INFLUENCING FACTORS FOR THE ADOPTION OF m-COMMERCE APPLICATIONS
A Multiple Case Study

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Abstract: In the last few years mobile-commerce (m-commerce) has evolved providing its users set of applications that provide greater communication and flexibility. As these m-commerce applications become popular, organizations are adopting them to provide these services to their customers. This paper explores the influencing factors involved in the adoption of m-commerce applications by organizations. The research question that is addressed in this paper is: *What factors affect an organization's decision to adopt m-commerce?* In order to answer the research question a research model adapted from the framework presented by Wang and Cheung (2004) is proposed. The research model examines the influencing factors under three levels: organizational, environmental and managerial. A multiple case study approach is employed as a research method to validate the research model. Findings from this research enhance research in m-commerce as well as assist businesses to better plan their adoption of m-commerce applications.

1 INTRODUCTION

Mobile-commerce (m-commerce) has evolved and provides its customers a set of applications and services which people can access from their web enabled mobile devices such as mobile phones, personal data assistants (PDA), and laptops (Venkatesh, Ramesh and Massey 2003). The adoption and diffusion of such m-commerce applications provide opportunities for organizations and individuals to communicate and exchange information and also engage in commercial transactions anywhere and anytime, without the constraints of time and location (Scheepers and McKay 2004). Due to the anywhere and anytime features of m-commerce applications organizations are adopting m-commerce to provide services to their customers. For example the health care industry is embracing m-commerce solutions to improve health care quality by safely providing patient-centered, equitable, timely and effective care to its patients (Goldberg and Wickramasinghe 2003; Burley, Scheepers and Owen 2008). Other businesses such as restaurants have also implemented mobile solutions to replace their previous paper-based process of taking orders from

customers, enabling waiters to relay orders directly from the table to the appropriate section (Scheepers and Scheepers 2008). Due to this rapid adoption of m-commerce there is a need to investigate factors behind the adoption of m-commerce in organizations. In the past, researchers have investigated m-commerce adoption from a customer's perspective. However to date, insufficient research has been conducted to identify and evaluate the factors that influence organizations to productively and profitably implement m-commerce applications. This lack of knowledge will prevent decision makers from making critical decisions while implementing m-commerce in organizations.

In order to address this research gap, a research model consisting of influential factors under managerial, organizational and environmental levels (adapted from Wang and Cheung (2004)) is proposed. The case study research methodology is used to evaluate the factors in the research model. Thus the paper attempts to answer the following main research question: *What factors affect an organization's decision to adopt m-commerce?*

The rest of the paper is structured as follows: the following sections presents the technology adoption literature reviewed from the organizational perspective, which is used for the development of
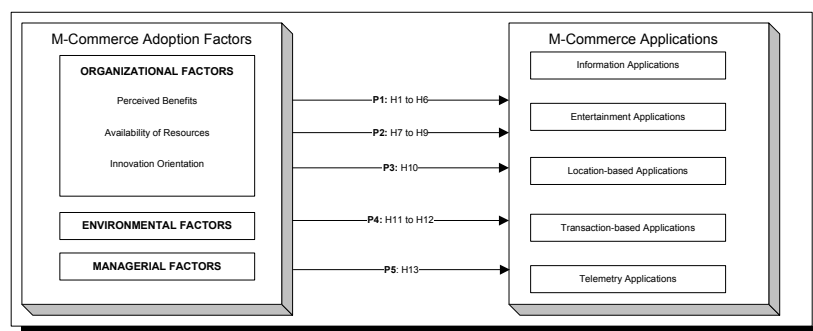
Figure 1: Research Model for Adoption of M-Commerce Applications.

the research model. Next, the research model is presented followed by the research method, selection of cases and strategy of data collection. The paper concludes with the empirical findings of the multiple cases.

2 LITERATURE REVIEW

Diffusion of innovation (DOI) theory proposed by Rogers (1995), has been employed by many scholars to study the innovation diffusion in organizations. It explains innovations as being communicated through certain channels overtime and within a particular social system. Further, Rogers (1995) states that the relative advantage, complexity, compatibility, trialibility and observability are the factors that influence the rate of innovation adoption. Most researchers have adopted DOI as a theoretical foundation for their conceptual model in order to study the innovation characteristics of organizational technology adoption. For example, Prasad, Scornavacca et al. (2005) used Rogers (1995) DOI model as a basic guide for examining the impacts of the adoption of mobile devices in a restaurant setting. While exploring the perceived benefits of using Personal Digital Assistant (PDA's) in a restaurant, in a B2E context they found that increased efficiency, speedier service, better usability and ease of use, enhanced reputation/image and increased accuracy were the most common perceptions. Their findings also indicated that relative advantage, compatibility, complexity and observability were contributing factors for the adoption of the system (Prasad et al. 2005). Further, perceived ease of use and perceived usefulness were found to be prominent factors during early stages of technology adoption.

Rogers (1995) argued that the organizational adoption decision can be influenced by a combination of environmental, organizational and managerial factors. Based on Rogers (1995) argument, Wang and Cheung (2004) presented a multilevel framework and studied seven factors under three levels to investigate e-business adoption by travel agencies. They concluded that external competitive pressure, innovation orientation, financial slack, IT resources, CEO's risk taking propensity and organization size were found to have a profound effect on e-business adoption.

3 RESEARCH MODEL

Based on the above literature, a research model consisting of influential adoption factors under managerial, organizational and environmental levels is proposed. The model is adapted from Wang and Cheung (2004) because 1) it explored the adoption factors from organizational perspective and 2), it was based on Rogers (1995) argument that the organizational adoption decision can be influenced by a combination of environmental, organizational and managerial factors.

Level one presents organizational factors. These factors include perceived benefits, availability of organizational resources and innovation orientation.

Enhanced communication, flexibility, better response time, task effectiveness, decreased operational cost and increased customer service are discussed under perceived benefits. Where as, availability of technological, financial and human resources are discussed under availability of organizational resources. Level two present environmental factors in which institutional pressure and competitive pressure are discussed. Level three present the managerial factor in which top management support is discussed.

Based on the theoretical viewpoint, propositions are developed. Each proposition is associated with its corresponding factor. As illustrated by Shank and

Parr (2003), *"terms in propositions belong to abstract world of theory"*.
"Each of the terms must be assigned an empirical indicator. These empirical indicators are then substituted into the propositions to form a corresponding hypothesis".
Hypotheses are then deduced from these propositions to empirically test the proposed factors. Figure 2 presents the proposed research model which depicts the thirteen proposed hypotheses. Each hypothesis was linked to its particular factor. Detail description of these factors under the three levels is discussed below.

The m-commerce applications shown in the research model are business-to-consumer (B2C) m-commerce applications and are implemented to create an alternative conduit between the organization and its customers. These applications create direct value to the customer which results in customer satisfaction. For instance, mobile advertising is an alternative and powerful marketing channel for the organizations to communicate with their customers (Varshney and Vetter 2002).

These applications benefit businesses in two main areas such as operational efficiency and customer service (Leung and Antypas 2001). These applications are generally categorized into five categories such as information applications, entertainment applications, location-based application, transaction-based applications and telemetry applications (see for example (Senn 2000; Coursaris and Hassanein 2002; Wang, Song, Lei and Sheriff 2005)).

3.1 Organizational Factors

The internal organizational factors are categorized into perceived m-commerce benefits, perceived ease of use and innovation orientation.

The adoption of IT brings significant opportunities for organizations (Sheng, Nah and Siau 2005). These IT opportunities can be classified into tangible and intangible benefits (Sheng et al. 2005) . Organizational profitability and cost savings are tangible benefits which focus on the financial performance of the organization (Sheng et al. 2005) whereas, customer services (Leung and Antypas 2001), efficiency and effectiveness of the work processes (Burley et al. 2008) are known as intangible benefits (Sheng et al. 2005). In this study, the main focus is to examine the importance of intangible benefits such as enhanced communication, flexibility, better response time, better customer service and effectiveness of the work tasks in the

adoption process. Decreased organizational operational cost which is a tangible benefit was also investigated during the study to examine the financial gain of the organization and its importance in the adoption process.

According to Davis (2002) anyplace/ anytime computing can remove the constraints of time and space to access critical information and enhance capabilities for communication and coordination. Increased communication results in improved information quality and relationship (Boadi, Boateng, Hinson and Opoku 2007). The flexibility, ubiquity and convenience of m-commerce services provides timely information to its users/customers anywhere and anytime (Anckar, Carlsson and Walden 2003) resulting in customer satisfaction. In addition, m-commerce increases the effectiveness of the tasks by speedier services/reduced task completion time (Branes 2002; Gebauer and Shaw 2004). Effectiveness is defined as measuring whether the task has achieved the intended objectives (Burley et al. 2008). The effectiveness of the organization's activities is achieved through the benefits provided by m-commerce applications such as connectivity, flexibility, interactivity and location awareness (Sheng et al. 2005).

As a result of better job performance through increased and timely communication and speedier service, organizational operational cost is decreased (Boadi et al. 2007). Based on the above mentioned benefits the following was proposed:
Proposition 1: Perceived m-commerce benefits have a positive relationship with the adoption of m-commerce applications.

Although m-commerce provides novel features like enhanced and flexible communication, however, organizations have to consider factors such as availability of IT technology, human resources, set up and operating costs (Anckar et al. 2003; Feng, Hoegler and Stucky 2006) before its adoption. Availability of technological, human and financial resources will enable organizations to adopt and use the technology.

Technological resources in the context of m-commerce applications refer to wireless network equipment, wireless access devices such as mobile phones, wireless application protocol used by the mobile devices to conduct m-commerce activities and customized applications made by application developers (Leung and Antypas 2001; Coursaris and Hassanein 2002; Zeeshan, Cheung and Scheepers 2007). Moreover, financial resources refer to a "pool of resources in an organization that is in excess of the minimum necessary to produce a

given level of organizational output" (Wang and Cheung 2004). Financial investment must be available in the organization to bear the cost for implementing new technology (Sharma, Citurs and Konsynski 2007). Similarly, human expertise is required to successfully implement any new technology. In addition, it is also important to have IT knowledge available within the organization in order to adopt and use m-commerce (Wang and Cheung 2004; Zeeshan et al. 2007). Based on the above discussion the following proposition was developed.

Proposition 2: Perceived availability of organizational resources have a positive relationship with the adoption of m-commerce applications

The third issue discussed under organizational factors is innovation orientation. As discussed by Wang and Cheung (2004) and Zeeshan et al. (2007) innovation oriented organizations implement new technologies by making resource commitments and create new products for their potential customers. Following proposition was proposed related to innovation orientation.

Proposition 3: Innovation Orientation have a positive relationship with the adoption of m-commerce applications

Hypothesis (H1 to H10) deduced from proposition 1, 2 and 3 are stated in the Appendix A.

3.2 Environmental Factors

Two types of pressures are discussed under environmental factors: institutional pressure and competitive pressure (Wang and Cheung 2004; Zeeshan et al. 2007). Pressures from external organizations such as resource dominant organizations, supply chain partners and government organizations can influence organization's adoption behavior (Wang and Cheung 2004; Sharma et al. 2007). Moreover, pressures from customers readiness and organizational stakeholders groups (e.g., customers and suppliers) are also related to environmental factors (Wang and Cheung 2004; Zeeshan et al. 2007). However, competitive pressures originating from competitors, that create a threat for the organization of falling behind in the competition may influence organizations decision to adopt an innovation (Wu, Mahajan and Balasubramanian 2003; Wang and Cheung 2004; Zeeshan et al. 2007). The following proposition was proposed related to environmental factors.

Proposition 4: Environmental factor have a positive relationship with the adoption of m-commerce applications

Hypothesis (H11 and H12) deduced from proposition 4 are stated in the Appendix A.

3.3 Managerial Factor

Top management support is a critical factor because m-commerce adoption requires technological, human and resource commitment, which cannot be invested without managerial permission (Wu et al. 2003). Top management support is also required to facilitate organizational learning process during the adoption and use of m-commerce. Hence, the following proposition was developed in relation to managerial factors.

Proposition 5: Management support have a positive relationship with the adoption of m-commerce applications

Hypothesis (H13) deduced from proposition 5 are stated in the Appendix A.

4 RESEARCH METHOD

Case study methodology is used to explore new areas of research such as adoption of m-commerce applications (Eisenhardt 1989). The case study approach is also selected for the following reasons. First, it helps in understanding the research phenomena (m-commerce adoption factors) in its natural settings (Benbasat, Goldstein and Mead 1987; Yin 1994; Cavaye 1996). Second, the case study method aligns with the aim of this research which is to empirically validate the framework for he adoption of m-commerce within the organizations.

Furthermore, a multiple case study approach is chosen in this research. Based on the literature available (Harriott and Firestone 1983; Yin 1994; Cavaye 1996; Premkumar, Ramamurthy and Nilakanta 1997), the following arguments are used to justify the selection of multiple-case study as a selected research method for this research study. Firstly, multiple case study method offers better chances to increase construct validity. Secondly, evidence from multiple cases is often considered more compelling; it makes the overall study more robust and reliable.

5 SELECTION OF CASES

As suggested by Paton (1990) the selection of information-rich cases is highly desirable for in-depth study. In order to ensure that the appropriate and information-rich cases are selected, the selection process is guided by the fact that case organizations must have used or are willing to use m-commerce applications as an alternate channel to communicate with their customers. Secondly, the case organizations must have practical exposure to the adoption process and lastly the case organizations should be willing to participate in this research. The multiple cases selected for this research are three organizational units: Library Services, Health Services and Examination Services, of the same university in Australia. The three organizational units had adopted SMS applications for sending notifications. Information about due or over due books and fines is sent to the students in the case of Library Services, exam results are sent to the students in the case of the Examination Services and patients are notified of their upcoming appointments in the case of the Health Service.

6 STRATEGY FOR DATA COLLECTION

The selection of interviewees from the organizational units is also crucial. The interviewees were selected based on the critical role they played during the adoption process of the m-commerce application. The director of the Library Central Services and the IT manager was selected from the Library case, the practice manager was selected from the Health Services and the examination manager was selected from the Examination Services.

Further the data collection process for this research was primarily based on the formal in-depth interviews with the key informants from each case. The data was collected in the period June 2007 to September 2007. To conduct the formal interview, an interview protocol was developed. The interview protocol was based on the initial research question, propositions and hypothesis. After the data collection phase the data was summarized and then structured in a tabulated form in order to test each hypothesis. The results were then analyzed by pattern matching and explanation building (Yin 1994). The patterns or explanations of the factors

were also analyzed. From this analysis conclusions about the adoption factors were drawn.

7 RESEARCH FINDINGS

Summary of the outcome of the hypothesis from the three organizational units is presented in Appendix A. Much of the discussion in this section is based on the data in Appendix A, and also on the transcribed interviews with participants.

It was previously mentioned that the organizational factors are categorized into perceived m-commerce benefits, availability of organizational resources and innovation orientation. In the case of perceived m-commerce benefits as an organizational factor it is concluded that all three organizational units acknowledged intangible benefits, such as enhanced communication, flexibility, better response time, increased organizational task effectiveness and improved customer service after their first trial of SMS application. However, the management in the current cases is unaware or unable to measure some of the tangible benefits (such as reduced operational cost) emanating from the SMS services and affecting their related internal business processes. The empirical results, however, seem to indicate that organizational units experimented with the m-commerce technology without careful evaluation of tangible and intangible benefits. Moreover, the interviewees suggested that they would like to adopt new innovative technology which support the proposition that innovative organization are more likely to adopt m-commerce applications. However, it is suggested that cost/benefit analysis must also be done by the innovative organizations before investing their resources into the m-commerce application (Scheepers and Scheepers 2008) to fully understand the impact the new technology will have.

Availability of financial resources is one of the most important organizational factors in the adoption of m-commerce applications. It is difficult for the organizational units operating within limited budgets to adopt and operate an expensive m-commerce applications. It is therefore important for the organizations to consider the overall benefits against the total cost of the investment overtime and should invest only if the benefits exceed the total cost of m-commerce adoption (Scheepers and Scheepers 2008). Furthermore, from the case studies it is evident that the availability of IT human resources and well maintained technological resources (computers, networks, softwares, databases) played a major part in the university

environment. The availability of these resources provided the organizational units the ability to experiment with m-commerce application without carefully conducting the financial appraisal of the m-commerce investment.

In the case of the Library Services competitive pressure is found to be a stronger environmental force than institutional pressure. In the case of the Examination Services however client readiness was identified as a influencing factor..

M-commerce adoption decisions are effected by the manager's perceptions of the environmental and organizational conditions (Wang and Cheung 2004). It is important for management to realize the benefits of the technology and estimate the cost of the investment prior to its implementation. In the case of the Health and Examination Services top management support played a major role in the adoption of m-commerce applications as they realized the benefits of the application. However, in the case of Health Services the management viewed the SMS application as an expensive innovation and hence did not continue the use after the initial trial period. Therefore it is concluded that the availability of financial resources and management support is the most critical factor in the m-commerce adoption decision.

Hence, the empirical evidence provided in appendix A show that intangible m-commerce benefits (H1 to H5), availability of technological (H7) financial (H8) and human (H9) resources, organizational innovativeness (H10) and top management support (H13) are important influencing factors in the m-commerce adoption. However, further research should be conducted for the evaluation of the following factors: reduced operational cost (H6), competitive and institutional pressure (H11 and H12), as these factors were not unanimously supported by all three cases.

Similar outcomes can be expected in other universities which have similar financial resources and facilities available. Further research is however required in commercial organizations and other industries to validate the findings.

The above findings contribute to building an empirical foundation for understanding the adoption of m-commerce in the organizations. The theoretical research model can be used as a basis for further research and development.

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APPENDIX

Appendix A: Outcome of Hypothesis.

Hypothesis	Library Services						Health Services			Examination		
	Director			Manager			Manager			Manager		
	S	PS	NS	S	PS	NS	S	PS	NS	S	PS	NS
H1: Enhanced communication has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		
H2: Flexibility has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		
H3: Better response has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			n/a	n/a	n/a
H4: Increased task effectiveness has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		
H5: Improved customer service has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		
H6: Decreased operational has a positive relationship with the adoption of m-commerce applications			✓	✓				✓				✓
H7: Availability of technological resources has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		
H8: Availability of financial resources has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		
H9: Availability of human resources has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		
H10: Innovation orientation has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		
H11: Institutional pressure has a positive relationship with the adoption of m-commerce applications			✓			✓		✓		✓		
H12: Competitive pressure has a positive relationship with the adoption of m-commerce applications	✓			✓				✓				✓
H13: Top management has a positive relationship with the adoption of m-commerce applications	✓			✓			✓			✓		

Legend: S= Supported, PS= Partially Supported, NS= Not Supported