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PIM APPLICATIONS - An Explorative Study on Benefits and Barriers¹

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Abstract

In this exploratory study, we look into the emerging usage of Personal Information Management (PIM) applications on mobile devices. We collected data in two rounds of empirical investigation: first, with pilot users in an organization providing PIM services, then, in customer companies subscribing to these services. Our findings suggest that the benefits of PIM applications are mostly related to the users' personal work: planning schedules and work tasks, making mobile communication even easier, and increasing flexibility, and that the benefits for companies are mainly realized through the users' benefits. There are, however, still a range of barriers, ranging from difficulties in use and technical limitations to organizational level security concerns.

Keywords: Personal Information Management, mobile work, mobile communication

1. Introduction

To do things constantly more efficiently, organizations increasingly utilize new technologies, new devices, as well as new software. While electronic commerce continues to influence the global business environment, technologies and applications are beginning to focus more on mobile computing and wireless web (Tarasewich et al. 2002). Now the development of mobile applications and wireless web can make changes to the way, where and when people work. There is a rapidly rising number of people who work at home or in mobile offices, connected by computer networks (Barbero 2001). Furthermore, mobile technologies can enhance business efficiency by distributing information to the workforce, and by offering new communication channels with customers (Leung & Antypas 2001).

Until very recently, Internet and mobile phone were largely separate (Barnes 2003). Potential of the Internet has been encouraging the development of technical solutions resulting in increased use of electronic business applications and finally of mobile

¹ This paper is based on an unpublished thesis of the first author.

business applications. Different types of smart phones and PDA's (personal digital assistant) allow people to organize their schedules and communicate not only by phone but also by e-mail faster than from fixed locations, that is, from their offices or from home. The current head of Nokia Enterprise Solutions unit, (Mary McDowell) has forecasted that within the following three years, one third of all firm e-mails have transferred to mobile world (Kauppalehti 2005). However, as Schlosser (2002) points out, wireless mobile technology seems still to be largely based in technology push, rather than in market pull, referring to that new technology solutions address undiscovered business problems or opportunities (Davern & Kauffman 2000).

The main function of a mobile phone is still to make voice calls, but the telecom industry has shifted focus from voice telephony to new services and advanced mobile phones (Tjostheim et al. 2003). Personal Information Management (PIM) applications enable anytime and anywhere access to their corporate networks. By using mobile devices, employees can access real-time documents, discussions, and other information in corporate intranet. (Hayes & Kuchinskas 2003) The early use of mobile applications was mainly focused on PIM containing e-mail, calendar, and address book (Hayes & Kuchinskas 2003). Depending on the definition, PIM can also contain time and expense tracking, to-do/task lists, memo pads (Evans 2002), calculator, and word processor (Alanen & Autio 2003) incorporated in for example mobile phones (Zimmerman 2003). There are several different devices that can utilize PIM applications in some form. In this paper the focus is on small, handheld and wireless devices: mobile devices such as smart phones and PDA's, and on e-mail and calendar applications.

In this exploratory study, we look into the emerging usage of PIM applications on mobile devices. Our aim is to find out what specific benefits companies can actually gain from the use of PIM applications as a service package and what barriers there might be to use them. We collected data in two rounds of empirical investigation: first, with pilot users in an organization providing PIM services, then, in customer companies subscribing to these services. The benefits PIM applications might create for the companies can be realized through the users within the company. Therefore, it is interesting and meaningful to study benefits and barriers that early adopters of PIM applications have realized within the use, and how these benefits and barriers are seen at an organizational level.

2. Benefits of and Barriers to the use of Mobile Technologies

Earlier literature does not contain extensive studies concerning PIM applications and their benefits and barriers due to the novelty of the technology. Literature review on mobile commerce and wireless technologies revealed potential benefits from both user's and company's perspective in the areas of planning, communication, flexibility, reduction in workload, productivity, entertainment, costs and revenues, and customer relations. Potential barriers on the other hand, have been found in the areas of difficulty to use, technological limitations, security concerns, integration, changes in employees' role, personnel challenges, disturbing use for entertaining purposes, negative prior experiences, lack of knowledge, and costs. In addition, some theoretical models explain factors influencing the use of new applications. According to the Technology Acceptance Model (TAM), perceived usefulness and perceived ease of use are major determinants of people's intentions to use computers and these intentions are found to predict reasonably well the actual use. (Davis et al. 1989) The Unified Theory of Acceptance and Use of Technology (UTAUT) is formulated based on eight competing theories and it helps to assess the likelihood of success for new technology and the drivers of acceptance. According to UTAUT, performance expectancy, effort expectancy and social influence

directly affect the intention to use, and intention to use and facilitating conditions directly affect the actual usage behavior. (Venkatesh et al. 2003)

We next present the results of our literature review on the use of mobile technologies in form of four tables: potential benefits from the user's and company's perspective (Table 1 and Table 2) and barriers from the same perspectives (Table 3 and Table 4).

Table 1: Potential benefits of mobile technologies from user's perspective

Potential benefit for user	Supporting literature
Planning (Combining notes, scheduling, address book, calling, and e-mail)	Jarvenpaa et al. 2005; Schlosser 2002
Improved information flow and communication	Hayes & Kuchinkas 2003; Heikkilä et al. 1999
Reachability (ability to contact)	Evans 2002; Jarvenpaa et al. 2003; Schlosser 2002
Flexibility	Gorlenko & Merrick 2003; Weijers et al. 1992
Autonomy, independence	Jarvenpaa et al. 2005; Jarvenpaa et al. 2003; Weijers et al. 1992
Decrease of human controlling, and dispatching work	Alanen & Autio 2003
Decrease in the amount of unnecessary traveling, waiting	Alanen & Autio 2003; Weijers et al. 1992
Productivity	Hayes & Kuchinkas 2003; Jarvenpaa et al. 2003; Schlosser 2002; Weijers et al. 1992
Decrease in the amount of paperwork (electronic document handling)	Alanen & Autio 2003; Hayes & Kuchinkas 2003; Pesonen et al. 2004
Entertainment	Schlosser 2002
Image and associated prestige	Schlosser 2002
Communication on personal and family relations	Jarvenpaa et al. 2003; Weijers et al. 1992

The user benefits found are clearly increasing ease and convenience of working from employees' personal perspective. Assistance in, for example, planning, communication, flexibility, and other matters listed, support everyday operations of employees who are typically working on non-repetitive and complicated tasks.

Table 2: Potential benefits of mobile technologies from company's perspective

Potential benefit for company	Supporting literature
Reduced manual document handling and paperwork	Evans 2002; Hayes & Kuchinskas 2003; Pesonen et al. 2004
Reduction of work force (clerical work, call center)	Hayes & Kuchinskas 2003; Pesonen et al. 2004
Reducing typing- and delivery errors	Hayes & Kuchinskas 2003; Pesonen et al. 2004
Better information flow/access	Alanen & Autio 2003; Barbero 2001; Evans 2002; Hayes & Kuchinskas 2003; Heikkilä et al. 1999; Leung & Antypas 2001; Weijers et al. 1992
New communication channels	Evans 2002; Leung & Antypas 2001
Flexibility	Weijers et al. 1992
Tighter integration	Murphy & Simon 2002
Day-to-day operations more efficient	Cline & Guynes 2001; Heikkilä et al. 1999
Improved workflow	Deloitte Research 2003
More motivated personnel	Weijers et al. 1992
Productivity	Alanen & Autio 2003; Deloitte Research 2003; Evans 2002; Hayes & Kuchinskas 2003; Leung & Antypas 2001; Weijers et al. 1992
Improved operations (such as invoicing)	Deloitte Research 2003; Evans 2002; Hayes & Kuchinskas 2003
Reduces expenses, cost savings	Cline & Guynes 2001; Deloitte Research 2003; Hayes & Kuchinskas 2003
Time save	Evans 2002; Hayes & Kuchinskas 2003
Increased market share through improved customer access, customer service and/or satisfaction	Evans 2002; Hayes & Kuchinskas 2003; Murphy & Simon 2002
Faster and/or better service	Alanen & Autio 2003; Evans 2002
Increased competitive advantage	Barbero 2001; Evans 2002

Benefits for the company are typically realized through employees' operations. For example, increased efficiency and convenience concerning planning, communication and flexibility for employees on a large scale, also ought to have positive impact on company as a whole. These benefits result in such improvements as company-wide time save and better information flow.

Table 3: Potential barriers for mobile technologies from user's perspective

Potential barrier for user	Supporting literature
Dependence	Jarvenpaa et al. 2005; Jarvenpaa et al. 2003; Schlosser 2002
Creates needs	Jarvenpaa et al. 2005
Disengage people (decreasing calling and meeting)	Hayes & Kuchinskas 2003; Jarvenpaa et al. 2005
Impersonal	van Akkeren & Harker 2003
Time consuming	van Akkeren & Harker 2003
Difficult to use	Bruner & Kumar 2005; Clarke 2001; Han et al. 2002; Hayes & Kuchinskas 2003; Jarvenpaa et al. 2003
Lack of training/maintenance	van Akkeren & Harker 2003
Technological difficulties	van Akkeren & Harker 2003; Hayes & Kuchinskas 2003
Security	Clarke 2001; Han et al. 2002; Tarasewich et al. 2002
Viruses	van Akkeren & Harker 2003; Tarasewich et al. 2002
Lost device	Frolick & Chen 2004
Lost information	Frolick & Chen 2004
Resistance to change	Hayes & Kuchinskas 2003
Lack of privacy	Jarvenpaa et al. 2005
Increasing expectations of availability	Jarvenpaa et al. 2003; Schlosser 2002
Disturbing when others use	Jarvenpaa et al. 2003; Schlosser 2002
Indifference towards other things	Jarvenpaa et al. 2003; Schlosser 2002
Bad experiences	Deloitte Research 2003; Jarvenpaa et al. 2003

Some of the barriers for the users are paradoxical in comparison to benefits in a sense that for example time save was listed as a benefit but time consume as a barrier. It is notable that the listed benefits and barriers are from different studies and they do not all apply to any single application. Also, technical applications do have paradoxical benefits. Potential barriers found – or concerns – are such as fear of loosing the device and information with it, and fear of change in current methods such as calling and personal meeting.

Table 4: Potential barriers for mobile technologies from company's perspective

Potential barrier for company	Supporting literature
Lack of knowledge	Alanen & Autio 2003; Evans 2002; Weijers et al. 1992
Uncertainty of benefits	Alanen & Autio 2003
Bad experience	Deloitte Research 2003
Technical complexity	Alanen & Autio 2003; Deloitte Research 2003
Security	Deloitte Research 2003; Han et al. 2002; Tarasewich et al. 2002
End-user resistance	Deloitte Research 2003
Training of personnel	Deloitte Research 2003
Complexity with service providers	Alanen & Autio 2003
Legal issues such as contracts and agreements	Blosser in Hayes & Kuchinskas 2003
Lack of standardization	Alanen & Autio 2003; Frolick & Chen 2004
Missing clearance on the supplier selection and complexity of coordination between service providers	Alanen & Autio 2003; Deloitte Research 2003; Hayes & Kuchinskas 2003
Costs	van Akkeren & Harker 2003; Alanen & Autio 2003; Hayes & Kuchinskas 2003

Here, as with the benefits, company-wide impact is typically realized through its employees. Personal concerns of the employees or the decision makers, such as security and training requirements, might act as barriers, with complexity of the application and related costs.

3. Empirical Findings

We collected data through semi-structured theme interviews first in a company providing PIM services, then in a number of customer companies of the service provider. The themes of the interviews at the service provider followed the lists of benefits and barriers found in the literature. The lists were then formed into more detailed categorizations, which were used in the interviews of the users in the customer companies.

All the interviewees were at managerial level, and male, using Nokia's smart phones. All the offices of the interviewed users were located in Helsinki Metropolitan area. Each of the interviews lasted approximately a little less than one hour.

3.1 Round One: Service Provider Company

The interviews in the first round were conducted among employees of the company providing PIM applications as a service package. The selected five users had all been using the service approximately from six months to one year.

First, one respondent working in the support service was asked to describe the situations where users had needed help. Then, four users of PIM applications within the company were asked to tell about benefits as well as difficulties and disadvantages that they had encountered.

These interviews suggested that not all of the benefits and barriers of mobile technologies presented in the earlier literature were fully applicable to PIM applications. We formed the benefits and barriers from both user's and the company's perspective into more detailed categorizations to be used in the next round of interviews. The benefits from user perspective were categorized into personal planning, personal communication, flexibility of time and place, personal productivity, entertainment, and ease of use and usefulness, while the benefits from a company's perspective were named to be reduction in workload, company-wide communication, company-wide productivity, costs and revenues for the company, and customer relations. Barriers from a user's perspective, in turn, were limited to four categories: difficulty to use, technological limitations, security concerns, and changes in employees' role. The barriers from company perspective were grouped under the headings of lack of knowledge, technological limitations, security concerns, challenges related to personnel, integration with other applications, and implementation and usage costs.

3.2 Round Two: Customer Companies

The second round of interviews was conducted among customer companies of the service provider company. Therefore, all of the respondents were familiar with the same service. Altogether, eight users of PIM applications were interviewed from seven companies from different fields of business (publishing, consulting, housing, construction, media, and chemicals). Each of the companies had taken PIM applications into use for a certain pilot group, before deciding on enlarging the user group. Each of the interviewees had been using PIM applications between three and eight months.

Respondents had had slightly differing expectations when taking PIM applications into use. Some had expected mobile working getting easier in the sense of being able to keep up with work tasks constantly. Especially highly mobile employees were expected to reach this benefit. Another expectation was to homogenize the calendar systems within the company. The unified way of making calendar notes would help the whole company to have calendar management more efficient. According to all the respondents, taking PIM applications in use has been a very successful decision, and none of them would be willing to give it up.

3.3 Benefits of and Barriers to the Use of PIM Applications

We will next review the findings from our exploratory empirical study. The benefits and the barriers revealed in both the service provider as well as the customer companies are presented together, but we will highlight the major differences between the two groups of interviewees.

The major benefit found at a user level was the help in personal planning (see Table 5). PIM applications make the schedule planning easier and more efficient. Another point of view in planning was the constant availability and access to e-mail. Having e-mail inbox

available helps the users stay up to date when traveling or on free time. Staying constantly up-to-date helps planning further. The second major benefit was related to communication. Mobile workers could now use another communication mean and messages could be better delivered even if one could not be reached by phone.

Table 5: Benefits created by PIM from user's perspective

Personal planning	<ul style="list-style-type: none"> - synchronizing of personal calendar notes - anywhere and anytime use of calendar and personal planning - time management and planning without delays - calendar changes directly available to view - decrease of double bookings - e-mail inbox directly available to view - next tasks directly available to view - anticipation - calendar and e-mail staying up-to-date - staying up-to-date even on free time - company-wide common planning system
Personal communication	<ul style="list-style-type: none"> - speed - fast responses - decrease of e-mails waiting to be replied - messages can contain more text or data in comparison to SMS - communication not fixed to location or time - attending on-going conversations from distance - easier to get informative messages
Flexibility of time and place	<ul style="list-style-type: none"> - flexibility on time and place - flexibility on free time, can choose on what to react - flexibility on choosing time of availability - flexibility on preparations
Personal productivity	<ul style="list-style-type: none"> - efficiency in communication - time save in traveling and waiting - preparation of issues from distance - information availability, also unnecessary information - more topics covered in shorter time period - increased possibility for last-minute checking
Entertainment	<ul style="list-style-type: none"> - image - personal communication
Ease of use and usefulness	<ul style="list-style-type: none"> - easy to use - fast to use - decreases stress caused by unawareness - convenience - access to support service if problems - user friendly automatic synchronizing

Roughly speaking, both groups found mostly similar benefits, but the respondents from service provider company were slightly more keen on seeing larger potential in the

applications. This means that they were also identifying benefits of further developed applications of PIM.

At a company level there was no single major benefit (see Table 6). Companies were seen to gain benefits from aspects such as more efficient operations of its employees', and improved external and internal communication. The benefits were clear on an individual level and that way affected the company.

Table 6: Benefits created by PIM from company's perspective

Reduction in workload	<ul style="list-style-type: none"> - reduction of some paperwork - reduced time spent on e-mails at the office - reduced physical search of people - reduction of solving the consequences of bottleneck phenomena
Company-wide communication	<ul style="list-style-type: none"> - fast information flow - speed of covering simple issues - reachability of mobile people - better information access
Company-wide Productivity	<ul style="list-style-type: none"> - faster decision making in simple matters - increase in productivity on personal work of covering e-mails -> faster speed of handling them on company level
Costs and revenues for the company	<ul style="list-style-type: none"> - save in costs in traveling and waiting - organization operates faster concerning simple matters - service package, no additional expenses - cheap data transfer except of additional GPRS costs - easiness and convenience in billing process
Customer relations	<ul style="list-style-type: none"> - fast responses, better service - additional information during meetings - ability to view customer complaints directly - ability to react faster in all cases

Some benefits were also controversial. For example, improved availability was also seen as increasingly blurring free time with work, and possible productivity gains were not clear for all. In addition, some issues of concern were the risk of losing the device, and problems with GPRS connections (see Table 7).

Table 7: Barriers for PIM from user's perspective

Difficulty to use	<ul style="list-style-type: none"> - applications ask for patience when taken into use - quality of the text and communication - difficulty with others calendar notes - problems with attachment files - GPRS connections abroad
Technological limitations	<ul style="list-style-type: none"> - uncertainty and lack of reliability - activation process - require up dating - connections, foreign operators, GPRS - attachments in e-mails, junk mail filters
Security concerns	<ul style="list-style-type: none"> - lost or stolen device - sending e-mails using the owner's name - unwanted access to information
Changes in employees' role	<ul style="list-style-type: none"> - pressure of availability - fear of changing role - reach ability both on free time and during other work tasks - productivity - amount of e-mails - last minute preparations

In general, the users wished further development to the applications, for example, having calendar reservations for others possible. This was already possible when using PC, but not when using PIM applications from distance.

Differently from the employees of the service provider, the users at the customer companies did not perceive some difficulties, such as, in Internet surfing, as a real barrier, but rather as a consequence of using a small device. Integration was also not seen as a barrier, but a responsibility of the service provider's to take care of (see Table 8).

Some concerns that employees of customer companies mentioned were related to the fast phase of technological development: what it the technology and applications offered now will become outdated soon, and there will be better or more advanced solutions in the markets soon after committing to a particular service. In addition, the fear that increased data protection costs would increase also the costs of buying this service, and problems in the installation phase were mentioned .

Table 8: Barriers for PIM from company's perspective

Lack of knowledge	<ul style="list-style-type: none"> - uncertainty of benefits - correlation between costs and benefits - unwillingness to pay for a service - fear and attitudes - GPRS costs - uncertainty of novelty of technology, fear of missing a forthcoming better solution
Technological limitations	<ul style="list-style-type: none"> - uncertainty and lack of reliability - activation process - require up dating - connections, foreign teleoperators, GPRS
Security concerns	<ul style="list-style-type: none"> - lost or stole device, outsider's access to company e-mail - data protection - unwanted access to information
Challenges related to personnel	<ul style="list-style-type: none"> - training - outdated attitudes, resistance to change
Integration with other applications	<ul style="list-style-type: none"> - non matching software components
Implementation and usage costs	<ul style="list-style-type: none"> - monthly fee - uncertainty of correlation between costs and benefits - potential new emerging costs

Respondents identified a number of smaller scale concerns, but the major company level barrier was costs could act as barriers but one above all was the costs.

4. Discussion

The benefits of most ICT investments are intangible and estimations of monetary returns are hard or impossible to establish. Also our study among users of PIM applications reinforces the intangible nature of the benefits. All respondents agreed that there are benefits for their work and they would not like to give up using the PIM applications. The benefits are mostly related to their personal work: planning schedules and work tasks, making mobile communication even easier, and increasing flexibility. The benefits for companies are mainly realized through the users' benefits. Even though many respondents assumed that there are also monetary effects, the effects were not so clear that calculations could be established to show it.

It should be pointed out, that all the interviewed users were at managerial level positions in their companies. The way executives utilize PIM applications is mostly limited to personal information management itself, rather than utilizing a variety of related applications. As the number of users grows, other user groups, such as different types of field workers, can be expected to start utilizing PIM applications. As the user groups become more heterogeneous, also the use will become more varied. This will also create new applications and ways to increase efficiency within companies. Field workers could, for example, start utilizing the mobile abilities by starting to fill some basic standard forms of documents already at the customer's site and send them to back office systems by utilizing the push e-mail system of PIM applications. The PIM applications in their

current form should be seen just as a starting point for a wider range of mobile applications and services that companies can utilize in the future.

The respondents mentioned also several barriers or problems that could decrease the willingness to adopt. However, it was agreed that the adoption of PIM applications for them had been successful and they would not be willing to give up the use. The barriers mentioned were mostly smaller scale issues and the biggest perceived barrier was the costs for the company. Some of the respondents perceived their monthly fee still relatively high, although they thought the costs were justified and likely to decrease in the future.

5. Summary and Conclusions

In this paper we have presented results from our exploratory study on benefits of and barriers to the use of PIM applications. We started with a review on earlier literature on benefits and barriers related to use of mobile technologies. The lists formed from earlier literature were used as grounding structure of interviews in a company providing PIM application services. After this first round of interviews, the lists were formulated into more detailed categorizations of benefits and barriers, both from the user's as well as the company's perspective.

As could be expected, the benefits of PIM applications are mostly related to the users' personal work: planning schedules and work tasks, making mobile communication even easier, and increasing flexibility, and the benefits for companies are mainly realized through the users' benefits. There are, however, still a range of barriers, ranging from difficulties in use and technical limitations to organizational level security concerns. Some of these are common to all mobile applications, while some are specific to PIM type of services.

There are some limitations to our empirical data that need to be taken into account. First of all, all of the respondents used Nokia smart phones, which makes it difficult in some cases to make a distinction between the characteristics of PIM applications and those of the device. All the interviewed users were managers: having other types of users, such as field workers, in the sample, would most likely have created a wider picture of the potential usage benefits. Also, all respondents were members of pilot groups within their companies, and it is likely that members in pilot groups are more innovative and technically oriented than regular employees.

However, we believe that this study serves as an early insight into the use of emerging application area of mobile personal information management, which will deserve more research in the future, both from the users', as well as, from organizational perspective.

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