

APPLICABILITY OF AN INTEGRATED ADOPTION MODEL

to an Adoption-Resistant M-Business Technology

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Abstract: Business is applying mobile technologies in the attempt to address its problems and to realize its opportunities at such a rate that researchers have difficulty maintaining their contact. Absent general models that can provide some assistance, business has few sources of impartial assistance. This paper aims to better assist organizations seeking to successfully adopt and to implement m-business innovations by testing the applicability of a general purpose e-business adoption model with a worst-case, adoption-resistant example of m-business technology. The Integrated Adoption Model was successfully applied to capture the complexity of the industry innovation and to identify major drivers and inhibitors of m-business success. Implications for practitioners and researchers are discussed.

Key words: Adoption model; M-Business; adoption factors.

1. INTRODUCTION

Consumer demand for mobile phone 3G services remains unclear. Still and video photography are interesting novelties but do not appear to provide a sustainable base for demand. The interface remains difficult to use. Ease of access is limited with the small screen and complex keyboard manipulations required. Meanwhile, the demand for data services is significant if packaged correctly. "Operators are now promoting bundles of easy-to-use services, rather than endlessly going on about complicated technology. Colorful

menus enable users to download games and ring-tones, read news updates, and send and receive photographs and small video clips” [26].

The technology for interactive, session-based data applications that are instantaneous in connection and delivery is contained within most Global System Mobile (GSM) networks and is available to nearly all GSM handsets. Unstructured Supplementary Service data (USSD) was built into the GSM standard as a means of transmitting information or instructions over the signalling channels of a GSM network. The fact that it uses the network's signalling channels makes USSD similar to SMS. But the vital difference between the two is that SMS is a store and forward service whilst USSD is session based. USSD was originally intended to provide set-up or cancelling for services like call forwarding. The capability of USSD to provide data services, however, remains virtually unknown and apparently resistant to adoption. It is the cellular industry's 'best kept secret' [10].

This paper initially provides an overview of adoption theory as applied to e-business and m-business noting the diversity of findings and then reviews an integrated adoption model (IAM) based on 30 implementations of B2C e-business in six countries; the design of the research project is explained; the detail of an m-business innovation utilizing USSD technology is examined; the industry experience is then compared with the IAM; and implications for theory and practice discussed.

2. THEORETICAL OVERVIEW

Electronic Commerce presents the potential opportunity for strikingly different business ventures as well as radically new ways to run existing business. New technologies may be harnessed by organizations to help them to achieve competitive advantage; to transform relationships with customers, suppliers and business partners; to empower global business; and to redesign their organizations. In short, Electronic Commerce may result in fundamental changes to current business practice.

Despite industry enthusiasm for Electronic Commerce, a major impediment to its widespread adoption is seen to be uncertainty within organizations as to how to address the challenges it presents. Uncertainty about how and why organizations and individuals decide to adopt (or not to adopt) Electronic Commerce exists also at a theoretical level [12].

Electronic Commerce provides a rich field for academic research. Studies have included: technology platforms; business challenges; management approaches; emergent organizational forms; and social and macro-economic impacts. This level of variety indicates both diversity and the degree of fragmentation. The danger of misinterpretation of a phenomenon by

researchers undertaking narrow investigations into Electronic Commerce has been highlighted by Peter Keen [12].

Research into IS innovation has been conducted predominantly at individual, departmental and organizational levels. Innovations studied include: personal work stations; spreadsheets; information centers; IT outsourcing; database management systems; automatic teller machines (ATMs); and electronic supermarket scanners. The focus in these studies has been predominantly on innovation by individuals within organizations. Much of the innovation literature is actually concerned with diffusion of the innovation throughout an organization rather than initial adoption into an organization, i.e., innovation at a strategic level. The literature dealing with adoption of technological innovation includes two major areas: intention-based models (which focus on behavioral aspects of innovators) and innovation models (focusing on innovation characteristics and processes).

Extensive research has been conducted on the applicability of intention-based models of innovation, which are grounded in theories of social psychology. These models include the Theory of Reasoned Action [2] and the Theory of Planned Behavior [1]. Of primary interest is the Technology Acceptance Model (TAM) [6]. TAM contends that the sole determinant of use of technology is the intention of the user, based on perceptions of the ease of use of the technology and of its usefulness. This model has been independently tested and commended for its parsimony and applicability. A major disadvantage is that TAM excludes the possibility of influence from institutional, social and personal control factors [13, 28]. Implications of these omissions are considered below. Kwon and Zmud's (1987) proposed Five Forces model of innovation and Scott-Morton's (1991) MIT90's framework both acknowledge the significance of environmental issues [15, 25].

A major influence in innovation literature is the work of E.M. Rogers [23]. Rogers locates adoption factors in individual, organizational and environmental groupings and sees the capability to distinguish between innovations of critical necessity to identify why some innovations are successful and some are not. "The usefulness of research on the attributes of innovations is mainly to predict their future rate of adoption and use" [23]. Rogers (1995) suggests the bulk of research conducted on innovations has been concerned with identification of differences between adopter groups with comparatively little regard for differences in characteristics of innovations. He provides a typology of characteristics for use in evaluation of an innovation: relative advantage; compatibility; complexity, and; trialability. All are considered influential in innovation and adoption.

Rogers' 1995 work identifies attributes of innovations, adoption processes and adoption decision approaches for organizations. Rogers

considers that: "Innovations are not initiated on the spur of the moment, nor by a single dramatic incident, nor by a single entrepreneur" [23]. While Rogers does examine organisational characteristics such as attitude toward the individual leader, internal organisational characteristics and external characteristics of the organisation, he does not address the influence of organisational issues such as adequacy of resources available, nature and culture of the organisation and the qualities of the organisation's leadership, other than attitude to change.

Rogers work has been criticized for producing dimensions 'as universally relevant as possible' but which were so abstract that they may not be easily applied [5]. In a separate study, Rogers' attributes, processes and approaches have been compared with implementations of smart-card based Electronic Commerce and, in general, found not to reflect the levels of complexity and diversity found in practice [7]. Theory of the adoption of Information Systems has been mostly concerned with intra-organizational adoption rather than at the inter-organizational level necessary for Electronic Commerce. Traditionally, organizations have needed to concern themselves only with their own requirements for Information Systems. Increasingly, however, pressures from Electronic Commerce necessitate that these intra-organizational systems are closely integrated between, and capable of operation across, several organizations. The implications of inter-organizational systems on the adoption and diffusion of Information Technology are a substantial increase in complexity at planning, requirements definition, design, development and implementation stages. Pressures to conform to external requirements may result in a period of externally imposed radical change to current practice. Operationally, inter-organizational systems represent a completely new set of challenges for both technical and business staff.

Elliot and Loebbecke (2000) suggest that within a single innovation, individuals with very different roles and objectives are involved and these individuals may be in conflict. This potential for conflict between adoption factors raises the importance of further empirical investigation of multi-organizational adoption.

Environmental issues are those external to the organization and innovation. The necessity for increased attention to contextual and cultural factors has been identified by several authors [4, 17].

Calls have been made for convergence of the major areas of adoption theory: innovation and intention. Moore and Benbasat (1996) developed a tool for the study of initial adoption of innovations by individuals in organizations. This tool integrated the intentions-based models and innovations literature, including the Theory of Reasoned Action and the perceived characteristics of innovations [21].

Adoption theory is mute in an area that appears to be of critical importance to Electronic Commerce: the consumer [12, 14]. The role of consumers in adoption of Business to Consumer Electronic Commerce appears significant from both empirical and theoretical perspectives. The importance of consumers' attitudes to successful adoption of Electronic Commerce has been documented in several studies (e.g., [11]) but has little incorporation into adoption theory.

Reference must be made to the discipline of marketing for consideration of consumer issues relating to adoption of new technological products [29]. Boyd and Mason (1999) propose a two-stage conceptual model of how consumers' evaluation of product category attractiveness affects adoption decision-making [5]. The first stage of their model (intention forming) proposes three key antecedents of consumer adoption: characteristics of the individual (e.g. personal needs), communications (e.g. advertising, publicity and distribution) and attractiveness of the product category (influenced by product, firm and market related attributes) These antecedents are referred to collectively as extrabrand attributes. The second stage captures the brand-choice process. These two stages relate to Rogers (1983) decision and implementation stages of the innovation decision process. A key contribution is the importance of attractiveness as an antecedent of adoption and the implications of attractiveness for firms. 'Managers can improve an innovation's chances of success by influencing the level of the factors they can change and knowing the implications of the factors they cannot change' [5].

Consumers have been found to rely on categories of information when evaluating innovations into: product information (e.g. key benefits, variety, complexity, switching costs, relative advantage, perceived risk); company information (e.g. corporate reputation, firm size, age) and market information (market size, competitive structure, distribution channels and an aggregation of individual firm attributes) [5, 20]. Bell et al (1975) suggest that 'attraction may be a function of the seller's advertising expenditure and effectiveness, the price of his product, the reputation of the company; the service given during and after purchase, the location of retail stores and much more' [3].

The Bell et al (1975), Moore (1995) and Boyd and Mason (1999) studies of consumer attributes also highlight product and innovation attributes e.g. price / cost, key benefits, variety, complexity, switching costs, relative advantage, perceived risk); company information (e.g. corporate reputation, firm size, age) and market information (market size, competitive structure, distribution channels and an aggregation of individual firm attributes). Boyd and Mason (1999) also highlight a frequently overlooked issue of changing consumer perceptions in line with product development.

Much research studying innovations assumes innovations remain unchanged over their life. They suggest a more realistic approach recognizes that the innovations change over time and, as a result, consumer perceptions and evaluations can also be expected to change. Extrabrand attributes were found to be primarily: cost and key benefits.

Satisfaction with product offerings has been found to be a primary driver of overall customer satisfaction. Quality of customer service (financial statements and IT-enabled services) is also important but of varying impact across different customer categories. Functionality had the largest impact on satisfaction with quality of automated service delivery. - 'Customers seem to be receptive to the potential benefits offered by an electronic system, such as speed and convenience, provided it addressed all their trading needs and was easy to use.' [14].

In a challenge to utilitarian models of technology adoption (e.g., TAM) consumers purchasing home Personal Computers (PCs) were found to be most strongly influenced by social outcomes (e.g., increased status from having the latest technology) and hedonism (applications for fun) rather than other anticipated benefits [29].

Further challenges to existing theory have arisen, not so much from consumers but due to dynamically developing technologies. Lyytinen and Yoo (2002) question traditional assumptions underlying IS research and stress the difficulty of using traditional models to predict adoption successes. The increasing influence of disruptive technologies has been found to be dealt with poorly by IT innovation theory. Disruptive technologies are those that transform existing products, services and business practices, thereby destroying existing competencies [24] and breaking down existing rules of competition [18].

An examination of the literature was made in search of a multi-dimensional research framework that might cater for the diversity of research findings through more holistic consideration of the innovation, environment, organization and consumer. Three models which incorporate the significance of environmental issues were identified: Kwon and Zmud's (1987) proposed Five Forces model of innovation, Scott-Morton's (1991) MIT90's framework of forces supporting organizational transformation which is of lesser direct relevance, and Elliot's (2002) Integrative Adoption Model for Business to Consumer Electronic Commerce. Kwon and Zmud's model ignores consumers, being limited to innovation, organizational, and environmental factors [15]. Elliot's model, consisting of the factors shown in Table 1 was drawn from IS, management and marketing disciplines and tested internationally through examination of 30 B2C implementations in six countries [8].

No comprehensive model was found to focus on m-business although research into particular aspects of m-business adoption using specific adoption theories abound. Lawrence et al (2003) find Rogers' Diffusion of Innovation model to be applicable to Bluetooth technology. Based on a survey of 1253 bank customers Suoranta et al (2003) identify drivers of mobile banking (accessibility, independence, immediacy of service and cost savings,) and inhibitors (poor ease of use including slow transmission speed and insufficient guidance, and service malfunction) [27]. Supporting Venkatesh and Brown's (2001) work, Pedersen and Nysveen (2003) examined adoption of a mobile parking service, finding TAM with a modification to incorporate self-expressiveness to be applicable [22].

2.1 Factors in an Integrative Adoption Model for Business to Consumer Electronic Commerce ([8].

2.1.1 Environmental factors:

- Market (uncertainty, competition, concentration, funding, acceptance, channel conflict)
- Inter-organizational imperatives (degree of integration of core business functions required across organizations)
- Infrastructure (legal, regulatory, technical, financial, delivery)
- Cultural and international

2.1.2 Organizational factors:

- Strategic adopter (for organizational level adoption, this includes the characteristics of the founder(s) / CEO / Champion, eg qualifications, relevant prior experience, capability to determine a business vision, willingness to explore the potential of the Internet, capability to review and revise business models and strategies in response to market)
- Strategic motivation (inspiration from Internet pioneer, business threat or perceived opportunity)
- Business model(s) and strategies (realistic business models and effective business strategies)
- Skills (at strategic, tactical and operational levels)
- Individual employee (education, tenure etc),
- Structural (specialization, formalization),
- Task (uncertainty, autonomy, variety etc)
- Roles / functions (inter-organizational)

2.1.3 Innovation factors:

- Compatibility, complexity, relative advantage, trialability, observability, usefulness, ease of use,
- Distinguishing characteristics / features (website characteristics based on the CEC Web Evaluation Framework)
- Perceived costs : benefits (to the firms)

2.1.4 Consumer factors:

The major benefit factors of Internet shopping include:

- Convenience in purchasing “anytime, from anywhere, to anywhere”.
- Cost savings through lower prices.
- Availability of products
- Quality of products
- Increased range of products.
- Responsiveness in product delivery, eg “instantaneous distribution of digital products & services”.
- Increased customisation, eg “capability to treat customers as individuals”.
- Major consumer concern factors leading to unsatisfactory experiences include:
 - Security
 - Uncertainty about delivery
 - Uncertainty about products
 - Purchase procedures / ease of use / usability
 - Poor levels of service
 - Costs

Additional consumer factors include the demographic profiles of customers for particular firms and products, consumers’ abilities to purchase on-line and their opportunity to do so.

3. RESEARCH DESIGN

This paper aims to better assist organizations seeking to successfully adopt and to implement m-business innovations by testing the applicability of a general purpose theoretical e-business adoption model with a current industry example of m-business. The example was selected as a worst case representation – an adoption-resistant m-business technology.

The scope was to establish key factors that promote or inhibit the adoption of implementations of m-business. Factors were examined at the level of: the innovation; each major participant in the transaction process (i.e., providers and consumers); and the market or environment. All components of the transaction cycle were examined, from information provision to payment and exchange. Key research questions are:

1. *Which organisational factors influenced provision of m-business services and how?*
2. *What characteristics of the implementations influenced proposal and acceptance of that innovation?*
3. *What drives consumers to, or inhibits consumers from, performing m-business transactions?*
4. *Which environmental factors influence adoption and how?*
5. *Is a general purpose model of e-business adoption able to adequately represent a current example of m-business practice?*

This paper aims to extend current theoretical and empirical understanding of the drivers of and inhibitors to m-business adoption. This research is exploratory. The research questions are broadly based, addressing separate areas of research: provider, innovation, consumer and environmental factors. Primary and secondary data were collected by one of the authors, a principal involved throughout the project. A major strength of this examination is that the factors influencing implementation success were assessed comprehensively in a single, consistent and integrated study.

4. M-BUSINESS INNOVATION

This section describes details of an innovative application of an existing but overlooked technology. USSD was built into the GSM standard as a means of transmitting information or instructions over the signalling channels of a GSM network. As will be seen, USSD has the technical capacity to provide superior performance to popular SMS-based services or over-promoted WAP-based services but remains little used.

Originally, USSD allowed only for one-way communication between a handset and the network but USSD phase 2 supports interactivity; two-way communication between the user and the network for many services or forms of content. While it is not possible to bill for USSD services directly, text sent via USSD to a customer could result in them making a billable call and a USSD request made by a customer could trigger an SMS to be sent to them, for which a charge could also be levied.

USSD can enable services that look remarkably similar to WAP and can utilise SMS, but have benefits over both technologies. It is ideal for menu based services, although for single-use USSD services it can be quick and easy to use since the 'string' (e.g., #222#) can be entered from the phone's home screen. Nokia claims that USSD can be up to seven times faster than SMS in carrying out a two way transaction given the instantaneous nature of its session-based environment. It is also a lot quicker than WAP [10]. In short, it is a technology that appears resistant to adoption and implementation.

Interacct Solutions is an Application Service Provider specializing in mobile telephony. The firm had previously operated successfully in South Africa and had developed technical expertise and capability in development and operation of USSD-based services. Interacct's co-founder opened a business development office in Australia in 2001.

Firms were approached to identify potential interest in USSD. The national telco, Telstra, decided to support a trial application, provided it had a specified commencement and completion date as it did not want to make an open ended commitment. The forthcoming Rugby World Cup (RWC) in 2003 was agreed to be an ideal test application since it was likely to raise interest, had preset start and end dates and presented no anticipated technical challenges. The service would provide RWC SMS alerts, live score updates, results & fixtures, TV schedules, polls, RWC news and team news. The application was assigned the USSD code 176.

4.1 Organisations in the RWC value chain

The RWC application required multiple organizations for its implementation. Telstra provided telecommunications services. SEMA operated a USSD Gateway (SS7 protocol) to provide capability. Interacct Solutions developed the application and operated application servers that provided functionality. Interacct used Http / XML over TCP/IP links to TWI. Authentication was by IP address under the contract between Telstra and TWI. TWI was the content provider contracted to Telstra to provide feeds of RWC scores, news etc. [9]. TWI, the television arm of IMG, is the largest independent producer, packager and distributor of sports programming in the world. TWI also represents the television rights and distributes programming for some of the world's most prominent sports and cultural organizations.

4.2 Customer operation instructions

As discussed in section 2, functionality and ease of use have been shown to be critical elements in consumer acceptance of an innovation. Instructions for the RWC service's customer operation provide some insight into its usability. Customers key #176# [send] on their mobile handset and receive a menu screen of Telstra's once off welcome, how to instructions and some Terms & Conditions. To reply to any screen they:

1. *press the "answer" button*
2. *key in the number of their selection (1 in the case of the first screen)*
3. *press "send".*

Customer instructions weren't explicit but if they didn't manage to reply within a limited period (between 15 and 40 seconds) the system would cancel the session and they would have to try again. Once they had accepted these once off first time screens they would only see the main menu on future calls.

4.3 Innovation processes

Interacct initiated discussions with Telstra approximately four months before the RWC. Agreement was reached within a month. Telstra setup two teams to implement the pilot application; technical and business. The technical issues were straightforward: identify and manage changes required to the Ericsson network system that would support a USSD call (this service was not previously used by Telstra for application services); contract with SEMA to provide USSD gateway services, develop and implement USSD application and interface with TWI and SEMA. The systems developments and modifications were completed three weeks prior to the RWC start.

A pre-tournament portal was launched to help develop interest and to test the system operation. There was no charge for the information presented by the system. On the start day, the test server at Interacct was switched to the live system. Interacct resourced for 24/7 service delivery with round-the-clock backup and technical support. The server and system provided to be very stable. By the end of the RWC, support had been reduced to a weekly check of the server.

If the technical issues were simple, the business issues were challenging. Some business intentions conflicted with technical requirements. Since the technology was previously unused by Telstra the capability to bill customers had to be established. SMS charges are based on message delivery but since USSD is session based there are no messages to be monitored. The business decision was to charge for information provided in response to a request and

then to close the session so if customers wanted additional information then they needed to initiate a new request.

The definition of requirements was more business than technical. Fortunately, Telstra had a specification for mobile applications (Application Requirements Document about 100 pages) that provided clear specifications for screen size and format, message format etc. Otherwise, the development would have taken much longer while all these matters were negotiated.

One major challenge related to the contract. Since this was a totally new service, the legal department required customers to specifically accept the terms and conditions of the revised contract before they could use the system. Reducing the contract terms and conditions to fit into two mobile phone screens with a maximum of 182 characters (accessed by scrolling) represented a significant challenge. Mobile phones with the traditional small screens can display a maximum of 17 characters on each of six lines (102 characters) without scrolling. The legal department initially insisted that the first screen displayed the terms and conditions. Subsequently, they were placed in a sub-menu for customers to review after they had accepted them by proceeding from the first screen. The terms and conditions screens were full of text and this broke all the rules for effective design of user interfaces on mobile phones.

The business case came down to the types of messages, format, response, how to terminate the session what to bill for and what was free. Menu screens and static information were free. Any data obtained from TWI was charged for. The business issues took about six weeks to resolve. The Marketing department wanted to encourage customers to browse on the system since every request for information would result in an additional charge. Engineering had a different view.

Engineering requirements were a major inhibitor. USSD messages utilize spare capacity in a GSM network's signaling channel. This channel is used to manage SMS services. The Engineering department was concerned that a high level of utilization of this capacity might impact on SMS services and so they specified rigid technical requirements. These included a maximum response time for any screen (including the first terms and conditions screen) of 15 seconds, although this was later extended to 20 then 40 seconds. A maximum duration of 70 seconds for the session was permitted after which the session was cancelled. Engineering's concern about possible network congestion since the system was not configured to cope with USSD traffic should have been catered for as #176# use developed. The network software was designed to dynamically re-configure itself based on load.

One week after RWC was completed the service was discontinued. A Post Project Review was conducted by Telstra and Interacct to consider their experiences. Perhaps as a result of the restrictive technical and operational

specifications, the RWC trial did not attract the anticipated volume of customers. USSD's potential as a source of innovative services with a secure revenue stream was, however, assured provided the engineering concerns could be addressed.

5. DISCUSSION

This paper aims to better assist organizations seeking to successfully adopt and to implement m-business innovations. While adoption factors and processes are a rich source of research in the m-business space, much of the work focuses narrowly on the characteristics of a particular m-business technology with little effort to generate a broader framework applicable to a range of mobile technologies and applications. Such a narrow focus raises the possibility that the nature of m-business precludes application of a general e-business adoption framework.

This possibility was explored through comparison of a general purpose Integrated Adoption Model to an arguably worst-case application - an adoption-resistant m-business technology. USSB technology is cited as having superior performance to SMS and WAP services but has been consistently overlooked by mobile telecommunications service providers.

As can be seen in Table 2, the Integrated Adoption Model was successfully applied to capture the complexity of the m-business innovation, identifying major drivers and inhibitors of success.

5.1 Factors in adoption of an M-Business Innovation (adapted from [8])

5.1.1 Environmental factors:

- Market (strong support from RWC fans seeking details on matches)
- Inter-organizational imperatives (highest degree of integration of core business functions required across organizations since the service operated in real time in sessions lasting 15-40 seconds)
- Infrastructure (legal, regulatory, technical, financial, delivery – all applicable)
- Cultural and international (reliance on strong sporting culture in Australia and international visitors attending RWC)

5.1.2 Organizational Factors

- Strategic adopter (not apparent)
- Strategic motivation (perceived opportunity for all parties)
- Business model(s) and strategies (realistic business models and effective business strategies)
- Skills (at strategic, tactical and operational levels to enable service delivery)
- Individual employee (not apparent),
- Structural (both specialization of skills and formalization of Application Requirements Specification),
- Task (uncertainty of technical impact, autonomy of business partners)
- Roles / functions (inter-organizational specialisations).

5.1.3 Innovation factors

- Compatibility with existing network and consumer handsets, complexity of functions reduced to simple activities, relative advantage over fixed location services or radio broadcasts due to results being continually available, trial completed, observability apparent, usefulness to customers, ease of use problematic,
- Distinguishing characteristics / features (specific features available including SMS alerts, live score updates, results & fixtures, TV schedules, polls, RWC news and team news)
- Perceived costs: benefits (contractually implemented).

5.1.4 Consumer Factors

The major benefit factors of RWC #176# included:

- Convenience in accessing RWC information “anytime, from anywhere, to anywhere”. (key benefit)
- Cost savings through lower prices (not applicable)
- Availability of information (key benefit)
- Quality of service (limited capacity)
- Increased range of products (not applicable)
- Responsiveness in service delivery, e.g. “instantaneous distribution of digital services” (key benefit)
- Increased customisation, eg “capability to treat customers as individuals” (not applicable)

Major consumer concern factors leading to unsatisfactory experiences include:

- Security (not expressed)

- Uncertainty about delivery (not expressed)
- Uncertainty about products (not expressed)
- Purchase procedures / ease of use / usability (major disadvantage)
- Poor levels of service (major disadvantage)
- Costs (not expressed)

Additional consumer factors include the demographic profiles of customers (rugby fans), consumers' abilities to obtain mobile services and their opportunity to do so (both applicable).

Key research questions raised in this project were:

1. *Which organizational factors influenced provision of m-business services and how? Table 2 shows six of the eight Organizational factors were found to be applicable.*
2. *What characteristics of the implementations influenced proposal and acceptance of that innovation? All three Innovation factors were found to be applicable.*
3. *What drives consumers to, or inhibits consumers from, performing m-business transactions? Nine of sixteen Customer factors were found to be applicable.*
4. *Which environmental factors influence adoption and how? All four of the Environmental factors were found to be applicable.*
5. *Is a general purpose model of e-business adoption able to adequately represent a current example of m-business practice? The finding on research question 5 is resoundingly affirmative.*

A study of this m-business adoption narrowly focused on the specific technology or the organizational characteristics of the telco (or even on all organizations in the value chain) or the environmental circumstances or on the customers in isolation would have been unable to capture the range of issues integral to this m-business innovation and, therefore, would be unable to adequately explain its resistance to adoption. The implications of this paper for both theory and practice are clearly that even disruptive technologies may be better explained through application of multi-factor, comprehensive research models and that these will provide better guidance for organizations than a tightly focused examination of a specific technology.

This implication is open to challenge since it represents the findings of a single case. Yin (1994) suggests a single case design may be appropriate where it represents a critical test of current theory; where the case is extreme or unique; or where the case can provide revelatory insights [30]. The RWC case does not claim any of these states, just that it might adequately serve as an indication to m-business researchers that multi-application and multi-technology models of adoption may be applicable to m-business applications. Theory and practice alike benefit more from development of

broadly-based models of adoption that reflect comprehensive representations of business activities than narrowly focused technology-specific models. Otherwise, theory may have little to offer organizations seeking to successfully adopt and to implement m-business innovations

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