

The Mobile Internet and Small Business: An Exploratory Study of Needs, Uses and Adoption with Full-Adopters of Technology

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The technological environment in which contemporary small- and medium-sized enterprises (SMEs) operate can only be described as dynamic. The exponential rate of technological change, characterised by perceived increases in the benefits associated with various technologies, shortening product life cycles and changing standards, provides for the SME a complex and challenging operational context.

The primary aim of this research was to concentrate on those SMEs that had already adopted technology in order to identify their needs for the new mobile data technologies (MDT), the mobile Internet. The research design utilised a mixed approach whereby both qualitative and quantitative data was collected to address the question. Overall, the needs of these SMEs for MDT can be conceptualised into three areas where the technology will assist business practices; communication, ecommerce and security.

Keywords: Mobile data technologies, ecommerce, SME, adoption, Internet

INTRODUCTION

The technological environment in which present Australian SMEs operate can best be described as dynamic and vital, however businesses have made an important psychological jump in viewing the Internet as a *marketing* tool rather than a *technological* issue (Dearne, 2001). The explosive rate of technological change, characterised by perceived increases in the benefits associated with various technologies, shortening product life cycles and changing standards, provides for the SME a complex and challenging operational context.

The development of infrastructures capable of supporting the Wireless Application Protocol (WAP) and associated technologies represents the latest generation of technological innovation with potential appeal to SMEs and end-users alike. For all stakeholders, the primary appeal of these mobile data technologies, apart from mobility, is that associated 'services' are delivered on *existing devices* with which users are familiar – mobile phones, palm-tops, or other personal digital assistants (PDAs). However, whilst much attention has focused on high volume end-user 'lifestyle' applications for mobile data services (Mobile Data Conference, 1999), less emphasis has been placed on applications and services that would meet the needs of SMEs.

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There are two objectives for this article. First, to discuss the literature in the area of adoption of mobile data innovation and, second, to report on the findings of an empirical study with SMEs in a regional setting, where the focus was on those businesses that were already full-adopters of technology. The primary aim of this research is to identify the needs of SMEs in regional areas for mobile data technologies (MDT), the mobile Internet.

LITERATURE REVIEW

Adoption of Information Technology

Early studies addressing the adoption of Information Technology (IT) provide insight into reasons why decision-makers adopt or do not adopt innovations. The Diffusion of Innovation theory (Rogers, 1995) suggests that characteristics of innovations help to persuade potential adopters to embrace or reject an innovation. Other researchers have since completed work resulting in modifications to Rogers' original theory that provide numerous models addressing IT adoption and usage within an organisation.

The Technology Acceptance Model suggested by Davis (1989) addresses IT adoption, implementation and diffusion in terms of perceived ease of use and perceived usefulness based on behavioural intentions. Belief about the system, perceived usefulness and perceived ease of use are seen as directly affecting attitude to use (Gefen and Straub, 1997; Agarwal and Prasad, 1997). Further studies suggest that behaviour is a direct function of behavioural intention and perceived behavioural control that will impact on decision-makers choosing whether to adopt an innovation (Ajzen, 1991; Taylor and Todd, 1995). Therefore, in the adoption of mobile data technologies, will the same behavioural/psychological factors impact on the decision by owner/managers to adopt MDT?

Constructs used in the above models are generally based around perceptions, beliefs, attitudes and intentions of the decision-maker. More recent studies have identified other factors in addition to these that will impact on an owner/manager's decision to adopt new innovations such as mobile phones and Internet technologies. These include economic factors such as return on investment and characteristics of the firm such as the size, sector and status, and the structural sophistication of the firm.

Adoption of IT/Ecommerce by SMEs

Empirical studies have identified a variety of factors thought to affect e-commerce/Internet technology adoption in small business (Brooksbank, Kirby and Kane, 1992; Kirby and Turner, 1993; Julien and Raymond, 1994; Iacovou, Benbasat and Dexter, 1995; Thong and Yap, 1995; Harrison, Mykytyn and Rienenschneider, 1997). From the adoption factors identified in earlier studies, Van Akkeren and Cavaye (1999) developed a model (Figure 1) based on a study on the adoption of e-commerce technologies thought to facilitate or inhibit technology adoption by SME owner/managers.

The **first** component of this model can be described as owner/manager characteristics and these are based on behavioural and attitudinal factors, being:

- *Perceived benefits* affect technology adoption in terms of the perceived ease of use and/or usefulness of the technology. If the owner/manager does not perceive the technology in a positive way, they will be reluctant to adopt (Iacovou *et al*, 1995; Kirby and Turner, 1993; Thong and Yap, 1995).
- The *computer literacy* of the business owner can also influence technology adoption. If the owners are unaware or do not understand the technologies available, they are unlikely to adopt them into their own business (Kirby and Turner, 1993; Thong and Yap, 1995).

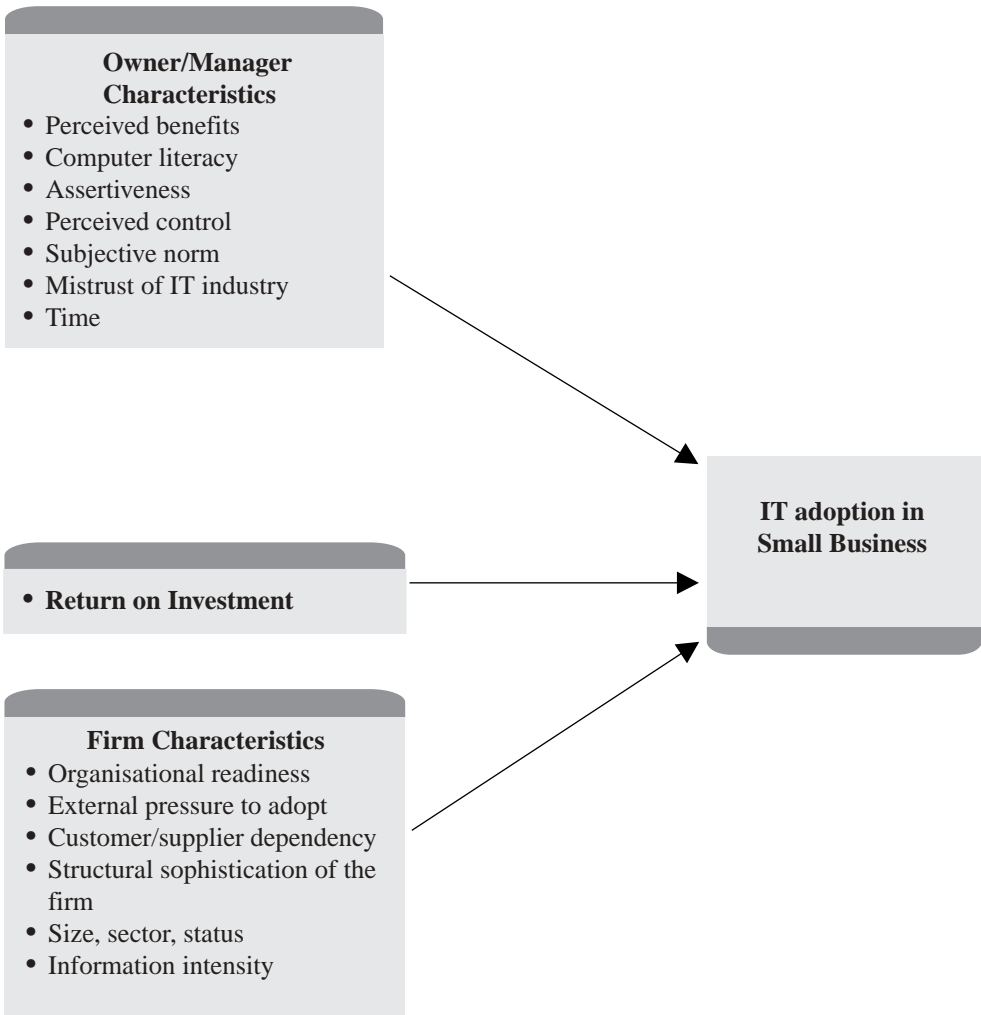


Figure 1: Framework of SME Adoption of Innovations

- The *level of assertiveness, rationality and interaction of business decision processes* can also impact on IT adoption. If owners of the firm are assertive in business decision processes, understand the benefits and uses of the technology to their organisation, and are able to rationalise that information, they will be more likely to adopt IT (Julien and Raymond, 1994; Harrison *et al*, 1997).
- *Perceived control* relates to the amount of requisite opportunities and resources (time, money, skills, co-operation of others) someone possesses to be able to carry out the course of action (technology adoption). For example, a small business owner may decide that connection to the Internet is an important competitive use of IT. Yet if there is a possible budget shortfall, or lack of time or understanding of the technologies, their decision to adopt will be influenced (Harrison *et al*, 1997).

- *Subjective norm* affects technology adoption in terms of the strength of the person's normative beliefs that 'groups' think the behaviour of interest (technology adoption) should or should not be performed, multiplied by a person's motivation to comply with the group (Harrison *et al.*, 1997).
- *Mistrust of the IT industry* relates to the attitudes of owner/managers that IT professionals are untrustworthy, difficult to understand and overcharge (Van Akkeren and Cavaye, 1999).
- *Lack of Time* refers to the owner/managers' attitude that they do not have sufficient time to invest in gaining knowledge and purchasing and implementing new technologies (Van Akkeren and Cavaye, 1999).

The **second** factor in this model is based on economic considerations, or Return on Investment (ROI). The need by small business owners for an immediate *return on investment* is due to the necessity of being concerned with medium-term survival rather than the long-term attainment of market share. When making a substantial outlay of capital resources the SME owner needs to see an immediate short-term ROI (Fichman and Kemerer, 1993).

The **final** category of factors is based on firm characteristics:

- *Organisational readiness* refers to the level of technology currently incorporated into business processes. If there is little technology incorporated, or outdated/inefficient technology being utilised, a firm is less prepared to incorporate the technologies and therefore less likely to adopt (Iacovou *et al.*, 1995).
- A small business owner/manager will be reluctant to adopt innovative IT unless there is a specific request for it by their trading partners and/or customers. If this *external pressure to adopt* IT is not present in the industry sector, then the business owner may perceive the technology as a waste of resources (Thong and Yap, 1995; Iacovou *et al.*, 1995).
- The *dependency of the small business customer on the supplier* is linked to the previous factor. Not only would the supplier need to have adopted the technology to make it viable, the small business owner would need to recognise and understand the benefits to his or her firm in adopting the technology. In addition, an organisation may perceive that their clientele was of a certain socio-economic level that would not readily benefit from the introduction of new technologies (Kirby and Turner, 1993).
- The *structural sophistication of the firm* in terms of centralisation and complexity will also influence technology adoption in its ability to incorporate new technologies into its work practices. A particularly complex structure could either inhibit or facilitate technology adoption and would be dependent on whether the owner believed that IT could be easily incorporated and enhance operations, or excessively disrupt operations (Julien and Raymond, 1994; Harrison *et al.*, 1997).
- The *size, sector and status* of the organisation have been shown to influence technology adoption, particularly in relation to the sector and status. If competitors and trading partners within the sector have adopted IT, an owner may be more inclined to adopt as well. The size of the business can also influence technology adoption, as a very small business with only two or three employees may not have the time or expertise to devote to implementing and using new technologies (Thong and Yap, 1995; Julien and Raymond, 1994; Harrison *et al.*, 1997).
- Finally, the *level of information intensity* within the organisation may influence the owner to adopt or not adopt a technology. For example, if large amounts of data and information are part of the business processes, an owner may be more likely to adopt technologies that could streamline operations and lead to improved information process within the organisation (Thong and Yap, 1995).

Recent studies about why SME owner/managers adopt or do not adopt IT and e-commerce technologies have highlighted both inhibitors and facilitators to adoption and are similar in content to the factors described above. Thong (1999) discusses SME adoption as being determined by decision-maker characteristics, information system (IS) characteristics, organisational characteristics and environmental characteristics. Further, the need for IS to offer better alternatives to existing practices are critical to adoption by SMEs (Thong, 1999). Therefore, could the use of mobile data technologies provide the 'better service' that SME owner/managers seek?

Owner/manager characteristics, planning orientation, and the existence of alliances/networks influence technology adoption by SMEs (McGregor and Gomes, 1999). Specifically in terms of alliances/networks, previous literature also suggests that the decision to adopt or not adopt IT will be influenced by the network within which the small business operates, particularly if time, cost and operational efficiencies can be realised (Piovesana and Rausch, 1998; Lawrence, 1998; Sillence, MacDonald, Lefang and Frost, 1998). In contrast, Bridge and Peel (1999) in their study of SMEs in the UK, suggested that adoption of IT would be improved through education of the benefits of the technologies and by fostering a planning orientation to IS design and implementation.

In an Australian study on IT adoption by SMEs, Fink (1998) identified adoption decisions as having three distinct phases: assessing IT benefits, organisational culture and firm-suited IT; assessing internal resources and procedures; and evaluating external environment, support and services. In terms of mobile data technologies, one could argue that owner/managers would need to assess what, if any, benefits can be derived by adopting the technologies and whether their firm was suited to adoption. Part of that evaluation would necessarily need to include both the internal and external environment in which the firm operates.

Previous studies on SME adoption of IT/e-commerce highlight a range of factors thought to influence an owner/managers' decision to adopt new technologies. The marketing of mobile data technologies to SME owner/managers will be competitive and intense.

The Marketing of Innovations

The marketing of innovations to SMEs has undergone considerable analysis and debate, particularly in relation to new technologies. Mahajan and Muller (1998) propose that with 'high-tech' products, the targeting of innovations does not necessarily lead to market success. Further, they suggest that traditional 'laggards' are dropped from marketing strategies and 'innovators' and 'early adopters' be grouped together and targeted. In this way, the early and innovative majority can be grouped as the mainstream market and strategies developed separately for this group.

Major innovations may have to 'prove themselves' in new markets before they can displace other technologies (Friar and Balachandra, 1999). It is the early adopters or innovators who will initially experiment with these technologies and hence marketing of new technologies to this group is a useful first step. In addition, the usefulness and ease-of-use will impact on owner/manager acceptance of the technologies (Agarwal and Prasad, 1997). Thus, focusing on these attributes may improve overall acceptance by SME owner/managers, a view supported by Nambisan and Wang (1999) who posit that the acceptance of web-based technologies is influenced by ease of use and perceived usefulness in terms of current IS sophistication, complexity of the new technologies, and perceived costs and benefits. They add that strategies needed to market web-based technologies should address the needs of the user and identify for them the context to which the technology can be used for business purposes.

Previous studies suggest that the marketing of technological innovations to SME owner/managers is a minefield of emotion, attitudes, behavioural intention and perceptions, coupled

with other factors considered important to owner/managers such as cost and technical complexity. Further, issues such as computer literacy of the owner/manager, and the size, sector and status of the firm are also considered important. It would appear, therefore, that marketers of MDT have many barriers to overcome. Businesses, however, are beginning to realise that mobile and wireless technologies need to be deployed where critical customer contact is occurring (Karaian, 2003; Keizer, 2003).

Mobile data technologies and SMEs

In Australia, the adoption of Internet/e-commerce technologies varies in different states, and further, between regional and city-based firms. However, the adoption of mobile phones is consistently high across states and regions within Australia. MDT, which marries mobile phones and e-commerce technologies, is seen as eliminating time and distance as barriers for regional businesses in their adoption of these technologies. A search of the literature has provided limited results on MDT adoption and/or marketing strategies, however, this is not surprising given the 'newness' of the technologies.

The mass market for mobile data technologies is so far largely untapped (Axby, 1998; Harrison, 1999). Estimates put usage of mobile devices as one billion worldwide by 2003 (Greengard, 2000), or US\$1.3 trillion in relation to annual turnovers by 2003 in the US alone (Thurston, 2000). With such potential markets available to the vendors of mobile data services and devices, it is useful to understand reasons why the majority of potential end-users are so far resisting these new technologies.

Lack of speed is a barrier to adoption as MDT is slow and hence inefficient (Taylor, 1999; Saunders, Heywood, Dornon, Bruno and Allen, 1999). Another barrier is the lack of standardised IT environment for developing mobile data applications and this impedes the growth of the mobile data market (Harrison, 1999; Axby, 1998). Limited bandwidth, higher usage costs, increased latency, and a susceptibility to transmission noise and call dropouts are also possible barriers to adoption (Duffy, 1999). Baxbaum (2003) posits that factors that have been shown to impact on the adoption of MDTs is the lack of a single standard and the fact that wireless networks are sometimes technically problematic. In addition, questions of security (or lack thereof) and vendors been accused of promising more than they can deliver have all impacted on the adoption of MDTs (Baxbaum, 2003). Problems with mobile data devices such as limited memory and CPU size; small, monochrome screens; low bandwidth; and erratic connections are further adoption barriers (Johnson, 1999). It is possible therefore that adopters are 'sitting back' and waiting for at least some of these problems to be corrected before entering the mobile data market. Another area of concern for end-users is that the Wireless Application Protocol (WAP), the emerging technology used to send data to and from handheld devices, has no in-built security mechanisms and this is of concern not only to the business user, but to the customers of the business as well (Riggs and Bachelor, 1999; Chan, 2000).

The marketing of mobile devices to potential customers will provide many challenges to the various players in the mobile data industry. Luring potential users away from their desktop PCs will require innovative marketing strategies and the literature provides many different approaches to capture potential customers. Wexler (1999) suggests three factors for the successful proliferation of mobile data services: coverage, ease of use and cost. In terms of segmentation, Axby (1999) suggests that there are two distinct market segments for these products: white collar groups and blue collar groups, distinguishing these groups via their application needs. For example, access to e-mail, database and file transfer applications will vary between the two segments, therefore packaging the appropriate applications to the particular segment would be a useful strategy.

It may also be argued that products would need to be developed for both business and the mass consumer markets. Capturing users requires 'transparency', that is, users want information or communication access whenever and wherever they need it, using whatever device is most convenient at that moment (Osowski, 1999). Consumers do not buy technology; they buy benefits (Duffy, 1999) and MDT benefits include easy communication through e-mail, ready access to information, entertainment, and improved lifestyle through e-commerce and home banking. Karaian (2003) adds that the real benefits of MDTs are gains in efficiencies and that there needs to be a real ROI to make a case for equipping the workforce.

A 'customer-centric' focus that personalises the device, providing simplicity, intimacy, transparency and immediacy, provides a complete e-business solution (Hom, 2000). Baxbaum (2003) states that mobile data solutions are an effective way to cut costs, streamline operations and provide better customer service in areas such as sales and logistics. Clearly, the literature on marketing mobile data devices to date underlines the importance of highlighting the benefits of using the technologies, and the ease of use to potential customers.

Most literature on the adoption and marketing of MDT is not empirically based and is limited to discussing the technologies in terms of their application to business, rather than adoption barriers or marketing strategies. By concentrating on those SMEs that are already comfortable and familiar with technology means that the findings from this research provide a deeper understanding of the facilitators and barriers to the adoption of MDT by SME owner/managers, and focus on the needs of the businesses. Much can be learnt from early adopters of technology when planning the emergence of new technology.

RESEARCH DESIGN

As Stokes (2000) suggests, it is important, when attempting to conceptualise marketing as practised by entrepreneurs, including owner/managers of SMEs, that we achieve a 'common meaning of terms.' This research is also guided by the call to arms of Gibb (1990) (cited in Stokes, 2000) who suggested that more inductive reasoning based on grounded theory, with equal emphasis on quality of data, be conducted. Thus, given the nature of this research problem, both qualitative and quantitative approaches to data collection were favoured. The former provided vital input to the latter, given the newness of this technology.

Stage One – Qualitative

Two focus groups were conducted with respondents identified as 'full-adopters'¹ of information technology, covering a variety of industry sectors. Attendance at the focus groups was vital to the integrity of the research, thus a rigorous procedure was adopted to increase response rates. The focus group topic guide was informed by the literature review and developed by the researchers. The videotapes of the groups were transcribed verbatim and a content analysis conducted.

The very newness of this type of technology presented special problems in research design. How, for example, could people understand and discuss technology that is still in its developmental stage? How could people be expected to gauge their need and possible use of this new technology if they could not conceptualise it? Merely describing the technology and its intended uses and applications would have been insufficient and, as Stokes (2000) warned, common meaning would have been difficult to achieve. To address this challenge in the research design for stage one an 8-minute industry video, depicting the use of mobile data technologies in the future, was played in all

¹ Those SMEs that used a computer and the Internet for business, email, ecommerce and had a website.

groups. Briefly the video depicted a family using a handset similar in design to a PDA. Features and applications demonstrated on the PDA included voice and video communication and activation; a navigational tool using a Global Positioning Satellite system; seamless on-line communication to ticket agents, hotels, shops; remote monitoring of premises; voice activated translation tools; and simulation of usage situations.

The groups were video-recorded and respondents were informed before commencement about the process and reasons were provided as to why it was necessary to record the group. Respondents were then given the option of leaving the group if they were not happy being recorded. No one left.

Stage Two – Quantitative

Data collection for stage two utilised telephone interviewing. Potential respondents were drawn from the Yellow Pages online with different business types grouped into their industry sector according to the Australian and New Zealand Standard Industry Classification (ANZSIC) system. The database comprised approximately 5500 potential respondents in total and a sample of 275 respondents were interviewed.

Interviewers worked through their respective database in a random manner to contact potential respondents and a policy of three callbacks before disregarding the potential respondent was employed.

Data Analysis

Setting the p level at 0.05, as was done in this study, succeeded in filtering out weak correlations, thus we can be 95% confident that the results are actually true. Unless otherwise stated the p-level here is significant at 0.05 or less, indicating that there is a 5% probability that the relation between the variables found in the results is a chance occurrence.

As the literature suggests that one would be foolish to treat all SMEs the same in respect of IT, this study concentrated on the needs of SMEs that had already adopted technology in order to gauge their needs for the emerging technology, MDT.

FINDINGS – STAGE ONE: QUALITATIVE

The group members, as full-adopters, were comfortable using the Internet and most had their own website. They tended to use the Internet as a business component and competitive edge, for example to sell their goods and services, rather than buy, and to generate enquiries:

“we get a lot of enquiries on email in the holidays, from all over the world ... Tasmania, Ireland” (Resort, 9)

*“people say they’ve seen your web page ... that’s a positive aspect”
(Mobile Hairdresser, 2)*

Product/Service Applications

Group members were visibly stimulated by the video, displaying knowledge of the area and being keen to discuss future applications:

*“we’re not very far away from a lot of these things ... I witnessed a digital camera take a photo and he hooked it up to his mobile phone and sent it to someone”
(Printing, 25)*

Respondents were encouraged to identify the services demonstrated in the video, discuss the

Service	Benefits	Typical Comments
1. 2 way communication: video/voice/voice recognition	Relationship marketing, the power of face-to-face persuasion, personalised and improved customer service, speed, time, planning:	<i>"international business is a very personal thing" (Exports, 17)</i>
2. Prioritising and screening messages	Delegation of work to others, freedom, cost savings on labour, rent overheads:	<i>"no one would have to be in one particular office space: (Fencing, 6)</i>
3. Remote access	Ability to check home/business from another location, security, peace of mind, working smart:	<i>"if it wasn't okay I could push another button and get Security guys there straight away" (Property Developer, 2)</i> <i>"I could check the chlorine levels in my pool" (Apartments, 2)</i>
4. Online information	Voice searching on the Internet or specialist databases:	<i>"like 'intestacy' – what sort of documents do I need?" (Solicitor, 4)</i>
5. Attachments, downloading	Ability to send information to others.	
6. Navigation	Directions, deviations, detours, speed, time, planning.	
7. Translation	Useful for international transactions.	

Table 1: Services

benefits associated, and rank the services in order of importance to them. Table 1 displays this information:

It was apparent from the groups that these full-adopters were clear about how and when they would use this technology – immediately. Discussions centred around how their top three ranked services would interact and the impact this would have on their business practices. For example, they included ‘prioritising messages’ in their top three, with the key benefit of delegation of tasks. There was also discussion in the groups about screening of junk messages and prioritising messages, suggestions included screening by time of day, and by different types of callers.

The respondents did, however, raise concerns about the services on show, especially in relation to ‘security’:

“what happens if you lose it (the handset)?” (Property Developer, 2)

“Someone else could access your home security before they go in and rob you” (Windscreen, 4)

The group members did provide remedies for their security concerns, for example using thumbprint recognition, retina scan or voice recognition.

FINDINGS – STAGE TWO: QUANTITATIVE

1. Technology Adoption

Few studies concerned with the adoption of technology by SMEs have focused on past or current

behaviour as an indicator of future intent. This study specifically categorised SME owner/managers based on current usage of IT and then focused on the needs of full-adopters in relation to the newest technology, MDT. Given that the very nature of full-adopters means they are familiar with technology, and specifically the Internet, this topic was particularly queried in the quantitative stage of data collection.

The Internet

Respondents were asked their main reason for being connected to the Internet as well as their secondary or other reasons (if any) (see Table 2). The question used to elicit this information was open-ended and responses were analysed and subsequently coded.

Reason Connected/Use	No. times named as 'Main Reason'	% of 'Main Reasons'	No. times named as 'Secondary Reason'	% of 'Secondary Reasons'
Research or Information Search	90	33%	47	25%
Communicate/email	83	30%	52	28%
Advertise Products and Services	31	11%	15	8%
Download Info. or Software	18	7%	25	13%
Order Products & Services	16	6%	12	6%
Take Orders (Sales)	11	4%	8	4%
Network with Other Businesses	8	3%	6	3%
Monitor Competition	6	2%	10	5%
Use Directories like Yellow Pages	5	2%	4	2%
Banking/Pay Bills	4	2%	7	4%
Pay for Products & Services	1	–	1	–
Other	1	–	1	–
Don't Know/Can't Say	1	–	–	–
Total	275	100%	188*	100%

* Not all 'full-adopters' named a secondary reason for connecting to the net.

Table 2: Internet Usage by Full-Adopters – Reasons SME Connected to Net

The most significant reasons for these SMEs to be connected to the Internet were to research, or information searching and communicating/email. These reasons rated highest as both the main and secondary reasons for connecting. Far fewer respondents reported conducting transactions such as 'ordering products and services', 'paying for products and services' and 'banking/paying bills'. While this does not mean that such activities were not undertaken, the data merely suggests that these are not (currently) the main reasons full-adopter SMEs adopt Internet technologies.

2. Reaction to MDT

The key issue in this research was to ascertain the needs of full-adopters of technology in relation to MDT, the suggestion being, that the more IT-literate people are, the more aware they will be of their current and future new technology needs. Clearly, the acceptance of technology will influence attitudes and approaches to it; it will also influence perceived needs of different market segments.

A key bank of questions in the questionnaire focused respondents on the use of MDT in a

business setting and asked them to state to what extent they agreed or disagreed² with a set of statements. To complement this bank of questions, an important, overarching question was also posed but placed later in the survey to alleviate any bias. This later question gauged the level of interest³ in acquiring the MDT, if it was available and affordable tomorrow. Thus, by focusing on those respondents who answered either 'strongly agree' or 'agree' with each statement in the 'key benefits' bank, it can be shown which features of MDT are important to each full-adopters.

Table 3 displays the perceived rankings of key benefits for the full-adopter group, together with the 'overall interest in acquiring' response.

Rank	Statement	Full-Adopter % (n=275)
1	Wait before investing	86
2	Being able to email	79
3	Owner/Manager feels excited	64
4	Trade with customers	62
5	Banking and other admin.	59
6	Trade with suppliers	59
7	Monitoring business premises	59
8	Being able to navigate	6
9	Being able to access the net	3
10	Being able to monitor or operate equipment	53
11	Competitive pressure to adopt	52
12	Live 2-way video	49
13	No need for this technology	35
14	Being able to shop	31
15	Staff would feel threatened	15
	Overall interest in acquiring	60

Table 3: Full-Adopters who 'Strongly Agree' or 'Agree' with Statements

Whilst full-adopters will wait a while before investing in the mobile data technology (86%), the owner/manager was excited by the prospect of it (64%). In terms of addressing the needs of the full-adopter SME owner/manager, the most important benefits were found to be using MDT for mobile email (79%), e-commerce via trading with customers (62%) and suppliers (59%), and to bank at their own convenience (59%), or monitor their premises (59%).

Overall six in ten (60%) full-adopters were very interested or interested in acquiring this technology.

SUMMARY

This article set two objectives. First, to discuss the literature in the area of adoption of mobile data innovation and, second, to report on the findings of an empirical study with SMEs, that are already full-adopters of technology, in a regional setting.

² Using a Likert-type scale where 1=strongly agree to 5=strongly disagree.

³ Using a Likert-type scale where 1=very interested to 5=very uninterested.

Many factors impact on the adoption of MDT by companies, and many different applications will specifically encourage SMEs in regional areas to adopt. However, much of the literature to date has been of a speculative nature, with little empirical research to identify the variables that play a role in the adoption and marketing of these technologies, or in identifying the most appropriate applications. In this study, the needs of regional SMEs for MDT applications can be classified into three areas; communication, e-commerce, and security.

Overall, SMEs on the Sunshine Coast would wait before investing in this technology. However this is not surprising, given that Australian SMEs have generally been slower to adopt e-commerce technologies, compared with other developed countries such as Japan, the US and Singapore (Forrester Research, 1997; Lawrence *et al*, 1998; Van Akkeren and Cavaye, 1999). This study has shown that SMEs have an overriding need for **communication**, closely followed by a need for **e-commerce** capabilities and **security**; thus, specific applications that address these needs include:

- access to email,
- trading with customers,
- trading with suppliers,
- banking and other administrative tasks, and
- monitoring business premises.

This research also identified that the more comfortable the owner/manager is with current technology, the more excited they feel about the MDT, and this is further supported when dealing with staff, as the more IT-literate the owner/manager, the less threatened they say their staff would feel.

Broadly, small businesses have needs for **communication** (email), **e-commerce** (trade with customers and suppliers) and **security** (monitoring business premises) when considering MDT.

CONCLUSION

Findings from this study have allowed refinement and development of the model presented earlier (Figure 1). The refined model, Figure 2, incorporates a range of factors impacting on regional SME adoption of MDT specifically and it is hoped that this model can provide direction for future research on the adoption and diffusion of MDT for SMEs. Demographic information obtained from phase II of the research included age, gender and educational level achieved by each participant and has been included in the revised model.

In terms of age and gender, the SME owner/manager most interested in acquiring this technology is between 30 and 50 years old. Compared to the mean response, women are slightly more interested in acquiring the technology than men, although this finding is not significant. Educational level achieved was more significant however, with one third of those 'interested' or 'very interested' in acquiring the technology having completed high school, and one quarter holding a university degree.

The availability of certain applications by SMEs was shown in this research to impact on the future adoption of MDTs. SMEs, by definition, do not have the luxury of time and money that bigger firms do. If they are going to invest money in new technology, whether it be a mobile phone, computer, PDA or MDT, they need to be able to reap immediate rewards. The most important aspects of SME owner/manager's daily business lives are concerned with communication and being in constant contact with the business in order to pursue contacts, orders, invoices and so on. However, they are also aware of the way the world is changing and, thus, identified a need of being e-commerce capable. These managers recognise the inherent cost savings of conducting electronic business and banking and this is important to them. It is interesting to note that managers ranked 'banking' at 5 for reasons to adopt MDTs, yet the ranking is much lower at '10' as a reason to adopt

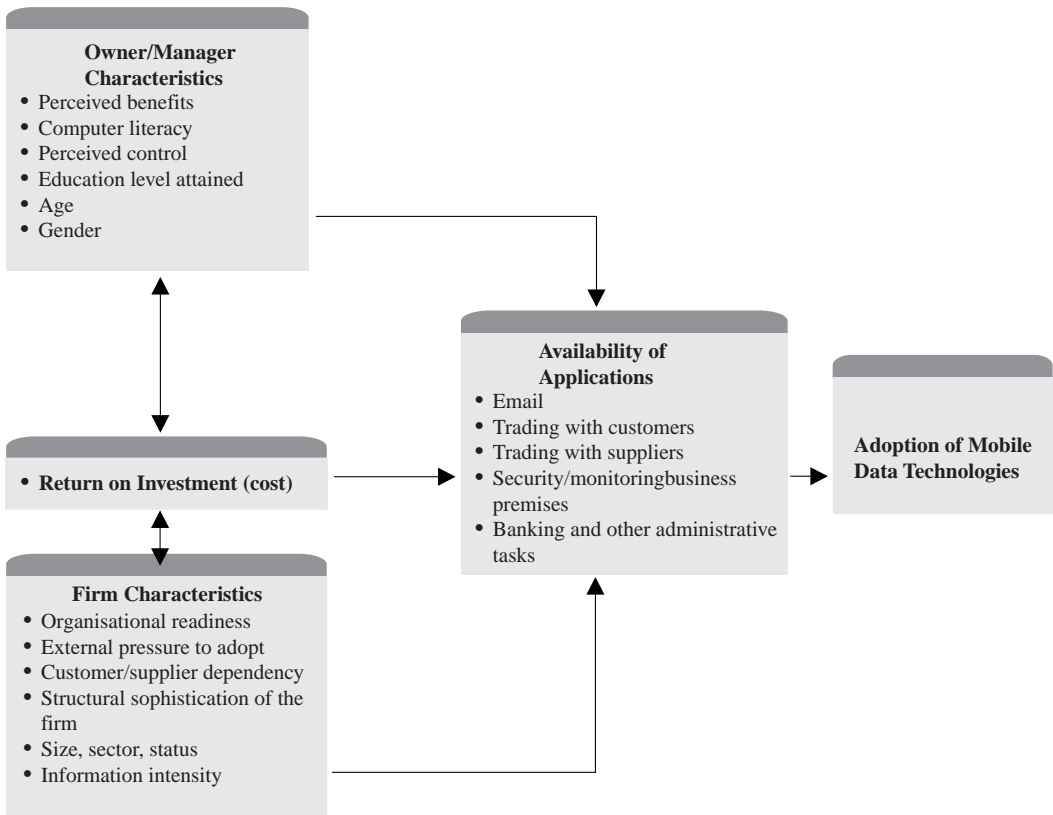


Figure 2: Factors impacting SME Adoption of Mobile Data Technologies

the Internet. It is possible that managers perceive using MDTs as a more convenient way of accessing accounts anywhere, anytime as apposed to more traditional Internet access from a desktop computer. Finally, security is an vital issue for most SMEs; their business premises are their livelihood and any untoward actions (such as staff pilfering, burglaries) have an immediate and dramatic effect on their bottom-line.

Findings from this research project make both theoretical and practical contributions. Theoretically we now know more about the adoption of the newest innovation, MDT, in the context of regional SMEs, amongst those most computer-literate. This work has contributed to the disciplines of information systems, marketing and small business. In practical terms, both marketers and developers of MDT can learn from the findings presented here and strive to continue to be customer-focused.

LIMITATIONS AND FURTHER RESEARCH

Despite attempts to instil the utmost rigour into research designs, all studies will inevitably have limitations, and this one is no different. The two major limitations of this research are concerned with the data collection methods employed and the lack of knowledge by respondents about this very new technology.

The data collection method employed in this study was selected as being the most practical, given the nature of the task. Two focus groups provided valuable insight into the nature of the problem, however, the cost and time involved in conducting face-to-face interviews with 500 small and medium sized enterprises would have been prohibitive, and the poor response rates of mail surveys are well documented. Thus, telephone interviewing was selected for stage two and the needs of the respondents were given great consideration. The interviews were no longer than ten minutes and the questionnaire utilised both open-ended and scaling questions to assist in time management. However, the drawbacks of this type of data collection technique with this population are that owner/managers of SMEs have little time to spend discussing new technologies over the phone, as they are very busy people.

The second limitation of this study relates to the implications associated with conducting research into very new technology. Whilst most people interviewed were aware of current technologies such as the Internet, mobile phones and computers, knowledge of the new mobile data technology was obviously limited. This situation inevitably had an effect on soliciting views about the technology.

Whilst these two limitations are significant, every effort was made to make the data collected both relevant and rigorous.

This project has far-reaching implications in terms of further research and a number of directions are proposed below for other researchers to pursue:

1. Replicate this study in a metropolitan environment.
2. Replicate this study in other regional areas.
3. Replicate this study in other countries.
4. Tracking studies, say, in 6 months, then one year:
5. Industry-specific needs study.

All of these areas of further research will elicit information that will be useful to the development and adoption of MDT in Australia. Each area of further research is a significant project in its own right and different research methodologies should be employed to uncover the truth in each case.

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BIOGRAPHICAL NOTES

Jeanette Van Akkeren is a lecturer in Information Systems specialising in Electronic Commerce, Data Modelling, and Information Systems for Managers (MBA). Jeanette's main research interests include the adoption and diffusion of e-commerce technologies, and strategies for business use of mobile data technologies. Jeanette has published extensively in the area of SME e-commerce adoption and diffusion in both journals and international conferences. In addition, she has worked as a consultant to small and medium sized firms in Queensland, Victoria and NSW in the areas of end-user training and e-commerce strategy development.



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