM.

### 4.1 The Salesperson as Relationship Builder

In the marketplace, salespersons often perform a vital bridging role that links the firm to customers. For some customers the salesperson is virtually synonymous with the firm (Crosby and Evans, et al, 1990,Czeipeil, 1990). Research into buyer-seller relationships suggests that a firm's salespeople are uniquely positioned to address several issues related to building a quality relationship. Through their interaction with buyers, salespeople can increase the customer's confidence in the supplier. This helps reduce uncertainty and increase trust. The relationship-builder role of salespersons is critical throughout the relationship evolution process. Initially, in the pre-relationship stage, the salesperson may be the only link between the two firms and constitute the customer's chief source of information regarding the supplier. During the development stage, the salesperson plays the role of the customer's representative inside the supplier's firm. Salespersons´ behavior in terms of commitment, competence and service orientation enhance the customer's perception that the selling firm is committed to the relationship and is capable of delivering acceptable performance. Once a strong relationship has been firmly established, it enters the long-term stage (Boles and Babin et al, 2001). As such a stage involves standardizing between the firms to the point of institutionalization; the number of personal communication lines increases. Hence, the salesperson plays the coordinator role between the selling and the buying firm and ensures that the committed relationship is maintained.

**4.2 The Salesperson as CRM Enabler**

The salesperson's role as CRM enabler stems from the knowledge he/she possesses about the marketplace and which can serve as a valuable input in feeding information about customers to CRM. Marketing scholars have indeed been advocating that business salespeople be incorporated into the firm's formal marketing information systems. For example, Klompmaker (1980) stated, "Salespeople are used because they possess a great deal of information about the market. To leave this rich source of information untapped, would be foolhardy" (Evans and and Schlacter, 1985).

## 5.Categorizationof Salespersons' CRM tasks

After discussing both state-of-the-art issues associated with technologies for location-based mobile support systems and the dual role of salespersons in CRM, the paper sets up taxonomy of salespersons' CRM tasks based on both the information contained in the personal selling literature about salespersons' tasks, and the properties of location-based mobile support systems. In this structure, the paper discusses four categories of tasks: targeting, servicing, entertaining, and disseminating tasks. For each category of CRM-related task the paper shows how location-based mobile support systems can support salespersons in performing it when they are operating in a highly mobile work setting. Salespersons are indeed typical examples of mobile workers who are constantly on the move and yet rely on access to information at the moment of relevance in order to accomplish their work. They work at various locations: in their own office, at customers' offices, at other members' offices, at work sites, on the train, plane and car, in a hotel room, etc. Such modalities of mobility impose rigid constraints on salespersons, particularly in terms of both the uncertainty they experience with regard to information and resources they may need to solve the task at hand and the way long-distance collaboration is conducted and coordinated.

Next the paper discusses each category of salespersons' CRM related tasks.

**5.1 Targeting**

Target selling is defined as a salesperson's ability to identify, select, and call on profitable customers (Kotler 1994). Often called "80-20", the concentration principle says that most of salesperson's sales, costs and profits come from a relatively small proportion of customers and products. Targeting tasks thus refer to the use by the salespersons of customer information such as the customer's purchasing history, customer demographics, or promotional history to classify customers and direct their relationship efforts to those with the highest sales potential. Targeting tasks involve classifying both current and prospective customers.

Location-based mobile support can help salespersons in their targeting tasks through its ability to mobilise relevant information about customers' status to salespersons despite their being constantly on the move and at the moment of relevance. For example, a salesperson, based on location, can be notified about his/her customers changing orders together with competitors´ moves as collected by intelligence systems so that he/she can proactively respond to the threat of losing his/her accounts. Likewise, the salespersons, based on their current location, can be told about sales leads located in the same geographical area together with the degree of attractiveness of such leads. For example, based on the salesperson's geographical position, they can receive alerts together with road instructions, be informed about trade shows in the neighbourhood where there are prospective opportunities to be found.

**5.2 Servicing**

The quality of customer/salesperson interaction, as perceived by the buyer, is important in determining customer satisfaction with the interaction (Bitner and Booms, et al., 1990). It has been shown that service quality is an antecedent to customer satisfaction as this has a significantly positive effect on the salesperson/customer relationship. Research suggests several reasons for why salespersons should pay attention to servicing their current set of customers. First, a customer's satisfaction with the quality of service determines whether the buyer-seller interaction will continue. This is fundamental to sales success as future sales opportunities depend on the quality of the relationship (Crosby and Evans, et al, 1990). Second, satisfied customers are likely to be a source of positive word of mouth and might refer new customers. Third, the cost of acquiring new customers is several times higher than the cost of retaining a customer (Reichheld 1996). Thus account servicing can be a critical selling activity.

Examples of salespersons' servicing tasks include presenting the product, handling shipment problems, following up customer's orders, keeping track of invoices, providing product information (Moncrief and Lamb et al., 1986).

Location-based mobile support can affect salespersons' servicing tasks by reducing the time it takes for a salesperson to address customer problems associated with orders or products through empowering him/her to deal with customer problems without referring to head office. For example, with the ability to track the product locations, the salesperson can answer order-related questions without referring to the logistics department.

**5.3 Entertaining**

Salespersons' entertaining tasks combine entertaining the customer with selling to the customer . (Moncrief and Lamb et al., 1986). The purpose is to form a strong bond between salesperson and customer. Examples of entertaining tasks include taking the customer to dinner, taking the customer out for a drink or hosting a party for the customer.

Location-based mobile support can help salespersons in their entertaining tasks by providing them, according to their geographical position, with information about restaurants located nearby where they can take their customers to lunch or dinner. Furthermore, location-based mobile support can enable the salesperson to receive alerts about the customer he/she is with during the entertaining event and uses the information she receives during the interaction.

**5.4 Disseminating**

As discussed earlier, salespeople enjoy the unique role of observing the match between an organization's offerings and the market(s) it serves. In addition, salespeople are in a position, through interaction with their customers, to acquire extremely sensitive information about competitors and developments within the customer's industry (Taylor, 1993). They can, for example, be exposed to rumors about customers' or competitors' projects, learn about new product launches before they take place, discover new products, and gather information about discount policies and competitors' policies. Location-based support systems can enable salespersons to exchange useful market information among their communities of practice based on their knowledge of each other's location. In this case knowledge of the geographical position can serve as a filtering tool that helps the salesperson to assess whether a market alert sent to colleagues would add value for him/her or would result in information overload. For example, a salesperson, identifying a cross-selling opportunity, can check based on the knowledge of her colleague's geographic position whether or not he/she would be able to attend the meeting being held with a customer and during which the cross-selling opportunity emerged. Location-based mobile support systems can also enable the salesperson to receive useful insights about him/her customers based on the market information that he/she, together with colleagues, has already fed into the customer database. For example, a salesperson discovering a threatening competitor's move in him/her colleague's sales area may proactively alert him/her based on the colleague's location. The salesperson may also send the alert to the customer database and then the service provider can check the colleague's location for the most suitable time to deliver the content together with instructions about the defensive intelligence the salesperson should practice in order to protect him/her accounts.

## 6. Linking Salespersons' Mobile Location Applications and Services to the Determinants of their Performance

After discussing a taxonomy of salespersons' tasks, which is based on both key properties of mobile location-based support and the areas of salespersons' tasks that may be affected by location-based mobile support systems, the paper now presents potential mobile location applications and services (MLS) that can improve the performance of salespersons in their tasks. The paper categorises such mobile location applications and services as the adaptive, the proactive, the locative and the disseminative. The papers shows how each category of such applications can support salespersons´ CRM tasks and enhance overall performance through its impact on a number of mediator variables that constitute the determinants of salespersons' performance. Indeed, several authors (Mooney and Gurbaxani et al. 1996; Huber, 1990; Davenport 1999) have proposed that in order to uncover the added value mechanisms and the impact of information technology on productivity, studies should include the intermediate benefits of information technology. For example, according to the theory of the effects of advanced information technology (Huber's 1990), the benefits in individual and organisational efficiency occur indirectly through the positive impact the technology has on information and communication processes.

### 6.1 Adaptive MLS

Location-based mobile adaptive applications are aimed at supporting situations where the salesperson is engaged in interaction with a customer within the framework of servicing and entertaining tasks and needs useful information about the customer so that he/she can practice adaptive selling. Salespeople's adaptive selling is one of the main determinants of their performance (Weitz and Sujan et al, 1988; Sipro and Weitz et al., 1990; Sujan and Weitz, et al, 1994). Indeed, the process of selling requires that the salesperson match the customer's needs with the available range of products. The process of adaptive selling involves two stages. In the first stage, the salesperson uses available information to form impressions about the customer. The next stage is to formulate a sales strategy that maximises the fit between the customer's preferences and the company's offerings. Through the practice of adaptive selling, salespeople exploit the unique opportunities of personal selling. However, it has been shown that adaptive selling can be improved by providing salespeople with the necessary market information and resources so that they can exploit insights from other sales situations in the customer contacts in which they are currently engaged (Weitz and Sujan et al.1986). For example, the market intelligence department can use knowledge of the salesperson's location to send an alert about a new discount policy introduced by the company's main competitor for the product being sold to the customer. The salesperson can then read the alert and prepare suitable arguments should the customer raise issues associated with new competitor's discount policy. Likewise, the salesperson can receive, according to his/her location, real-time notification about the business of the customer visited and use such information in tailoring his/her proposal to the customer.

Location-based adaptive applications can also help salespersons to alter their sales call schedule by means of alerts about customers changing orders and profitability as well as about moves by competitors so that they can target their relationship efforts on the most profitable customers. For example, the market research department may send an alert to the salespersons that one of their customers, who is located nearby, has just cancelled an important order. Such alerts would enable the salesperson to adjust his/her sales visits schedule so that he/she can devote more efforts to react to the potential account loss.

**6.2 Proactive MLS**

Proactive MLS enable salespersons to continuously search for market opportunities and experiment with potential responses to a changing environment. Examples of proactive location-based mobile applications include notifications, according to the salesperson's geographical position, about sales leads located nearby. For example, the market research department can send alerts about trade shows in the area where the salesperson is located. Similarly, a telemarketing support centre can provide real-time alerts to the salesperson about high-quality leads that are in the same area as the salesperson. Depending on the quality of the lead (i.e. sales versus no sales) and the salesperson's sales calls schedule, the salesperson can agree or refuse to make a face-to-face sales visit to the sales call identified by the telemarketing support centre. If the salesperson agrees to make the sales visit, then additional information from the marketing research department can be sent to his/her mobile terminal about the lead including a rebuttal to prepare him/her for any question that the prospect may raise (BenMoussa 2004). Proactive MLS would enhance the salesperson's ability to focus efforts on value-adding activities such as maintaining a quality relationship with his/her customer. In addition, proactive MLS have the potential to enhance the salesperson's customer orientation, which is a key determinant of a salesperson's performance. Support for the use of customer-oriented selling is provided by the contention that customer orientation is an important characteristic of high performers (Kelly 1992, Bragg, 1986, Mackay 1988; Peterson 1988). For example, according to MacKay (1988) the "best" salespeople are genuinely interested in their customers and sales representatives sell to people, not to computers.

**6.3 Locative MLS**

Locative MLS are aimed at empowering the salesperson to deal with customer requests and problems. The purpose is to shorten the time it takes to address customer problems and concerns. Examples of locative MLS may include product tracking applications and customer support staff locating applications. Product-tracking applications would enable salespersons, irrespective of their locations, to track the delivery status of products ordered by customers, either by connecting wirelessly to smart tags incorporated in the products or by receiving location-based alerts about the order status of customers in the same geographical location as the salesperson. This can enhance their ability to answer a customer's order-related inquiries rapidly, accurately and irrespective of their locations, which would enhance their customer orientation. Furthermore, receiving an alert about the status of a customer's order may enable salespersons to react to possible shipment problems that may result in a delivery delay.

Customer-support staff-locator applications enable salespersons to locate the nearest customer-support staff in order to address a customer's problem. The salesperson can send a request to locate customer-support staff, display their locations on a map and forward the customer's request for service to the nearest field worker. Upon receiving confirmation that the field worker can perform the service, the salesperson can then provide his/her customer with an accurate estimate of the arrival time of the personnel. Dispatching the nearest customer-support field employee has the potential to reduce the time needed to provide support to customers, which in turn enhances the customer's perception of the salesperson's empathy.

Colleague-locator applications support situations where the salesperson needs to collaborate with colleagues in order to deal with a complex sales problem. The salesperson can then identify the colleagues who are in the same area and check whether they are available for a meeting or a conference call.

**6.4 Disseminative MLS**

Disseminative MLS support the situation where the salesperson wants to alert colleagues to a market opportunity and/or potential threat within the colleague’s sales area. The salesperson can use the geographical position of the colleague as a filtering mechanism to assess the potential impact of the alert in terms of information overload. For example, the salesperson can uncover a competitor’s deficiency in the colleague’s sales area. The salesperson can then use the colleague’s geographical position and calls agenda to assess whether or not the insight uncovered may help the colleague in practising adaptive selling with the customer he/she is visiting. Therefore the salesperson may either notify him/ her colleague directly or elect to submit the alert to the corporate customer database for subsequent forwarding to him/ her colleague.

Disseminative MLS have the potential to exploit the wealth of information salespersons possess as a result of their daily interactions in the market place. In addition, disseminative MLS provide salespersons with a tool that can improve collaboration between them even if they are constantly on the move. Furthermore, enabling salespersons to disseminate a market insight immediately after it has occurred (i.e. after the sales interaction) enhances their accuracy. The importance of accurate customer knowledge to a salesperson’s performance is intuitive. If salespersons’ perceptions are inaccurate, it can adversely affect the building of a customer relationship in at least two ways. First, inaccuracy in assessing customer requirements by the salesperson will negatively affect both relationship building and corporate profitability, particularly in industries where salespersons are given the latitude in tailor prices and services to individual customers. Second, the inaccuracy on the part of salespersons in the company’s planning processes, including CRM programmes, will adversely affect the quality of these plans (Lambert et al.1990).

## 7.Conclusion and Implications

The paper explored the area of mobile location technologies within the framework of one category of salespersons every day tasks, which is customer relationship management. More specifically, the paper provides a taxonomy of salespersons CRM tasks based on the areas that might be supported by location based applications and services. Moreover the paper suggests potential location-based mobile

application and services to support salespersons’ CRM efforts and linkes such applications to determinants of salespersons performance in achieving their dual role in CRM. The paper aims at assisting stakeholders including sales managers to understand the potential added value that mobile location technologies can provide salespersons with and takes into consideration the nature of their tasks and the determinants of their performance.

It is worth mentioning that the technology for mobile location and services is progressing at fast pace. Moreover, mobile location applications and services can raise a number of issues. Perhaps one main issues is the functional deficiency of information overload, where the number of alerts the salesperson receives extends his or her cognitive capacity.

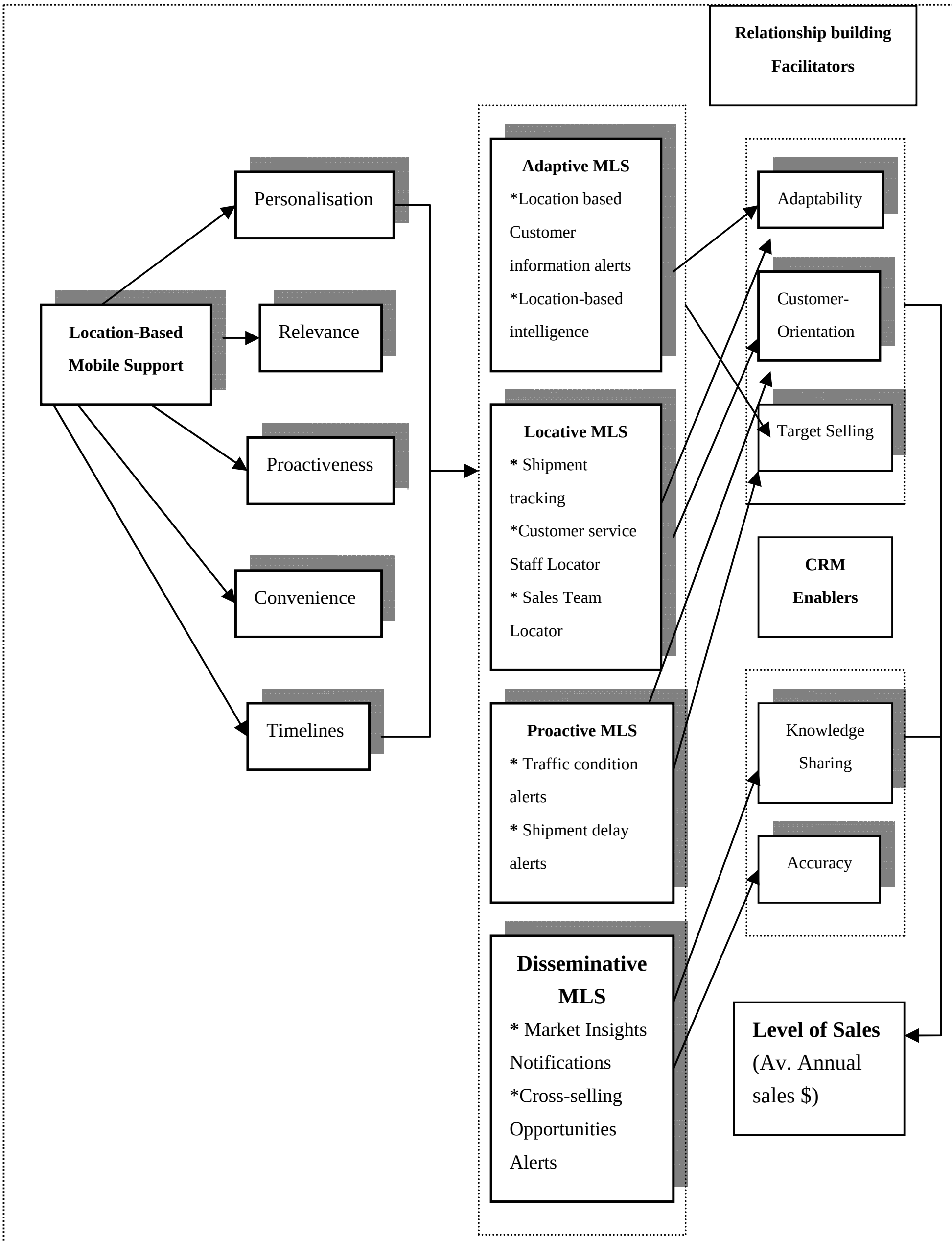


Figure 1: A model linking a location-based mobile support system with salespersons´ determinants of CRM performance.

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# Research Paper 2

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**18th Bled eConference**

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Bled, Slovenia, June 6 - 8, 2005

# Supporting Sales Representatives on the Move: A Study of the Information Needs of Pharmaceutical Sales Representatives

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## Abstract

*The purpose of the current study is to understand the nature of the challenges that sales representatives face as a result of operating within a highly mobile and heterogeneous work environment. The paper also focuses on how the sales representatives manage their information needs and discusses the properties of mobile support systems that would enable them to work effectively despite their being extensively mobile. This is achieved through a case study involving the sales representatives of a medium-sized pharmaceutical company*

## 1. Introduction

Sales representatives (sales reps) play a central role in many companies, spanning the boundary between the selling firm and the customer. For some customers the salesperson is virtually synonymous with the firm (Crosby et al., 1990; Czeipeil, 1990).

They also represent a growing number of employees, with an estimated 1.9 million sales reps in US alone in 2002 according to the U.S Department of Labor (www.bls.gov). In the UK and Ireland there are about 400 000 sales reps (Kodz et al., 1997), approximately 1.4 per cent of the workforce.

Given both the size and the role of the sales reps within organisations, it was not surprising that such a group of workers has figured on the agenda of numerous researchers from different disciplines including marketing, organizational behaviour and human resource management (see, for example, Churchill, et al.1985, Sujan, et al., 1988, Weitz et al., 1986, Kotler, 1994). However, it was surprising to note that the sales force has been relatively overlooked in information systems literature, despite its growing size, role and the boom in the sales force automation (SFA) market. There have been few studies that explicitly considered the information needs of the sales force and examined how to exploit information and communication technologies to support them effectively despite the great mobility of their work.

Work mobility is indeed one key dimension that characterises the work of sales representatives. Such mobile workers spend most of their working time out of their office, interacting with customers and attempting to bring new orders to their companies.

In recent years, there have been numerous research endeavours tending to focus on mobility and mobile work issues especially in the research fields of computer-supported cooperative work and mobile informatics (see for example, Kristoffersen and Ljungberg, 2000; Fargrell 2000;Bellotti and Bly,2000; Wiberg, 2001) Some of these studies have produced significant results. However in a number of studies focusing on work mobility, there has been a tendency to consider mobile work as a temporary separation from the stationary work setting. That is, the worker temporarily works away from his/her office and then comes back to his/her resource-rich work setting. Studies that focus on situations where mobile work rather than stationary work is the norm, which means that the workers carry out all their work-related activities outside the office moving from one activity to another, are lacking. Additionally, there is a paucity of interpretive empirical studies that consider the challenges that mobile workers face and the information support they might need as they move within both heterogeneous and dispersed work environments(March et al, 2000), during the course of their everyday work. And none have explicitly considered such themes in relation to the sales force's work.

The purpose of the current study is therefore to further understand the nature of the challenges that sales representatives face as the result of operating within a highly mobile and heterogeneous work environments. We focus on how the sales representatives manage their information needs and discuss the properties of mobile support systems that would enable them to work effectively despite their extensive work movement. This is achieved with the aid of a case study involving the sales representatives of a medium-sized pharmaceutical company.

The remaining part of the paper is structured as follows. The second section outlines the research methodology. Then, in section 3, the paper presents evidence from the case study and discusses the performance challenges that the sales reps face before, during and after their daily sales trips. Section 4 discusses the implications of the study for the design of mobile support systems for the sales force. The paper concludes with some remarks and suggests areas for further research.

## 2. Research Approach

This paper reports on the initial empirical findings from research undertaken in the sales and marketing group of a subsidiary of a multinational pharmaceutical company (Pharma Co) employing 6000 people worldwide in 2003, about half of them engaged in sales and marketing activities. Pharma is a medium-sized company operating as a niche player with a particular expertise in the area of psychiatric and neurological disorders.

The company has a national sales team consisting of 14 sales representatives and four territorial sales managers. These sales representatives report to a sales manager who is ultimately responsible to the marketing manager.

We conducted five semi-structured interviews lasting on the average two hours with Pharma´s sales and the marketing managers who supervise the sales force. The purpose was to document and validate the existing sales process, discuss their criteria in assessing and rewarding the reps' performance and identify activities that they regard as potential performance inhibitors for their sales reps. subsequently; data were collected through observation by the means of field sales trips. The field sales trip lasted an entire day and represented "an ordinary day" in the life of a Pharma sales rep.

The interviews were supplemented with informal interactions and discussions over lunch.

All the interviews and discussions were recorded, transcribed and subjected to content analysis using established qualitative coding techniques prescribed in qualitative research methodology. Throughout the research process, the field material was categorised into issues, then themes and then "made sense" of (Hayes (2001) by drawing on the theoretical approach that underpinned the research study.

## 3. Pre-, in- and Post-Mobility Challenges

This section draws on the detailed case material to indicate the difficulties that Parma's sales reps experience during the course of their everyday work activities. The paper assigned these challenges to three main categories, pre-, in- and post-mobility challenges. In the following we consider each key challenge posed to Pharma's sales reps performance in turn.

### 3.1 Pre-Mobility Challenges: Planning How to Deal with the Unpredictable

The first challenge that the reps face prior to starting their daily sales trips is the difficulty in predicting whether or not he/she can be received by the general practitioner (GP) with whom a meeting has been scheduled during the day. As the following extract from a sales rep illustrates, in many situations the sales rep fails to see the GP because of unpredictable circumstances that might make the doctor not available for the meeting.

> *"You never really know (with regard to meeting with GP). You should only hope that he will be there and, of course, face the reality that there may be a problem with your schedule. I sometimes call on a neurologist with whom I had a booking, I might be waiting outside her office; and then a nurse comes to me and says the doctor is too busy at the moment, "I am sorry you cannot see her today".*

The uncertainty associated with the planned meetings with GPs makes it difficult for the sales rep to plan for an alternative activity if the meeting is unexpectedly cancelled. Indeed, in most cases, the cancellation happens at the last minute, when the rep is already waiting for the meeting outside the GP´s office. As a result, if the meeting is cancelled the sales rep moves to the next sales visit scheduled for the day and waits in the car or in a cafeteria until the meeting time with the next GP, with the frustrating feeling that he/she will not meet the quota of five sales visits of the day.

Another challenge that pervades the pre-mobility stage was associated with preparation for the presentation that the sales rep will give during the following day's sales visits. Indeed, the reps have to visit their targeted GP at least 5 times a year. Prior to each sales visit, the reps review the content of the previous meetings held with the GP and try to gain new information not mentioned in previous meetings that the GP may find helpful and interesting. As one rep explained:

> *"The doctor would be pleased if you can provide her with new information she does not know…You should prove to the doctor that you are up to the task and that you know more than her".*

A further difficulty that the reps face prior to starting their sales visits is adaptation to the shortcomings associated with the technological support they have (the laptop) in order to make sure that the information they need during the working day is available when it is required. For example, given the fact that the reps know that they cannot get access anytime and anywhere to the information stored in their laptop or within the corporate database, they make sure to print out in the evening all the documents they consider would be useful during the following day's sales trip. However, the strategy of printing files on particular topics (for example, the day's schedule) is not always effective in adapting to the deficiencies associated with the technological support they have access to, as one rep explained:

> *"Usually I print the timetable for next day at night. Last night I forget to print any paper to remind me where to go and I didn't do it in the morning because I have a little daughter and I don't want to interrupt her sleep in order to get my briefcase. When I don't remember to print my schedule, then I don't want to do it the following morning, either, for fear of waking her up. Fortunately this morning I have only four meetings and I can memorise them when I check them on the laptop".*

### 3.2 In-Mobility Challenges: Making the Most of Working Time

Kristoffersen and Ljungberg (2000) categorised people's mobility into three types: travelling, visiting and wandering. *Travelling* is the process of going from one place to another using some means of transport such as car or train. This kind of mobility refers to the mobility of people in a vehicle. *Wandering* is extensive local mobility in a local area. *Visiting* is spending time in one place for a certain time before moving on to another place. The visiting type of mobility refers to the process in which people spend time in a place on a transitory basis before moving on to another place.

The work of Pharma´s sales reps exhibits all the above three modalities of mobility. They spend a considerable portion of their time travelling by car from one GP´s location to another. Their daily work activities involve visiting when they spend time meeting the GPs in their offices or other places (i.e. restaurant). They sometimes exhibit the wandering type of mobility when they schedule meetings with many GPs located in the same building (e.g. hospitals). However, in addition to the above categories of mobility, there is another modality of mobility that emerges form observing Pharma´s reps daily work activities in the field, which the paper labels as *waiting* (see figure 1). Waiting is spending time waiting for the scheduled activity to take place. It captures the situations of "in betweeness" among the activities that the rep carries out in a mobile work setting. It is the case when the reps arrive at the meeting place before the agreed time, possibly thanks to better than expected traffic conditions, or get their meeting cancelled by the GP and therefore go back to the car or some other place (e.g. a cafeteria) until the time for the next scheduled meeting comes.

In the following we discuss key challenges posed to the performance of Pharma´s sales reps when they operate within each of the different modalities of mobility.

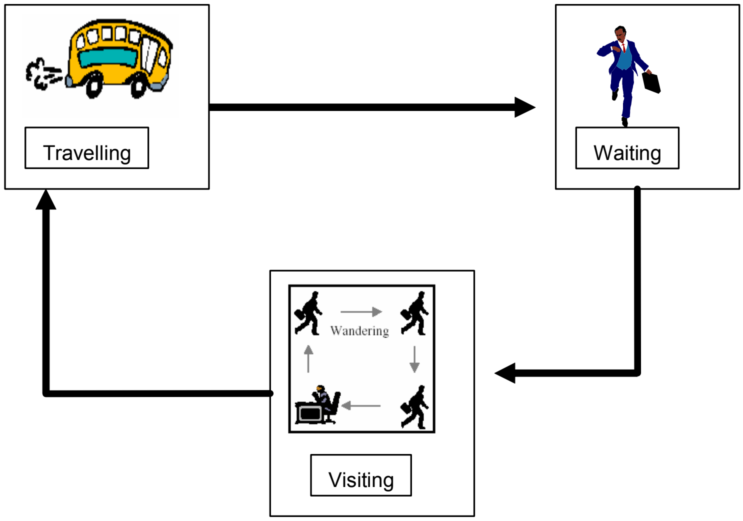


*Figure 1: Four types of mobility (Adapted from Kristoffersen and Ljungberg (2000)*

### 3.2.1 Barriers to Performance when Visiting

The key hindrances to effective working that Pharma´s reps encounter when they are operating within the visiting modality of mobility are as follows.

***Adaptation during short sales visits***

A common challenge facing Pharma´s reps is that GPs devote a short time to the meeting with them. In most cases the sales visit does not last more than 15 minutes. Moreover, they experience strong competition with reps from other competing companies for the time that the GP has set aside for meeting pharmaceutical sales reps. In some cases, hospitals discourage the GP from meeting pharmaceutical sales reps during ordinary working hours. Therefore, the GP schedules those meetings during their own short breaks (e.g. lunch time).

The short meeting time and the competition for it among the reps representing various pharmaceutical companies put pressure on Pharma´s reps to be as much effective as possible during their short sales visits to GPs. One key method of improving Pharma´s reps' effectiveness during sales visits is to make the GP realise that the meeting with the rep is intellectually rewarding as one rep mentioned:

> *"Every time you come, they (doctors) expect you to have something new. They also want to hear other doctors' opinions, their experience with the drug, they want you to deliver all the information you heard from other doctors. Even though you know your drug quite well, a doctor believes another doctor more than the rep".*

A further difficulty that sales reps face during their sales visits is the need to adapt to the questions and issues that GP may raise. Indeed, to be effective during the sales call they need to demonstrate knowledge and assertiveness with regard to the various questions raised by the GP.

Laptop computers, though they contain valuable information in their hard drive, were not regarded by the sales reps as appropriate in supporting an unanticipated need for information during interactions with GPs. Their size, weight, and long boot-up time prohibit them from being regarded as convenient supportive technology. Therefore most of the reps do not take them on sales trips and if they do, they leave them in the car. Moreover, the company forbids the sales reps to use their laptops during sales calls. On the other hand, the time devoted to the meetings with doctors is too short to allow appropriate access to paper-based documents as a means to deal with unexpected information needs. Therefore the reps rely mainly on their own knowledge base stored in their memory.

***Managing follow-up questions***

During the sales visits Parma's reps face the situation in which the GP asks questions for which they do not have the answer. In such cases the reps would make a commitment to the GP about a date when they can supply the required information. They first make sure that they record the question(s) so that they will not forget the GP´s information requests and then try to figure out which colleague can help in providing the answer.

The difficulty associated with GPs´ follow-up questions is the long time it takes to provide an answer:

> *"If there is a question I can't answer, I need to find out who can answer and make a phone call to our product manager. Sometimes it takes days because the product manager may need to request the information from abroad (headquarters). When he gets the information, he submits it to me via e-mail but I need to go home to read the e-mail before getting back to the doctor"*

The lack of access while on the move to such a basic communicative resource as e-mail by the reps contributes to lengthen the time it takes to provide the information to the GP. The reps can access e-mail only at the end of the day when they are at home via a dial-up to the head office. Therefore it might be the case that the product manager submits the answer to the rep in the morning, but the rep is not aware of it till the evening, when he/she gets home, which adds more time to the process of answering follow-up questions.

A further difficulty that the reps face in terms of dealing with follow-up questions is related to finding a fast way to contact the doctor and deliver the answers to their outstanding questions as one rep explained:

> *"Sometimes doctors may need things urgently; the quicker you deliver the information the better. The problem is how to reach the doctor. Some of them don't like us calling them during working hours".*

The long time it takes to provide the doctors with answers to their questions may be detrimental to both the sales reps and the company. For the sales rep, a delay in answering the doctor's questions may affect their customer orientation as perceived by the GP. Moreover, the GP may be waiting for information related to an important Pharma´s drug issue such as its side effects or interaction with other drugs. In this case, failure to satisfy the doctor's need for information would delay the decision to prescribe the drug till he/she gets the information from the rep.

***Note- taking during sales visits***

During the short meeting with GP, Pharma´s reps rely mainly on their own memory for recording what they perceive as useful information such as the drug-related issues discussed with the doctors or questions that the GPs have. For information that the reps perceive as highly important (i.e. questions needing a follow up), the rep writes it down in order not to forget, and then, enters the handwritten information into the laptop when there is sufficient time between meetings. As one rep explained:

> *"During meetings with doctors I try to memorise. If there is an important thing I write it on a piece of paper to make sure that things that were asked of me could be answered for sure. Then when I have sufficient time during the day, I try to open the laptop and input the information just to make sure it stays there and I don't have to find my piece of paper later on".*

In the evening, once at home, the rep connects to the company's database and enters the sales reports of the day. Some reps leave reporting tasks till the weekend and input the sales reports of the whole week.

***The availability gap***

A further challenge that the reps face during their sales visits is what the paper terms as the availability gap. When doctors encounter an urgent need for information about Pharma´s drugs, they try to make a call to the reps. However, during their sales visits, the reps put their mobile phone on the "meeting status" and thus they cannot answer incoming calls. After the sales visits, the reps may try to call back to the doctor who initiated the phone call but the doctor may be busy and not available to take the rep´s call. The availability gap may result in the doctor lacking context-specific information that he/she may need to deal with a patient being treated. The doctor may contact the rep using e-mail to ask for the information needed. However, by the time the rep gets home at the end of the day, reads the e-mail and sends a reply to the doctor, the information may no longer be relevant to give the doctor what he/she needs to know.

### 3.2.2 Barriers to Performances when Travelling

Travelling from one location to another using the car is one of the most time-consuming activities for Pharma´s reps. Pharma's reps spend on average more than a third of their working day on the road, in normal weather. The main challenge posed to the reps during travelling is how to make the long time they spend on the road more productive despite the physical and legal constraints (access to work resources, legislation prohibiting talking over a mobile phone while driving) resulting from driving the car.

> *I spend about half of the working day driving from one place to another. This time is too much to get wasted. The whole goes to listening to radio. I can't even reply to my customers´ phone calls during this time."*

### 3.2.3 Barriers when Wandering

A number of the reps´ meetings with GPs take place in large hospitals where they may encounter many opportunities for sales leads given the hospital's large medical workforce as one rep explained:

> *"When you go to hospitals you know that there is a lot of potential for the same hospital. Even when you have only one scheduled meeting in the morning, you can reach lot of doctors during the morning if you can remember your contacts in the hospital. You can just call them and say that I am here. It is possible that somebody may be having a coffee break and automatically comes to the cafeteria where you can offer him coffee; his colleagues may also join him".*

The key challenge that the reps may face when they have a sales call within a hospital is how to get access to useful information about potential prospects within the hospital so that they can know who to call and whether or not he/she might be interested in meeting them.

> *"It is important that you have access to the information about the doctors within the hospital so that you can easily get a recall picture such as, for example, who knows me in this hospital, is there a doctor who once asked me to give him a call when I am in the hospital and the like".*

### 3.2.4 Barriers when Waiting

The main hindrances to effective working that Parma's reps face when they are operating at the waiting modality of mobility are the ability to work in dead time periods, coordination with stationary colleagues and dealing with an impromptu information need.

***Working in dead time***

Periods of dead time refer to the amounts of time that take place during the working day and that Pharma´s reps perceive as wasted because they unwillingly spend it without performing any work-related activity. In the case of Pharma's sales reps, the occurrence of dead time is frequent and has various causes. One cause is the difficulty in predicting its happening so that the reps can plan ahead for the kind of activities that would enable them to make a good use of it. For example, in the event of a last minute cancellation of a meeting the reps find it difficult to fill that time with a value-generating activity such as visiting another contact (see Fig. 2). Generally GPs require to be contacted in advance in order to arrange a meeting with the rep. Therefore the time devoted to the cancelled meeting turns to be a dead time, as one rep mentioned:

> *"When you have a long gap between your contacts, what you can do is to wait for the next meeting. You may try to visit another doctor but most of them like you to call them before hand, sometimes a few weeks in advance".*

Another cause of dead time for Pharma reps is the lack of appropriate technological support that would enable the rep to perform a work-related activity during this time. A laptop computer is awkward to support the reps during dead time because of its size and also the long time it takes to get the device mobilised to provide the required support. The reps try to use the laptop generally in the car. However, if the rep faces short dead time (e.g. between two meetings in a hospital), and wants to use the laptop to perform a scheduled task or retrieve information, he/she is discouraged from doing that. This is because the rep figures out that by the time he/she gets to the car in the parking area and starts the laptop, the time for the next meeting will come. Therefore the rep may choose to use the short dead time just waiting outside the GP´s office or in the hospital's cafeteria.

***Coordinating with stationary colleagues***

A further difficulty that Pharma's reps experience is coordinating with co-workers who are operating within a stationary work setting. The reps need to cooperate closely with field secretaries who partly arrange the rep´s meetings with GPs. However, in some situations the lack of mutual awareness with regard to the actions undertaken by the reps and the secretary in terms of booking time for meetings with GPs can be detrimental to the rep´s relationship with GPs:

> *"The worst thing that may happen is that when you have just booked a doctor for yourself and then for the same time the secretary makes you a booking with another doctor and they are both very important. Then you have to decide what to do, which one you have to transfer to another time. It is not easy as they are busy and you may not find another time to catch him or her"*

The lack of a real-time awareness of the booking actions undertaken by both the secretary and the rep also hinders the ability of the secretary to book meetings with the GP, as one rep mentioned:

> *"Sometimes I tell my secretary that I have just written an e-mail to a doctor am waiting for his reply. Then my secretary is also waiting, she is a kind of engaged, she does not have all the potential that she would have in another case if she knows what is happening in my day. She needs to wait until I check the doctor's answer when I get access to my e-mails at the end of the day"*.

In some situations, even mobile phones fail to support the reps in alleviating this kind of coordination problem as one rep explained :

> *"It is not always possible to reach the secretary by phone, when I have some time and try to call and inform her about the days I suggested to doctors. I may find all the lines busy because there are four other reps trying to call her and all of us are served by the same secretary. When she tries to call me back, I may be in meetings or driving and not available to take her call"*

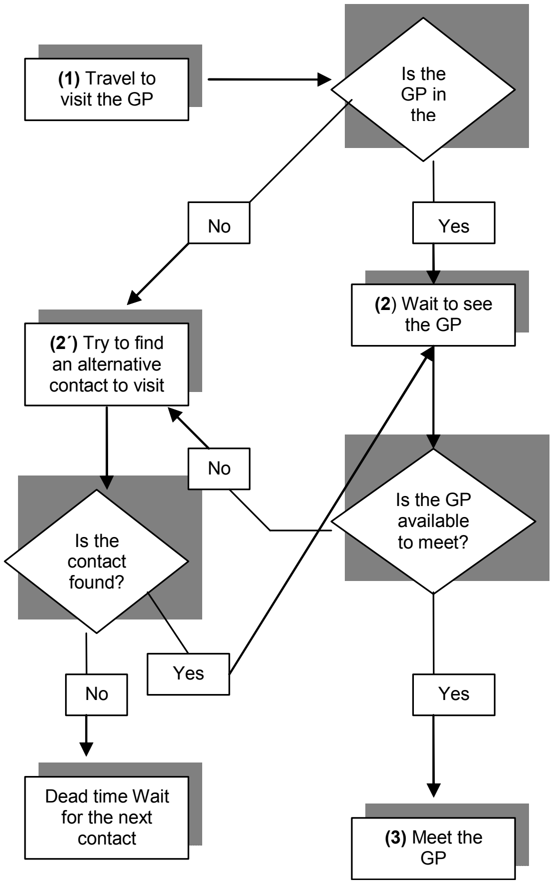


*Figure 2: A chart depicting the uncertainty the rep faces with regard to dealing with dead time*

### 3.3 Post-Mobility Challenge: Achieving the Life/Work Balance

Once at home, Pharma's reps have to accomplish work-related activities that they were not able to do during the day, as one rep explained:

> *"When I come back home, I have to open the laptop and start doing reporting and administrative work. There I have the telephone line that allows me to connect to the company resources. I do my reports; I read and reply to e-mails, try to find information for doctors. I prepare expense reports and send the receipts to the head office so that my bank account gets updated. It takes too much time. Sometimes I do part of that on Friday night or Sunday morning. I have also to read reports and studies to answer doctors´ questions".*

The time that the reps devote to accomplish work-related tasks at home is used at the expense of their leisure and family time.

> *"I attach great value to not being obliged to open my laptop after 4 pm so I can fully concentrate on my little daughter, my hobbies and my everyday tasks at*

*home. You don't get paid after 4 pm. It is quite embarrassing to keep working on Sunday morning at home".*

## 4. Implications for the Design of Mobile Support Systems

In terms of the implications of this study for the design of support systems that can support pharmaceutical sales reps when they are operating in a mobile work setting, the study offers ways to improve the development of such systems in a number of possible respects. More specifically, mobile support systems that could have supported the reps participating in the study would have the following characteristics.

- Be running over a mobile client that would help the rep to work anytime. The device should have such physical characteristics as being easily portable, not obstructive to use during a meeting (e.g. with the doctor) and not requiring a lengthy boot-up time to be ready for action.
- Allow and manage a virtual shared space linking the sales rep with the doctors. The fact that doctors are stationary workers, spending most of their working day in an office next to their desktop computer, should be exploited to deal with the problems associated with the availability of the rep during working hours to satisfy doctors' impromptu information needs. For example, each time the doctor has a drug- related question he can enter it into the created virtual shared space, which may be running over the Internet. Then the rep would receive notification over his mobile device each time the doctor enters a question. When the rep has some time available (e.g. between two meetings), he may try to enter his answer to the shared page or seek collaboration from colleagues if he finds the question difficult to answer. The doctor may also use the shared virtual space to enter useful information about his meetings with the reps. Examples of such information may include cancellation of the next meeting, possible change of meeting time or some drug samples that the doctor may need.
- Support the fact that the reps' information need is often short-lived. In other words, they have only little time available to get the information that they may need to carry out the task at hand. This may be achieved through alerts consisting of information that the rep may use as arguments during his/her interaction with doctors, or doctors targeting related information. The alerts can be pushed to the rep's device by the marketing department, R&D department, a colleague or a third party such as a market research company. Likewise, the reps can receive alerts about upcoming e-mails that fit their predefined preferences in terms of the e-mails they want to check during the working day. Indeed, the reps may invest some time looking for information they feel they need to deal with a task at hand. However, because of their considerable mobility, they may not be able to find time to check possible information that would support them during their interactions with doctors. As a result, the standard pull paradigm of information may not be appropriate to satisfy the reps' highly situational and short-lived information. In addition, the time to access corporate resources should not be too long in order to ensure that the required information is relevant.
- Allow a monitoring of stationary colleagues', such as the field secretaries', actions more easily in order to ensure better coordination. This could be achieved by enabling the rep to check, irrespective of location, updates about the actions the secretaries have taken in terms of booking meeting times with doctors.
- Exploit the knowledge of the rep's current geographical position to provide him/her with targeted support that fits his/her predefined preferences and changes of context. In the case of an unexpected cancellation of a scheduled meeting, for example, knowledge of the rep's geographical location could help the service

provider to offer alternative contacts nearby that the rep might consider visiting, possibly together with route recommendations. Similarly, if the rep is holding meetings in a large hospital, the marketing department, using knowledge of his/her location can send alerts about possible sales leads in the hospital.

- Prevent forgetting of useful information. This would be achieved by providing the reps with convenient and time-effective ways for note-taking during or just after the sales visit. Solutions might include entering information about the sales visit by checking over a predefined sales report format or voice entry of useful sales visit information when the rep has only a short time to take notes and report activities. Appropriate support in terms of reporting sales visits and market-related information is important, as many stakeholders would benefit from the information if the rep made it available over the corporate system. First, there is first the rep him/herself, who can use the stored market- related information in order to perform his or her knowledge mediator role effectively. Other stakeholders include the other reps that can use the shared information in their own sales interaction. The company's management can benefit from the wealth of information that the rep could provide in designing sales campaigns and providing customer-targeting guidelines for the sales force.
- Support effective use of the time the reps spend driving from one location to another. This would involve enabling the rep to carry out, during driving time, activities that do not require the same physical and cognitive capabilities needed for driving the car (e.g. visual attention). Reps could, for example, make use of the time they spend driving to update their knowledge base by listening to updates about drug-related information or market intelligence. Likewise, the reps could use such time to make a voice-based report of their previous meeting. Similarly, during driving time, if the systems enabled the reps to detect another colleague who was driving, then the two reps could use such time to share knowledge with each other. Potentially other reps engaging in travelling could join in their discussions.

## 5. Conclusion

The paper explored the challenges that pharmaceutical sales representatives face when operating in a mobile work environment. The paper classifies such challenges as pre-mobility, in-mobility and post-mobility challenges. In addition to this analysis, the paper discusses some implications of the study in terms of the features of mobile support systems that would support the reps in their daily work activities.

Mobile technologies could act as an enabler of effective mobile support systems for the sales force thanks to certain unique features that they offer. Further research would involve integrating the insights provided by this study into the continuous development of mobile technologies in order to develop value-adding applications that would enable the sales force to work effectively at any time.

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# Research Paper 3

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# Supporting the Pharmaceutical Sales Force through Mobile Information and Communication technologies: an Exploratory Investigation

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**Abstract**

*Firms are increasingly rushing to invest in a variety of technologies or sales force automation (SFA) to increase the performance of their sales forces. Research has shown, however, that a high proportion of SFA projects fail. The high failure rate of SFA projects can be explained by the lack of appropriate planning, resulting in a gap between management and the sales force in perceptions and usefulness of SFA. This paper explores the barriers to performance that the pharmaceutical sales force face when operating in a mobile working setting, The paper also explored the perception of the sales force with regard to a number of mobile solutions that could provide the sales representatives with the necessary support to deal with the barriers to performance they face in the course of their everyday work. This is achieved through a case study of a midsized multinational pharmaceutical company.*

*Keywords: Mobile information and communications technologies, sales force, mobility, barriers to performance.*

## 1. Introduction

Firms worldwide are investing significant sums in sales force automation (SFA) with the goal of improving the performance of their sales forces. SFA occurs when a firm applies information technology to enhance the performance of its sales force or to computerise routine tasks in the sales process (Honeycutt, 2005).

SFA appeared to provide firms with a competitive advantage (Dulaney 1996; Keillor et al. 1997). Some researchers even go so far as to claim that SFA is now a survival tool, something a firm adopts so as not to be at a competitive disadvantage (Erffmeyer & Johnson, 2001). However optimistic reports contrast sharply with other research that clearly states that the adoption and use of SFA/CRM technologies have been less successful than originally hoped (Rigby et al. 2002). The failure rates for SFA implementations have been reported to be as high as 55–80 per cent (Honeycutt, 2005; Rigby et al. 2002). According to a leading IT consulting agency, 60 per cent of sales personnel report not using available SFA technology (Dulaney, 1996). The main reason cited by sales representatives is that SFA did not help them in the most important aspects of their job: face-to-face customer meetings. As a result, given that firms invest between US$5000 and US$15,000 per salesperson in SFA projects, failure rates at even one half of this magnitude indicate that firms may not be recouping their technology investment (Honeycutt, 2005).

However, despite the growth of SFA initiatives, the potential efficiency and effectiveness SFA is perceived to bring to the sales force, and the magnitude of SFA failures, it is surprising that relatively few studies have addressed this important topic especially in the information systems discipline. Most researchers state that the level of SFA research is insufficient (Erffmeyer and Johnson, 2001, Jones et al. 2002, Pathasarathy & Sohi, 1997, Rivers & Dart, 1999, Speier& Venkatesh, 2002 and Widmier et al. 2002). For example, according to Honeycutt et al. 2005, the accelerating growth and significant investments made by industrial firms validate the significance of SFA research. Likewise, Erffmeyer observes that major literature reviews suggested sales force automation would be a promising area of research, yet noted that little has been forthcoming.

The literature about SFA adoption (e.g. Gohmann et al. 2005; Buehrer et al.2005; Jones et al., 2002; Robinson et al. 2005; Rangarajan, 2005) suggests that although the sales force may initially adopt the SFA technology, their full usage of the technology is not always guaranteed. Therefore the majority of the studies about adoption of SFA by the sales force point to the importance of convincing the sales force of the usefulness of SFA for their everyday work activities, "Unless the sales force buy into the CRM implementation it will fail" (Patton, 2001). According to Honeycutt et al.(2005) one common mistake individual firms make when promoting automation is focusing on technology features (e.g. wireless Internet access) instead of specific benefits (e.g. ability to check inventory and delivery dates instantly while talking to clients at their locations). However, there remains the unanswered question of how to convince the sales force of the usefulness of the SFA technology so that they can both adopt it and use it to its full potential. For example, although salespeople technology usage has been recently investigated, most of the studies focus on implementation issues either after implementation of the sales force technology or a few months prior to implementation, but after the decision of automation and the selection of technology has already been made by the management. No study has yet looked at what salespeople perceive as barriers to their performance in their everyday work activities prior to shopping for a technology solution and then, based on the results, identify the characteristics of the technological support that would enable them to overcome the barrier to performance they face. Knowledge of the sales force's barriers to performance in the field would not only enable management to select the appropriate SFA technology that would help the sales force to deal with the barriers they face, but would also provide convincing arguments that could show the usefulness of the technology to the sales force and thus ensure their acceptance. As Gilbert 2004 observed, in order to gain the sales force "buy-in", the benefits of SFA must be understood by management and explained to the sales force (Gilbert, 2004). Likewise, Gohmanna et al. (2005) state that when salespeople are excluded from the decision-making process they may view the adoption of SFA technology as an imposition at best or an odious addition to the job at worst. Indeed, when salespersons do not understand the benefits offered by new technology, they only see cost in the time and effort of using it.

Additionally, the majority of the studies of SFA technologies neglect one major dimension of the sales force's work activities, which is mobility. Work mobility is indeed one key dimension that characterises the work of sales representatives. Such mobile workers spend most of their working time out of their office, interacting with customers and attempting to bring new orders to their companies.

The advent of mobile information and communication technologies (M-ICT) has resulted in rapid growth in a number of mobile applications and services. This paper

defines M-ICT as information and communication applications run over a wireless network using a mobile device and in a wireless environment. A mobile device is any lightweight device connected to the Internet or other networks through wireless networking using any standard wireless communication protocol. They may include such devices as PDAs, communicators or smart-phones. How M-ICT can support these frontline ambassadors in their everyday tasks are key questions facing many stakeholders, including sales managers, today.
In order to study those topics (barriers to performance that the sales force faces when operating within a mobile work setting, and on how M-ICT could support them to overcome the barriers they face and enhance their overall performance), we carried out a case study of the sales force of midsized pharmaceutical company (Pharma). The purpose of the case study was to answer the following two research questions:

> 1) <u>What barriers to performance do the pharmaceutical sales representatives face when they are operating in a mobile work environment?</u>
>
> 2)<u>What mobile solutions would allow the pharmaceutical sales representatives overcome the barriers they face in the field and enhance their overall performance?</u>

**2. Study Context**

The research was undertaken in a subsidiary of a multinational pharmaceutical company (Pharma Co) employing 6000 people worldwide in 2003, about half of them engaged in sales and marketing activities. Pharma is a relatively small company operating as a niche player with particular expertise in the area of psychiatric and neurological disorders.

The company has a national sales team consisting of 14 sales representatives (sales reps) and seven territorial sales managers. These sales representatives report to a sales manager who is ultimately responsible to the marketing manager.

The main role of a Pharma sales rep is to meet physicians, nurses as well as prescribers in hospitals and pharmacists to provide information about the way the company's products operate, trying to emphasise their clinical benefits to patients and health professionals in terms of disease management. The purpose is to encourage the health professionals the sales reps they visit to prescribe Pharma's products rather than those of their competitors.

In addition to their daily encounters with health professionals (mainly physicians), Pharma's reps work duties include managing relationships with their customers. Relationship management with physicians involves providing them with any information they need related to the company's products, entertaining them in order to personalise the relationship with them as well as inviting and accompanying them to scientific conferences and congresses covering the scope of their medical interests. Pharma´s sales reps duties also include administrative work. Their administrative tasks include preparing reports about both their daily sales encounters with health-care professionals and the expenses they incur during their sales visits (i.e. catering provided to health-care professionals during sales meetings).

The management of Pharma's reps is based on an outcome system of compensation as well as autonomy in the field within certain regulatory guidelines. Pharma requires each sales rep to make five sales visits per day. The reward system is then based on the number of face-to-face meetings held with target customers as well as the level of the company's product sales within the territory where the rep operates.

Pharma provides training for its sales force once per year. Each training course lasts three days and covers both sales and technical training programmes related Pharma products.

The information technology support that Pharma provides for its sales force includes a mobile phone and a laptop computer. The sales reps also have a sales support system that runs on their laptops and that enables them to store sales visits information and to connect their company's corporate database via a dial-up system

## 2. Study 1: A qualitative investigation

### *2.1 Method*

We conducted five semi-structured interviews lasting on average two hours with Pharma's sales reps and the marketing managers who supervise the sales force. The purpose was to document and validate the existing sales process, discuss their criteria in assessing and rewarding the reps' performance and identify activities that they regard as potential performance inhibitors for their sales reps. Subsequently; data were collected through observation by means of field sales trips. The field sales trips lasted an entire day and represented "an ordinary day" in the life of a Pharma sales rep. Throughout the research process, the field material was categorised into issues, then themes and then "made sense" of (Hayes 2001) by drawing on the theoretical approach that underpinned the research study. Several interesting themes were found about both the barriers to performance that the reps face within the course of their everyday work life and the nature of their information they need when on the move. Such themes helped frame the survey to be used in the second study.

### *2.2. Results*

#### *2.2.1Emerging barriers to performance in the field*

Based on the thematic analysis of the qualitative field material, the paper assigns the barriers to performance the sales representatives face during the course of their everyday mobile work, into pre-, in- and post-mobility barriers to performance (see BenMoussa, 2005 for more details).

One barrier that the reps face prior to starting their daily sales trips is associated with preparation for the presentation that they will give during the following day's sales visits. The reps have to visit their targeted physician at least five times a year. Prior to each sales visit, the rep has to find time to review the content of the previous meetings held with the physician and to find out new information not mentioned in previous meetings that the physician may find helpful and interesting. Indeed, the reps' effectiveness in their meetings with physicians depends to a large degree on the extent to which the physician perceives that the meeting with the rep has been intellectually value-adding. In some cases based on such judgement the physician may decide about the future of the relationship with the rep.

A further difficulty that the reps face prior to starting their sales visits is adaptation to the shortcomings associated with the technological support they have (the laptop) in order to make sure that the information they need during the working day is available when and where it is required. For example, given the fact that the reps know that they cannot get access anytime and anywhere to the information stored in their laptop or within the corporate database, they make sure to print out in the evening all the documents they consider might be useful during the following day's sales trip. However, the strategy of printing files on particular topics (for example, the day's schedule) is not always effective in adapting to the deficiencies associated with the technological support they have access to, as one rep explained:

> Usually I print the timetable for next day at night. Last night I forget to print any paper to remind me where to go and I didn't do it in the morning because I have a little daughter and I don't want to interrupt her sleep in order to get my briefcase. When I don't remember to print my schedule, then I don't want to do it the following morning, either, for fear of waking her up. Fortunately this morning I have only four meetings and I can memorise them when I check them on the laptop.

In-mobility barriers to performance refer to the challenges the rep face during their daily sales visits. The paper assigns such challenges to barriers to efficiency and barriers to effectiveness.

One barrier to efficiency the reps face during their daily sales trips is when a physician cancels an already arranged appointment. In many situations the sales rep fails to get received by the physician because of unpredictable circumstances that might make the doctor not available for the meeting as one rep explained:

> You never really know (with regard to meeting a GP). You should only hope that he will be there and, of course, face the reality that there may be a problem with your schedule. I sometimes call on a neurologist with whom I had a booking, I might be waiting outside her office; then a nurse comes to me and says the physician is too busy at the moment, "I am sorry you cannot see her today".

As a result, if the meeting is cancelled the sales rep moves to the next sales visit scheduled in his/her day and waits in the car or in a cafeteria till the meeting time with the next physician comes, with the frustrating feeling that he or she will not fulfil his/her quota of five sales visits per day.

Another barrier to efficiency identified in the study is the difficulty in turning periods of dead time into productive ones. Dead time refers to the time during the working day that the rep perceives as wasted because it is spent without performing any work-related activity. Examples include time in transit between the day's scheduled meetings, time wasted as a result of a last minute cancellation of an already booked meeting with a physician, or time available because of less time than expected being spent with a physician. In the case of Pharma's sales reps, the occurrence of dead time is frequent and has various causes. One cause is the difficulty in predicting its happening so that the reps can plan ahead for the kind of activities that would enable them to make a good use of it. For example, in the event of a last minute cancellation of a meeting the reps find it difficult to fill that time with a value-generating activity such as visiting another contact. Generally physicians require to be contacted in advance in order to arrange a meeting with the rep. Therefore the time devoted to the cancelled meeting turns to be a dead time, as one rep mentioned

> When you have a long gap between your contacts, what you can do is to wait for the next meeting. You may try to visit another doctor but most of them like you to call them beforehand, sometimes a few weeks in advance.

Another cause of dead time for Pharma reps is the lack of appropriate technological support that would enable the rep to perform a work-related activity during this time. A laptop computer appeared to be awkward to support the reps during dead time because of its size and also the time it takes to get the device mobilised to provide the required support. The reps try to use the laptop generally in the car. However, if the rep faces short dead time (e.g. between two meetings in a hospital), and wants to use the laptop to perform a scheduled task or retrieve information, he/she is discouraged from doing that. This is because the rep figures out that by the time he/she gets to the car in the parking area and starts the laptop, the time for the next meeting will come. Therefore the rep may choose to use the short dead time just waiting outside the physician's office or in the hospital cafeteria.

A third barrier to efficiency that the reps face during their daily sales trips is the difficulty of accessing contact information when the reps have meetings in large hospitals. A meeting that takes place in a large hospital is a good opportunity for the reps to perform their prospecting activities. This is due to the large number of physicians working in large hospitals. A key enabler to help the reps search for new prospects in such hospitals is to have access, whenever they have time available (i.e. between meetings), to sales information such as the contact names of the physicians they know in the hospital. Then the rep could have those physicians with whom they have already built a relationship introduce him/her to their colleagues, during a coffee break for example. However, the reps store useful sales information in their laptops, which in most cases they do not carry with them. As a result, they rely mainly on the contact name they remember. The time available for performing prospecting activities is therefore spent just waiting for the following meeting.

The barriers to effectiveness the reps face during their sales trips are various and have many sources. One barrier to effectiveness is the difficulty the reps experience in terms of coordinating with field secretaries during sales trips. Such difficulty stems from that fact that the reps as mobile workers cannot be aware of the booking actions made by the secretaries during their sales trips. They need to wait until they are at home and connect to the corporate database. The field secretaries experience the same difficulty. In order to know the reps' opinion about possible meeting dates or the reps' actions with regard to contacting a specific physician, they need to wait until the rep enters the information into the corporate system. Such coordination difficulties result in problems such as booking a meeting with the same physician twice, which can be detrimental to the rep´s relationship with physicians:

> The worst thing that may happen is that when you have just booked a doctor for yourself and then for the same time the secretary makes you a booking with another doctor and they are both very important. Then you have to decide what to do, which one you have to transfer to another time. It is not easy as they are busy and you may not find another time to catch him or her

A second barrier to effectiveness is a long delay in providing physicians with answers to their outstanding questions. Outstanding questions refer to questions that the physician asks and to which the rep does not know the answer.

> Sometimes doctors may need things urgently; the quicker you deliver the information the better.

In order for the rep to provide answers to such a question, he/she needs to look for the information him/herself. In most cases, the information-gathering process takes place at home, which increases the time; it takes for the rep to submit the answer to the physician. Also the reps may forward them to more specialised colleagues within the company. In this case the rep has to wait until the colleague submits the reply to the outstanding question. However, the inability to check e-mail while on the move extends the time it takes the rep to provide an answer to the physicians' outstanding questions. As a result it might be that the colleague from whom the rep seeks support with regard to a physician's outstanding question has already submitted an answer using e-mail to the rep during the working day. However, in the absence of access to e-mail in the field, the rep will not be aware of the colleague's reply until he or she gets home in the evening and accesses his or her corporate database.

A further barrier to effectiveness is physicians expecting reps to adapt to physicians' information requirements. Physicians require that the reps provide them with new information during each sales meeting as one rep explained:

> The physician is pleased if you can provide her with new information she does not know…You should prove to the physician that you are up to the task and that you know more than her.

Also, the fact that physicians appreciate that the rep can provide them with the experiences of other physicians is another barrier to effectiveness the reps face during their sales encounters. Physicians often regard the opinion of their colleagues about the product the rep is promoting as more reliable than the arguments the rep provides them with, as one rep explained:

> Every time you come, they (doctors) expect you to have something new. They also want to hear other doctors' opinions, their experience with the drug, they want you to deliver all the information you heard from other doctors. Even though you know your drug quite well, a doctor believes another doctor more than the rep.

The way the reps take and store useful information that they acquire during sales visits appeared to be a barrier to effectiveness. During the short meeting with physicians, the reps rely mainly on their own memory for recording what they perceive as useful information, such as drug-related issues discussed with the doctors or questions that the physicians have. For information that the reps perceive as highly important (i.e. questions needing a follow-up), the rep writes it down in order not to forget, and then, enters the handwritten information into the laptop when there is sufficient time between meetings. As one rep explained:

> During meetings with doctors I try to memorise. If there is an important thing I write it on a piece of paper to make sure that things that were asked of me could be answered for sure. Then when I have sufficient time during the day, I try to open the laptop and input the information just to make sure it stays there and I don't have to find my piece of paper later on.

In the evening, once at home, the rep accesses the company's database and enters the sales reports for the day. Some reps leave reporting tasks till the weekend and input the sales reports for the whole week.

The time gap separating sales visits and the time when the reps enter information related to such visits to the corporate database affects the quality of the reports. Indeed, if the rep carries out the reporting activity at the weekend, then he/she will have to input on average 25 reports. Therefore quite a lot of useful information might be omitted or locked somewhere on a piece of paper. Such a time gap would also lead to a collaboration gap between reps in terms of sharing knowledge about physician-related experiences with the company's drugs. A rep may gain useful knowledge from his/her interactions with doctors. However, other reps cannot access such knowledge and use it as an argument during their sales visits even though they try to connect up to the office in order to access the corporate database, until the rep enters it into the corporate database at the end of the week.

A final barrier to effectiveness that reps face is the availability gap. When physicians feel an urgent need for information about Pharma's drugs, they try to make a phone call to the reps. However, during his or her sales visits, the reps put their mobile phone in meeting status and thus they cannot answer incoming calls. After the sales visit the rep may try to call back the physician who initiated the phone call, but the physician may be busy and not available to take the rep's call. Such an availability gap may result in the physician lacking context-specific information that he or she may need to deal with a patient being treated.

Post-mobility challenges refer to the work-life balance that the reps attempt to achieve. Indeed, once at home, Pharma’s reps have to accomplish work-related activities that they were not able to do during the day. The time that the reps devote to accomplishing work-related tasks at home is used at the expense of their rest and family time:

> I put great value on not being obliged to open my laptop after 4 pm to fully concentrate on my little daughter, my hobbies and my everyday tasks at home. You don’t get paid after 4 pm. It is quite embarrassing to keep working on Sunday.

| Category | Type of Barriers |
|---|---|
| **Pre-Mobility Barriers** | • Preparation of sales visits and planning how to deal with physicians’ questions<br>• Printing in advance all the documents that the reps regard as important for the following day’s sales visits |
| **In-Mobility Barriers** | <u>Barriers to efficiency</u><br>• Unexpected cancellation of appointments by physicians<br>• Difficulty in working productively in dead time periods including when driving from one location to another<br>• Difficulty in accessing sales information to carry out prospecting activities<br><u>Barriers to effectiveness</u><br>• Managing physicians´ outstanding questions<br>• Note-taking during sales visits<br>• Availability gap<br>• Difficulty in coordinating with field secretaries in the field<br>• Difficulty in adapting to physicians’ information requirements in terms of providing new information during each sales trip and disseminating the experiences of other physicians with the company’s drugs |
| **Post - Mobility Barriers** | • Carrying out administrative and information-gathering task at the expense of rest and family time. |

Table 1:
Emerging barriers to performance that the reps face based on the data collected in the study1

Based on the themes identified in Study 1, a second study was conducted. For this study a survey was developed. The questionnaire was sent to the company’s entire sales force. It was thought that confirmation of the themes identified in Study 1 with a survey would help confirm the validity of the thematic analysis conducted on the qualitative material collected in study1.

### *3.1 Method*

The instrument used was a questionnaire that was e-mailed to each of the salespeople working in Pharma. The managers of Pharma regularly employ e-mail to communicate with their sales force. Once the e-mail survey was completed by the salesperson, his/her response was sent directly to the researcher to maintain confidentiality. Respondents were assured of the confidentiality of the information they provided and that only averaged and anonymous data would be used in any report. The main themes of the questionnaire were:

- The nature of the work impediments that the sales representatives face when they operate within a mobile work setting,
- How the sales representatives perceive the possible impact of mobile solutions in terms of overcoming the barriers they face and enhancing their performance.

In the first part of the survey salespeople were asked to rank several statements about the barriers to performance they encounter during the course of their everyday work, on a five-point Likert-type scale, ranging from 1 to 5, where 1 equalled always facing the barrier to performance, 2 = often, 3 = sometimes, 4 = seldom and 5 = never.

In the second part of the questionnaire respondents were asked to assign points to several statements that describe solutions that would enable them to overcome the impediments and enhance their performance in the field, on a five-point Likert-type scale, ranging from 1 to 5, where , where 1 equalled “extremely unimportant” and 5 equalled “extremely important”. Questions about the reps’ frequency of usage of the information technology support (i.e. laptop) available to them were also asked.

### *3.2 Results*

#### *3.2.1Barriers to performance in the field*

As shown in table 2, the percentage of Pharma´s reps always or often, facing the barriers to performance ranges from a low 21% to a high 93%. While the percentage of the reps at least sometimes facing the barriers to performance ranges from a low 50% to a high 100%. The mode value of 9 out of the 14 barriers to performance is 2 or 1.These results directly replicate Study 1 results in terms of the barriers to performance the reps face during the course of their everyday work. The reps confirm the existence of the efficiency and effectiveness barriers to their performance identified in the qualitative study. In terms of the usage of laptop computer during sales trips, seventy-nine per cent of the reps report that they seldom or never use their laptop computer to find answers to physicians’ questions that are difficult to answer. Ninety-two per cent of the reps also report that they seldom or never carry their laptop with them to each sales meeting with physicians. In order to get access to information whenever needed, the reps print out documents they think they may need before starting their daily sales trips. Indeed 71% of the reps report that prior to starting their sales trips, they always or often print out all documents they may need during sales trips. They also extend their working days to carry out administrative tasks that they are not be able to do in the field even when they have an opportunity in terms of dead time. These are performed at the expense of their rest and family time.

Table 2:
Leading sources of barriers to performance for the sales reps interviewed. N=14

| How frequently do you face the following barriers to performance | Always or often* % | Sometimes ** % | Seldom or never *** % | Mode | Mean | SD |
|---|---|---|---|---|---|---|
| Performing administrative work at home | 92.9 | 7.1 | 0.0 | 2.0 | 1.6 | 0.6 |
| Printing out documents before sales trips that might be useful during sales trips | 71.4 | 7.1 | 21.4 | 1.0 | 2.0 | 1.4 |
| Making notes on paper about physicians' outstanding questions during sales visits | 71.4 | 7.1 | 21.4 | 1.0 | 2.0 | 1.2 |
| Physicians requiring to call in advance before arranging a meeting | 64.3 | 0.0 | 35.7 | 2.0 | 2.8 | 1.6 |
| Physicians requiring new information during each meeting | 50.0 | 42.9 | 7.1 | 2.0 | 2.5 | 0.8 |
| Difficulty of identifying alternative contacts to visit if an appointment is cancelled | 57.1 | 28.6 | 14.3 | 2.0 | 2.6 | 0.8 |
| Physicians appreciating hearing the opinion of other physicians about the company's products | 50.0 | 50.0 | 0.0 | 2.0 | 2.5 | 0.5 |
| Spending time gaps between meetings just waiting for the upcoming meeting to take place | 50.0 | 28.6 | 21.4 | 2.0 | 2.7 | 1.1 |
| Physicians not informing in advance in case they cancel an appointment | 42.8 | 50.0 | 7.1 | 3.0 | 2.6 | 0.8 |
| Difficulty in accessing sales contacts in large hospitals | 42.9 | 28.6 | 28.6 | 2.0 | 2.7 | 1.1 |
| Long delay in providing an answer to physicians ´ outstanding questions harms my relationship with him or her | 42.9 | 14.3 | 42.9 | 4.0 | 2.9 | 1.2 |
| Coordinating with field secretaries during sales trips | 21.4 | 50.0 | 28.6 | 3.0 | 3.1 | 0.9 |
| Not checking e-mail during sales trips increases the time taken to provide physicians with answers to their outstanding questions | 21.4 | 35.7 | 42.9 | 3.0 | 3.4 | 1.0 |
| Physicians do not like me to call them during their work hours | 21.4 | 35.7 | 42.9 | 3.0 | 3.3 | 0.9 |

*) Percentage of respondents who answered always = 1 or often = 2
**) Percentage of respondents who answered sometimes = 3
***) Percentage of respondents who answered seldom = 4 or never = 5

### *3.2.2 Overcoming the barriers*

The survey also asked respondents to assign points to several statements that describe solutions that would enable them to overcome the barriers they face and enhance their performance in the field, on a scale of 1 to 5, where 1 equalled "extremely unimportant" and 5 equalled "extremely important". We classify such solutions into two groups: the productivity of working time-boosting solutions and effectiveness-enabling solutions (Tables 3 and 4).

Table 3:
The importance reps assign to the productivity of working time-boosting solutions

| Scales 1-5 | Unimportant * % | Important** % | Mode | Mean | SD |
|---|---|---|---|---|---|
| **How important is for you?** | | | | | |
| Identifying alternative doctors to visit if a planned meeting is cancelled | 0.0 | 85.7 | 5.0 | 4.4 | 0.7 |
| Recording and reporting sales contact information after meeting | 0.0 | 85.7 | 5.0 | 3.9 | 1.0 |
| Receiving information alerts about new customers to visit during sales trips | 0.0 | 85.7 | 5.0 | 4.4 | 0.9 |
| Receiving information alerts about customers that have the highest potential in your territory during sales trips | 7.1 | 71.4 | 5.0 | 3.8 | 1.1 |
| Receiving information alerts about cancel-lation of appointments with physicians | 14.3 | 64.3 | 5.0 | 3.9 | 1.3 |
| Receiving information alerts about potential traffic jams during sales trips | 21.4 | 35.7 | 3.0 | 2.6 | 1.2 |
| Receiving information alerts about exhibitions and display during sales trips | 35.7 | 21.4 | 2.0 | 2.8 | 1.1 |

*) Percentage of the respondents who answered 1 = extremely unimportant or 2 = unimportant
**) Percentage of the respondents who answered 4 = important or 5 = extremely important

Table 4:
The importance the reps assign to the effectiveness-enabling-solutions for their performance in the field

| Scale 1-5 | **Unimportant %** | **Important %** | **Mean** | **Mode** | **SD** |
|---|---|---|---|---|---|
| **How important is for you?** | | | | | |
| Accessing field secretaries' booking actions while in the field | 0.0 | 92.86 | 4.1 | 4.0 | 1.1 |
| Providing physicians with straightforward answers to their questions | 7.1 | 92.9 | 4.2 | 4.0 | 1.4 |
| Accessing the company database for information before meetings with physicians | 7.1 | 78.6 | 3.4 | 4.0 | 0.9 |
| Checking e-mails during sales trips | 14.3 | 71.4 | 3.9 | 4.0 | 1.4 |
| Accessing physicians' sales visit information before meetings | 0.0 | 57.1 | 3.7 | 4.0 | 0.6 |
| Receiving information alerts about important events in the pharmaceutical industry, | 21.4 | 50.0 | 3.1 | 3.0 | 1.1 |
| Receiving information alerts about competition during sales trips | 21.4 | 35.7 | 2.9 | 3.0 | 1.0 |
| Learning about new or competitive products while driving from one location to another | 42.8 | 28.6 | 3.1 | 2.0 | 1.3 |
| Accessing other team members sales visits information | 50.0 | 14.3 | 2.7 | 3.0 | 1.0 |

*) Percentage of the respondents who answered 1 = extremely unimportant or 2 = unimportant
**) Percentage of the respondents who answered 4 = important or 5 = extremely important

The survey findings reveal an overall positive opinion of the reps with regard most of the mobile solutions suggested to them, in terms of enhancing their performance as seen by them. The high importance the reps assign to almost all the solutions suggested to them in the survey reveal that that reps face a number of barriers that need to be removed. The majority of the reps rate as highly important for their performance a number of time-saving solutions such as the ability to make sales visit reports using available time during their sales trips or receiving alerts from physicians about potential cancellation of appointments.

Furthermore, a high proportion of the interviewed regard as highly important their ability to receive information alerts on various topics during sales trips that would support their actions and also save time that could be devoted to information-gathering activities. In addition, the possibility for the reps to access information just before a sales meeting with a physician is reported by the interviewed reps as highly important for their performance because, armed with fresh and pertinent information, they can be more responsive to the physician's questions and information needs, which in turn strengthen his or her relationship with the physician.

However, there are some solutions that have not been regarded by the reps as highly important for their performance in the field. For example, less than a third of the reps interviewed regard traffic-jam alerts as highly important for their performance in the field. This could be explained by the relatively low density of traffic in cities where the reps operate, which means that traffic jams are not a major source of time-wasting for the reps. Likewise, according to the survey results, only fourteen per cent of the interviewed reps regard accessing other team members' sales reports as highly important for their performance in the field. This would be due to the fact that the current reporting system that the reps use does not emphasise knowledge-sharing, such as storing a useful insight about a physician's experience with company drugs obtained by one rep for potential use by his/her colleagues

## 4. Discussion

Companies have invested in sales force automation in the hope of achieving the benefits it can provide in terms of enhancing the sales force's performance, increasing organisational knowledge about customers and building profitable long-term customer relationships. However the literature is clear in stating that the adoption of sales force automation has achieved less successful results than originally hoped (Rigby et al. 2002). These failures happened because a large proportion of the sales force either did not accept the technology or underutilised it. The lack of both appropriate planning of the SFA investment and communication of its benefits to the sales force account for the problems associated with SFA failure. Firms fail to clearly identify the business problems that need to be resolved and then match the appropriate technology to that dilemma. Erffmeyer´s et al. 2001 study about firms' expectations from investing in SFA reveal that a limited number of the firms participating in their study were able to offer details with regard to the goals of their sales force automation. For example, the majority of respondents mentioned improving the sales force efficiency as a goal of SFA. However, when asked what specific areas need improvements, a typical response was "our goal is to get as many things automated as possible". Other studies report that mangers can be motivated to adopt a technology by the broad belief that by not acting other firms may gain a competitive advantage (Gilbert, 2004). The inability to articulate specific goals for SFA makes it difficult for firms to plan, communicate and evaluate the benefits of the SFA investment to the sales force. As a result the sales force may perceive the SFA as just an added responsibility or a burden (Honeycutt et al. 2005).

The fast and ever-changing set of technological tools available to salespeople as in the case of mobile technologies, will continue to pose a challenge to sales managers in terms of selecting the technology the would result in the expected outcomes.

Consequently, it is very important that sales managers fully understand the barriers that hamper their sales force performance. Once the barriers are identified, sales managers can take steps to select and implement the ICT that matches the barriers' support requirements.

Knowledge of users' barriers to performance is particularly important when we are dealing with M-ICT. The physical and computational limitation of mobile devices makes them unfit for some tasks, e.g. providing an overview of large amounts of information. Indeed a number of studies treated mobile devices as a stand-alone technology to support the prospective users in carrying out their job related tasks. They do not relate mobile devices to other technological support available to the users and which can support them better than mobile technologies. However as Gebauer et al. (2004) showed, mobile applications can complement rather than replace existing applications and support in terms of supporting users to deal with specific tasks. Likewise Nielson (2001) argued that mobile technology support should be examined as one component among the "web-of-technologies" available to support the user's tasks and routines. Hence she suggested that mobile devices need to fulfil at least one of the following demands in order to be successful: (i) expand an already existing service or system by giving them mobility and making it possible to solve a set of specific tasks in a specific context; (ii) offer a solution to a well-defined, targeted task, i.e. provide here-and-now related information.

The results of both studies showed that salespeople face a number of barriers that impede their efficiency and effectiveness in the field. The negative impact of these barriers goes beyond their work performance, to affect even their family and rest time.

The ICT support available to the reps in the form of laptop and mobile phone does not appear to provide them with an appropriate support. The lack of relevant information that could support the reps' actions whenever needed appears to be the main source of most of the barriers the reps face during their sales trips. Useful information that could support both the reps' effectiveness and efficiency in the field might be available. However, they are not accessible when the reps experience a need for them to support their actions. The information is either locked in the corporate database, which the reps cannot access in the field or it is stored in a laptop computer that most of the reps use as a "desktop" at home. Additionally, useful insights remain locked in the reps' heads and are not shared with other reps or with the sales management. The inability to work whenever time is available is the main factor underlying the barriers to efficiency facing the reps. During their sales trips the reps have many opportunities, i.e. time, where they can carry out some of their daily work activities (i.e. administrative work). However, the reps' efforts to exploit such opportunities productively are hindered by the characteristics of the laptop, which does not support "any time work". As a result, the reps extend their working day at the expense of their rest time and work at home to carry out tasks that they could do during the sales trips if they had access to an appropriate information technology device.

When asked their opinion with regard to a set of mobile solutions that would enable them to overcome the barriers they face in the field, the sales reps were highly positive about the positive impact of such solutions on their performance as seen by them. Those solutions could be implemented thanks to key characteristics of M-ICT in terms of timely information support, ubiquitous terminals, adaptive communication and simple and natural input/output.

M-ICT can allow users to have a timely information support in a number of ways. First, with a mobile device and a wireless connection (i.e. GPRS or UMTS), the mobile user can have access to the Internet as well as diverse databases anytime time is available and irrespective of location to get the information he or she needs. Wireless bandwidth is increasing which supports the demands of business applications such as e-mail with attachments, multimedia contents and Web services. The current development of positioning technologies has the potential to enhance the timely information support enabled by mobile technologies.

The ubiquitous features of mobile terminals free the users from the time and space constraints that may impede their access to the information systems capabilities. This is a key characteristic of mobile information systems compared to traditional (wired) information systems, where users have to be in a specific place (the office, home) in order to use the system's capabilities (Keen and Mackintosh, 2001). For instance technologically speaking mobile digital calendars are not very different from their PC based calendar systems, but they naturally incorporate portability benefits, a key desired feature in calendaring (Sell 2006). Similarly as the mobile device is "always on" it enables the user to get access to the mobile system's functionalities anytime and with reduced booting time compared to laptop computers, especially in situations where the user has only little units of time to satisfy his information and communication need.

Another attribute of M-ICT is that it provides flexibility in terms of the communication medium that the rep could select when it comes to collaboration and coordination in the field with co-workers. The communication medium carrying the information support can take such forms as SMS, MMS, e-mail, phone call, pushed alert or real-time access to database. The selection of the communication medium would depend on both the environment where the rep is operating (e.g. face-to-face meeting with a customer, in a train or restaurant) and his or her information support value chain (provider versus receiver of the support).

A hand and eye-free approach using audio based augmentation would enable the user to simultaneously perform other tasks while listening or speaking (Martin, 1989). This is of great interest for the sales reps whose information support need is both time-independent and space-independent. Speech augmentation would provide the reps with a simple and natural mechanism to enhance the productivity of their working time even in situations where their cognitive and physical capabilities are engaged by other activities such as driving the car.

## 5. Limitations and suggestions for future research

This study has limitations. Perhaps the most important limitation of the current study is the single company frame. However, the choice of the single-case study focus has been inspired by the wish to control contextual factors (e.g. market and organisational factors). Within the sales force research context, many researchers have warned of the danger of pooling data from a number of unrelated industries and product types in an attempt to generalise. Furthermore, lumping together data from different firms has been mentioned as a potential explanation for the mixed findings in research investigating information technologies and performance (Schillewaert and Ahearne, 2001). Also, it is possible that the results of the study may not represent the population of interest, salespersons in general.

As always in science limitations open avenues for future research. One avenue would be to replicate the current study and confirm the validity of our exploratory finding using another pharmaceutical firm and a larger sample. Another avenue would be to carry out a similar study in a different industry than the pharmaceutical context. This would make it possible to study similarities and differences among industries when it comes to M-ICT support to the sales force.

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# Research Paper 4

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# Mobile Information and Communication Technologies in the Context of the Pharmaceutical Sales Force Work

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## Abstract

*We need to understand how effective implemented information and communication technologies are and to derive lessons from them. Firms have invested in a variety of technologies to enable their sales force to achieve better performance. However, research has shown that the failure rate of such investment is high. This paper investigates the effectiveness of a mobile information and communication support system designed to help the sales force of a medium-sized pharmaceutical company in dealing with the barriers to performance they face when operating within a mobile work setting. The paper also examines issues associated with the implementation of such a system. The results show that the members of the sales force were pleased with their firm's initiative to invest in the mobile information and communication support system. However, they were underutilising it in terms of dealing with a number of barriers to performance they face in the field. The study suggests that in order to enhance the adoption of technology by the sales force, training that goes beyond technical issues and focuses on the sales force's way of working is the key.*



**Keywords**: Mobile information and communication technologies, sales force, barriers to performance, training.



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# 1. Introduction

The evidence for a positive impact of information technology on selling success is becoming increasingly compelling. For example, various researchers have found that new technologies increase the efficiency and effectiveness of salespeople, especially through their ability to improve communication between the salesperson, the buying organisation, and the selling firm (Keillor et al. 1997; Swenson & Parrella, 1992) and by enabling salespeople to accomplish more activities for the same effort and thereby make their jobs easier (Widmier et al. 2002). In addition, others have provided evidence that by increasing available selling time, enhancing communication and allowing faster access to relevant and timely information, sales force automation (SFA) can increase the overall quality of the sales effort, partly by facilitating a greater understanding of the selling situation (Rivers & Dart, 1999). Engle & Barnes (2000) found that both managers and sales representatives believed sales technology tools to be useful in job performance and empirically supported the linkage between higher sales performance and technology.

However, those optimistic reports contrast sharply with other research that clearly states that the adoption and use of SFA/CRM technologies have been less successful than originally hoped (Rigby et al. 2002). The failure rates for SFA implementations have been reported to be as high as 55–80% (Galvin 2002; MacInnes, 1998). According to a leading IT consulting agency, 60 per cent of sales personnel report not using available SFA technology (Dulaney, 1996). The main reason cited by sales representatives is that SFA did not help them in the most important aspects of their job: face-to-face customer meetings. Honeycutt (2005) then made the point that given the fact that firms invest between US$5000 and US$15,000 per salesperson in SFA projects; failure rates of even one-half this magnitude imply that firms may not be recouping their technology investment (Honeycutt, 2005).

Given the magnitude of both SFA investment and its failures, many scholars (Erffmeyer & Johnson, 2001; Jones et al. 2002; Pathasarathy & Sohi, 1997; Rivers & Dart, 1999; Speier & Venkatesh, 2002; Widmier et al. 2002) have called for more research in this area. As Buehrer (2005) argued, the pressing question now seems to be "How we can prevent repetition of any firm's failures in information technology investment?"

The purpose of this study is to investigate the effectiveness of a mobile information and communication support system designed to help the sales force of a medium-sized pharmaceutical company in dealing with the barriers to performance they face when they are operating in a mobile work setting. The study also aims at examining issues and deriving lessons associated with the implementation of the mobile information and communication support system. The next section positions our work with regard to earlier research on information technology adoption. Section 3 outlines the research approach chosen. Section 4 provides a description of the research site. Section 5 illustrates the nature of the barriers to performance the sales force members face in the field. Section 6 provides a description of the implemented mobile system. Sections 7 and 8 analyse the findings of the study.

## 2. Theory and Research Questions

### 2.1. Technology Acceptance Model

Research on technology adoption has a long tradition in the area of information technology. The most widely used framework is the technology acceptance model (Davis, 1989).

The technology acceptance model (TAM) attempts to explain the determinants of computer use across a broad range of end-user computing technologies and populations. According to TAM an individual's acceptance of information technology is based on two beliefs: perceived usefulness and perceived ease of use. Perceived usefulness is defined as the prospective user's subjective probability that using a specific technology will increase his/her job performance (Davis et al. 1989). Perceived ease of use refers to the degree to which the prospective user expects the technology to be free of effort (Davis, 1989). TAM suggests that perceived ease of use influences perceived usefulness. Indeed, other things being equal, the easier the system is to use, the more useful it can be (Venkatesh & Davis, 2000). Moreover, effort saved by improved ease of use may be reused to carry out more work for the same effort (Davis, 1989).

TAM has been revised and elaborated in various ways. One extension of TAM focuses on extending the perceived usefulness and perceived ease of use constructs. For example, Chau (1996) expands the construct of perceived usefulness into two different constructs: perceived near-term usefulness and perceived long-term usefulness. Near-term usefulness refers to how the user perceives the capability of the technology to improve his performance while long-term perceived usefulness refers to the user's career prospects or social status. His study revealed that near-term perceived usefulness has the most significant influence on intention. Also it had a significant and positive influence on long-term usefulness. That is, a user who perceives the technology as useful in accomplishing his or her tasks is predisposed to believe it will help him or her in his future career. Another extension of the original TAM goes to the definition of the antecedents of perceived ease of use and perceived usefulness.

Venkatesh & Davis (2000) introduced TAM 2. It extended the original model by defining the external variables of perceived usefulness in terms of social influence processes (subjective norm, voluntariness, and image) and cognitive processes (job relevance, output quality, result demonstrability and perceived ease of use). According to TAM 2, subjective norms influence perceived usefulness via both internalization, a process by which, when one perceives that an important referent thinks one should use a system, one incorporates the referent's belief into one's own belief; and identification, in which people use the system to achieve status and influence within their work group and thereby improve their performance. With increasing experience of using the system, users rely less on social information but continue to judge the system's usefulness on the basis of the benefits they could achieve in terms of their status by using the system (Venkatesh & Davis, 2000).

Venkatesh (2000) focused on the antecedents of ease of use in three studies involving employees from three different organisations. He developed a model of the antecedents of the perceived ease of use construct. The model suggests that control (defined as the individual perception of the availability resources to perform the specific behaviour), intrinsic motivation (defined as the degree of a user's computer playfulness), and emotion (defined as the individual's anxiety when he or she is faced with the situation of using a computer) are anchors that influenced users' early perceptions of the ease of use of a new system.

Venkatesh et al. (2003) developed a unified model (UTAUT) based on studies of eight prominent models in IS adoption. According to Lee et al. (2004), UTAUT is the most intensive elaboration of TAM.

UTAUT posits three direct determinants of intention to use: performance expectancy, effort expectancy and social influence as well as two direct determinants of usage behaviour (intention and facilitating conditions).

Performance expectancy is defined as "the degree to which an individual believes that using the system will help him or her to attain gains on performance; effort expectancy is defined as the degree of ease associated with the use of the system; social influence refers the degree to which an individual perceives that important others believe that he or she should use the new system. Facilitating conditions are defined as the degree to which an individual perceives that an organisational and technical infrastructure exists to support the use of the system. According to UTAUT, the effect of performance expectancy on a user's behavioural intention is stronger for men and younger workers; the effects of effort expectancy on behavioural intention are stronger for women, older workers and those with limited experience; the effects of social influence on behavioural intention are stronger for women, older workers, under the condition of mandatory use and with limited experience. The effect of facilitating conditions on usage is significant only in conjunction with the moderating effects of age and experience. UTAUT was empirically examined and found to outperform the eight individual models, including TAM.

### 2.2. Information System Success Model

Delone & McLean (1992) developed a model of information systems success based on a review of 100 papers containing empirical IS success measures published in 1981-1987. They synthesise the success measures they identify into a six-factor taxonomy of IS success: System quality, information quality, IS user, user satisfaction, individual impact and organisational impact.

According to the DeLone & McLean model (1992) the quality of an information system together with the quality of information will lead to both use of the system and user satisfaction. This use then leads to an individual impact resulting in some organisational impact.

DeLone & McLean do not provide any empirical validation to their models. However, elements of the model have been subject to empirical tests (Seddon & Kiew, 1994; Rai et al., 2002). For example, Seddon & Kiew (1994) tested five of the nine relationships and found them to be significant.

Despite being used widely, the model has been subject to criticism and calls for respecification and extension. For example, according to Alter (2000) the distinction between the work system and the information system that supports it does not appear clearly in the DeLone & McLean success model. As a result, the model's constructs can be interpreted differently depending on whether they are seen from the perspective of a work system or an information system. For example, while information quality can be measured in terms of the demands of a work system; the same construct can be measured from an information system perspective based on the information *per se* regardless of whether the information is needed or not by the work system. For example Seddon (1997) suggests a respecification of the DeLone & McLean model by disentangling the process model from the variance models and separating the variance model of IS success from the variance model of behaviour that occurs as a consequence of IS success.

Based on the calls for respecification and extension of their original IS success model, Delone & McLean (2003) have provided an update of such a model. They extend it by adding a new construct which is service quality, and combining the individual and organisational impact constructs into a single variable, "net benefits". According to this updated model, information quality, system quality and service quality, singularly or jointly, affect both intention to use and user satisfaction in a process sense. User satisfaction in turn affects intention to use in a casual sense, as increased user satisfaction will lead to increased intention to use and thus use. Both use and user satisfaction will result in certain net benefits from the perspective of a system stakeholder (e.g. user, sponsor of the owner of the system) that would either reinforce subsequent use and user satisfaction in the event of positive benefits; or result in decreased use and potential discontinuance if the net benefits are negative.

Delone & McLean (2003) recommend that the researcher should carefully define the stakeholders and the context in which net benefits are to be measured. The same recommendation is provided by Seddon et al. (1999) in his discussion of the dimensions of IS success. Such authors argue that different measures of IS effectiveness or success are required for different contexts. According to Delone & McLean (2003), no single variable is better than another; the choice of success variables is often a function of the objective of the study and the organisational context.

### 2.3 Adoption research for the sales force

Much of the research on SFA has been conducted by marketing researchers and has dealt with issues associated with the adoption of SFA by salespeople. They focused on either the variables that moderate salesperson usage of these technologies, the technologies used to perform certain sales management activities, or the consequences of SFA implementations.

Pathasarathy & Sohi (1997) propose a two-stage model outlining a myriad of variables involved with planning, purchasing, training, and use of information technology by salespeople. The first stage of the model identifies theoretical impact of organisational issues that influence the decision to adopt a SFA system. The second stage of the model explores the factors that potentially influence the adoption of SFA by individual salespersons. This results in what they term as dual adoption first by the organisation, and then by the sales force.

Robinson et al. (2005) test the concept of technology acceptance in a field sales setting and explore the linkage of this concept with the outcome measure of adaptive selling and job performance for salespeople. They found that salespeople who believe that a technology tool will be useful will also have a positive attitude towards using that tool. Additionally, they found that perceived ease of use also has an indirect impact on a salesperson's attitude toward using a technology through its relationship to perceived usefulness. When a salesperson perceives that a technology will be free of added effort (or that it reduces effort), he or she may take the opportunity to redirect the unused effort toward other tasks. This will allow more work to be accomplished for the same effort, hence greater productivity. Ease of use will have a direct effect on usefulness to the extent that the increased ease of use contributes to working more efficiently and improving performance.

Jones et al. (2002) performed a longitudinal study to investigate which individual variables influenced salespeople's intention and infusion of a new SFA system. They found that salespersons' attitudes (perceived usefulness, attitude towards the new system and compatibility) have an impact on intention to use a new SFA system prior to implementation. However, personal innovativeness, attitudes towards the new system and facilitating conditions have greater effect on how extensively the new system is used.

A noteworthy study on SFA adoption is by Speir & Venkatesh (2002). Their longitudinal study presented data that support favorable salesperson reactions to SFA immediately after release. However, negative perceptions of the SFA technology emerged after six months of use. Further, they found that salespeople with stronger professional commitment indicated more negative job-related perceptions as experience with the SFA technology increased.

Schillewaert et al. (2005) study 229 salespeople from different industries in order to investigate their adoption of information technology. In their study the authors used TAM to better understand perceived usefulness and perceived ease of use of SFA. They also examined such constructs as personal innovativeness, computer self-efficacy, training, technical support, supervisor support, peer usage, and customer interest. The results of their studies indicate that usefulness is a fundamental driver of the use of sales technology by the sales force and ease of use is a secondary driver. Also they found that salespersons' technological innovativeness and the role of supervisor are significant factors in the adoption of technology. Their recommendations to sales managers include hiring technologically innovative salespersons, training the sales force to use technology based upon impact on job performance and, more importantly, the sales managers should lead by example since their sales forces are likely to emulate them.

Avlontis et al. (2004) tested a model of antecedent variables such as social, organisational and individual factors on CRM perceived usefulness and ease of use to predict user satisfaction, acceptance and performance based on a sample of 240 salespersons. The results of their study indicate that salespersons who found the technology useful and easy to use were more likely to both adopt it and use it. The authors recommend managers to set accurate expectations and that the sales force should be involved in the design and implementation of SFA. Also the authors highlight the role of sales managers in the sales force acceptance process through the support and encouragement they could provide to their sales members.

Ranjarajan et al. (2005) examined the impact of sales force automation on technology-related stress, effort and technology usage among salespeople. Their study showed that role conflict increases when salespersons believe that the time used to master the technology could be better used to talk to customers. As a result, they encourage managers to clarify expectations tied to the technology and to invest in a technology that salespeople perceive to be useful. They also recommend that sales managers should minimise the complexity of integrating technology into the everyday work routines of the sales force by providing support to reduce the increased work demand caused by the technology and increase successful adoption of the technology.

Three observations emerge from the above literature review:
*First,* a considerable research endeavour on technology adoption has focused on tackling the phenomenon from a variance theory perspective. Variance models assert that for some populations, if all other things are equal, variance in any one of the independent variables is necessary and sufficient to cause variance in dependent variables. That is, variation in the predictors (e.g. users' behaviour as in the case of TAM, or system quality and

information quality in the DeLone & McLean model) accounts for variation in outcome (e.g. IS use).

While variance models provide useful insights in terms of explaining variances assumed to occur inside the “black box”, they provide little explanation of how and why the predictors and outcomes are related This results in providing partial guidance to the practitioner who is interested not only in knowing the dynamics between the pieces of the system implementation puzzle but also how such pieces should be arranged in order to attain the expected system success (Newman & Robey, 1992).

Moreover, variance models posit an invariant relationship between antecedents and outcomes by assuming that the antecedent is necessary and sufficient to cause the outcome (Markus & Robey, 1988). Such an assumption is too stringent for social phenomena such as assessing the success of an information system. Additionally, the increasingly costly failures of information systems development projects calls more for studies that could integrate insights collected from actual experience in order to derive lessons to guide practitioners in the complex process of information system development and implementation. Several scholars indeed have argued for the need to develop alternative approaches such as process models that could complement, refine, and mutually inform the variance models in the area of information technology implementation (Newman & Robey, 1992; Markus & Robey, 1988, Sarker & Lee, 2002; Chan, 2000). In process theory the precursor is assumed to be insufficient to cause the outcome but is held to be merely necessary. However, as Markus & Robey (1992) observed, necessary conditions alone cannot constitute a satisfactory theory (water may be necessary for the growth of plants, it is not sufficient for the purpose). Mohr (1982) has observed, however, that necessary conditions can compromise a satisfactory causal explanation when they are combined in a recipe that strings them together in such a way as to tell the story of how the outcome occurs whenever it occurs. Outcomes are partly predictable from knowledge of the process, not from the level of predictor variables.

*Second,* despite the high failure rate of SFA projects, reported in some cases to be as high as 55–80 per cent, (Honeycutt, 2005; Galvin 2002; MacInnes, 1998), few studies have taken steps to investigate the reasons for such failures and the lessons learned from the various experiences with SFA implementations.  This is important because as Jones et al. (2002) point out, given the magnitude of SFA failures, firms cannot afford to continue investing in SFA technology while getting lacklustre result; which in turn may result in the sales force becoming stagnant and obsolete. Another apparent problem of SFA studies is that they have been applied to tasks that are too broad, or sometimes to the salesperson’s job in general (e.g. while several researchers warn that the lack of task focus in evaluating IS causes mixed results and may lead to findings which cannot be generalised to task-dependent situations (see e.g. Goodhue & Thompson; Karahanna & Straub, 1999).

Similarly many studies on technology adoption by sales forces have focused on a broad definition of the SFA /CRM without a robust definition of the technology under study (e.g. Schillewaert et al, 2005; Rangarajan et al, 2005; Avlontis et al, 2005; Jones et al, 2002). As Erffmeyer et al. (2002) point out SFA still means different things to different people. While one firm may consider adding a fax machine as SFA, another may see SFA as providing the sales force with mobile phones or laptop computers. Yet another may see SFA as selling products or services via the Internet. Also most of the studies examining SFA adoption by the sales force have tackled the phenomena using variance models that they subject to empirical testing using statistical techniques in order to draw conclusions about the sales force population. Few studies have investigated the adoption and implementation issues associated with an accurately defined set of sales technologies aimed at supporting precise sales force tasks and within the sales force's natural work environment (e.g. in the field).

*Third*, few studies of SFA implementation have assessed the success of the investment in terms of achieving the ultimate objective, which is net benefits to stakeholders. Scholars and practitioners need to understand better the success or failure of investment in sales technologies not only from an information systems perspective (e.g. use of the SFA technologies by the sales force) but also in terms of the net benefit to the work system that the technology is supposed to support and to the various stakeholders. We believe that technology adoption is important only if it leads to net benefits for such main stakeholders as the individual salesperson, his or her organisation or the customer. Alter (2000) indeed made a point when he builds the analogy between the work system and the information system that supports it as Siamese twins that are distinguishable but still so deeply connected that examining them separately is meaningless. However, reviewing the literature on the SFA systems make it obvious that such a link between the two systems is not clear. For example, very few studies have considered a dependent variable other than the sales force's own reported usage of the system. Two exceptions are the recent work by Ahearne et al. (2005), who integrate in their study such performance measures as call productivity and percentage of quotas achieved, and Robinson et al. (2005) who used outcome measures of adaptive selling. Also, a review of the instruments (e.g. questionnaires) used in a number of studies examining the antecedents or the consequences of SFA implementations, shows that the questionnaire statements are too general and do not reflect deeply the every day realities of the work system (e.g. nature of tasks, barriers that impede the performance of the tasks) within which the sales force operates and that the technology under study is aimed at supporting.

### 2.4 Research Questions

Based on the recommendations of DeLone & McLean (2003), this study sets at the outset the dimension against which to analyse the effectiveness of the implemented mobile system. Such a dimension is the extent to which the system supports the sales representatives (reps) in dealing with the barriers to performance they face during the course of their everyday mobile work.

The choice of the barriers to performance as a dimension against which to evaluate the implemented mobile system has a number of advantages.

*First,* focusing on the barriers to performance as a dimension of IS success would enable us to achieve the balance between the work system and the information system when analysing IS effectiveness that Alter (2000) calls for. Indeed, using such a dimension would enable us to evaluate the effectiveness from the work system perspective while analysing issues associated with the information system if the objective of the work system is not achieved (i.e. failure to support the reps to deal with the barriers to performance they face).

*Second,* removing the barriers to performance reps face in the field would benefit many stakeholders: (i) the individual salesperson through enhancing his or her efficiency and effectiveness, (ii) the organisation, which would achieve a better bottom line value from improving the performance of its sales force and (iii) the customers, who would benefit from a better experience (e.g. better service, better information) as a result of the removal of the barriers that impede the performance of the sales force with whom they interact.

Third, several scholars (e.g. Goodhue et al. 1995; Karahanna & Straub, 1999) recommend a task focus as a basis for a strong diagnostic tool to evaluate whether information systems and services in a given organisation are meeting user needs. In this study we focus on specific barriers that impede reps' efforts to carry out their everyday tasks. Therefore, the research questions for the present study are as follows:

1) To what extent does the mobile system implemented support the sales force in removing the barriers to performance it faces in the field?

2) What are the issues associated with implementing the mobile system?

## 3. Research Approach

Two complementary data collection methods were used in this research. The first method is observation (i.e. shadowing) in the field. According to Barley & Kunda (2001), although the interview method is especially useful for "understanding how people make sense of their work and the issues they believe important", it is not a credible source of information on "what people actually do or how they do it" (p.84). They argued that observation-based techniques should be mixed with interview methods.

However, applying an observation method raises some practical difficulties to the researcher. Observation techniques require the researcher to spend an extended period of time in the field (Myers, 1999) and be close together with the subjects. As Kakihara (2003) argued, this makes sense only if the field could be geographically defined and fixed (like office, factory, or home). The sales representatives, the main subjects of this field work, were operating in different regions of the country and they extensively move across various geographical areas. They rarely visit their head office. Furthermore, the sales representatives will constantly feel that the researcher will interfere with the sales process.

In order to deal with the above research constraints, I first collected data by shadowing one sales representative in the field. Then I used the material collected from observing the sales representative to design a survey involving all company's sales force. As Lyytinen & Yoo (2002) argued, studying emerging mobile and nomadic work environments requires considerable tailoring of the research methodology. In order to collect highly contextualised data of work practices, researchers need to adapt their research strategy in order to benefit from the strength of certain research methods while dealing with obstacles they may encounter especially in terms of the availability of informants.

Member validation (Lincoln & Guba, 1984) was used as a part of the research method. Executive and detailed reports describing barriers to performance, issues associated with the implemented mobile system and recommendations were presented to the company's sales manager and the reps. This resulted in minor changes when the reps' sales management team approved our description of the barriers the reps face in the field.

## 4. Site Description and Selection

The research was undertaken in a subsidiary of a multinational pharmaceutical company (Pharma), employing 6000 people worldwide in 2003, about half of them engaged in sales and marketing activities. Pharma is a relatively small company operating as a niche player with particular expertise in the area of psychiatric and neurological disorders.

The company has a national sales team consisting of 14 sales representatives. These sales representatives report to a sales manager who is ultimately responsible to the marketing manager.

The main role of a Pharma's sales rep is to meet physicians, nurses as well as prescribers in hospitals and pharmacists to provide information about the way the company's products operate. It is up to him/her to emphasise the clinical benefits to patients and health professionals in terms of disease management. The purpose is to encourage the health professionals to prescribe Pharma's products rather than those of the competitors. In addition to their daily encounters with health professionals (mainly physicians), Pharma's reps work duties include managing relationships with their customers. Relationship management with physicians involve providing them with any information they need related to the company's products, entertaining them in order to personalise the relationship with them as well as inviting and accompanying them to scientific conferences and congresses covering the scope of their medical interests. Pharma's sales reps work duties also include performing administrative work. Administrative tasks include preparing reports about both their daily sales encounters with healthcare professionals and the expenses they incur during their sales visits (e.g. catering provided to healthcare professionals during sales meetings). Pharma's sales reps are also responsible for categorising the healthcare professionals they plan to visit into groups based on their prescribing potential. On the basis of this profiling the sales rep decides on the frequency of sales visits as well as the intensity of customer relationship effort he/she should devote to each targeted health professional. Once the sales rep groups the health professionals, he/she coordinates with field secretaries in order to book appointments with them. Pharma has four secretaries who coordinate with all the sales reps. According to Pharma's sales manager, field secretaries are responsible for booking two-thirds of the appointments with healthcare professionals; the rest are performed by the reps.

The management of Pharma's reps is based on a system of compensation as well as autonomy in the field within certain regulatory guidelines. Pharma requires each sales rep to make five sales visits per day. The reward system is then based on the number of calls (face-to-face meetings held) with targeted customers as well as the level of the company's product sales within the territory where the rep operates. Pharma provides training to its sales force once a year. The course lasts three days and covers both sales and technical training programmes related to Pharma's products.

Before implementation of the mobile system, the information technology support that Pharma provides to its sales force included a mobile phone and a laptop computer. The sales reps have also a sales support system run over their laptops and that enables them to store sales visits information and to access their company's corporate database via a dial-up system.

## 5. Understanding the barriers to performance the sales reps face in the field

In order to understand the nature of the barriers to performance the sales reps face during the course of their everyday life mobile work, we first collected data through observation by the means of two field sales trips.

The field sales trips lasted an entire day and represented “an ordinary day” in the life of a Pharma sales rep. In the field, the interviews were supplemented with informal interaction and discussions over lunch with the reps. All the interviews and discussions were recorded, transcribed and subjected to content analysis using established qualitative coding techniques prescribed in qualitative research methodology. The thematic analysis of the qualitative field material led to a list of emerging barriers to performance faced by reps in the field.

### *5.1Emerging barriers to performance in the field*

Based on the thematic analysis of the qualitative field material, we assigned the barriers to performance the sales representatives face during the course of their everyday mobile work, into pre-, in- and post-mobility barriers to performance.

One barrier that the rep faces prior to starting his daily sales trips is associated with preparing for the presentation that he will give during the following day's sales visits. The reps have to visit their targeted physician at least five times year. Prior to each sales visit, the rep has to find time to review the content of previous meetings held with the physician and try to find out new information not mentioned in previous meetings that the physician may find helpful and interesting. Indeed, the reps' effectiveness in their meetings with physicians depends to a large degree on the extent to which the physician perceives that the meeting with the rep has added intellectual value. In some cases this may lead the physician to decide the future of the relationship with the rep.

A further difficulty that the rep faces prior to starting their sales visits is adaptation to the shortcomings associated with the technological support they have (the laptop) in order to ensure that the information they need during the working day is available when and where it is required. For example, given the fact that the rep knows that he cannot access the information stored in his laptop or within the corporate database at any time and anywhere, he makes sure to print out in the evening all the documents he believes would be useful during the following day's sales trip. However, the strategy of printing files on particular topics (for example, the day's schedule) is not always effective in adapting to the deficiencies associated with the technological support they have access to; as the rep explained:

> Usually I print the timetable for next day at night. Last night I forgot to print any paper to remind me where to go and I didn't do it in the morning because I have a little daughter and I don't want to interrupt her sleep in order to get my briefcase. When I don't remember to print my schedule, then I don't want to do it the following morning, either, for fear of waking her up. Fortunately this morning I have only four meetings and I can memorise them when I check them on the laptop.

In-mobility barriers to performance refer to the challenges the rep faces during their daily sales visits. The paper assigns such challenges to barriers to efficiency and barriers to effectiveness.
One barrier to efficiency the rep faces during his daily sales trips is when a physician cancels an already arranged appointment. In many situations the sales rep fails to meet the physician because of unpredictable circumstances that might make the physician not available for the meeting as the rep explained:

> You never really know (with regard to meeting with the physician). You should only hope that he will be there and, of course, face the reality that there may be a problem with your schedule. I sometimes call on a neurologist, with whom I had a booking, I might be waiting outside her office; and then a nurse comes to me and says the physician is too busy at the moment, "I am sorry you cannot see her today.

As a result, if the meeting is cancelled the sales rep moves to the next sales visit scheduled in his/her day and waits in the car or in a cafeteria till the time to meet the next physician, with the frustrating feeling that he or she will not meet his or her five sales visits quota of the day.

Another barrier to efficiency identified in the study is the difficulty in turning periods of dead time into productive ones. Dead time refers to the time during the working day that the rep perceives as wasted because they unwillingly spend it without performing any work-related activity. Examples include time in transit between the day's scheduled meetings, time wasted as a result of a last-minute cancellation of a meeting already booked with a physician, or time available because of less time than expected being spent with a physician. In the case of Pharma's sales rep, the occurrence of dead time is frequent and has various causes. One cause is the difficulty in predicting its happening so that the rep can plan ahead for the kind of activities that would enable them to make a good use of it. For example, in the event of a last-minute cancellation of a meeting, the rep finds it difficult to fill that time with a value-generating activity such as visiting another contact. Generally physicians require to be contacted in advance in order to arrange a meeting with the rep. Therefore the time devoted to the cancelled meeting turns to be a dead time; as the rep mentioned:

> When you have a long gap between your contacts, what you can do is to wait for the next meeting. You may try to visit another doctor but most of them like you to call them on before hand, sometimes a few weeks in advance.

Another cause of dead time for Pharma rep is the lack of appropriate technological support that would enable the rep to perform a work-related activity during dead-time periods. A laptop computer appeared to be awkward to support the rep during dead time because of its size and also the time it takes to get the device mobilised to provide the required support. The rep generally tries to use the laptop in the car. However, if the rep faces short dead time (e.g. between two meetings in a hospital), and wants to use the laptop to perform a scheduled task or retrieve information, he/she is discouraged from doing that. This is because the rep figures out that by the time he/she gets to the car in the parking area and starts the laptop, the time for the next meeting will come. Therefore the rep may choose to use the short dead time just waiting outside the physician's office or in the hospital cafeteria.

A third barrier to efficiency that the rep faces during their daily sales trips is the difficulty of accessing contact information when the rep have meetings in large hospitals. A meeting that takes place in a large hospital is a good opportunity for the rep to perform his prospecting activities. This is due to the large number of physicians working in large hospitals. A key enabler to help the rep to search for new prospects in such hospitals is to have access, whenever they have time available (i.e. between meetings), to sales information such as the contact names of the physicians they know in the hospital. Then the rep could have those physicians with whom they have already built a relationship introduce him/her to their colleagues, during a coffee break for example. However, the rep stores useful sales information in their laptops, which in most cases they does not carry with him. As a result, he relies mainly on the contact name they remember. The time that could be spent prospecting for new contacts is therefore spent just waiting for the following meeting.

Travelling from one location to another using the car appears to be another source of barriers to efficiency for the rep. Pharma's rep spends on average more than a third of his working day on the road, in normal weather. The main challenge posed to the rep during travelling is how to make the long time they spend on the road more productive despite the physical and legal constraints (access to work resources, legislation prohibiting talking over a mobile phone while driving) resulting from driving the car; as the rep explained:

> I spend about half of the working day driving from one place to another. This time is too much to get wasted. The whole goes to listening to radio. I can't even reply to my customers' phone calls during this time.

The barriers to effectiveness the rep faces during their sales trips are various and have many sources. One barrier to effectiveness is the difficulty the rep experiences in terms of coordinating with field secretaries during sales trips. Such difficulty stems from the fact that the rep as mobile workers cannot be aware of the booking actions made by the secretaries during their sales trips. He needs to wait until he is at home and connect to the corporate database. The field secretaries experience the same difficulty. In order to know the rep's opinion about possible meeting dates or the rep's actions with regard to contacting a specific physician, they need to wait until the rep enters the information into the corporate system. Such coordination difficulties result in problems such as booking a meeting with the same physician twice, which can be detrimental to the rep's relationship with physicians:

> The worst thing that may happen is that when you have just booked a doctor for yourself and then for the same time the secretary makes you a booking with another doctor and they are both very important. Then you have to decide what to do, which one you have to transfer to another time. It is not easy as they are busy and you may not find another time to catch him or her.

A second barrier to effectiveness is delay in providing physicians with answers to their outstanding questions. Outstanding questions refer to questions that the physician asks during the sales meeting and to which the rep does not know the answer.

> Sometimes doctors may need things urgently; the quicker you deliver the information the better.

In order for the rep to provide answers to such a question, he/she needs to look for the information him/herself. In most cases, the information-gathering process takes place at home, which increases the time it takes for the rep to submit the answer to the physician. Also the rep may forward them to more specialised colleagues within the company. In this case the rep has to wait until the colleague submits the reply to the question. However, the inability to check e-mail while on the move extends the time it takes the rep to provide an answer to the physicians' questions. As a result it might be that the colleague from whom the rep seeks support with regard to a physician's outstanding question has already submitted an answer using e-mail to the rep during the working day. However, in the absence of an access to e-mail in the field, the rep will not become aware of the colleague's reply until he/she gets home in the evening and accesses the corporate database.
A further barrier to effectiveness is the adaptation to physicians' information requirements. Physicians require that the rep provides them with new information during each sales meeting; as the rep explained:

> The physician would be pleased if you can provide her with new information she does not know...You should prove to the physician that you are up to the task and that you know more than her.

Also, the fact physicians appreciate that a rep may be able to provide them with the experiences of other physicians is another barrier to effectiveness the rep faces. Physicians often regard the opinion of their colleagues about the product the rep is promoting as more reliable than the arguments the rep gives them; as the rep explained:

> Every time you come, they (doctors) expect you to have something new. They also want to hear other doctors' opinions, their experience with the drug, they want you to deliver all the information you heard from other doctors. Even though you know your drug quite well, a doctor believes another doctor more than the rep.

The way the rep takes and store useful information that they acquire during sales visits appeared to be a barrier to effectiveness. During the short meeting with physicians, the rep relies mainly on his memory for recording what they perceive as useful information such as the drug-related issues discussed with the physicians or questions that the physicians have. For information that the rep perceives as highly important (i.e. questions needing a follow-up), the rep writes it down so as not to forget, and then enters the handwritten information into the laptop when there is sufficient time between meetings. As one rep explained:

> During meetings with doctors I try to memorise. If there is an important thing I write it on a piece of paper to make sure that things that were asked of me could be answered for sure. Then when I have sufficient time during the day, I try to open the laptop and input the information just to make sure it stays there and I don't have to find my piece of paper later on.

In the evening, once at home, the rep accesses the company's database and enters the sales reports of the day. Some reps leave reporting tasks till the weekend and input the sales reports of the whole week.

Post-mobility barriers refer to the work-life balance that the rep attempts to achieve. Indeed, once at home, the rep has to accomplish work-related activities that he was not able to do during the day. The time that the rep devotes to accomplishing work-related tasks at home is used at the expense of their rest and family time; as the rep explained:

> I attach great value to not being obliged to open my laptop after 4 pm to fully concentrate on my little daughter, my hobbies and my everyday tasks at home. You don't get paid after 4 pm. It is quite embarrassing to keep working on Sunday morning at home.

### *5.2 Survey*

In order to validate and complement the findings of the qualitative study as to the barriers to performance discussed in section 5.1, a survey involving all Pharma's 14 reps was conducted.

The instrument used was a questionnaire that was e-mailed to each of the salespeople working in Pharma. The managers of Pharma use regularly e-mail to communicate with their sales force. Once the e-mail survey was completed by the salesperson, his/her response was sent directly to the researcher to maintain confidentiality. Respondents were assured of the confidentiality of the information they provided and that only averaged and anonymous data would be used in any report. In the survey, salespeople were asked to rank the statements about the barriers to performance they encounter during the course of their everyday work life on a five-point Likert-type scale; ranging from 1 to 5, where 1 equalled always facing the barrier to performance, 2 = often, 3 = sometimes, 4 = seldom and 5 = never. Responses were received from all 14 sales reps. The data were collected and analysed as to the nature of the barriers to performance faced by the sales reps in the field in summer 2004 prior to implementation of the mobile system.

The data were collected and analysed as to the nature of the barriers to performance faced by the sales reps in the field in summer 2004 prior to implementation of the mobile system. Table 1 provides the results of the survey.

**Table 1: Survey results of leading sources of barriers to performance for the sales reps**

| How frequently do you face the following barriers to performance | Always or often* % | Sometimes ** % | Seldom or never *** % | Mode | Mean | SD |
|---|---|---|---|---|---|---|
| 1. Performing administrative work at home | 92.9 | 7.1 | 0.0 | 2.0 | 1.6 | 0.6 |
| 2. Printing out documents before sales trips that might be useful during sales trips | 71.4 | 7.1 | 21.4 | 1.0 | 2.0 | 1.4 |
| 3. Making notes on paper about physicians' outstanding questions during sales visits | 71.4 | 7.1 | 21.4 | 1.0 | 2.0 | 1.2 |
| 4. Physicians requiring a call in advance before arranging a meeting | 64.3 | 0.0 | 35.7 | 2.0 | 2.8 | 1.6 |
| 5. Physicians requiring new information during each meeting | 50.0 | 42.9 | 7.1 | 2.0 | 2.5 | 0.8 |
| 6. Difficulty of identifying alternative contacts to visit if an appointment is cancelled | 57.1 | 28.6 | 14.3 | 2.0 | 2.6 | 0.8 |
| 7. Physicians appreciating hearing the opinion of other physicians about the company's products | 50.0 | 50.0 | 0.0 | 2.0 | 2.5 | 0.5 |
| 8. Spending time gaps between meetings just waiting for the coming meeting to take place | 50.0 | 28.6 | 21.4 | 2.0 | 2.7 | 1.1 |
| 9. Physicians not informing in advance in case they cancel an appointment | 42.8 | 50.0 | 7.1 | 3.0 | 2.6 | 0.8 |
| 10. Difficulty in accessing sales contacts in large hospitals | 42.9 | 28.6 | 28.6 | 2.0 | 2.7 | 1.1 |
| 11.Long delay in providing an answer to physicians' outstanding questions harms my relationship with him or her | 42.9 | 14.3 | 42.9 | 4.0 | 2.9 | 1.2 |
| 12.Difficulty in coordinating with field secretaries during sales trips | 21.4 | 50.0 | 28.6 | 3.0 | 3.1 | 0.9 |
| 13. Physicians do not like me to call them during their work hours | 21.4 | 35.7 | 42.9 | 3.0 | 3.3 | 0.9 |

*) Percentage of respondents who answered always = 1 or often = 2
**) Percentage of respondents who answered sometimes = 3
***) Percentage of respondents who answered seldom = 4 or never = 5

## 6. The mobile system implemented

The mobile system implemented consists of providing members of the sales force with wireless access to the business information stored in their company's database, e-mail, calendaring, enterprise applications and to the Internet. Such mobile applications are run over a Nokia 9500 Communicator. In addition to office tools (e.g. Word and Excel, e-mail attachments, PowerPoint editor and viewer), the communicator includes Bluetooth and an integrated camera. It also supports both voice and messaging services such as multimedia messaging (MMS), e-mail, text messaging (SMS) and fax (see www.nokia.com) for more details). The sales reps can also synchronise data between their communicator and desktop. The mobile system runs over the GPRS network.

With the implemented mobile system the reps can check e-mail, view and edit attachments. They can also create presentations, adjust their calendar, locate crucial customer information in the corporate database, instant-message colleagues, enter and upload sales visits reports to the company customer database.
Implementation of the mobile system was carried out by a software development company. In addition to implementing the system, the company was responsible for providing training to the sales force as well as support. The training was basically technical and consisted of introducing the mobile system to the sales force and teaching them how to operate its basic functionalities.

## 7. Study 1: A qualitative Investigation

### 7.1 Method

In order to explore both the extent to which the implemented mobile system supported the reps in dealing with the barriers to performance we discussed in section 5 and issues associated with the implementation of the system, we collected data through observation on two field sales trips. The purpose of the field sales trips was (i) to observe the rep's application of the mobile system in order to deal with the barriers to performance discussed in section 5.1, (ii) to evaluate the extent to which the sales force uses the system to deal with the barriers, and (iii) to assess the nature of the difficulties the reps experiences in terms of integrating the mobile system into their everyday work life.
In the field interviews were supplemented with informal interaction and discussions over lunch with the rep. All the interviews and discussions were recorded, transcribed and subjected to content analysis using established qualitative coding techniques prescribed in qualitative research methodology.

### 7.2. Results

As a result of observing the rep's behaviour in the field a major theme surfaced. The rep uses the mobile system only in case the usefulness of the system is apparent to him in terms of dealing with a particular barrier. In other words, although the system has the potential to provide support for certain barriers, if the rep cannot figure out how it would be useful for that purpose, he will not use it. The rep finds the mobile system useful and thus uses it to deal with such barriers as long delays in dealing with physicians' questions, reducing periods of dead time in the field, updating his knowledge base before the meeting with physicians and coordinating with field secretaries in the field. For example, in terms of dealing with delays in answering physicians' outstanding questions, the rep explained:

> I think the mobile system is a big help. This device is useful in making things much faster. When I send the question to my colleague in the office, the workload has gone from your shoulder. Then I just wait for the answer. I mailed one question to the leader of medical affairs just after the meeting with a doctor. He sent me the answer straight back and then I was able to contact my doctor again in the same day.

Likewise, the rep uses the system to perform administrative work between meetings in the field.

> The main benefits from the device come mainly from entering and uploading daily reports as well as reading and answering e-mail messages. Just after visiting physicians I write my reports and send the information to the office, which saves to me lot of time at home to do such a task.

Similarly, the rep uses the mobile system in updating his knowledge base in the field before meeting the physicians:

> To have access all the time is a big help. The biggest benefit I believe is that if something important happens, you can get it by e-mail. The stress level goes down. All the information about what is happening in the market comes to me by e-mail.
> I also use the device to check my colleagues' reports and if there is something dramatic we call each other. Also when visiting a doctor I can find out if he or she works with other products my colleagues are promoting. I try to open the door to my colleague. I can then call the secretary and ask her to book the meeting for my colleague.

Also the mobile system seemed to be useful for the rep in terms of dealing with the barrier associated with coordination with field secretaries in the field:

> If a change happens to my visit, my secretary calls me and says have you noticed that from your mobile. Sometimes the day is so hectic that you don't have time to call the secretary, so I connect to the system and check the booking she made for me with physicians.

The rep also finds the mobile system useful in terms of the support it provides for dealing with physicians´ information requirements through access in the field to e-mail alerts, as the rep explained:

> Yesterday we received an e-mail alert form a rep about a side effect of a drug that's very useful for my visits with the physicians. Sometimes my colleagues also send information about rumours if the competition tries to disarm the

> sales force. This is important because if you don’t have the mobile device, you don’t have the information.

However, for such barriers as difficulty in identifying alternative contacts to visit if an appointment is cancelled; difficulty in accessing sales contacts in large hospitals; physicians, Physicians requiring new information during each meeting; physicians appreciating hearing the opinion of other physicians about the company’s products, the rep does not find the mobile system useful and did not use it for those purposes.

An additional theme also emerges from observing the rep’s behaviour in the field. A number of functions that would support the rep’s tasks in the field have not been fully exploited. For example, although the system provides presentation applications such PowerPoint, the rep still uses an overhead when making presentations to groups of physicians in hospitals. Likewise, the rep still prints in advance documents (i.e., agenda) that he thinks he might need during sales trips:

> I can check the agenda from the mobile device but then of course in the morning I print it out at home. Despite having such a connection you can have a double the paper version and the mobile version just to make sure.

Similarly although the mobile system provides a calendar application enabling the rep to book subsequent meetings with a physician during a sales encounter with him or her, the rep does not use it during his sales meeting with the physicians.

The long time required to get a connection to the mobile system’s application seems to be a barrier for the rep in terms of using the system, as he explained:

> Sometimes you need to do a lot of work to access the information. The mobile is quite slow when you have to access applications or download certain information.

To summarise, results of the exploratory study suggests that the mobile system has been used by the rep to deal with certain barriers for which the system’s usefulness was apparent to him. However, the system remains under-utilised in terms of helping the rep to minimise or remove other barriers that affect his efficiency and effectiveness in the field (e.g. identifying an alternative physician to visit in the event of an unexpected cancellation of a meeting, providing physicians with both new information during sales visits and the experiences with other physicians). For those barriers the rep lacks knowledge about how the mobile system could support him in dealing with them. As a result although the system has the potential to provide the necessary support, it is not used, as its usefulness is not apparent to the rep. Fig1. proposes a preliminary framework that summarize the findings of study 1.

The results suggest that firm could increase the reps’ usage of the system by providing training that goes beyond the technology to focus on the reps’ work system. Training from a work-system perspective would demonstrate to the reps how the various features of the system could support their tasks and help them to deal with the barriers they encounter. In the light of such knowledge the rep could assess the usefulness of the system's features in connection with his or her tasks as well as the barriers to performance he or she faces, and decide which features of the system to integrate into his or her everyday tasks (c.f. figure 1). The constructs in Figure 1 represent the relationship between events and outcomes in a process way.  That is an outcome can occur only if the condition occurs.

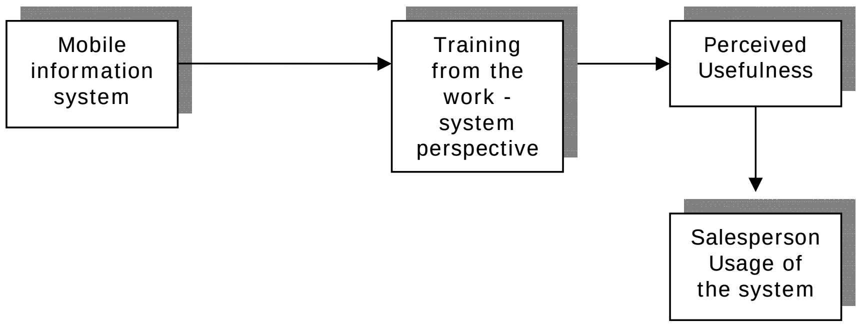


Fig.1. Preliminary Framework based on results of study1

## 8. The survey

On the basis of the themes identified in Study 1, and findings from earlier studies, a second study was conducted. For this study a survey was developed. The questionnaire was sent to all the company's sales force. It was thought that confirmation of the themes identified in Study 1 with a survey would reinforce the validity of the observations derived from the qualitative material collect in Study 1.

### 8.1 Method

The instrument used was a questionnaire. The design of the questionnaire was based on the information collected during the field sales trips, the literature about information technology adoption as well as input from the company sales managers. An initial draft of the questionnaire was sent to the company sales managers for input and approval. The initial version of the questionnaire was later refined with the help of a pre-test involving one sales rep, the reps' sales manager and an academic expert, which led to some adjustments: some questions were modified to increase their clarity for the respondents, others were deleted or added.

The questionnaires were distributed as attachments via e-mail to all the company's sales representatives. Pharma's managers regularly use e-mail to communicate with the reps. The e-mail addresses of the sales representatives were provided by the company sales manager.

Once the e-mail survey was completed by the salesperson, his/her response was sent directly to the researcher to maintain confidentiality. Respondents were assured of the confidentiality of the information they provided and that only averaged and anonymous data would be used in any report. Out of the 14 members of the sales force, 13 responses were received.

The specific constructs included in the questionnaire are summarised in the following:

- **Perceived usefulness**

Seddon, 1997, defines perceived usefulness as "the degree to which the stakeholder believes that using a particular system has enhanced his or her job performance or his or her group's performance." Perceived usefulness was measured by adapting Davis's instrument to specifically reference the usefulness of the mobile system in dealing with the barriers to performance the reps face. Also, the future-orientation of Davis's instrument was changed to reflect past usage. Ratings were made on a five-point Likert-type scale, ranging from 1 to 5, where 1 equalled agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5= disagree.

- **Perceived ease of use**

Davis, 1989, defines perceived ease of use as "the degree to which the prospective user expects the technology to be free of effort". Perceived ease of use "was measured by adapting Davis's instrument to specifically include factors observed in the field study that make the system difficult to use, such as slow data connection, small screen and keyboard. Responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1 equalled agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Perceived ease of integration**

Ease of integration reflects the degree to which the rep perceives that he/she was provided with appropriate training and support to use the mobile system in order to deal with barriers to performance faced. Perceived ease of integration was measured by adapting the instrument developed by Jones et al. (2002). All the responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1 equalled agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Usage of mobile system**

System usage refers to the frequency with which the system was used by the reps to carry out a list of operations in the field, on a scale of 1 to 5, where 1 equals always using the mobile system to carry out the operation described by the statement, 2 = often, 3 = sometimes, 4 = seldom, 5 = never. System usage was measured by adapting an instrument developed by Engel and Barnes (2000). All responses were measured on a scale of 1 to 5, where 1 equals always using the mobile system to carry out the operation described by the statement, 2 = often, 3 = sometimes, 4 = seldom, 5 = never.

We also included in the questionnaire internal factors that have been shown to influence users' adoption of information technology. Such factors include personal innovativeness, subjective norms, and compatibility with existing systems. Including such factors was aimed at "controlling" their impact when validating the proposition, as recommended by Lee, 1989.

- **Personal innovativeness**

Personal innovativeness refers to the degree to which an individual is relatively earlier in adopting new ideas than other members of a group (Jones et al. 2002). Personal innovativeness was measured by adapting a three-item instrument developed by Jones et al. (2002). Responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1 equalled agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Subjective norms**

Subjective norms indicate the degree to which a person perceives that his or her superiors, peers and customers would want him or her to use a particular system (Jones et al. 2002). Subjective norms were measured by adapting an instrument developed by Jones et al. (2002). Responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1 equalled agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

- **Compatibility with existing systems**

Compatibility with existing systems is defined as the degree to which the innovation fits with the adopters' existing values, previous experiences, and current needs Jones et al. (2002). Compatibility with existing systems was measured by adapting a three-item instrument developed by Jones et al. (2002). Responses were measured on a five-point Likert-type scale, ranging from 1 to 5, where 1 equalled agree with the statement, 2 = partially agree, 3 = don't know, 4 = partially disagree and 5 = disagree.

The questionnaire also included two open questions. One was related to suggestions about how the mobile system could be further improved to fit their job requirements. The other was about the number of weekly hours the sales force members carry out work-related tasks at home both before and after implementation of the mobile system.

The initial version of the questionnaire was later refined with the help of a pre-test involving one sales rep, the reps' sales manager and an academic expert, which led to some adjustments: some questions were modified to increase their clarity for the respondents, others were deleted or added.

**Table 2 Respondent demographic information**

| Characteristics | Frequency | Percentage % |
|---|---|---|
| **Gender** | | |
| Male | 8 | 57 |
| Female | 6 | 43 |
| **Education:** | | |
| Some college | | |
| Institute | 4 | |
| Polytechnics | 6 | |
| University degree | 4 | |
| | **Mean** | **Range** |
| **Age** (a years) | 36 | 28-56 |
| **Sales experience** (years) | 6 | 1-22 |

## 8.2 Results

The survey results show that the majority of the reps interviewed regard the mobile system as compatible with their work (cf. Table 3) and they do not use it just because of the influence of their colleagues or supervisor (cf. Table 4 ). The majority find it easy to use in general (cf. table 5); despite some reported barriers such as slow data communication, small screen and keyboard, which were a problem for certain reps. Moreover, more than half report that they have access to the support they need if they face a problem in operating the mobile (cf. Table 4). Additionally, more than the half of the interviewed reps agrees with the statement that when they need work-related information in the field about physicians they should visit, they find it available in their company database (cf. Table 6). The results also reveal certain innovativeness among the reps in terms of using information technology (cf. Table 7).

With regard to perceived usefulness of the mobile system, the results show that for certain barriers that do not require advanced training in terms of showing how the mobile system could support the rep in dealing with them; the perceived usefulness of the majority of the reps was high. Those barriers include (i) making productive use of dead time during sales visits (e.g. sending and receiving e-mails, preparing sales reports), (ii) difficulty in coordinating with field secretaries in the field; and (iii) carrying out work-related tasks at home (cf. Table 8). For example, 85 per cent of the reps report that the mobile system allows them to do administrative work, such as sales reports, when encountering time gaps between meetings while 70 per cent agree that the mobile system frees them from spending time at home on doing work-related activities. Additionally 85 per cent of the reps report that the mobile system allows them to better coordinate with field secretaries during sales trips.

For those barriers the basic technical training the reps received in operating the system (e.g. learning how to access the corporate database, enter and upload sales reports, compose e-mails), allows the reps to assess how the capabilities of the system could support them in dealing with such barriers, and thus the usefulness of the system was apparent.

However, for other barriers such as (i) unexpected cancellation of an appointment with a physician, (ii) dealing with physicians' information requirements in terms of providing them with both new information and the experiences of other physicians with the company's drugs, and (iii) responding quicker to the questions doctors 'outstanding questions; the majority of the reps do not regard the system as useful (cf. Table 8). As an example only 46 per cent of the reps interviewed agree that the mobile system allows them to identify an alternative physician to visit in the event of the unexpected cancellation of an appointment, with mode and values of 4 and 3 respectively. Similarly, fewer than a third of the reps interviewed agree with the statement that the mobile system allows them to inform physicians about the experiences other physicians have had with the company drugs they are promoting, with mode and mean values of 4 and 3.3 respectively. Also only the half of the reps agree with the statement that the mobile system allows them to respond quicker to the questions doctors ask during sales visits if they do not have an immediate answer

The finding regarding the reps' usage of the mobile system in the field, corroborate the findings about the reps perceived usefulness of the mobile system. The reps use the mobile system in order to deal with the barriers for which the system's usefulness is quite obvious to them. Indeed, the reps use the mobile system's solutions to deal with such barriers as (i) making productive use of dead time during sales visits, (ii) difficulty in coordinating with field secretaries in the field, and (iii) carrying out work-related tasks at home. For those barriers the majority of the reps perceive the mobile system support as useful (cf. Table 9). For example, 100 per cent of the reps interviewed report that they always or often use the mobile system in the field to read and answer their e-mail messages.
Additionally, 85 per cent of the reps interviewed report that they always or often use the mobile system to enter and send reports from sales visits when they have time gaps between meetings. Similarly, 69 per cent of the reps always or often use the mobile system to retrieve information alerts received from team members

However, the majority of the reps interviewed do not seem to fully integrate the mobile system to deal with other barriers such as (i) unexpected cancellations of appointments with physicians, (ii) dealing with physicians' information requirements in terms of providing them with both new information and the experiences of other physicians with the company's drugs, and (iii) responding quicker to the questions doctors 'outstanding questions For those barriers, the survey shows a similar pattern for the reps' perceived usefulness of the mobile system. That is, the majority of the reps do not perceive the mobile system as useful in helping them deal with those barriers (cf. Table 9). As an example, only 39 per cent report that they

always or often use the mobile system to identify an alternative physician to visit. Additionally, only 39% of the reps always or often use the system in order to provide information to doctors about the questions they ask during sales visits and for which you did not have an immediate answer.
Moreover, in terms of using the system in order to deal with physicians' information requirements, i.e. providing physicians with both new information and the experiences of other physicians with the company's drugs, only a minority of the reps interviewed use the mobile system in the field for that purpose. For instance, 54 per cent of the reps report that they seldom or never use the mobile system before the sales visit in order to obtain useful information to provide to doctor. Additionally, sixty-nine per cent of the reps interviewed report that they seldom or never use the mobile system in the field in order to learn about new events in the pharmaceutical world during periods of free time. Furthermore, 62 per cent of the reps report that they seldom or never retrieve in the field work-related information from the Internet. When asked about accessing team members' sales visits information in the field in order to obtain information about physicians' experiences with the company products that the rep could use during his or he own sales visits, 62 per cent of the reps report that they seldom or never use the mobile system for that purpose (cf. Table 9).
Regarding the barrier of responding quicker to the questions doctors 'outstanding questions, only 39% of the reps report that they always or often use the mobile system in the field in order to provide information to doctors about the questions they ask during sales visits and for which the reps do not have answers.

The survey's results show that training in terms of operating the system to support the reps' everyday work activities does not seem sufficient for more than half of the reps interviewed. The reps need advanced training that would provide them with guidance about how the features of the mobile system could support them in terms dealing with those barriers. This was shown by the fact that more than the half of the reps disagree with the statement that the training they received, which was merely technology-driven, was sufficient. Likewise, more than the half of the reps disagrees with the fact that they find the information they were given about the capabilities of the mobile system sufficient. Also, more than half of the interviewees report that it would be useful if they could get help and support on how to use each feature of the mobile system to support their tasks and enhance their performance (cf. Table 7). The reps' answers to the open question about how the mobile system could be further improved to suit their job requirements strengthened such a pattern. More training in terms of using the system's capabilities was the second most frequently mentioned suggestion for improvements; as one rep wrote:

> Everybody knows the basic features. What now should be done is to organise a new training event to go through all the possibilities that you can use the communicator for. I doubt that very many of us truly know all that can be done with the communicator

The results of the survey appear to parallel what was found in the earlier qualitative field study. Study 1 showed that the rep uses the mobile system only in case the usefulness of the system is apparent to him in terms of dealing with a particular barrier. In other words, although the system has the potential to provide support for certain barriers, if the rep cannot figure out how it would be useful for that purpose, he will not use it. Study 1 also identified that providing training that goes beyond the technology to focus on the reps' work system, i.e training from a work-system perspective is a good way to increase the mobile system by the sales reps. Training from the work system perspective would demonstrate to the reps how the various features of the system could support their tasks and help them to deal with the barriers they encounter. In the light of such knowledge the rep could assess the usefulness of the system's features in connection with his or her tasks as well as the barriers to performance he or she faces, and decide which features of the system to integrate into his or her everyday tasks.

**Table 3 Compatibility with existing systems**

| | Agree * % | Disagree % ** | Mode | Mean | SD |
|---|---|---|---|---|---|
| Using the mobile system is compatible with all aspects of my work | 77.0 | 8.0 | 2.0 | 2.0 | 0.9 |
| I think that using the mobile system fits well with the way I like to work | 92.0 | 8.0 | 2.0 | 1.8 | 0.9 |
| I think that using the mobile system fits into my work style | 92.0 | 8.0 | 2.0 | 1.8 | 0.8 |

*) Percentage of respondents who answered agree = 1 or partially agree = 2
**) Percentage of respondents who answered disagree = 5 or partially disagree = 4

**Table 4 Subjective norms**

| | Agree * % | Disagree % ** | Mode | Mean | SD |
|---|---|---|---|---|---|
| I use the mobile system because my colleagues think I should use it | 0.0 | 77.0 | 5.0 | 4.5 | 0.9 |
| I use the mobile system because my superiors want me to use it | 31.0 | 54.0 | 5.0 | 3.5 | 1.7 |

*) Percentage of respondents who answered agree = 1 or partially agree = 2
**) Percentage of respondents who answered disagree = 5 or partially disagree = 4

**Table 5 Perceived ease of use**

| | Agree* % | Disagree**% | Mode | Mean | SD |
|---|---|---|---|---|---|
| Learning to operate the mobile system was easy for me | 92.3 | 7.7 | 2.0 | 1.8 | 1.1 |
| I find it easy to become skilful in using the mobile system | 69.2 | 15.4 | 2.0 | 2.4 | 1.1 |
| I find the mobile system easy to use in accomplishing my everyday work duties | 76.9 | 7.7 | 2.0 | 2.1 | 0.9 |
| Slow data communication (connection to the database and downloading of files takes too long) is a barrier for me in terms of using the mobile system | 61.5 | 23.1 | 2.0 | 2.5 | 1.0 |
| I find it difficult to type information using the communicator | 46.2 | 46.1 | 4.0 | 2.9 | 1.1 |
| I find it difficult to read information retrieved from the database using the communicator | 38.5 | 61.5 | 4.0 | 3.4 | 1.2 |
| The small screen of the communicator (compared to the laptop) is a barrier for me in terms of using the mobile system in the field | 38.5 | 53.8 | 2.0 | 3.4 | 1.3 |

*) Percentage of respondents who answered agree = 1 or partially agree = 2
**) Percentage of respondents who answered disagree = 5 or partially disagree = 4

**Table 6 Perceived ease of integration of the mobile system**

| | Agree *% | Disagree **% | Mode | Mean | SD |
|---|---|---|---|---|---|
| When I need work-related information in the field about doctors I should visit, I find it available in my company database | 69.2 | 15.4 | 2.0 | 2.3 | 0.9 |
| I have access to the support I need if I face a problem in operating the mobile | 61.5 | 7.7 | 2.0 | 2.2 | 0.9 |
| It would be helpful for me if I could get help and support on how to use each feature of the mobile system to support my tasks and enhance my performance | 61.5 | 7.7 | 2.00 | 2.4 | 0.8 |
| It will be helpful for me if I could access non-company databases to obtain work-related information (i.e. market information) during sales trips | 38.5 | 15.4 | 3.0 | 2.8 | 0.9 |
| I find it difficult to know how all the capabilities of the mobile system could support my tasks in the field | 30.7 | 46.2 | 4.0 | 3.1 | 1.0 |
| I find the training I receive about operating the mobile system sufficient | 15.4 | 53.8 | 4.0 | 3.4 | 0.8 |
| I find the information I was given about the capabilities of the mobile system sufficient | 7.7 | 61.5 | 4.0 | 3.6 | 0.8 |

*) Percentage of respondents who answered agree = 1 or partially agree = 2
**) Percentage of respondents who answered disagree = 5 or partially disagree = 4

**Table 7 Personal innovativeness**

| | Agree * % | Disagree % ** | Mode | Mean | SD |
|---|---|---|---|---|---|
| If I heard about a new information technology, I would look for ways to experiment with it | 61.6 | 30.8 | 2.0 | 2.5 | 1.1 |
| Among my peers, I am usually first to try out new information technology | 38.5 | 46.1 | 2.0 | 3.2 | 1.1 |
| In general I consider myself quite innovative when it comes to information technology | 38.5 | 38.5 | 2.0 | 3.0 | 0.9 |

*) Percentage of respondents who answered agree = 1 or partially agree = 2
**) Percentage of respondents who answered disagree = 5 or partially disagree = 4

**Table 8 Perceived usefulness of the mobile system**

| | Agree * % | Disagree % ** | Mode | Mean | SD |
|---|---|---|---|---|---|
| **Using the mobile system allows me:** | | | | | |
| to do my administrative work (i.e. sales reports) when I face time gaps betweens meetings | 84.6 | 15.4 | 1.0 | 1.5 | 1.1 |
| to better coordinate with field secretaries during sales trips | 84.6 | 7.7 | 1.0 | 1.7 | 0.9 |
| to free myself from spending time at home on doing work-related tasks | 69.2 | 30.8 | 2.0 | 2.6 | 1.4 |
| to enhance the quality of my sales visits reports | 61.5 | 23.1 | 2.0 | 2.5 | 1.3 |
| to respond quicker to the questions doctors ask during sales visits if I don't have an immediate answer | 53.9 | 23.0 | 2.0 | 2.5 | 1.1 |
| to identify an alternative physician to visit in the event of an unexpected cancellation of an appointment with a physician | 46.1 | 46.2 | 4.0 | 3 | 1.6 |
| not to print documents I think I would need before sales trips | 38.4 | 46.2 | 5.0 | 3.2 | 1.6 |
| to inform doctors about experiences other doctors have had with the company drugs I am promoting | 30.7 | 53.9 | 4.0 | 3.3 | 1.3 |
| to provide doctors with new information about the company drugs during each sales visit | 15.4 | 69.2 | 4.0 | 3.7 | 0.9 |

*) Percentage of respondents who answered agree = 1 or partially agree = 2
**) Percentage of respondents who answered disagree = 5 or partially disagree = 4

**Table 9 Sales force usage of the mobile system**

| | Always or often % | Sometimes % | Seldom or never % | Mean | Mode | SD |
|---|---|---|---|---|---|---|
| **How frequently do you use your mobile system in the field to:** | | | | | | |
| Read and answer e-mail messages | 100.0 | 0.0 | 0 | 1.5 | 2.0 | 0.5 |
| Enter and send sales visit reports during sales trips when | 84.6 | 0.0 | 15.4 | 1.8 | 1.0 | 1.1 |
| Retrieve information alerts received from team members | 69.2 | 7.7 | 23.1 | 2.5 | 2.0 | 1.2 |
| Retrieve information alerts received from the office | 61.5 | 7.7 | 30.8 | 2.5 | 2.0 | 1.1 |
| Retrieve sales reports before meeting the doctor | 53.9 | 23.1 | 23.1 | 2.7 | 2.0 | 1.1 |
| Provide information to doctors about the questions they ask during sales visits and for which you did not have an immediate answer | 38.5 | 23.1 | 38.5 | 3.0 | 2.0 | 1.2 |
| Identify alternative doctors to visit when a planned visit is not possible | 38.5 | 38.5 | 23.1 | 2.8 | 3.0 | 1.1 |
| Access field secretaries' booking actions when you have free time in the field | 30.7 | 38.5 | 30.8 | 2.9 | 3.0 | 1.1 |
| Access your calendar in the field to book meetings with physicians | 30.7 | 46.2 | 23.1 | 2.8 | 3.0 | 1.1 |
| Access the company's database before the sales visit in order to obtain useful information to provide to doctors | 23.1 | 23.1 | 53.9 | 3.5 | 4.0 | 1.3 |
| Identify new doctors to visit in your territory (i.e. when you have meetings in large hospitals) | 23.0 | 46.2 | 30.8 | 3.2 | 3.0 | 0.9 |
| Access your calendar during the visit with a doctor to book ahead future meetings with him or her | 15.4 | 15.4 | 69.2 | 3.6 | 4.0 | 0.9 |
| Provide useful information about doctors' questions to team members | 15.4 | 23.1 | 61.6 | 3.6 | 4.0 | 1.0 |
| Learn about the company products when you have free time in the field | 15.4 | 23.1 | 61.6 | 3.6 | 4.0 | 1.0 |
| Learn about competitive products when you have free time in the field | 7.7 | 38.5 | 53.9 | 3.5 | 3.0 | 0.9 |
| Learn about events in the pharmaceutical industry when you have free time in the field | 7.7 | 23.1 | 69.3 | 3.8 | 4.0 | 0.9 |
| Retrieve useful work-related information from the Internet | 7.7 | 30.8 | 61.5 | 3.7 | 4.0 | 0.9 |
| Retrieve team members' sales reports | 7.7 | 30.8 | 61.5 | 3.7 | 4.0 | 0.9 |

*) Percentage of respondents who answered agree = 1 or partially agree = 2
**) Percentage of respondents who answered disagree = 5 or partially disagree = 4

## 9. Discussion

The results of the study show that the sales force was in general pleased with the initiative to adopt the mobile system. The majority report that mobile system is compatible with all aspects of their work, and fits well with both their work style and the way they like to work. They also used it in order to deal with certain barriers for which its usefulness was clear to them.

However, in terms of dealing with other barriers the system was not fully exploited by all members of the sales force. The study also raised a major implementation issue: Training. Many IT scholars have indeed argued that facilitating conditions such as training and support have a favourable impact on technology use (see e.g. Good & Stone, 2000; Venkatesh et al., 2003; Davis, 1989; Igbiria & Tan, 1997). Research reports in adoption of information technology by sales forces also supported such a hypothesis (Jones et al. 2002; Ahearne, 2005; Buehrer et al. 2005). Those researchers recommend providing users with the necessary knowledge of how to operate the technology in order to enhance its adoption. However, to our knowledge none of those studies took the step of specifying the nature of such training as would enhance adoption by the sales force. In those studies training has been examined broadly together with other variables, such as support, and both those variables were included within the facilitating condition construct. Moreover, training was approached in the technology adoption studies mainly from the technical perspective, i.e. providing users with instructions and guidelines on how to operate the technology (Ahearne et al. 2005)

The results of our study suggest that the sales force needs not only technology-driven training (e.g. learning how to operate the technology) but also training from the work-system perspective. In other words, training needs to provide guidance to the sales force on how the various capabilities of the technology could support their tasks and performance. The majority of the reps participating in the study were not satisfied with the training they had received, which was merely technical. On the other hand, they were favourably disposed to the idea of receiving training that would enable them to uncover how the various capabilities of the implemented mobile system would support their everyday tasks. Indeed, in a number of information systems implementations, firms tend to provide the salespersons with quick technical training and leave them with the task of uncovering applications of the system to support their work, believing that their sales force already understands enough of PC basics to make it work. Erffmeyer's et al. (2001) study about firms' expectations from investment in SFA, reveal that a limited number of firms participating in their study offer training to support their SFA efforts. They also found that a third of the sales representatives were frustrated by the way training was handled. Such an attitude was expressed in a comment by one national sales manager participating in their study: "the owners think this is overvalued. They refer to my laptop and training as "executive time suckers".

The study also shows that perceived usefulness is a condition that precedes the usage of the system's capabilities by the sales force. This is in line with what has been found in sales and, more generally, information technology adoption (Schillewaert et al. 2005; Avlontis et al. 2004; Ranjarajan et al. 2005). Indeed, as Jones et al. (2002) argue because of the nature of their job, salespeople are autonomous decision-makers who are accustomed to assessing the features, advantages, and benefits of a new product or service. Therefore when it comes to using the capabilities of an implemented technology, they are more likely to adopt only the ones that they regard as useful in supporting them in their everyday work routines.

In terms of the design of a mobile information support for the sales force, our study has some implications. The study shows that information alerts constitute a preferred approach by the reps to updating their knowledge. The survey indicates that only a minority of the reps frequently use the mobile system to access the corporate database during sales visits in order obtain information to give to physicians. Likewise, a minority of the reps connect to the mobile system in the field to update their market and technical knowledge in the field when faced with periods of free time. On the other hand, the results indicate that about two thirds of the reps frequently use the system to retrieve information alerts that their colleagues and the head office send to them on different topics such as drug-related information, intelligence information or physicians' questions.

Furthermore, the survey's results reveal that the mobile system can enhance knowledge-sharing among the reps. However, management support is needed to encourage the members of the sales force to share knowledge with each other. For example, the study shows that sales visits reports are an information source where the reps could enter sales visits information, including the nature of questions that physicians they visit ask or useful information about physicians' experiences with company products. Then other reps could access this information and use it as an argument during their sales encounters with physicians. However, the results indicate that the majority of the reps report that they do not frequently retrieve team members' reports from sales visit in order to obtain useful information about physicians' experiences that they can use during their own sales visits. This could be explained by the fact that the current reporting system does not emphasise knowledge-sharing activities, such as storing a useful insight about a physician's experience with company drugs gleaned by one rep, for potential use by his/her colleagues. The current reporting system is mainly used as a medium to provide activity records to the sales management team and to enable the rep to store and subsequently review issues discussed in his or her meeting with the physician. As a result, a sales rep may not think it is important to review another team member's sales report if the report contains mainly sales records or the rep's personal observations about his/her meeting with the physician. As a result companies should consider encouraging the reps to see the reporting task as more of a knowledge-sharing activity than an administrative duty. The management team could encourage the reps to include in their sales reports information that they perceive as useful about physicians' questions and experiences with the company drug. The company can then collect such insights based on the reps' sales reports and re-distribute the useful insights to all the sales force in the form e-mail information alerts, after checking them for accuracy and adding their own comments and evaluations.

### Limitation and further research

A possible limitation of the current study is that it is restricted to a single company. However, the choice of the single-case focus has been inspired by the wish to control contextual factors (e.g. market and organisational factors). It was important to obtain responses from salespersons that operate within a similar context in terms of the arrays of technology available to them and the meaning of "performance" for them. Furthermore, within the sales force research context, many researchers have warned of the danger of pooling data from a number of unrelated industries and product types when attempting to generalise. Furthermore, lumping together data from different firms has been mentioned as a potential explanation for the mixed findings in research investigating information technologies and performance (Ahearne & Schillewaert, 2001). The use of self-reported measures instead of actual usage information is another limitation of our study. Thus, additional studies replicating the results obtained here, in a larger research setting and using actual usage data, would confirm the validity of the findings.

One interesting future avenue of research would be to test the framework from this study in another setting, involving a larger sales force, to examine whether the insights derived form the present case study will survive other empirical testing. Another interesting avenue would be to re-examine the adoption of the mobile system by the sales force after receiving training from the work-system perspective in order to see the actual contribution of such training to enhancing their adoption.

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# Research Paper 5

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# A TASK-BASED FRAMEWORK FOR MOBILE APPLICATIONS TO ENHANCE SALESPERSONS´ PERFORMANCE

*Subtitle*

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Abstract: The paper suggests a framework for mobile applications aimed at supporting salespersons` tasks for greater performance when they are operating within a highly mobile work environment. To do so the paper starts by providing a review of mobile technologies characteristics in terms of mobile devices, connectivity and mobile applications. After deriving a set of propositions, the paper offers some concluding remarks and suggests areas for future research

Key words: Mobile technologies, Salespersons performance, salespersons tasks, task technology fit

## 1. INTRODUCTION

The role of the professional selling has expanded and changed dramatically in recent years. Instead of merely selling products, today's sales persons are expected to serve customers as consultants who offer expert advice on improving customer's life style or making their business operations more profitable. They operate like micro marketing-managers in the field. Buyers are becoming increasingly skilful at obtaining value of their expenditures. Salespersons now usually deal with professional buyers or purchasing agents who base their buying decisions on the representative's delivery of quality and service and how the product will affect their company's profit. Such rapidly growing sophistication of professional buyers and their increasing access to information will continue to challenge salespersons to find new sources and faster methods of obtaining information despite their constant move. Additionally, the unique nature of selling with its mobility requirements, time demand, psychological strain, work-related role stress and performance orientation continue to put unusual pressure on salespersons.

The advent of access to services through mobile and wireless devices has resulted in a fast growing of a number of mobile applications and service. Mobile (or wireless) applications, despite being different in their nature, they share a common characteristic that distinguishes them from their wire-line counterpart: They put the user at the centre of information and communication through the provision of location specific information, personalization, immediacy, and service availability (Durlacher, 2001). These characteristics would enable the development of innovative mobile applications to support firms´ salespersons for greater performance despite their high work mobility. How and which mobile applications can support these frontline ambassadors in their sales efforts are key questions facing a number of stakeholders including sale managers today.

The paper suggests a task-based framework for developing mobile applications to support salespersons` tasks when they are operating within a highly mobile work environment.  To do so the paper starts by providing a review of mobile technologies characteristics in terms of mobile devices, connectivity and mobile applications. After deriving a set of propositions, the paper offers some concluding remarks and suggests areas for future research

## 2. MOBILE TECHNOLOGIES OVERVIEW

A complex, interconnected set of technologies provides the basis on which mobile applications and services can be built. Similar to traditional information systems (IS), mobile technologies can be reviewed according to three dimensions: mobile devices corresponding to the hardware in IS, network connectivity and applications (software).

## 2.1 Mobile Devices

Mobile technologies bring back to discourse the issues associated with devices that can be used to access and utilize IS functionality. Laptop PCs have extended IS functionality by enabling workers to bring their digital work with them whenever they were going. Gradually smaller devices have been developed. Personal Digital Assistant (PDA) such as Psion, Palm and Windows CE based palm tops, and operating systems such as WinCE, EPOC and PalmOS have emerged for mobile users. Smartphones, a combination of a mobile phone and a PDA have increasingly become popular and hold a great promise. They include versions of Nokia communicators, Handspring Treo, smartphone devices form vendors such as Orange, Samsung and AT&tT Wireless version (www.synchrologic.com).

For the purpose of this paper, a mobile device is any device connected to the Internet or other networks through wireless networking using any standard wireless communication protocol. They include such devices as laptop PCs, Tablet PCs, PDAs, smartphones and WAP enabled phones.

Mobile devices can be assessed according to the three dimensions: usability, capability and cost. Usability includes such characteristics as portability, micro-mobility, display and input characteristics. Portability as determined by the device's weight and size is a significant usage factor for the mobile workforce. Device's micro-mobility as describes by Luff and heath (1998) is inherent in the physical objects in that they may be moved about and be shared between people to support communication (i.e. during a meeting).

Device's capability include such characteristics as processing power, amount of local storage, battery life, available connection options, location-awareness and security factors (see for example, Tarassewich et al. 2002, Ovum 2003, synchrologic 2003 for discussions of open issues).

The device ´s cost factor includes procurement cost, support and add-in cost. Add-in cost is the cost resulting from adding other functionality to an existing type of device such as a cell phone. An example is mobile software applications that add processing and other functionality to cell phones (Gebauer et al., 2002)

Mobile devices differ in terms of their usability, capability and cost characteristics. Such differences give raise to tradeoffs particularly between device capability and device usability. For instance a Laptop Pc offers some good features in terms of processing power, memory, display and input /output characteristics, but they are often awkward to use on the move. Indeed, a laptop is able to receive a document anywhere that a network can be established with computers back at the office. However once the document is received, the laptop cannot be spatially reoriented at the micro-level, during a face-to-face meeting in a way that a PDA or a smartphone allows. Additionally, The Laptop’s procurement and maintenance cost are far high compared to PDAs or smartphones.

## 2.2 Connectivity

In addition to mobile devices, networking support is crucial to support a mobile workforce without constant physical access to stationary IS. Mobile and wireless networks are experiencing significant progress in the form of wireless local area network (WLAN), Satellite-based Networks, Wireless Local Loops, Mobile Internet Protocol and Wireless Asynchronous Transfer Mode Network (see for example Varshney 2002 for more details about such technologies). One emerging technology is bluetooth, a short-range, point-to-multipoint data transfer, which provides low cost short-range radio link for wireless connecting.

Distinguishing factors for network connectivity include Network capacity (i.e. bandwidth), geographic network availability and connection fees. Significant efforts are in course to enhance mobile and wireless network´ bandwidth. In addition, developments in mobile middleware platforms contribute in optimising for low bandwidth, intermittent connections as well as the amount of processing required at the mobile device.

Network availability, including roaming across multiple networks and the mobile user location’s environment (outdoor, indoor, underground); might be a significant functionality factor for mobile applications and services, in particular those supporting an on the move workforce. An example is location based mobile applications and services, which rely on positioning technologies such as GPS and Cellular positioning technologies. The positioning accuracy of such technologies depends on whether the user is in an indoor environment (i.e. a building), a rural or dense urban area. (BenMoussa, 2004).

Current developments in wireless and mobile connectivity in the form of the third generation mobile communication systems (3G) hold a great promise in providing a faster and reliable access time to users and reducing the total cost of access and transfer of data across multiple networks. Some firms started developing 4G technologies and global standards. NTT DoCoMo, Inc. announced in 2003 plans for a field trial of 4G mobile communication systems.

## 2.3 Applications

Although mobile technologies such as mobile phones and PDAs were first developed as consumer products rather than business solutions, a number of innovative companies have adopted those technologies as enablers for their process innovation` initiatives (Kakihara et al. 2003). Traditionally, the use of mobile technologies in business environment has been concentrated in supporting sales process and logistics (i.e. the cases of Fritto-lay, UPS). The introduction of wireless digital networks has made it possible to transfer data cost effectively and potentially increase the added value of mobile applications through the provision of location sensitive information.

The paper categorizes mobile application and services into the three functional categories: the connective, the interactive and the proactive mobile application and services. The following outline the three analytical categories of mobile application and services.

### 2.3.1 Connective mobile applications

Connective mobile applications involve basically a mobile and a wireless client accessing a centralized service. An example of connective mobile applications includes accessing wirelessly Intranet functionality via a mobile device. The user sends information requests to the server, which in turns serves, the relevant information back to the user. Another example is accessing wirelessly a WAP or I-mode site.

### 2.3.2 Interactive mobile applications

Mobile interactive applications support the generation of information through communication between people. Obviously the best example of interactive mobile applications is the mobile phone itself (Sorrensen et al., 2002). The SMS functionality supports short text messages can also be considered interactive mobile applications. As is the instant messaging services, such as ICQ, AOL, and MSN messenger service for pocket PC 2002. Other examples of interactive mobile applications include e-mail systems and Awareware supporting mutual awareness through synchronous or asynchronous modes of awareness employing visual or verbal media.

### 2.3.3 Proactive mobile applications

Proactive mobile applications are aimed at supporting mobile users in responding proactively to potential changing environmental trends. Based on the user's situational context and changing environment, the service provider delivers content without receiving a request from him/her. An indicative example of mobile applications could be the use of mobile wireless client in managing the supply chain allowing dispersed actors to interact with the parameters governing the supply chain and respond proactively to potential malfunction (i.e. lost or delayed orders).

# 3. FRAMEWORK FOR MOBILE APPLICATIONS TO SUPPORT SALESPERSONS TASKS

The paper now suggests three propositions for developing mobile applications aimed at supporting salespersons for greater performance.

✓ Categorising salespersons tasks by the areas that might be affected by mobile technologies,

✓ Fitting mobile technologies characteristics with salespersons´ task requirement in order to increases the applications´ chance to succeed,

✓Involving actively the salespersons in the design, development and implementation of mobile applications can increase the success chance of such applications.

## 3.1 Categorizing Salespersons Tasks by the Areas of Mobile Support

The paper suggests that categorising salespersons tasks based on the areas that mobile technologies can support, would provide a rich resource in terms of delivering a targeted support to salespersons in order to handle the tasks at hand. Salespersons tasks can thus constitute the point of departure in terms of developing salespersons´ mobile applications. Using tasks as unit of analysis for supporting knowledge workers in general has been emphasised by many authors (Hackman, 1969; Druckar, 1999; Byström, 1999; Perry et all, 2001, luff and Heath, 1998). For instance, Druckard points out that understanding knowledge workers´ tasks is the first requirement in tackling knowledge workers ´ productivity. One reason for this, Druckard said, stems form the fact that unlike manual work, knowledge work does not program the worker. (Luff et all, 2000) have shown that the misunderstanding of the mature of tasks that workers perform can be problematic and lead to technologies being used in unexpected ways. For example they describe a situation in which a mobile device was introduced onto a building site to replace a paper allocation sheet used to record the amount of time workers spent on particular aspects of a job. The system was supposed to provide a mobile resource for the workers to help them monitor problems as they occur and to support in situ discussion with other people on the site. What happened in actual use however differed form the intent. Instead of being used as a communication tool to support the mobility of the worker around the site, it was used primarily as a data documentation device. This occurred because the device impeded certain important features of collaborative work practices of the workers and the other workers when on the site.

The paper proposes the following categorisation of salespersons tasks based on the review of the determinants of salespeople performance and the characteristics of mobile technologies.

### 3.1.1 Information tasks

Mobile technologies can enable salespeople to collect and have access to information irrespective of their locations, which would have an impact on the areas of prospecting and customer relationship management.

In prospecting, salespersons can be supported by having access anywhere and anytime to customize the list of prospects together with additional information about customer’s buying history, real time orders, and latest events in the customer’s business, which may enable them to qualify prospects and apply target selling.

In the field, mobile technologies can also enable salespersons to obtain up-to date information about the prospect and use it during the sales call to adapt to sales situations and to overcome objections. In addition, Mobile technologies can give the sales force the ability to check the availability and prices of any products, and thus deliver feasible promises. Salespersons can also configure products to reflect customers needs and wants, while with the customer, by having access to communication with the company’s technical specialist. Furthermore, awareness of salespersons’ location can enable useful information about the customer to be delivered to them so that they can reflect it during their sales call.

### 3.1.2 Interaction Tasks

Information contained in sales call, expenses and calendar reports from salespersons is vital to sales managers´ ability to both adapt their marketing strategies and manage salespeople. Mobile technologies can help sales persons in reporting such information any time and irrespective of their locations. Also, ubiquitous access to e-mails and corporate data by salespersons may enable them to make themselves readily available to interact with their accounts and address their problems and question, which would have a positive impact on their customer orientation. Indeed the customer requires, in today’s highly competitive world, timely and accurate information, fast response to questions and the ability to work with salespersons that can provide these things (Engel et all, 2000). In addition mobile technologies would make it possible to salespersons, irrespective of their locations, to seek support from both their colleagues and managers should they face an unexpected challenging sales problem.

### 3.1.3 Planning Tasks

Mobile technologies can enable salespersons to better manager their time and reorganize their contacts irrespective of their locations so that they can focus on the most profitable accounts and use their dead time more productively. This time generally occurs between tasks and between meetings, in which salespersons usually have little control over the resources available to them. For instance, pharmaceutical sales reps often visit doctors to provide them with information on what is available as order brochures on products in which the doctor is interested. Frequently the doctor is not available and the representative wants to find a nearby alternative contact. If there is no alternative contact to visit, then the time for waiting for the doctor to become available may turn to be dead time for the sales representative. With mobile technologies, the sales rep can turn this dead time into a productive one by performing non-selling tasks such as completing and sending expense reports to her company, preparing invoices or writing and sending thanks letters to customers. These reduce the time that sales reps have to spend in the office to perform routine tasks and thus allow them to spend more time selling. Indeed, despite the problems associated with laptop computer in terms of carrying behaviour, weight and booting time, Hewlett Packard found that salespeople using laptop computers spent 27 percent more time with customers, earned 10 percent more sales and achieved three times the productivity of sales reps who did not use laptops (Taylor, 1987). Using dead time more efficiently may occur in a variety of locations (i.e. trains, airports, airplanes, hotels rooms, office buildings, etc).

## 3.2 Fitting Salespersons´ Task Requirements With Mobile Technologies characteristics

After reviewing mobile technologies characteristics in terms of devices, processing and network connectivity, the paper suggested a categorisation of salespersons tasks based on the areas that can be affected by mobile technologies, the paper derived three categories of salespersons tasks: information tasks, interaction tasks, planning tasks and mobile tasks. The paper now suggests that each of the above mentioned category of tasks has specific requirements in terms of mobile technologies characteristics, and that a fit between mobile technologies characteristics and the requirements of the tasks with respect to content, processing, device portability, device micro-mobility, retrieval and location based alerts can support the success of salespersons ´mobile applications in terms of achieving the expected benefits. Figure one refers to a framework of mobile applications to support salespersons´ tasks when they are operating within a mobile work environment.

The paper proposes that salespersons perform a variety of tasks with different purposes, which impose requirements that cannot fit the characteristics of a specific mobile device. For instance a laptop is able to receive a document anywhere that a network connection can be established with a computer back at the office. But once the document is received, the laptop cannot be spatially reoriented at the micro-level, for example during a face-to-face interaction in a way that a PDA or a smart phone can allow. Additionally a mobile phone can be appropriate for alerts and notification to support information tasks as well as simple interaction tasks (i.e. inventory checking, price inquiry or product inquires) but difficult to use it for interaction tasks involving a data processing or complex information analysis such as reports on customers´ business or key accounts profitability.

In contrast the laptop, given its size and functionality can support salespersons in performing such tasks. However for alerts and notifications, laptop might not be an adequate medium given their size, weight and booting requirement.

The tasks also impose requirements in terms of the content. For instance information tasks require an adaptation of the content so that it can fit with other requirements such as device portability or micro-mobility and thus make the information relevant to the situation faced by the salesperson. Content about products, market or prospects´ business should be adapted so that they can fit with the portability characteristics of mobile phones or PDAs and thus they can be used at the moment of relevance (i.e. during customer interaction).

Travel is a key component of salespersons´ work. Studies have shown that before the trip, workers face unpredictability with respect to the nature of information and artefact that they need during a trip. (Perry et all. 2000). As a result, they plan ahead to take thinks that they just feel they would need. The purpose is to make sure that documents and information are available in the appropriate form when and where needed to support unanticipated information and communication need. In theory laptops can support this type of impromptu document access because they offer the potential flexibility to open unanticipated documents from hard disk or over network connections. However Perry et al. 2000 behaviour study of 17 mobile professionals from a variety of professions (management personnel, sales staff, consultant, medical workers, civil servant and media) revealed that while 70% of the participants they studied have access to a laptop, only about a half took them to the trip and those participants bringing their laptop do not necessarily take them to meeting. Furthermore according to such a study, the use of connected laptops to access information was hindered because laptops themselves were subject to planning (should they be taken or not). This was due to the laptop carrying behaviour (i.e. size, weight, risk of theft) conflicts with potential use in supporting unanticipated documents and communication needs.

## 3.3 Involving Salespersons in Applications´ Design, Developments and Implementation

The paper suggests that the real benefits of developing mobile applications to support salespersons´ tasks come from their use in actual selling and customer interaction. Therefore salespersons should be encouraged to use such application. This raises the need of the acceptance of such applications by salespersons. The paper proposes that involving salespersons in the design, development and implementations of such applications can insure good information of the applications´ design, which in turn can have a positive impact on the quality of support the applications provide. Delone and Mclean (1992) model supports this proposition. DeLone and McLean believe that the information technology system´ quality, together with the quality of information will lead to the utilisation of the information technology. This utilization then leads to an individual impact resulting in an organizational impact. They also point out that utilisation also interacts with user satisfaction. Additionally, involving actively salespersons in the different stages of applications development process might lead to new innovative ideas in terms of the use of the new technologies that salespersons can come up with based on their experience.

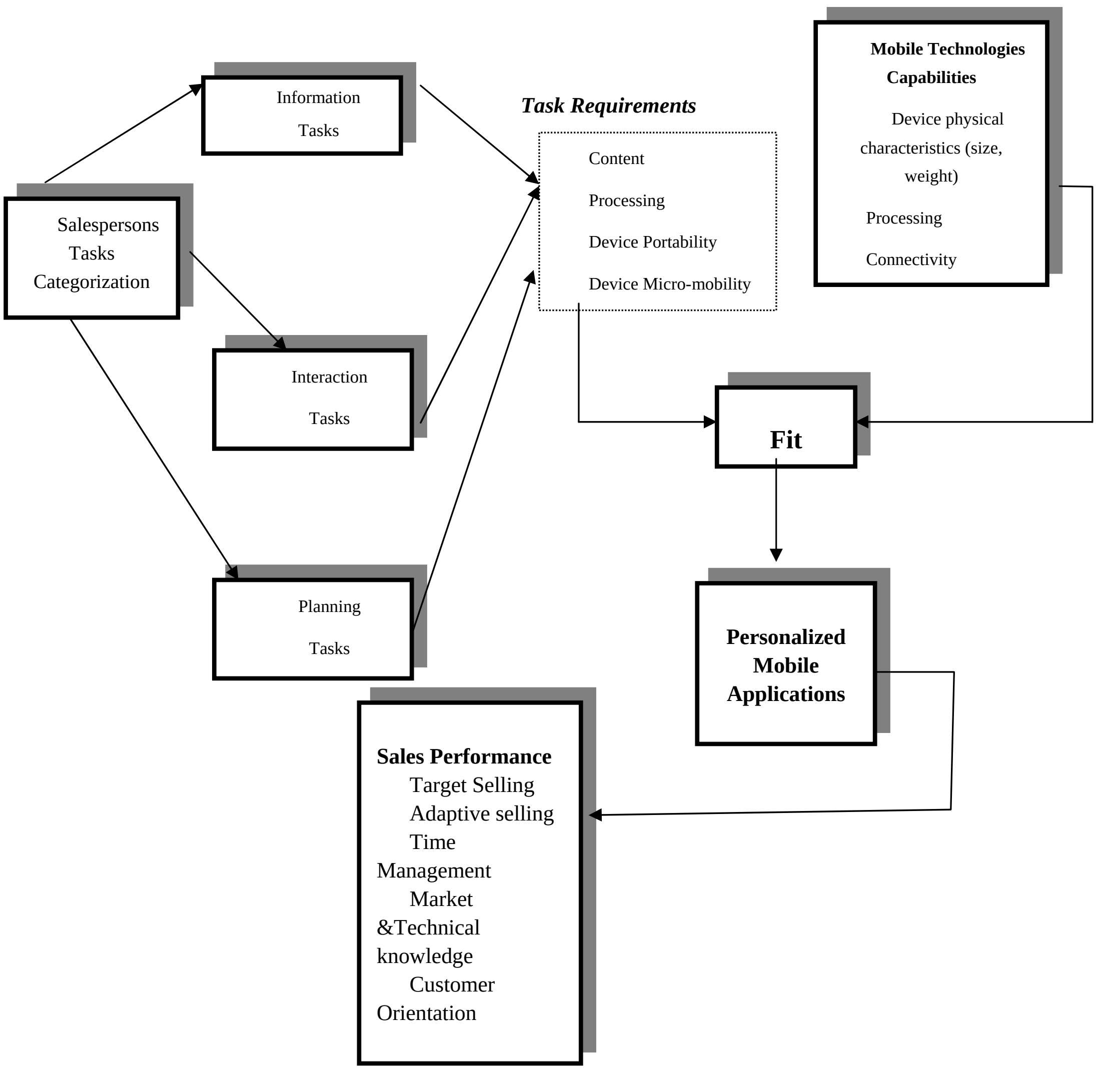


**Figure 1**: Fit between salespersons task requirements and mobile technologies capabilities as enabler of the success of mobile applications to support salespersons performance

## CONCLUSION

The paper has proposed a framework for mobile applications to support salespersons tasks .The paper suggested a categorisation of salespersons tasks based on the areas that can be affected by mobile technologies. The paper then derived three categories of salespersons tasks: information tasks, interaction tasks and planning tasks. The paper also suggests that each of the above mentioned category of tasks has specific requirements in terms of mobile support and that a fit between mobile technologies characteristics and the requirements of the tasks in terms of content, processing, device portability, device micro-mobility, retrieval and location-based alerts can increase the success of salespersons ´mobile applications in terms of achieving the expected benefits. The paper also proposes that involving actively salespersons in the design, the development and implementation of the applications can increase the chances of developing high quality application; which in turn would affect positively their acceptance by salespersons and thus their use during sales situations.

It is worth mentioning that the use of mobile technologies may result in some consequences that salespersons may not welcome. Perhaps the most immediate drawback of extensive use of mobile technologies by salespersons is the problem of "information and interaction overload". In addition, some salespersons may perceive mobile applications and services as threat of their freedom in the field and thus may be reluctant to adopt them.As the acceptance of mobile applications and services by salespersons goes beyond the scope of this paper, future research is needed to both address acceptance issues associated with mobile applications and services and translate the rapid development of mobile technologies into innovative and value adding solutions for the sales force.

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# Research Paper 6

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# EFFECTS OF MOBILE COMMERCE ON SALESPERSONS PERFORMANCE

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## Abstract

*The paper proposes a conceptual model of the effect of mobile commerce on salespersons performance. To do so it draws from the personnel selling literature to identify variables that have been shown to be important determinants of salespersons performance. Then the paper relates such variables to mobile commerce properties in terms of information, location and interaction.*
*The paper begins with a rapid overview of mobile commerce's properties in terms of information, interaction and location. Then a section discussing the main determinants of salespersons performance follows. A third section is devoted to the elaboration of a set of propositions related to the effects of mobile commerce on salespersons performance. The fourth section discusses the research framework of a project that aimed at providing an empirical support to the propositions that the paper suggests.*

## 1. INTRODUCTION

Some 50 years ago Peter Drucker coined the phrase "knowledge workers" and insisted on the need for managers in the post capitalist society to manage their knowledge workers for greater productivity. He even went to the extreme and considered that the survival of every business will depend on the performance of its knowledge workers. Later, perhaps in frustration, he claims that, when it comes to our understanding of knowledge-workers´ productivity, "we are in the year 2000 roughly when we were in the year 1900 in terms of (understanding how to improve) the productivity of manual workers" (Drucker, 1999). Today, both academic and practitioner communities would agree on the importance of enhancing knowledge workers productivity for corporate competitiveness. In an attempt to boost their knowledge workers´ productivity, organizations have invested heavily in information technology (IT). However, the expected benefits of such investments in terms of productivity do not seem to be realized. Productivity has been relatively stagnant (Sichel, 1997). One possible cause of this gap separating IT investments and their impact in terms of knowledge workers´ productivity is that most IT support to knowledge workers have been designed with stationary work setting in mind. In order to benefit from IT support, workers often have to be in a specific place (typically the office), use a specific tool (their personnel computer) and adapt to how the knowledge is stored and organized. However, Knowledge workers spend a considerable portion of their time on the move. And during their extensive geographical movement, knowledge workers are often away from their desktop computers, which contain most of the information they need and impose rigid constraints on how and where they can be used.
Salespersons are typical examples of knowledge workers who are constantly on the move and yet rely on the access to information at the moment of relevance in order to accomplish their work. Indeed, the role of the professional selling has expanded and changed dramatically in recent years. Instead of merely selling products, today's sales persons are expected to serve customers as consultants who offer expert advice on improving customer's life style or making their business operations more profitable. They operate like micromarketing managers in the field (Anderson, 1995). Buyers are

becoming increasingly skilful at obtaining value of their expenditures. Salespersons now usually deal with professional buyers or purchasing agents who base their buying decisions on the representative's delivery of quality and service and how the product will affect their company's profit. Such rapidly growing sophistication of professional buyers and their increasing access to information will continue to challenge sales persons to find new sources and faster methods of obtaining information despite their constant move. Mobile commerce (M-commerce) thanks to its unique attributes may bring the solution to salespersons.

The paper proposes a conceptual model of the effect of mobile commerce on salespersons performance. To do so it draws from the personnel selling literature to identify variables that have been shown to be important determinants of salespersons performance. Then the paper relates such variables to mobile commerce properties in terms of information, location and interaction. A third section is devoted to the elaboration of a set of propositions. The fourth section discusses the research framework of a project that aimed at providing an empirical support to the propositions that the paper suggests.

## 2. DIMENSIONS OF MOBILE COMMERCE IMPACT

There are many definitions of m-commerce with differing emphases. Keen and Mackintosh define M-commerce as the extension of electronic commerce from wired to wireless computers and telecommunications, and from fixed locations to anytime, anywhere, and anyone. (May, 2001) argues that when something is mobile it means that its primary usage environment is a mobile one. On the other hand, mobility in itself and mobile technology is not necessarily a value; the freedom created and supported with the technology is the key issue. Durlacher defines M-commerce as "any transaction with a monetary value that is conducted via a mobile telecommunication network". The focus in this definition lies on the exchange of products and services that is associated with a monetary value. (Skiba, et al, 2000) take a slightly different approach and define M-commerce as the "use of mobile hand-held devices to communicate, inform, transact and using text and data via connection to public or private networks". They specifically list any kind of service that can be provided by the mobile device, thus expanding the mere commercial character through communicative and informative services. If we break down the above definitions into their activity components they may include (i) solutions for information sharing, networking, e-commerce in the Internet (ii) solutions for wireless connectivity anytime, anywhere, and (iii) solutions for personal, portable and localized information, which enables transactions (Carlsson 2000).

M-commerce comprises technologies designed both to improve business processes and also to open new business opportunities for salespersons and their enterprises. In particular, these stem from three dimensions of M-commerce, namely:

### 2.1Ubiquitous Access to Information

M-commerce puts the user in the centre of information and communication. Information comes to the user instead of the user looking for it. Users can have access anytime and anywhere to relevant information either from his/her home office or from external content providers. For a kind of professionals who particularly move extensively and rarely stay in one place for a long time such as salespersons, ubiquitous access to information is a key enabler of their effectiveness. Indeed, their extensive movement makes them away form the "benevolent dictator", their desktop computers, which contain most of the information they need and impose rigid constraints on how and where they can be used.

### 2.2Location:

The application of mobile technology allows an elimination of the spatial dimension of business processes. This is of particular importance for salespersons who work at various locations: in their own office, at clients' offices, at other members' offices, at work sites, on train, plane and car, in a hotel room, and so on. Kristoffersen and Ljungberg (2000) describe three distinct modalities of mobile work. First, travelling is the process of going from one place to another in a vehicle such as by train, car and plane. This type of mobility seeks to capture the mobility of people in a vehicle. Second, visiting is spending time in one place for a certain period of time before moving on to another place, for example, spending in a hotel room or a construction site. Third, wandering is extensive local mobility in a building or local area. Salespersons ' everyday work practices exhibit all of these modalities of mobility. Such modalities of mobility impose rigid constraints on workers particularly in terms of both the uncertainty they experience with regard to information and resources they may need to solve the task at hand and the way long distance collaboration is conducted and coordinated. With M-commerce salespersons can overcome the challenges associated such modalities of mobility through the ability to remain 'on-line' regardless their location and receive actionable and useful information based on the awareness of their location.

### 2.3 Interaction

Asynchronous communications enabled by emails has made co-workers interactions with others more flexible. However, as (Kakihara and Sorensen, 2001) notice, asynchronous communication inevitably creates time lag. Until a receiver of an email actually goes to his computer and read the email, the communication does not come into effect in practice. Moreover, email communication requires a computer and software, which are mostly fixed to a certain location such as an office and home. M-commerce enhances interaction among distributed workers and others by enabling them to send and receive emails and have access to corporate resources regardless of their location. More interestingly, web-enabled mobile phone enables them to forward email coming into their formal account to their web enabled mobile phone so that they can read email on their mobile phone immediately after its reception no matter where they are, and, in urgent cases, reply from their mobile phone. Furthermore, access to corporate resources regardless of locations would enable salespersons to take benefit form the knowledge of their colleagues at the moment of relevance.

## 3. DETERMINANTS OF SALESPERSONS PERFORMANCE

The determinants of salespersons performance have attracted a number of empirical researches in the personal selling literature. More than 100 studies have addressed this issue (Churchill at al. 1985). Such studies examined the determinants of salespersons performance from many angles ranging from the power of psychological factors to the impact of organizational/environmental elements, motivation, satisfaction and knowledge. The following list summarises the main variables that those researches have shown to be predictors of salespersons performance.

### 3.1 Sales Skills

***Market and Technical Knowledge***

Market knowledge pertains to sales rep's knowledge about the industry he/she serves and about the business in general. Sales reps deal more and more with professional buyers or purchasing agents who base their buying decisions on the representative's delivery of quality and services and on how the product will affect their companies´ profits. Sales people who can demonstrate that they have studied the customer's business and understand the customer's problems will be able to build long-term relationship based on mutual trust, respect and professionalism (Anderson, 1995). Therefore successful reps regularly stay alert to trends in their customers´ industries, read annual reports of their customers, their competitors and their own companies. They also study analysis of all these companies prepared by financial companies.

Technical knowledge reflects the development and use of technical expertise such as product applications, specifications and customer use situation (Behrman and Perreault. 1982).

The importance of information gathering skills and activities is well recognized in the personnel selling literature (e.g. Ingram and La Forge 1997; Moncrief, 1986). For instance, (Sujan et al.1988) suggest that a salesperson’s effectiveness and knowledge can be enhanced by providing them with market research information and encouraging them to unitise knowledge. In order to provide sales reps with market and technical knowledge, some companies invested in knowledge repositories and intranets. Alas, Most of such systems fail to mobilize the required knowledge to support salespersons in action. Sales reps are often on the move and thus away from their desktop computers that contain market and technical knowledge they may need.

***Target Selling***

Target selling is defined as a salesperson’s ability to identify, select, and call on profitable customers (Kotler 1994). Often called the “80-20”, the concentration principle says that most of salesperson’s sales, costs and profits come from a relatively small proportion of customers and products. Avon sells its cosmetic products in over 50 countries, but only 8 countries account for 86 percent of the company’s sales and 90% of its profits (Markovits, 1988). USV Pharmaceutical company increased its sales 250 percent over four years by eliminating sales calls on 330,000 small accounts in order to concentrate on 70,000 major ones (Vizza, Chambers, 1971). The importance of effective prospecting for a salesperson’s success is well recognized in selling textbooks (e.g. Stanton and Spiro 1999).

***Efficient Time Management***

Successful salespeople understand that their success depends not only on their effectiveness but also their efficiency (Anderson 1995). That is why time management is recognized as one of prerequisite of salespersons´ effectiveness. The most successful sales people learn how to avoid daily time traps so that they can get the most out of each working hour. Green (1987) stresses this issue in the statement “how a salesperson allocates his or her time across activities directly affects his or her performance and therefore impacts a firm’s sales and profits.” Henry (1975) maintains that three factors contribute to selling success: number of sales calls, quality of sales calls and allocation of sales efforts. The first and third of these factors contribute to time allocation, implying that greater allocation of effort will result in greater selling success (Weeks et al. 1990). Dead time is one example of time traps that hurts many salespersons efficiency. This time generally occurs between tasks and between meetings, in which sales persons usually have little control over the resources available to them. McGraw Hill’s study of 239 salespeople across 198 different companies reveals that salespeople spend on the average about 25% of their time just waiting for interviews with clients and travelling.

### 3.2 Sales Behaviours

***Adaptive Selling***

Salespeople’s adaptive selling behaviours are characterized by altering sales approach across and during customer contacts (Weitz et all, 1986; Sipro and Weitz 1990; Sujan 1986). Through the practice of adaptive selling, salespeople exploit the unique opportunities of personal selling. Salespeople have the possibility to implement a sales presentation that is tailored to that customer, as opposed to a canned presentation across all customers. In addition, they can sense customer reactions during call and make instant adjustments (Weitz et all. 1986). The personal selling literature proposes that adaptive selling can be improved by providing salespeople with the necessary market information and resources such that they can link insights from other sales situations to the customer contacts in which they are currently engaged (Weitz et al.1986). Ubiquitous access to information about customer’s buying history, real time orders, latest events in the customer’s business would enable the sales rep to exploit information her /she receives to adapt to each individual interaction (Marshall et all. 1999).

***Customer Orientation***

Customer orientation can be viewed as the practice of the marketing concept at the level of individual salesperson and customer. The marketing concept calls for an integrated, company wide approach in which all the firm’s activities are directed toward providing customer satisfaction and establishing mutual beneficial relationship (Saxe and weitz, 1982). The American Management Association reports that 65% of the average company sales come from its present, satisfied customers (Anderson, 1995). Furthermore it is as twice as expensive to win a new account, as it is to increase sales from an existing account. Access to relevant corporate data by sales persons may enable them to make themselves readily available to address customer problems and question. Reducing the time it takes to deal with a client concern or difficulty may have a positive impact on customer orientation. Indeed, customer orientation is a key enabler of buyer-seller relationship developments (Lawler, 1992).

### 3.3 Salespersons´ Morale

***Intrinsic rewards***

Organizational psychologist have pointed out that there are two orientations with which people approach their work. In one, people find the work itself enjoyable. They like their jobs and think work is fun that is they find the content of their work intrinsically rewarding. Another orientation is to think of work as just something that must be done (Sujan et al, 1988). Sales managers, who concentrate on creating intrinsic rewards in selling among salespersons-through setting the job up to be fun and work rewarding in itself- are likely to be more successful at encouraging adaptive selling and improving the productivity of sales force (Amabil, 1983 Sujan et all, 1988,).

Salesperson may experience role stress when they receive incompatible sets of expectations or when they are uncertain what type of job behaviour to perform in a given work situation (Behrman and Perreault 1984). Because the sales rep is often in the field and isolated physically and psychologically from day to day interactions at the home office, there is reduced opportunity of communication between the rep and the manager, which aggravates ambiguity (Behrman et al, 1984).

Role stress may result in emotional exhaustion, a situation when individuals are facing seemingly overwhelming demands on their time and energy. Researchers suggest that one possible way to reduce the negative effects associated with work stress and emotional exhaustion involves providing a supportive work environment to workers (Boles J et all, 1997). Emotional exhaustion appears to be more prevalent in boundary spanning positions such as salespeople (Singh et al., 1994).

***Work Family Balance***

Conflict between work requirements and family concerns can be found across all work environment. However, the unique nature of selling with its time demand, psychological strain, work-related role stress and performance orientation can put unusual pressure on the salespersons (Dubinsky et al., 1986). According to (Boles et. 1997) reducing work family conflict may result in lowering sales persons´ perception of emotional exhaustion.

## 4. EFFECTS OF MOBILE COMMERCE ON SALESPERSONS PERFORMANCE

In an effort to uncover the added value mechanisms and the impact of information technology on productivity, several authors have proposed that studies should include intermediate benefits of information technology (Mooney, Gurbaxan &Kennneth, 1996). According to Huber's (1990) theory of the effects of advanced information technology, the benefits in individual and organizational effectiveness occur "indirectly " through the positive impact the technology has on information and communication processes. Mooney et all. (1996) assert that information technology may have automational or efficiency impact (e.g. doing things more quickly and cheaply), and informational and transformational outcomes (e.g. doing things more effectively). As depicted in Figure 1, the paper suggests that M-commerce properties in terms of ubiquitous access to information, location and interaction can affect salespersons performance through their impact on such mediator variables of salespersons ´performance as sales skills, sales behaviour and salespersons morale. Thus based on the review of the determinants of salespersons performance and the relevant properties of M-commerce in terms of information, location and interaction, the paper now discuss a set of three propositions towards a model of the impact of M-commerce on salespersons performance. The three propositions are as follows.

1. M-commerce properties in terms of information, location and interaction have a positive effect on salespersons performance through their impact on sales reps´ sales skills,

2. M-commerce properties in terms of information, location and interaction have a positive effect on salespersons performance through their impact on sales reps´ sales behaviour,

3. M-commerce properties in terms of information, location and interaction have a positive effect on salespersons performance through their impact on sales reps´ morale.

After elaborating on the three propositions, the paper presents the research framework of a project that aims at providing a mobile support system to the salespersons of one of the Finnish food manufacturers).

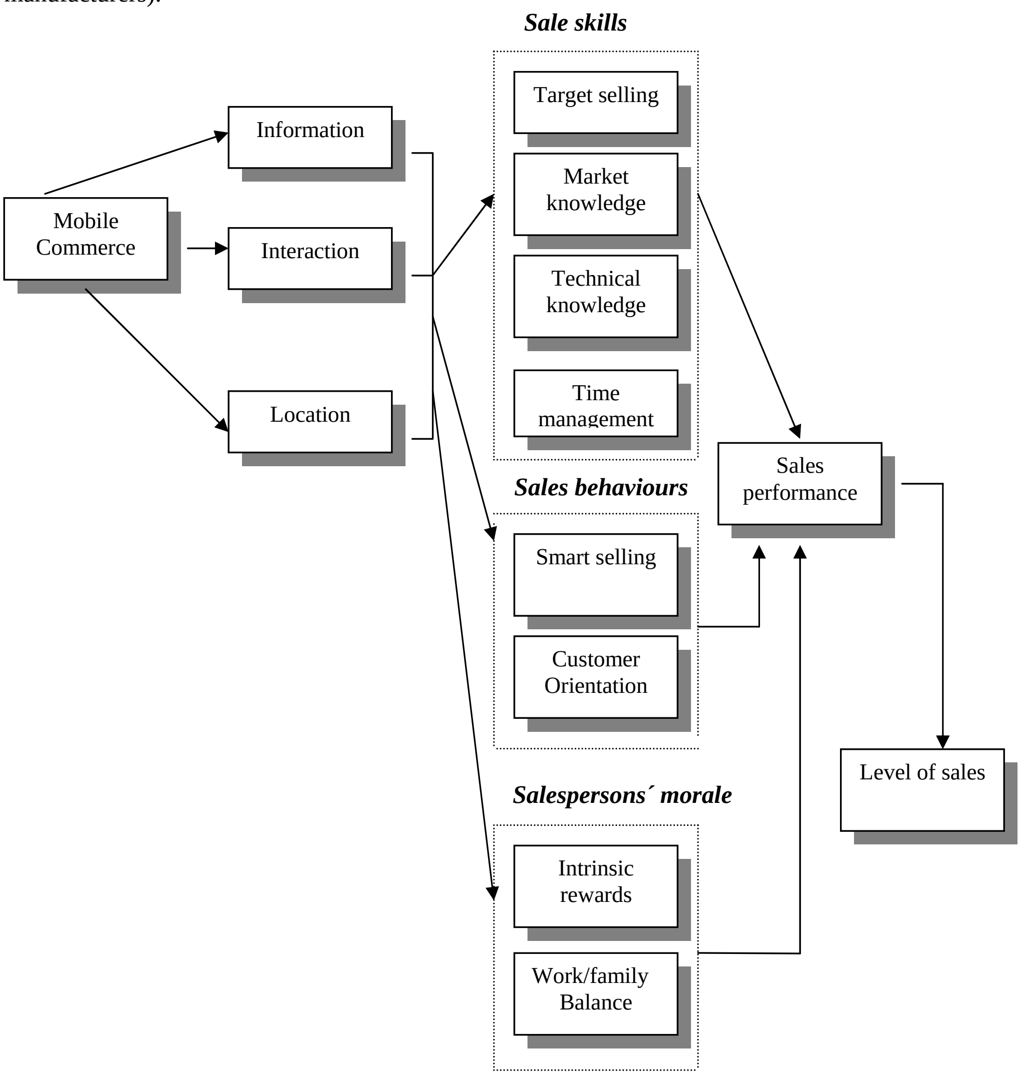


**Figure 1: Conceptual Model of the Effect of Mobile Commerce on Sales persons**

### 4.1. Effects of M-commerce on salespersons´ sales skills

M-commerce may make sales reps able to receive actionable and useful information on demand at the moment of relevance and regardless of their location and extensive movement. For instance, a sales rep can obtain the latest information about a customer either from his/her home office or an external content provider (i.e. Reuters) while en route to the customer. The sales rep can then integrate the information he/she receives to tailor the sales approach he /she has prepared for the sales call, overcome customer objections or adapt to opportunities that may arise during the sales call. Also, a sales rep can transmit real time customer data or key information about competitors moves to his/her home office, interact with his/her colleagues, irrespective of his/her location, about the possible reactions and adapt his/her call plan accordingly. For instance, Frito-Lay the PepsiCo’s snack businesses company introduction of handheld computers to its route sales force enabled a fast and efficient coordination among field force, marketing managers and manufacturing. Marketing managers use the data flowing from the field to evaluate the results of promotions and decide on new product introductions more rapidly. Manufacturing uses the information to reduce overproduction and the incidence of stale products (Davenport, 1993).

With mobile commerce, sales reps can receive irrespective of their location information about client’s orders, product’s profitability, promotions and thus can adjust anytime their call schedule to adequately target those customers with the highest potential at the right time. Furthermore, key information about competition attacks pushed by corporate intelligence system to sales reps regardless of their location may enable them to react to competitor’s moves at the right time and coordinate with people in the main office in order to protect their key accounts.

M-commerce can enable sales reps to use more efficiently their time through it impact on dead time. This time generally occurs between tasks and between meetings, in which workers usually have little control over the resources available to them. For instance, pharmaceutical sales reps often visit doctors to provide them with information on what is available as order brochures on products in which the doctor is interested. Frequently the doctor is not available and the representative wants to find a nearby alternative contact. If there is no alternative contact to visit, then the time for waiting for the doctor to become available may turn to be dead time for the sales representative. With m-commerce, the sales rep can turn this dead time into a productive one by performing non-selling tasks such as completing and sending expense reports to her company, preparing invoices or writing and sending thanks letters to customers. These reduce the time that sales reps have to spend in the office to perform routine tasks and thus allow them to spend more time selling. Indeed, despite the problems associated with laptop computer in terms of carrying behaviour, weight and booting time, Hewlett Packard found that salespeople using laptop computers spent 27 percent more time with customers, earned 10 percent more sales and achieved three times the productivity of sales reps who did not use laptops (Taylor, 1987). Using dead time more efficiently may occur in a variety of locations (i.e. trains, airports, airplanes, hotels rooms, office buildings, etc). Additionally, sales reps spend considerable portion of their time on the road. Awareness of their geographical position by the network can allow relevant alerts and support to be send to them which, may save the time they would spend on non-productive task caused by for instance by traffic jam, restaurant searching or waiting for the car to be repaired. Examples of alerts that may be pushed by the network are *“there is a traffic jam two kilometres ahead, use the alternative highway”, “there is a restaurant offering 10% discount in avenue X “, I have a breakdown, in nowhere, send me a tow truck”.*

Ubiquitous access to information about customer’s buying history, real time orders, latest events in the customer’s business would enable the sales rep to exploit information her /she receives to adapt to each individual interaction (Marshall et all. 1999). The portability characteristic of mobile devices makes it possible for the sales rep to receive alerts and reflect them in the sales approach during the sales interaction. Indeed mobile devices support the notion of micro mobility, the mobility inherent in physical objects in that they may be moved about and be shared between people to support communication (Luff and Heath, 1998).

### 4.2. Effects of M-commerce on salespersons sales behaviour

Ubiquitous access to e-mails and corporate data by salespersons may enable them to make themselves readily available to address customer problems and question. Furthermore, access to corporate data regardless of locations may enable salesperson to check the availability of inventories, interact with colleagues about the delivery date and thus provide the customer with realistic promises. Keeping promises is indeed a main determinant of trust, which is in turn a major factor affecting long-term relationship. For instance a smart mobile application that can use the appointments on the salesperson's calendar and link it to the corporate Custom relationship management applications may have a positive impact of the salesperson's ability to deal with customer questions and adapt to difficult situations that may arise during the call. With such an application the salesperson can receive anytime and anywhere useful alerts about the sales call he/she planning to visit, ensuring that he can answer any question that may arise during the sales call.

### 4.3. Effects of M-commerce on salespersons morale

Mobile commerce can reduce role stress and emotional exhaustion among salespersons by enabling them to have access irrespective of their location to relevant information that they may need in order to solve a task at hand or deal with an unexpected selling situation. Furthermore ubiquitous interaction enabled by M- commerce would make it possible to salespersons, irrespective of their locations, to seek support from both their colleagues or managers should they face an unexpected challenging sales problem. M-commerce may help fostering intrinsic interest among salespersons through mobile entertainment and role stress reduction. Mobile entertainment may add fun to salespersons´ work by enabling them to have access, irrespective of their location to on-demand games, songs and videos. Additionally, sales managers can use mobile games as training tools that can add fun to salespersons work. For instance best and most experienced salespeople in the company can contribute in developing the content of mobile games in such areas as role-playing or selling situations. Salespeople can then access anytime and anywhere (i.e. train, airport, hotel) such mobile games and thus turn a dead time to a productive one by benefiting from a training program while having fun.

M-commerce may help salespersons mitigate the impact of work-family conflict through its impact on time management especially with regard to using dead time to handle urgent family issues (i.e. mobile shopping, bill payments, mobile banking), better scheduling of their daily activities and ubiquitous access to relevant information that would allow them to engage in smart selling. Furthermore, the ability of salespersons, despite their extensive movement, to know anytime and anywhere the location of their teenagers would provide them with assurance about their ability to react in time to problems that their teenagers especially problematic ones may experience, which would enable them to concentrate more on their selling activities.

## 5. RESEARCH FRAMEWORK

### 5.1 Objectives

To assess the effects of M-commerce on salespersons performance and to identify the critical success factors for the development of a mobile support system to salespersons, we will conduct a research project at one of the Finnish food companies (FinFood). More specifically, the project aims at developing a mobile knowledge mobilisation system for the salespersons of such company. Broken down into its component parts, the objectives of the research process are therefore to:

(i) Evaluate the current capabilities of FinFood company to support its sales persons for greater performance,
(ii) Identify routines and solutions that such persons regard as bottlenecks,
(iii) Develop data and information handling solutions that will improve the salespersons productivity,
(iv) Develop and test a mobile support system for FinFood ´s sales force.

### 5.2 Approach

After a brief orientation to acquaint study team members with the operations and system environment, the following activities will be undertaken.

- <u>Review of background information about FinFood</u> to include the salespersons workflow processes their output and their customers as well as salespersons´ performance measures that the company uses. This preliminary information will be gathered form the company's studies and reports as well as interviews with managers,
- <u>Interview salespersons</u> to identify their weekly work program, examine how they carry out their activities and what they believe helps or hinders them in their work performance,
- <u>Perform an ethnographic study</u> to identify salespersons communicative and informational requirements,
- <u>Formulate design proposals</u> based on the empirical findings and the mobile technologies capabilities,
- <u>Discuss the design proposals with salespersons in workshops</u>,
- <u>Develop a prototype based on one of the design proposals</u>,
- <u>Validate the prototype under real salespersons work conditions.</u>

## CONCLUSION

The paper has proposed a model of the effect of m-commerce on salespersons performance. The model suggests that m-commerce's properties in terms of information; location and interaction can have effects on salespersons´ performance via their impact on such mediating variables as sales skills, sales behaviour and salespersons´ morale. It is worth mentioning that m-commerce may result in some consequences that salespersons may not welcome. Perhaps the most immediate drawback of extensive use of mobile technologies by salespersons is the problem of "interaction overload". Anytime and anywhere connectivity may becomes everywhere/all-the-time connectivity; which may result in the danger of users becoming "too connected". In such a case a reengineering of salespersons´ business process may be appropriate to mitigate such a drawback.

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