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M-BUSINESS ORGANIZATIONAL BENEFITS AND VALUE: A QUALITATIVE STUDY

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Mobile technology innovations have allowed organizations to expand the way they conduct business. Organizations are increasingly leveraging the unique value propositions of mobile business (m-business) in terms of convenience, ubiquity, unison, and personalization to improve business performance and support their value chain activities. Building on a process-oriented model of IT business value, we propose that m-business value is derived from its perceived impacts on the value chain activities. This article addresses the following research questions: (i) How does m-business create value for organizations? and (ii) Which are the organizational impacts of m-business?

Through qualitative research involving in-depth interviews with experts, this article defines m-business value by clarifying the impacts of m-business usage at the organizational level. While the interview results show that m-business does have impact on marketing and sales and internal operations, its impact on procurement requires further research. The findings extend existing literature by proposing a definition of m-business value, based on a more in-depth understanding of m-business impacts on firm performance, highlighting new m-business value components, and developing a conceptual model of m-business value assessment in which task requirements and business characteristics may play a moderating role. The implications of these findings on future research are discussed.

Keywords: ***business process; business value; IT value; m-business value; mobile business***

1. INTRODUCTION

Technological advancements in mobile communications and devices are enabling new business opportunities and supporting organizational performance improvements. Mobile telephony has become the most direct, personal, and individual way to communicate with people, providing value-added services, such as video conference, Internet access, mobile games, and access to a wide range of additional applications for business and personal use. Although there are some restrictions, such as price, availability, standards, and

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security, mobile technologies have enabled the concepts of "mobile business" and "mobile commerce" to emerge.

M-business advantages, however, may only contribute to creating business value if they result in some business process improvement (Schierholz, Kolbe, and Brenner 2007). If organizations are able to leverage mobile technologies for process improvements, they will likely benefit from improved productivity, lowered operational costs, increased customer satisfaction, and improved decision making (Varshney and Vetter 2002). Despite the potential of m-business, there remains a need to justify its usefulness and value for various stakeholders. Indeed, IT and business managers have expressed doubt whether mobile technology business value is as substantial as its suppliers claim (Westelius and Valiente 2006). The article's approach to value, which is aligned with Berente et al. (2011), focuses on the impact m-business technology may deliver to the organization, rather than on the cash-inflows and cash-outflows it causes. Such an approach allows the study to focus on how m-business provides value to firms, beyond financial data.

Global leaders in mobile technology and m-business are not necessarily the richest economies or the leaders of fixed line communications or Internet adoption (Dholakia et al. 2004). Portugal, for example, has less than one third of the per capita income of countries such as Japan, Switzerland, and the United States, and lower penetration of fixed line telephony and Internet usage. However, Portugal is far ahead of many developed countries in terms of mobile penetration (Dholakia et al. 2004). This fact suggests that Portugal is an interesting country for this study, leveraging on the Portuguese high mobile penetration rates. Mobile technologies had a 148.9% penetration rate in March 2010 in Portugal (the third European Union [EU] country with highest mobile penetration rate) while the EU average was 122.9%, according to the Portuguese National Communications Authority (Anacom 2010). In fact, the mobile broadband penetration in Portugal has been growing exponentially; it was 10.8% in 2009 while the EU average was 4.2% (Communications Committee 2010).

Even though m-business has been studied at the conceptual level, as well as at the individual level, we could not find a clear definition of m-business organizational value creation. There is, therefore, a need to explore m-business value and identify which impacts m-business usage may have in the organization value-chain activities from the organizational perspective. A better understanding of m-business value and its components will support managers in their decisions about m-business initiatives, and provide a theoretical foundation for researchers interested in future m-business studies. Consequently, the following research questions guide the present research: (i) How does m-business create value for organizations? and (ii) Which are the organizational impacts of m-business? We explore these questions by proposing a process model of m-business value derived from the literature and from data collected through in-depth semistructured interviews. The interviews' results provided strong evidence for the relevance of the contribution m-business is providing for (i) marketing and sales and (ii) internal operations improvement, while m-business contribution for the improvement of (iii) procurement remains unclear.

This article is organized as follows: First, we present a background of prior relevant research. The qualitative methodology is then described, followed by presentation of analyses and results. The final sections include a discussion of findings and their implications, as well as conclusions.

2. LITERATURE REVIEW

2.1. IT Business Value

There are many studies analyzing IT contribution to firm performance and whether IT is capable of creating value (Mooney, Gurbaxani, and Kraemer 2001). Some focus on financial data (Hitt and Brynjolfsson 1996; Mukhopadhyay, Kekre, and Kalathur 1995), while others focus on the managers' perceptions of IT impacts on value chain activities (Mahamood and Soon 1991; Tallon, Kraemer, and Gurbaxani 2000; Zhu et al. 2004). In the present study, we are interested in defining m-business value at the business process level in order to identify processes that are impacted by m-business usage and, as a result, create value for the firm. This approach requires the identification of key business processes and of the linkages and contributions of IT to those processes. A key factor for achieving IT business value is IT's relationship with process innovations (Mooney et al. 2001). At the process level, the validity of the business value assessment is enhanced because the analysis is performed at the same level as the technology is being used, identifying the value adding mechanisms of IT, and offering "considerable insight into the processes by which value is created" (Mooney et al. 2001:, p. 3).

There are several frameworks of IT business value that focus on business processes. The Mahamood and Soon (1991) model suggests that IT helps organizations to improve their value chain activities according to the following dimensions: (i) marketing and sales (e.g., developing products more suited for market demand or enhancing customer services); (ii) internal operations (e.g., improving internal process efficiency); and (iii) procurement (e.g., improving interorganizational efficiency, inventory management, or coordination with business partners).

Meanwhile Tallon and colleagues (2000) offered a model of IT business value that focuses on how IT affects critical business activities. It focuses on process-oriented measures of IT business value. In this model, "IT creates value for the organization by improving individual business processes, or inter-process linkages, or both" (Tallon et al. 2000:, p. 149). Therefore, a higher impact of IT on each business process and on interprocess linkages implies a higher contribution of IT to firm performance.

A few e-business value-creation studies apply the process-focused approach (Chang and Shaw 2009; Zhu and Kraemer 2005; Zhu et al. 2004). For example, Zhu and colleagues (2004) and Zhu and Kraemer (2005) suggested that with richer information about downstream markets, e-business could enhance a firm's responsiveness to market changes, support firms in their sales channel expansions, and improve their customer relationships. Within the organization, e-business can improve productivity and efficiency of internal operations. Upstream, the Internet can facilitate the firm's coordination with business partners and reduce transaction costs. Chang and Shaw (2009) focused on e-business process sharing in supply chains, and assessed five business values that result from process sharing: the direct and indirect technological value, the direct and indirect process value, and the relationship value. Those business values influence firm performance, with the degree of collaboration playing a moderating role.

We contend that the process of m-business value creation is different from the process of previous innovations, such as e-business innovations, as m-business has distinct characteristics (the next section further elaborates on these unique characteristics), and thus deserves further theoretical development to explain how m-business may create value for firms. In this research, we follow a process-focused approach to define and analyze m-business value. Given the nature of m-business and the fact that it may be used

throughout an organizational value chain, it is expected that m-business has impacts in all categories of the firms' value chain processes.

2.2. Mobile Business

Although m-business has gained much attention in the past decade, being a key priority for some organizations, its actual development and application has not yet fully met market expectations, namely regarding the achievement of mass adoption. It is not yet clear how mobility can influence businesses, nor is there a unified view regarding the benefits of mobile technology usage from an organizational perspective. In fact, most research on mobile commerce and mobile business focuses on individual issues (Harris, Rettie, and Kwan 2005; Mort and Drennan 2005; Okazaki 2005; Pedersen 2005; Wen-Jang 2007; Wong and Hsu 2006)—describing the relevant factors to be considered when analyzing m-business adoption by individuals. There has also been extensive work focusing on identifying conceptual frameworks to guide m-business research (Balasubramanian, Peterson, and Jarvenpaa 2002; Frolick and Chen 2004; Okazaki 2005). Finally, although there are only a few, some studies do analyze m-business from an organizational perspective. Appearing in Table 1, these studies are used to identify important factors needed to effectively conduct m-business initiatives.

Internet-enabled mobile technologies have rapidly achieved worldwide diffusion due to personalized products and services and to the availability of sophisticated devices and communications technologies. However, there is presently no integrative model to assess m-business value. In this research, a broad definition of m-business is used that includes the commercial transactions and related interactive business processes that may occur before and after actual commercial transactions, using handheld mobile devices and wireless communications networks to conduct those transactions (based on the definition suggested by Tarasewich, Nickerson, and Warkentin 2002). M-business applications have shown potentially significant impacts on firms, such as improving operational efficiency and flexibility, and offering the ability to handle situations rapidly. This allows users to have access to critical information anywhere, anytime, resulting in greater ability to seize business opportunities.

Many existing e-business applications can be applied in a mobile environment. However, m-business also involves new applications and functionalities that leverage the unique features of the mobile infrastructure. Table 2 provides a comparison between e-business and m-business. According to Sharma and Gutiérrez (2010), m-business value chains are much more complex than the e-business-related value chains. For the following reasons, they caution against directly copying traditional e-commerce business models into m-business models: the mobile market is carrier-dominated, mobile devices are more personal, the information availability in m-business should be very specific by taking into account the user context, and m-business is usually more focused on productivity than transaction costs reduction.

2.3. Mobile Business Value

It is known that mobile technologies affect professional and personal activities, as they enhance flexibility on the spatial dimension alone (e.g., watching the news on the move), on the time dimension alone (e.g., checking the movie available at the cinema), and spatial and time dimensions simultaneously (e.g., checking the status of a delivery truck)

Table 1 Examples of existing m-business studies.

Reference	Issues addressed	Theoretical foundations	Methodology	Main finding
Conceptual papers				
(Balasubramanian et al. 2002)	M-commerce conceptualization and impact on changing the basic nature of space and time in the context of consumer behavior; Classification of m-commerce applications; Retail pricing strategy changes in the context of m-commerce.	None	Conceptual work	It compares the space-time matrix with and without mobile technologies. It also develops a taxonomy of m-commerce applications.
(Barnes 2002)	How wireless network computing will create value in the business sector. It also aims to examine the potential impact of wireless applications for organizational use.	Porter's value chain	Theoretical paper	This study assesses 8 organizational benefits of unwired business: Efficiency (generic benefits from IT app.); Business transformation (generic benefits from IT app.); Effectiveness (generic benefits from IT app.); Interactivity; Location awareness; Ubiquity; Flexibility; Connectivity.
(Scornavacca and Barnes 2008)	Explores the strategic value of enterprise mobility in New Zealand.	Porter's supply chain and mobile enterprise model	Four firm studies	"It defines 3 major phases in the use of mobile distributed work. (i) Mobile employee linkage: mobility focuses on establishing the appropriate wireless infrastructure to 'link-in' employees, enabling access to organizational data and improving efficiency to existent work. (ii) Mobile employee empowerment: mobile employees are able to significantly improve the effectiveness of work and also of products and services provided. (iii) Mobile enterprise creation: the organization can leverage from truly mobile workers and services." (p. 232)

(Continued)

Table 1 (Continued).

Reference	Issues addressed	Theoretical foundations	Methodology	Main finding
(Wu and Hisa 2008)	What are the differences between I-commerce, m-commerce, and u-commerce? Analyzes the impact of e-commerce innovations on incumbent e-businesses and identifies the specific capabilities necessary to cope with these changes.	Abernathy's and Clark's e-commerce innovation model	Conceptual work	The impact of the innovation from I- to m-commerce is radical and from m- to u-commerce is disruptive in terms of the technology and business model. Dynamic capabilities for m-commerce and u-commerce are also identified.
Individual level studies				
(Gebauer and Shaw 2004)	What are the impacts of mobile technology characteristics on application usage? What are the impacts of task characteristics on application usage? What are the impacts of application usage on business processes?	Task technology fit (TTF)	Firm study	"The study found that users valued notification (especially in conditions of high mobility); support to simple activities; access to ad-hoc information; and reachability. Mobility could predict the usage of mobile application, especially in combination with the frequency in which tasks occurred." (p. 37)
(Nah et al. 2005)	Understand the value of m-business applications.	Keeneys' value-focused thinking approach	Firm study in a major utility company	Value was defined in this study as the "principals for evaluating the consequences of action, inaction, or decision" (p. 85). Their results suggest the following overall objectives of mobile business: (i) maximize customer satisfaction, (ii) maximize effectiveness, (iii) maximize efficiency, (iv) minimize cost, (v) maximize employee acceptance, and (vi) maximize security.

(Sheng et al. 2005)	To examine the strategic implications of mobile technology in a leading publishing company that has realized the importance of mobile technology and equipped its sales personnel with wireless tablet PCs.	Value-focused thinking approach	Firm study in a publishing company and interviews	A means-ends objective network for mobile technology with the fundamental and means objectives was developed. It also suggests that there are 3 main strategic implications of mobile technology: (1) improve working process, (2) increase internal communications of knowledge sharing, and (3) enhance sales and marketing effectiveness.
(Westelius and Valiente 2006)	Aims at describing and analyzing uncertainty of mobile business and the interactions between the new and old technologies. In particular, it studies the usage of mobile terminals that can give mobility to employees' access to central IS.	None	Firm study	Managers have to decide about a new technology investment in which change management involving open-ended technologies is an ongoing and uncertain process. They suggest that it is important to resolve the enabling uncertainty and the scope of what could be done with the mobile technologies.
(Brodt and Verburg 2007)	To identify enablers and barriers for successful implementation of mobile work, which process is carried out independently from a fixed location and supported by ICT.	None	Multiple firm study with five organizations	The study proposes a list of enablers and barriers for mobile work. Enablers: adequate skills, sufficient commitment and systematic preparation, transparency in the communication of the costs and benefits associated with the mobile environment for users and stakeholders, strong management support. Barriers: changes with work processes and work styles, organization fragmentation stemming from reduction of face-to-face interactions, increase of administrative activities, potential limitations of decision-making and lack of employee autonomy.

(Continued)

Table 1 (Continued).

Reference	Issues addressed	Theoretical foundations	Methodology	Main finding
(Tsai and Gururajan 2007)	"Why does business transform into m-business? What are the possible challenges during the process of m-transformation?" (p. 20)	None	Multiple-firm study	The study identified 21 motivational factors and 22 challenges for m-business transformation.
(Vuolle et al. 2008)	Development of a questionnaire to evaluate the experience (in terms of usability and productivity) of mobile business services.	Technology acceptance model/TTF	Questionnaire development methods	MoBiS-Q: A questionnaire for measuring the mobile business service experience was developed, and it includes three dimensions: (i) perceived usability of a mobile business service; (ii) fit for mobile working context, and (iii) perceived impact on mobile work productivity.
(Gebauer and Ginsburg 2009)	Explore the operationalization of particular combinations of tasks and technologies based on the theory of task-technology fit in order to achieve a number of issues that are less abstract from earlier research studies.	TTF	Content analysis of online user reviews	The authors find five factors that are important to the reviewers, each of them combining different aspects of technology performance, task-related fit, and band use context-related fit. The TTF theory for mobile systems can be assessed only within a narrow domain of technology.
(Sheng et al. 2010)	To understand the benefits and limitations of the usage of mobile technologies in education settings in order to discover issues that are important for the adoption and diffusion of mobile applications. It aims at "inductively identifying the users value system in the context of mobile education." (p. 30)	Value-focused thinking approach	Interviews (33)	The paper evaluates decision making from the user perspective. It follows the steps: (1) Develop initial list of objectives and convert them into a common form; (2) Structure objectives—fundamental objectives versus means objectives; (3) Build means-ends objective network.

(Yuan et al. 2010)	"How can the nature of mobile tasks be modeled? What are the typical mobile work support functions? What is the best fit between mobile tasks and mobile work support functions?" (p. 126)	TTF and attitude/behavior theory	Survey	Identification of the ideal fit between 3 dimensions of task characteristics and 4 typical mobile work support functions. They developed a more general model for TTF for mobile workers. Provides a comprehensive task model for mobile work, including specific dimensions of mobility, location dependency, and time criticality.
Organizational level studies				
(Heijden and Valiente 2002)	Explore the linkages between the usage of mobile technology and the actual improvement in business performance.	None	Multiple firm studies	The following propositions are drawn from the firm studies: "A business process can benefit from mobile technology if coordination is required between business process actors who are (temporary) difficult to locate." "The benefits of mobile technology are related to the opportunity costs of not being able to coordinate during the time when actors are difficult to locate." "The benefits of mobile technology are related to the attractiveness of substitutes to solve the coordination difficulty."
(Kadyte 2004)	To guide decision-makers on analytical decisions related to mobile technology investments in the business context.	None	Firm study	Show how to identify the related potential benefits of a mobile system in the firm study.
(Barnes and Scornavacca 2006)	"To analyze the current best practices in the application of wireless data communication in New Zealand; To analyze the business models being applied through the use of wireless data platforms; To assess the range of technology platforms adopted; To evaluate the strategic impact and benefits of wireless data communications; To assess the barriers to organizational adoption of wireless data solutions." (p. 46)	Mobile work model	Mixed method: qualitative (firm study) + quantitative (survey)	At the strategic level, the results indicate that the focus is more on employee integration and individual performance improvement than in product, service, or organizational improvement. They also found that impacts go beyond providing more output for the same input toward effectiveness; providing better information where needed helps employees in making better decisions. However, there is little support that applications are providing transformation of business processes, and findings do not suggest that the applications had an impact on the value proposition.

(Continued)

Table 1 (Continued).

Reference	Issues addressed	Theoretical foundations	Methodology	Main finding
(Gruhn et al. 2007)	Modeling mobile business process: How to choose a suitable solution for achieving savings from reduced process cost?	None	Firm study	A method for modeling mobile business processes is proposed as a solution for achieving savings from process costs reduction. The study also suggests how to obtain predictions for costs and benefits for a mobile IT solution.
(Liang et al. 2007)	Studies the adoption of mobile technologies in business and its determinants, and examines the success or failure of the usage of mobile applications in business.	Fit-viability model (FVM)	Multi-firm study	It develops a set of instruments to assess the fit and viability in adopting mobile technology and the findings sustain that the FVM provides useful guidelines for organizations' decisions on whether or not they should adopt a mobile technology.
(Balocco et al. 2009)	To analyze the diffusion of B2E mobile internet applications in small and medium Italian enterprises, underlying the main adoption barriers, and "to describe the impact on corporate environment and decision-making process leading to the introduction of such applications." (p. 245)	None	Survey and multiple firm study with 28 Italian companies	Connectivity-based and application-based solutions lead to different processes of adoption. The main reasons for not adopting B2E mobile internet are little knowledge about this technology and low perception of the value for the company generated by the use of these applications.

Table 2 E-business and m-business comparison.

Differentiation	E-business[1]	M-business
Unique characteristics of the underlying technologies	• Open standard • Public network • Global connectivity	• Portability • User identification • Localization • Instant connectivity
Unique value	• Transaction efficiencies • Market expansion • Information sharing and integration	• Ubiquity • Personalization • Unison • Convenience

[1]Zhu and Kraemer 2005.

(Balasubramanian et al. 2002). An activity is spatially and temporally flexible when it can occur anywhere and anytime. Therefore, from the marketing perspective, for example, m-business must consider the importance of timely and relevant information, the enhancements provided by the mobile Internet, and the capacity of knowing the consumer location reaching consumers where they are located and when they wish to do business (Mort and Drennan 2002). As the effects of m-business can be analyzed in time and space, a good way to differentiate current mobile applications is to examine their location ubiquity and time criticality (Balasubramanian et al. 2002). The time dimension indicates the value of timely service (time criticality or urgency) of an application and the space dimension reflects the value of location flexibility of the service.

These unique characteristics of the mobile technologies, when compared to fixed electronic channels, therefore, include the concepts of time and location flexibility. Together, they are defined as mobility, which is enabled by the mobile technology characteristics (Table 2) of (i) portability (being able to readily carry them—creates major difference with traditional e-business); (ii) user or product (entity) identification (through SIM cards or Radio Frequency Identification [RFID]); (iii) localization (being able to identify the geographic position of the mobile user); and (iv) instant connectivity (ability to be reachable and have access at any time and in any place). However, there is a trade-off between portability and usability (Gebauer and Shaw 2004), as the portability of mobile devices implies some disadvantages when compared to fixed line e-business: the screens are smaller, there is limited computational power and memory capacity, shorter battery life, and higher risks related to data storage (Nah, Siau, and Sheng 2005). These shortcomings, coupled with the unique advantages of mobile technologies, make m-business more suited for tasks that require timely information (Liang, Huang, and Yeh 2007), when the user has to do his or her job on the move (Gebauer and Shaw 2004; Liang et al. 2007), when there is an emergency situation (Gebauer and Shaw 2004), or when tasks are simple and do not have high information requirements (Wu and Hisa 2008).

2.4. Mobile Business Features

In the existing literature, mobile technologies' unique features are often undifferentiated from unique value propositions of m-business. However, they are distinct and, therefore, should be clearly defined in order to understand the unique value creation of mobility. Unique mobile technology features, as previously presented, include (i) ubiquity, allowing easier real time access to information; (ii) convenience, through devices that store data and provide easy and quick connection to the Internet, intranet or extranet, or other

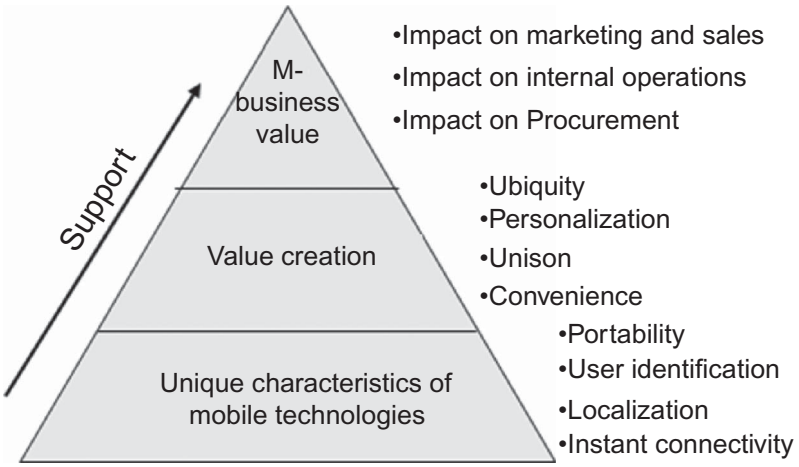

Figure 1 M-business value hierarchy. Adapted with permission from Zhu, K., and K. L. Kraemer, "Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry." *Information Systems Research*, volume 16, number 1, March, 2005. Copyright 2013, the Institute for Operations Research and the Management Sciences, 5521 Research Park Drive, Catonsville, Maryland 21228.

mobile devices; (iii) personalization, through individual client identification and localization of both clients and products or services; and (iv) unison, having real-time access to organizational databases through mobile applications (Camponovo and Pigneur 2003; Clarke 2001; Sharma and Gutiérrez 2010; Watson et al. 2002). Figure 1 depicts how these key characteristics support value creation.

Ubiquity combines portability and instant connectivity to create access to the wireless network anytime and anywhere (Picoto 2011; Watson et al. 2002). This helps fulfill the need for real-time information, as the mobile user can access the network independent of his or her time and spatial location. Ubiquity also results from users not leaving mobile computing devices at their workplace, as they are mobile, resulting in both the boundary between work and life becoming fuzzy, but also because such devices are integrated in people's lives beyond their work. This is known as the concept of experiential computing, suggested by Yoo (2010). An example of ubiquitous computing is instant stock prices or auction notifications, which can be customized to individual preferences. New products can also be created, which are specific to a certain location and time (Clarke 2001). Notifications about stock prices or auctions are other examples that could be customized, according to configurations dependent on personal content.

Personalization combines user identification and localization, while relying on the capability of geographically locating the mobile user (Picoto 2011; Watson et al. 2002). Knowing the user and his or her location allows organizations to offer location- and context-specific value-added services, such as promoting a local café in the area where the m-user is currently positioned, providing information to technicians near a specific work location, or tracking a product's current location. Personalization in the context of m-business provides organizations with several opportunities, such as offering new products and services, enhancing customer service, improving employee and business partner coordination, or reducing inventory costs. While the e-business and Internet literature suggests that location could become irrelevant, in m-business, location suddenly matters again (Watson et al. 2002). In fact, as examples of personalization, organizations can offer new products and

services to enhance customer service, such as a restaurant offering promotions in the vicinity of a user, or furnishing information about available technicians near a specific location, or tracking the location of a product.

Unison combines instant connectivity and integration and refers to the possibility of having a consistent view of information with data integrated across multiple applications (Junglas 2003; Picoto 2011). This is possible because mobile applications and data synchronization can be made across platforms (Watson et al. 2002), enabling m-users to access data from organizational core systems (e.g., Enterprise Resource Planning [ERP] or Customer Relationship Management [CRM]) to synchronize their phonebooks or calendars, or to share these applications with others. As a result, unison can create increased collaboration among employees, increased productivity and organization flexibility, and increased efficiency of internal operations. As examples of ubiquity, mobile users can access the organizational core systems, such as ERP or CRM, to consult or update data. They can also synchronize their phonebooks/calendars or share applications with colleagues, increasing collaboration among employees.

Convenience combines portability and instant connectivity because of the ability to have the devices always accessible (Camponovo and Pigneur 2003), and the agility and accessibility (Clarke 2001) provided by these mobile devices (Picoto 2011). Examples of convenience include a sales manager receiving a quote approval while traveling on a train, or a customer receiving stock quotations while on vacation in another country. Convenience also means that m-users can access different services integrated on the mobile device: voice communication, SMS, e-mail, camera, scanner, GPS. Furthermore, since mobile apps are increasingly attractive and user-friendly, there is no longer the need to use browsers on the mobile device. Electronic approval requests for the sales manager who receives them while on a train to visit a client in another city, and clients receiving stock quotations while on vacation in a foreign country are examples of this value creation.

As shown in Figure 1, the key unique characteristics of mobile technologies allow organizations to create value, which can be defined as the impact m-business usage has on firm performance as measured by the impact on the three major organizational value chain activities dimensions: (i) marketing and sales, (ii) procurement, and (iii) internal operations. The marketing and sales dimension could include different elements, such as increased sales areas, increased customer satisfaction (Varshney and Vetter 2002), increased convenience to customers, and better communication with clients (Liang et al. 2007). For internal operations, the literature suggests possible impacts, such as greater ability to manage internal operations more efficiently through speeding up processing, reducing bottlenecks, reducing errors, compression of business processes, improvements in organizational flexibility and on decision making (Gebauer and Shaw 2004; Mooney et al. 2001), improvements in staff productivity (Gebauer and Shaw 2004), better communication among employees, and increased organization profitability (Liang et al. 2007). Finally, for procurement, impacts could include decreased inventory costs, decreased procurement costs (Varshney and Vetter 2002) and better communication with suppliers (Liang et al. 2007).

3. METHODOLOGY

According to Myers (1997, p. 241) a "qualitative research involves the use of qualitative data, such as interviews, documents, and participant observation, to understand and explain a phenomena." A qualitative approach is appropriate if there is a high degree of uncertainty around the phenomenon under study (Trauth 2001). Given the newness

of the concept of m-business value, and in the absence of existing theoretical models of m-business value, we conducted an inductive investigation (Eisenhardt 1989) to propose a conceptual model to explain mobile business value. This qualitative study was conducted by performing in-depth semistructured interviews with m-business experts and analyzing organizational documents to obtain a rich understanding of m-business value creation.

3.1. Data Collection

The interview procedures were consistent with the suggestions provided by Benbasat, Goldstein, and Mead (1987) and Yin (2003). First, based on the existing literature presented in Table 1, an interview protocol was developed consisting of a set of semistructured interview questions (Appendix). The protocol was designed to guide the interviews according to Yin's recommendations to ensure that data collection was adequate to accomplish research goals, and to increase the reliability of data collection and analysis. The use of semistructured interview protocol allowed the interviewees some degree of freedom in their responses, while also allowing the researchers to raise questions suggested by the existing literature on m-business and IT business value. Before conducting the interviews, face validity was confirmed by three specialists who analyzed the data collection plans regarding both the content of the data and the procedures to be followed (Yin 2003). The protocol was then pretested and validated with researchers in the fields of information systems and e-business. The pretest consisted of verifying the protocol in terms of the questions and the structure, in order to assess whether, in their opinion, it would address the research questions.

The in-depth interviews were conducted at the convenience of the respondents. They were recorded when possible, and then transcribed. If issues arose during the transcription of the interviews, telephone conversation or e-mails were used to clarify those issues. In one case, notes were taken instead to make the interviewee more comfortable. Each interview lasted approximately one hour. In the first part of the interview, the key informants were asked about their perception of m-business definition in order to align their concept with ours. In the second part, the interviewees were asked about which m-business applications and functionalities their companies use. In the third part of the interview, we inquired about the impacts of the usage of those applications in their organizations. For each component of marketing and sales, internal operations, and procurement, the informants were asked about the extent to which the m-business applications affected their organizations' value-chain activities. In the last part of the interview, we asked the key informants about additional impacts they believe m-business has in their organizations.

Data were also collected from published documents about the companies and their m-business projects. For example, additional data were collected from the companies' Web sites, company documents, reports, financial statements, and published articles.

3.2. Research Sites and Key Informants

Given the goals of this research to define m-business value and its components, we needed our interviews to be conducted with m-business experts. We therefore decided to approach executives in large organizations with well-known m-business initiatives and that have been using m-business on a regular basis. These are Portuguese firms. In identifying experts to interview, we aimed to identify people known as m-business experts in their organizations. An additional criterion was to interview informants from different industries to

provide a higher generalization level to our findings. The majority of interviewees gave us an organizational level perspective of m-business value within their organizations. The only exception was the interviewee from Firm A, who was not comfortable in speaking about the overall m-business initiatives undergoing in his organization. Instead, he answered the interview questions with respect to only a specific project, which is a well-known national m-business implementation. In prior research, executives' perceptions regarding IT business value have been used to assess the actual impact of IT in the value chain activities in a process-oriented approach (Chang and Shaw 2009; Tallon et al. 2000), so this should be an adequate approach toward the understanding of m-business value.

The organizations were carefully selected, taking into account the suggestions provided by Benbasat and colleagues (1987) that researchers studying organizational-level phenomena should select sites based on the following characteristics of the firm: industry, size, and organization structure. Additionally, researchers interested in specific technologies should also consider this when selecting the sites. The selection of the interviewees for each case was performed according to the key informant approach as recommended by Yin (2003). After extensive research, five large Portuguese organizations were selected from the banking, telecommunication, retail, and utility industries, each with well-known m-business implementations and being a leading-edge exploiter of m-business usage. The subjects selected for interview were experts who were participating in those m-business projects (almost all held positions as directors of innovation, sales, and information systems areas within the organizations). When possible, two persons were interviewed from the same company for triangulation purposes. We also interviewed an m-business expert based in London from one of the biggest multinational technology companies, who has been developing mobile applications. Finally, we interviewed an academic m-business expert based in Brazil. These two interviews further reinforced and validated the findings from the Portuguese market.

The number of interviews was determined by theoretical saturation, the point "when all of the main variations of the phenomenon have been identified and incorporated into the emerging theory" (Guest, Bunce, and Johnson 2006:, p. 65), in this case m-business value. This is a standard approach to data collection in qualitative research (Nah et al. 2005). Nine interviews were conducted, although the saturation point was satisfactorily achieved after the seventh interview, as no new codes were identified. This is consistent with a study of saturation points by Guest and colleagues, who found that most insights in their studies occurred between the first and sixth interview with almost no new insights after the twelfth interview. The interviews allowed the assessment of experts' perceptions that served to further our knowledge and understanding. The results provided important understanding about m-business value and its impacts at the organizational level.

3.3. Data Analysis

The analysis of the data was performed via content analysis techniques that allow maximizing the objective and internal validity of the work (Bardin 2004). The main objective of the data analysis carried out in this research is to identify if a certain m-business impact was found in an organization. To accomplish these, we first coded the raw data from the interviews. The coding procedures consisted on developing a coding template, then extracting the response segments referring to each question, and then applying the template in order to code and categorize the specific m-business impact in each response segment. For pattern identification purposes, the coded impacts were enumerated and clustered by

question, and then the frequency for each impact was determined. Prior research indicates that benefits of using m-business are difficult to quantify in isolation, and recommends that the unit of analysis to identify value should be the business process (Heijden and Valiente 2002).

The developed coding template included categories of possible emergent findings related to m-business value, usage, impacts, and determinants. For example, several of these categories can be found in Tables 4, 5, 6A and 6B, as well as sections 2.1, 2.2, and 2.3, of Appendix. Once the template was completed and validated with other researchers, two coders coded two interviews each. After coding of two interviews by both coders, we calculated the Cohen's Kappa (Landis and Koch 1977) for each transcript. One of the interviews achieved a very high Kappa of 0.80, while the other had a very low Kappa of 0.10. In discussions with the coders, one of them stated that for one of the files, she started not to code things that seemed "obvious." After we discussed the procedures again, both coders coded a new transcript. This round of coding resulted in an inter-coder reliability of 100%, so that one researcher coded the remaining interviews.

4. RESULTS AND MODEL DEVELOPMENT

4.1. Descriptive Findings

Table 3 summarizes characteristics of the companies where the interviews took place.

4.1.1. Firm A. Firm A is a major utility company that had started facing new challenges regarding the liberalization of the European market. Therefore, the organization was pressured to introduce higher levels of automation and control in the distribution networks. In this context, the mobile system project began in late 2007, and the first equipment was installed in 2010. The system is based on a multilevel hierarchical architecture capable of dealing both separately, and in an integrated way, with commercial and technical information, providing two-way ubiquitous communication between the firm and its clients. It can access real time data on client consumption, while also offering new personalized services. The project aimed to achieve advantages such as increases in operation flexibility and efficiency, cost reduction, and improvement of quality of service and control. One example of the systems implemented is the integration of mobile technologies with the smart grid implementation. Devices connected to smart grids are installed in the customer's house with a Global System for Mobile Communications (GSM) card and several applications. Information about consumption, current pricing, promotions, and so forth is then sent directly to the customer's mobile phone. The customer can also control the equipment remotely with a mobile phone.

4.1.2. Firm B. Firm B is a telecommunications company that is one of the three biggest players operating in the mobile communications industry of its country, with more than €1300 million revenues in 2010, around 7 million clients, and with nearly 1000 employees. For the purposes of this study, we interviewed the Director of Data, Content and Roaming Services (DCRS) of Firm B, who explained that the main objectives for launching the m-business initiatives were "To give the example and to give the best response to the challenges we have today."

Given the nature of this company's business, m-business is being used both for internal operations as well as for m-commerce. Regarding the internal operations support, the

Table 3 Company characteristics.

Firm	A	B	C	D	E
Industry	Utility	Mobile Telecom	Banking	Distribution	Fixed and Mobile Telecom
Dimension	~1000M€ of profit in 2009 ~7000 employees	~250M€ of profit in 2008 ~7M clients ~1000 employees	~10000 employees ~175M€ of profit in 2009 ~1000 branches in Portugal	30000 m-business employees users ~80M€ of profit in 2009 Over 370 points of sale	More than 2000 employees ~5,7M€ of profit in 2009 Corporate Market size: 11000 companies
Interviewee 1 Job Position	Business consultant for the mobility project	Director of Data, Content and Roaming Services	Director of Information Systems	Director of Business Development and Innovation	Mobile solutions data business consultant
Interviewee 2 Job Position			Director of New Channels		Director of Enterprise Solutions
M-business project details	MD: customized equipment Project start: 2007 Estimated investment: 70M€	MD: mobile phones	MD: mobile phones E-commerce portal adapted to mobile browsers	MD: customized PDA Initial investment: 3,5M€	MD: mobile phones and mobile stations
Main reasons for adopting m-business	Facilitate operations, reduce and better control costs and frauds. Also, to get more functionality to their clients	To give the example and to give the best response to the challenges they have	Potential benefits in efficiency increase and demanded by customers. Support the increasing mobility of sales force	To ensure that employees have the information they need in their pocket, without the need to move	To increase mobility, autonomy, and flexibility; and decrease costs

Note: MD = mobile device.

sales force is equipped with PDA devices with access to the organizational databases (for information about clients, inventory, and products' technical characteristics). Technical field teams are also equipped with PDA devices for technical support and work planning. For m-commerce, the company runs a mobile portal where customers can purchase services and products, such as entertainment, music, and hardware. Among several applications available to clients, the ATM phone (availability of ATM functionalities on the mobile phone) can also be used for money transfer and micro-payments.

In one specific example of using the mobile phone for payment purposes, Firm B has recently launched a digital wallet pilot program for its employees. This application allows users to buy goods in vendor machines without cash, through the combination of several technologies: NFC (near field communication), QR (quick response) codes, SMS, and USSD (unstructured supplementary data service). Another example of a mobile application available to users is the telecom drive app (generic name). This application allows free GPS navigation with added-value services: 3D visualization of buildings, weather inquires, and integration with social networks. Although originally available, reverse auction functions for procurement and product customization applications were deactivated, due to very low usage and the fact that some clients found them confusing. In fact, this illustrates that the immaturity of technology might be an inhibitor for realizing the full value of a mobile application in practice. Regarding the latter, the DCRS Director argued:

> this functionality needs to be made in a way that certain products are adapted to the user profile without the user noticing it . . . and depends on the technological advancements predictor for the future, when this is expected to be developed more.

4.1.3. Firm C. Firm C is a large retail bank with nearly 10,000 employees and a profit of €175 million in 2009, and over 1000 branches in Portugal. Two departments in the Bank are handling the mobile system project: the Information Systems Department and the New Channel Department. The Information Systems Department is responsible for developing applications to support mobile sales force operations (such as accessing client information or making approval requests), employee work support (such as e-mail and calendar synchronization and sharing), and decision-making support. The New Channel Department is responsible for developing functionalities to be provided to clients, such as statement inquiries, commercial transactions, and CRM services. The heads of both departments were interviewed for this project.

One major concern of the bank is that mobile systems need to be well integrated with other information systems in the company. One of the biggest challenges for Firm C has been the need to guarantee high levels of security and protection of its data, given the high sensitivity involving financial information. For this reason, the bank's usage of m-business internally by its employees was originally mainly for information dissemination purposes, as explained by the head of the information systems:

> [while] most of the bank's campaigns . . . use SMS mainly for commercial and informative purposes; it was not further used given security reasons.

However, the new channel Director stated:

> the initial objectives for m-business have been evolving over time with the technological and the security advancements,

and the IS Director stated:

> the increasing mobility needs of the sales team foster the development of a mobile portal to support decision making on the move, without the need to come to the office.

While security is an issue for internal applications, client access to the mobile banking network has been secured by the implementation of two technological mechanisms. First, the communications between a smart phone and the bank is made through a secure access and a dedicated line. Second, the banking operations made with the mobile device are subject to additional confirmation through the introduction of a key generated based on a client's card. In terms of applications, Firm C developed the e-banking portal adapted to mobile browsers and, more recently, launched two apps for smartphones.

Firm C developed a mobile channel for e-banking, which is available to clients already registered for the e-banking service. Examples of mobile services available include account balance and transaction inquiries, NIB (banking identification number), credit card balance or transaction inquiries, services payments, mobile phone re-charging, internal money transfers, inter-banking money transfers, and checks requests. When questioned about the main reasons for launching these m-business initiatives, the IS director explained, "The increasing demand by clients pressured the bank to adapt the e-banking website to mobile browsers."

More recently, the bank developed the "Stock Exchange Menu," a service that allows the client to perform stock related operations in a convenient, simple and secure way. In this menu, it is possible to buy and sell stocks, cancel orders, calculate profitability, inquire about one's portfolio composition or current quotations, and visualize the available information with graphics. There is also an online brokerage service where experts from the stock market department can help immediately for any question related to the capital market.

There are two different applications available for clients. The first allows money transfers between different accounts and the ability to personalize the device with available information about the recipients. The other one, App Bank, has all the functionalities related with payments and money transfer, but also allows clients to make inquiries regarding their account or credit card balances and transactions, as well as to access and manage notifications.

4.1.4. Firm D. Firm D is a large grocery retailer that has nearly 400 points of sale and 30,000 employees using mobile devices and making an extensive use of m-business. In 2010, its gross revenues were close to €3275 million, with a net profit close to €147 million. For this research, we interviewed the Director of business development and innovation, who is responsible for the mobile portal project. This project is a platform that integrates several applications for all the logistical and operational stages of a large department store into a single mobile device to support business processes. Employees working at the store level are provided with PDAs running an information system that covers all the logistical and operational stages of a large department store, ranging from monitoring trucks' movements, unloading of goods, product placement on shelves, and price marking. It also allows field employees to have access to all the information available from the company's information systems, such as inquiry about prices, availability, supply dates, and sales and promotions.

Employees can also print product labels and register information about available resources. The mobile portal is available to shop employees using a customized PDA and a mobile label printer. The adopted mobile portal solution has a modular architecture that integrates the retailers' information systems through open and standard solutions, allowing access to the organizational core information systems from anywhere and at any time, creating value through ubiquity and unison. Additionally, the mobile portal may work online or offline, communicating through the wireless network or a mobile phone network (e.g., 3G).

Firm D's innovation Director explained the rationale behind the implementation of the project as follows:

> We wanted to ensure that employees have the info they need in their pocket without the need to move around the shop. Print the labels where they want to, get information about product availability in other shops, compare prices, etc. Only when they need to print a report, they have to go to a PC.

The project allows savings of more than €10 million per year, an impact of 3% in the operating margins. Payback on the investment was accomplished in less than one year. Firm D also developed mobile applications to enhance customer loyalty, granting access to a customer loyalty program through mobile devices, or simply giving cooking recipes with the possibility to add the required ingredients via the mobile portal shopping basket.

4.1.5. Firm E. Firm E is a major Portuguese mobile communications company that has received several innovation awards. It has developed mobile applications for internal users (sales force automation) and has helped clients develop their own m-business solutions, in terms of mobile devices, wireless network access, and mobile applications. An example is the multimedia kiosks for a medical clinic in a shopping mall, where clients can check-in and subsequently receive instructions and information via SMS. Another is RFID student cards that not only enable access control and assiduity management, but also allow students to use their mobile devices as credit cards for small purchases.

Table 4 shows the m-business functionalities and applications that each organization is using. Applications, such as social networks, were left out of this list because they include many of the applications presented here, such as games, entertainment, and communication, among others. As can be seen from the table, all of the mobile functionalities identified, except the auction and reverse auction functions, were used by one or more of the organizations in the study.

5. EMERGENT MODEL: MOBILE BUSINESS IMPACTS AND VALUE CREATION

The purpose of our research is to define the m-business value concept and its components. As we were especially interested in the impacts that the usage of m-business may provide to organizations, we collected empirical evidence of m-business usage impacts at the organizational level. As mentioned earlier, this approach aligns with Berente and colleagues (2011) and excludes cost issues. Next, we discuss results gathered from the interviews, how this overlaps with our literature review, and highlight the contributions of this research. We also provide theoretical propositions and an emergent model that summarizes these findings, which are presented later in the article.

Table 4 M-business functionalities used at the respondents' organizations.

	Firm				
Mobile Applications/Functionalities	A	B	C	D	E
Mobile Sales	✓	✓	✓	✓	✓
Mobile Services	✓	✓	✓	✓	✓
Product Search and Comparisons by Consumers			✓		✓
Postpurchase Customer Support	✓		✓		✓
Mobile Banking			✓		✓
Mobile Brokerage			✓		✓
Mobile Micropayments		✓	✓		
Mobile CRM	✓				✓
Workflow	✓				✓
Data Collection	✓	✓	✓	✓	✓
Knowledge Management	✓			✓	✓
Provide Information	✓	✓	✓	✓	✓
Context-based Information to Users	✓	✓	✓		✓
Inventory Management					✓
Mobile Purchasing		✓	✓		✓
Delivery Tracking				✓	✓
Integrates with Other Company Systems (as for example CRM or ERP)	✓	✓	✓	✓	✓
Providing Services to User Proactively	✓		✓	✓	✓

5.1. Impact on Marketing and Sales

The downstream dimension of m-business value indicates that firms can get substantial benefits from using mobile technologies and applications to enhance sales- and marketing-related activities. Considering that clients are increasingly using their smartphones or other mobile devices to perform different types of tasks, m-business has been recognized as a key channel in the interviews. All interviewees agreed that m-business applications could positively influence this organizational dimension. In fact, m-business could increase sales if mobile sales forces are equipped with m-business applications, and for allowing the products to be better positioned on the shelves. For Firm B, for example, although m-business applications are being used by a variety of users groups (e.g., clients, sales teams, technical support teams), they all share the same ultimate goal: the improvement of client services through sales, marketing, and after sales customer support. As our interviewee stated: "There has been a significant impact on sales volume from our mobile portal."

This is interesting and goes beyond common expectations that m-business would have primarily a support role on organizational value chain activities. Indeed, m-business value could not only comprise indirect benefits, but also direct and quantitative ones. The individual making the comment pointed out that, because the company sells in the mobile web portal the same products and services it offers on the regular web portal, it can now reach a different set of clients who might not use their computer but use their cell phone to purchase goods and services, also widening their sales.

Customer services can also be improved through m-business usage. As was noted by one respondent, m-business allows companies to: "improve customer response time and improve competitiveness though not strategically when competitors use the same m-business features."

Therefore, even though this may no longer provide a differentiating competitive advantage, providing some mobile functionality to the clients is mandatory to remain competitive in some contexts, as in the banking industry. However, the innovation regarding

such functionalities may offer a differentiating competitive advantage for some industries. In fact, although the large majority of the Portuguese banks provide their customers with m-banking, Firm C has been nationally recognized by the superior interactivity of their m-banking apps. This highlights how the usability and interactivity characteristics of mobile applications play a fundamental role in achieving m-business value. Another example is Firm D, as the company now has a customer loyalty program through mobile devices. It also offers recipes with the possibility to add the required ingredients via the customer mobile portal shopping basket. Clearly, there are several benefits for clients:

> clients' experience improvement, motivated employees that are more clients driven . . . the organization is able to respond to client's demands, enhancing client's service.

With better product placement on the shelves, the company has experienced increased sales volume. For the future, the interviewee would like to have mobile applications for approval requests and after sales support, and would like to use identification and localization data of clients for marketing purposes.

Mobile banking, for example, has enhanced the client's convenience, as the user can access the information through the mobile phone from anywhere and at any time to perform a wide range of operations easily and rapidly. As examples of how the m-business enhances client services, one of the interviewees said:

> We improved clients' response time and enhanced the convenience with the development of the apps through which they can have access to a wide array of functionalities.

M-business also allows for quicker response to client demands, which has significantly enhanced customer satisfaction. As for example, one interviewee acknowledge that m-business initiatives have helped facilitate communication with clients:

> SMS helps a lot the communication with clients. Another example is when the client makes an inquiry about the mobile phone account balance; there are also other services that are communicated in the SMS response.

As clients are increasingly using their smartphones to perform different types of tasks, mobile e-banking has been recognized as a key channel for the banking sector. Therefore, one of the firms has been focusing on the optimization and development of technological tools for the mobile channel to increase both the degree of satisfaction and the opportunity to attract new customers. In fact, as one interviewee explained, "clients are increasingly demanding the availability of net banking on the mobile channel." Indeed, pressure from its clients forced the bank to adapt its e-banking Web site to mobile browsers and to develop the m-banking apps. The increasing convenience related with mobile devices does make them the preferred hardware device of many users for conducting a wide array of activities, from transactions to other more hedonic usages.

The fact that, today, customers are often equipped with mobile phones also facilitates contact with them, which becomes more frequent and personal. One of the informants reinforced this finding revealing that when a client sends an SMS to inquire about his or her account balance, the organization sends an SMS back with the account balance together with advertisements related to their services. Per day, they could reach around 4000 to 5000 people using the service. Another interviewee stated that:

> Most of the bank's campaigns also use SMS, mainly for commercial and informative reasons; it is not further used given security reasons.

Looking toward the future, one interviewee said that:

> m-business usage is expected to increase in the next few years, when mobile telecommunications operators offer packages that are less costly. The technology needed is already here; however, the access in terms of communication costs is still a barrier for a more massive client adoption, along with the still low usability of mobile devices.

Through our analysis, we find evidence from the interviews to clearly support an assertion that m-business value includes impacts on marketing and sales. All experts acknowledge that m-business improves the performance of marketing and sales activities, mainly as a complementary communication channel with clients, by innovation in the ways of communicating and interacting with them. One informant also pointed out that the benefits that may derive from m-business usage "highly depend on the kind of business" the organization runs, and that if the organization has a mobile workforce, the usage of mobile business has greater impact on firm performance when compared to organizations that do not have a mobile field force. This is in line with Sharma and Gutiérrez's (2010) conclusions, as underlying issues might be more complex than on other types of technologies, as the m-business organizational value also depends on the individual value that users may derive from mobile technologies. Based on the above discussion we put forward the following proposition:

> **P1**: Usage of m-business applications by firms creates value for the firms through downstream activities, such as increased sales, improved product and service innovation, increased customer satisfaction, and facilitated communication with clients.

5.2. Impact on Internal Operations

The internal dimension of m-business value indicates that firms can get substantial benefits from using mobile technologies and applications to perform their internal business processes and support employee tasks. Regarding the impact of m-business on internal operations dimensions, the informants agreed on most of its determinants. The only exception is that m-business applications could reduce the number of employees, with which the majority of the interviewees did not agree. One of the informants argued that it could increase revenues or it could decrease costs; but, on the other hand, the initial investment on the necessary infrastructure, the fact that the technology is easily outdated, and the communication costs, make unclear the relationship between m-business and increased profitability. However, as another interviewee explained, since its implementation, the mobile portal has proven to have significant impact on the company's value chain activities and has created business value for the company. In fact, the interviewee stated, "the project has generated savings of more than €10 million per year." There was an impact of 3% on operating margins and the payback on the investment was accomplished in less than one year. More specifically, their project for equipping store employees with mobile devices and applications is considered the one with the best financial results of the past few years (compared to other IT initiatives).

All experts acknowledged that m-business applications are useful for managing internal operations. In fact, it could have a positive impact in making internal operations more efficient (e.g., with notifications and alerts, or helping to locate problems more easily), and in increasing staff productivity (mainly for mobile field and sales forces). For instance, one interviewee explained that there was an improvement in sales force efficiency and productivity as m-business has eliminated unnecessary trips between the store, the office, and the warehouses so that "the mobile teams save 30% to 40% of their time [from using their mobile devices] and this increases significantly employee satisfaction."

Technical employees are also seeing increased productivity. In fact, these lead to "enhanced employee satisfaction." Teams are more flexible and able to respond more rapidly to clients. Business processes are more compressed, simpler, and more agile. Additionally, decision making is improved, as "core information about revenues, management and key performance indicators is now more easily obtained."

Informants' comments also indicate that m-business does play an important role in facilitating communication among employees. However, they mentioned that it is important not to forget the work overload and the stress of always being connected. Nevertheless, informants recognize that it is an easy way to disseminate information among mobile workers and that this allows workers to have more flexibility at work, which is related to their increased motivation. One of the interviewees explained:

> The organizational structure could be more flexible if we adopted more powerful mobile devices to create an environment where employees can work where they need to, increasing the flexibility in terms of time and space.

Administrative workload may also decrease with m-business applications usage. One informant expressed a concern that, while the administrative workload may decrease in the back-office, it is really transferred to operational staff members who now have to perform some of the administrative tasks on the mobile device. Others pointed out that this is part of business processes being compressed, as they become automatic, simpler, and more agile. For example, one informant commented:

> Now [with m-business] it is possible to insert a new purchase order directly from the PDA without any paper and with no need to move around.

M-business also plays an important role in improving decision-making as it is "possible to have all the important information on the mobile phone." The head of the information systems department of one company exemplified the m-business impact on enhancing decision making by this comment:

> When there are urgent and critical decisions to be made, m-business gives me access to the right people.

All of the interviewed informants agreed that m-business usage could make information easier to disseminate, especially when urgent and critical decisions need to be taken and the decision maker is in another location. Another stated that receiving key business indicators, management information and Key Performance Indicators on mobile devices improves decision-making. Moreover, in evaluating the value of m-business along the internal dimension, an interviewee said:

> The decision making process with the increased mobility of the sales team is now faster, and there is a reduction of administrative tasks.

As another added:

> Now employees can make use of the time that used to be spent on the road.

Clearly, m-business has affected the efficiency of internal operations and employee productivity. In all business processes where decisions or approvals are needed, m-business has allowed the organization to compress the decision making cycle, with decisions now made more rapidly. One interviewee further explained:

> Before we used the mobile portal, the store employee would have to look at the product, and compare its price placed in the shelf with the price on the computer. Now, the product's label has a bar code which is read by the PDA and the mobile portal compares this price with the one available in the ERP's system, and in the case they are different, the PDA will print a new label though the mobile printer.

As stated, employees are also now more motivated, making decisions using real time data. This is an important difference between m-business and previous innovations, such as e-business. While the functionalities may be available on employees' smart phones or other mobile devices, it is up to them to decide if they want to use it. Thus, employees' motivation regarding m-business plays an important role in the m-business value achievement. In fact, mobile technologies, such as smart phones or PDAs, have been first adopted at the individual level for personal usage, and then by organizations to support their business activities. Thus, the evidence collected from the interviews clearly supports that m-business value includes the impact on internal operations dimensions. The usage of m-business, combined with other organizational information systems, does allow business improvements in internal operation activities. As one of the interviewees stated, it "always depends on the kind of work" [the employee has to do].

This is in line with Gebauer and Shaw (2004), who suggested that the frequency, structure, mobility, urgency, and emergency characteristics of the task the employee has to perform, have impact in the usage of m-business. Nevertheless, all experts acknowledge the importance of m-business usage to increase the efficiency and productivity of internal operations through making information more available when it is needed, simplifying internal processes, increasing organization flexibility, and, in the end, reducing costs and increasing profitability. Based on the above discussion we put forward the following proposition:

> **P2**: Usage of m-business applications by firms creates value for the firms through internal operations activities, such as more efficient internal operations, reduced administrative workload, increased control, and improved decision making.

5.3. Impact on Procurement

The upstream dimension of m-business value indicates that firms can get substantial benefits from using mobile technologies and applications to conduct business with their business partners upstream in their supply chain. The informants' comments reveal that it is not yet clear how m-business applications can affect the procurement dimensions. However, Firm D has been able to recognize some value creation of m-business on the upstream

dimension. Asked about how much inventory costs were reduced with the m-business initiative, the Innovation Director said that with the mobile business applications, the "level of stocks are more adjusted to needs, there is better control of inventory losses, and lower levels of inventory disruption."

The m-business has also increased the agility of the organization, as "we are now faster on doing things, as for example, on replenishing stock." With the m-business applications, the firm is also able to control for internal temperature, stops, breakages, robberies and driving speed in the company's trucks, which are equipped with GSM.

In addition to reducing inventory costs, one firm has seen improvements in procurement costs reduction. They are able to process orders via PDAs much faster and are able to speed up the information flow to top management. Additionally, having the purchase lists from the e-commerce Web site available in the PDA fosters the reduction of picking and routine errors and possible disruptions in stocks. Finally, another important impact pointed out by the interviewee is food quality improvement, because with m-business "It is not possible to have unconformity on the cold process."

In our conversations, the only usual benefit of m-business in the upstream dimension that was not identified was better coordination and communication with suppliers and partners. For Firm D, for example, this was not an important impact. In fact, the mobile portal of one of the companies we studied has increased efficiency of retail store employees, improved the execution of operational activities, and reduced inventory losses and disruptions. It is estimated that these savings represent approximately 20% of the IT annual budget. As the interviewee explained, m-business allows "the traceability and location of goods" and getting "the best price for urgent or unscheduled purchasing." As a result, m-business has a significant impact on inventory cost reductions for that firm.

The reduction of inventory and procurement costs were only identified as m-business value dimensions by few experts. The RFID technology was mentioned as important in this area, but mainly regarding the increased control and management of inventory. As one of the interviewed experts stated, "There is a high potential for reducing inventory costs with the RFID usage since it helps to control and locate objects; however, there are only few projects where this was calculated."

According to Miragliotta, Perego, and Tumino (2009), profitability of RFID projects is significantly affected by the actual costs of the RFID tags and characteristics of the supply chain. Additionally, the maturity level of this technology may also play an important role on its actual usage and the value that organizations may derive from that.

In summary, evidence collected from the expert interviews is unclear about supporting the notion that m-business impacts procurement dimensions. Impacts on the upstream dimension, mainly via procurement, are not as significant as the impact that usage of m-business has on downstream (e.g., marketing and sales) and internal operations dimensions. Even though not knowing exactly how m-business may impact the organizations' procurement activities, an expert illustrated its potential value with an example of a company's project where they placed chips in the gas tank of the trucks to control fuel movements, which allowed for reduction in gas losses. One may add, however, that a deeper analysis of the impacts of m-business usage on procurement dimensions should explore the usage of specific technologies such as RFID, once it is more widely disseminated and mature in the organizational environment. Based on this discussion, we put forward the following propositions:

P3: Usage of m-business applications by firms creates value for the firms through procurement activities, such as decreased inventory levels, improved coordination with suppliers, and facilitated communication with suppliers.
P4: Usage of m-business applications by firms has lower value creation levels on procurement than on marketing and sales and on internal operations activities.

5.4. New Impacts of M-business

Table 5 summarizes the findings from the interviews. However, respondents were also asked if there were any other impacts that should be included. The additional impacts found here are specific for m-business and extend the framework proposed by (Mahamood ans Soon 1991) and the impacts found in the m-business related literature. Three experts identified the following impacts for the internal operations dimension: (i) better information quality (because information could be collected in the field in real time), which could improve decision making and organizational control; (ii) improved employee learning (as it is possible to have highly mobile employees informed and trained remotely); (iii) increased employee performance (many resources can be directly delivered to the employee in the field); (iv) innovation incentive; and (v) facilitated inventory management (with the RFID usage, for example). These additional impacts clearly highlight differences between m-business and e-business, as they are derived from unique characteristics of mobility. As one respondent commented, in her view "m-business is being used mainly in company's activities that add greater value, given the cost associated with communications and investment needed in mobile technologies."

Respondent comments also suggest two possible factors that might moderate the effect of m-business usage on value for firms. One informant stated that the value of mobile business depends on the kind of work that employees do, suggesting that task characteristics (e.g., mobility requirements) may moderate m-business value. Another indicated that the benefits of mobile business "highly depend on the kind of business." This is consistent with findings from prior work that suggest many employees use m-business as a proxy to complement their stationary work, enabling increased interdependence between people at work (Gebauer 2008) and with research according to which the task requirements and frequency of mobile tasks are important drivers of m-business (Liang et al., 2007). Based on these points, we advance the following propositions:

P5: Business characteristics of firms, such as distributed users or performance impacts of information delays, play a moderating role between m-business usage and value creation through m-business activities.
P6: Task requirements, in terms of mobility or frequency information required for decision making, play a moderating role between m-business usage and value creation through m-business activities.

Based on the findings from the interviews, the discussion of these findings, and the propositions set forth, we proposed the emergent model of mobile business value presented in Figure 2.

Despite the limitations of the study with respect to the small sample of interviewees and country specific context, the results of our study provide several theoretical and practical contributions. First, by synthesizing the literature on IT business value, e-business value, and m-business, this research derived a more precise definition of m-business value

Table 5 Interview results for m-business value.

Components[1]	Source	#[2]	Examples of evidence from the interviews
Impact on marketing and sales			
Sales increasing	(Mahamood and Soon 1991; Zhu and Kraemer 2005)	7	"Sales teams are now equipped with m-business so are more able to close new deals." "It is now possible to reach new clients that don't have access to buy in a PC, but can do it in a mobile phone."
Product and service innovation improved	(Mooney et al. 2001)	8	"Adapting in the best possible way the actual services to the mobile platform, as the iPhone for example."
Customer satisfaction increased	(Mooney et al. 2001; Varshney and Vetter 2002)	9	"There are a lot of intangible benefits, as for example, the experience that we provide to the client, the motivation of employees that has implication in the way they interact with our clients, and also we have now less off stock."
Facilitated communication with customers	(Liang et al. 2007)	9	"The SMS helps a lot to communicate with clients."
Impact on internal operations			
Internal operations more efficient (ex. speed up processing, reduce bottlenecks, reduce errors)	(Gebauer and Shaw 2004; Kadyte 2006; Mahamood and Soon 1991; Sharma and Gutiérrez 2010; Zhu and Kraemer 2005)	9	"We are now more fast doing things, as for example, replenishing stock, and thus the company is more agile."
Reduce administrative workload	(Nah et al. 2005; Westelius and Valiente 2006)	7	"For example, it is possible to insert a purchase order directly from a PDA, without any paper and in the client's site."
Increased Control	(Kadyte 2006)	7	"With mobile equipment that exists in the delivery trucks, it is possible to control the inside temperature, the stock losses and robbery, if the truck has or has not stopped, if the doors were opened, or if it exceeded the speed limit."
Improved decision making	(Gebauer and Shaw 2004; Mooney et al. 2001; Varshney and Vetter 2002)	9	"Members of the board and directors receive management information on their mobile phones."
Impact on procurement			
Decreased inventory costs	(Mooney et al. 2001)	2	"The usage of RFID technology has a great potential. However, there is not yet evidence from the existent projects."
Improved coordination with suppliers	(Gebauer and Shaw 2004; Mahamood and Soon 1991; Mooney et al. 2001; Zhu et al. 2004)	3	"It is important for product tracking and localization."
Facilitate communication with suppliers	(Liang et al. 2007)	4	"It is very intensive mainly in the service sector when employees need to contact often with the clients."

[1]Those components were identified based on the IT business value, e-business value, and m-business researches.
[2]Represents number of respondents identifying this component.

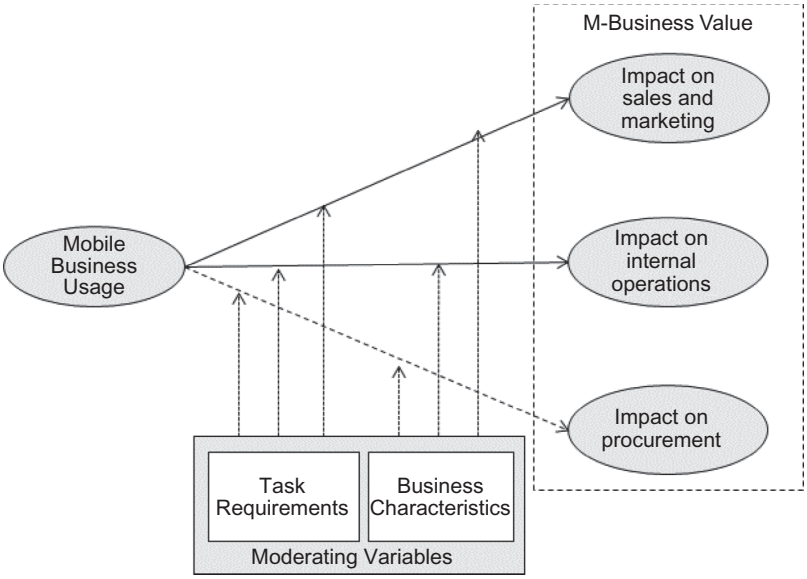

Figure 2 M-business value conceptual model.

for firms, which, in itself, is a significant step in clarifying the issue of m-business value measurement while clarifying the difference between m-business and other more traditional ways of e-business. These differences derive from the unique characteristics of mobile technologies in terms of portability, user identification, localization, and instant connectivity, which sustain the m-business unique value creation of ubiquity, personalization, unison, and convenience. The research findings allow us to validate the m-business value definition and to identify components for the m-business value construct. They also enhance understanding of m-business impacts on the organizational value chain activities. The findings suggest that m-business value is a second-order construct comprised of the impacts of m-business on marketing and sales and the impacts of m-business on internal operations. Our findings ground the question of how m-business can create value for firms. Further studies should empirically validate the several propositions and the research model developed in this work.

Unlike e-business, where B2B is one of the most successful applications, the internal operations applications and the sales and marketing related activities seem to have more importance for m-business value. One might ask why spatial or temporal characteristics of tasks are more important in marketing and sales and internal operations impacts than for procurement. One possible explanation is that while it is important if one can reach the customer exactly when he or she is ready to make a purchasing decision, it does not much matter if one can place an order with the supplier on the road rather than waiting until the person is back at the office. Another possible explanation is that purchasing managers stay at their offices more than sales people, who have a more mobile type of work. This goes toward the comments of one interviewee, who said that m-business value creation would also depend on the type of the work tasks. Additionally, this point makes clear that m-business' unique value of ubiquity and convenience is required for users to switch from an e-business application to an m-business one. If employees are not mobile or decisions and activities do not require immediate actions, the unique value of m-business may not be present, leading to no usage.

There are also several practical implications to this research. First, managers can use the list of potential impacts that m-business usage may provide to their organization to compare where their organization stands within their industry. They can also see how m-business value can be evaluated in their firms. The findings of this research can also support managers in their decisions about future m-business initiatives. M-business is reshaping many organizations' business strategies, and "has been a player with an increasingly important role in the company's overall strategy," as one of our informants said. Our theoretical propositions and conceptual model are the outcomes of inductive and deductive thinking to explain how m-business can create value for firms. The research paves the way for new empirical work regarding the m-business usage from the organizational perspective.

Organizations willing to emerge in m-business initiatives should rethink the organization's processes, taking into consideration the value dimension that m-business can provide. Table 5 shows the most often identified impacts by previous interviewees. These may offer a good starting point for other organizations interested in implementing an m-business project. In most of the cases, the goals for the m-business initiatives were well defined before the beginning of the project, helping the company to track them along the project life cycle. Additionally, organizations should identify the relevant activities that may benefit from mobility (urgent tasks, disperse tasks, emergent situations) and which functionalities are required to achieve superior performance on these activities. Once organizations have identified the main goals for their m-business implementation, they can examine which functionalities are most likely to help achieve these goals. In our discussion with m-business experts, we identified specific functionalities that can be linked to impacts or value dimensions. These expected impacts for the various functionalities of m-business are presented in Tables 6A and 6B. Table 6A presents the functionalities linked to the internal operations and upstream activities, while the expected impacts of the functionalities linked to downstream activities are shown in Table 6B. For example, Firm B offers its clients a mobile portal from which they can make purchases or account inquiries from any place whenever they want or need, leveraging the m-business unique value propositions of ubiquity, convenience, and personalization to create a positive impact of sales and customer satisfaction. In Firm D, for instance, employees are equipped with mobile devices integrated with the firm's ERP system for data collection and information access, taking advantage of the m-business unique value propositions of ubiquity, unison and convenience to improve sales and customer satisfaction, while conducting internal operations more efficiently.

Finally, organizations should evaluate the integration effort needed for m-business to work with the organization's existing technology infrastructure and business processes. M-business functionalities may involve different levels of complexity, requiring a variety of organizational efforts in terms of technology infrastructure and business processes implementation. Interestingly, those substantial investments in time and money are also the ones that enabled those organizations to achieve greater business value levels with impacts along the value chain. Higher levels of m-business breadth and depth deliver superior performance improvement, but usually demand greater organizational efforts.

Given that mobile business still lacks a theoretical foundation from an organizational perspective, the purpose of this research was to define m-business value and its components in terms of m-business impacts from the organizational point of view. The present work proposes a model for assessing m-business organizational impacts that considers the impact of m-business on sales and marketing, on internal operations, and on procurement. It also identifies new impacts specific to m-business such as better information quality, improved

Table 6A Functionalities and resulting impacts from mobile technologies (internal operations and procurement).

	Functionality									
Impact (value)	Mobile purchases	Delivery tracking	Job dispatch	Inventory management	Post-sale customer support	Knowledge management	Mobile information	Workflow	Context-based information to users	Data collection
Procurement										
Decreased inventory costs		👍		👍			👍	👍	👍	👍
Improved coordination with suppliers		👍		👍			👍	👍	👍	👍
Facilitated communication with suppliers		👍		👍			👍	👍	👍	👍
Internal										
More efficient internal operations	👍	👍	👍	👍	👍	👍	👍	👍	👍	👍
Reduced administration workload			👍		👍		👍	👍	👍	👍
Increased control		👍	👍	👍		👍	👍	👍	👍	👍
Improved decision making						👍	👍	👍	👍	👍

Table 6B Functionalities and resulting impacts from mobile technologies (marketing and sales).

	Functionality												
Impact (value)	Post-sale customer support	Knowledge management	Mobile information	Workflow	Context-based information to users	Data collection	Mobile sales	Mobile services	Mobile CRM	Mobile banking	Mobile micro-payments	Product search/ comparison	Mobile brokerage
Marketing and sales													
Increased sales		👍	👍	👍	👍	👍	👍	👍	👍	👍	👍		👍
Improved product/ service innovation			👍	👍	👍	👍	👍	👍		👍	👍		👍
Increased customer satisfaction	👍	👍	👍	👍	👍	👍	👍	👍	👍	👍	👍	👍	👍
Facilitated communication with customers	👍		👍	👍	👍	👍	👍	👍	👍	👍			👍

employee learning, increased employee performance, innovation incentives, and facilitated inventory management. These newly identified impacts of m-business may foster new perspectives for research. Additionally, the present article proposes new variables to be considered in m-business value-related research.

6. CONCLUDING REMARKS AND FURTHER RESEARCH

Based on the IT value concept developed by Mahamood and Soon (1991), this work proposes that m-business value can be defined as the impact m-business usage has on firm performance, which is measured by the three major organizational value chain activities: (i) marketing and sales, (ii) internal operations, and (iii) procurement, and it identifies the potential components for m-business value. The approach used in this work relies not only on the in-depth semistructured interviews with m-business experts but also on the aggregation of various contributions from the existing literature. Although the interviewees hold mainly director-level positions, implying some potential bias in the data collection, those individuals have a high level of m-business expertise that ensures quality of the data.

The data collection procedures and results benefited from the advanced stage of mobile applications usage in the Portuguese organizational environment and the high mobile phone penetration rates in Portugal. During the interviews, respondents also discussed various factors affecting their usage of m-business. Some of the most prevalent ones include the difficulty of integrating the mobile platform into the overall strategy and business processes, the lack of staff with m-business expertise, and the insufficient support from top management. While some of the experts mentioned those issues, they were not identified during the coding of the interviews, as they tended to be isolated comments, as opposed to recurring themes. However, it could be interesting in future research to further explore their potential role in achieving m-business value.

Conversely, many managers suggested that pressure from competition, clients, or partners often are key reasons to decide to implement m-business. Further research could investigate the role of those variables on the m-business context. Additionally, this research develops the m-business value concept based on Mahamood and Soon's (1991) work, which does not comprise the cost components of m-business usage and is focused mainly on its benefits. Further research can analyze the drawbacks of m-business that would give a more comprehensive understanding of its impacts (both positive and negative). Additionally, future research can collect large data sets to test the research propositions proposed by this work.

Another avenue for further research would be to use the Task-Technology Fit theory to analyze the individual (user) perceptions of m-business value building on the work of Liang and colleagues (2007), which proposes a fit-viability model for m-business. Other industries and companies with different dimensions could also be analyzed to validate and enhance this study. Interviews could also be extended to other countries in order to examine the impact of cultural and environmental factors in m-business value.

We believe that technology advancements in the mobile communication infrastructure and portable devices will shape mobile communications price, availability, and application developments. These will, in turn, change the way m-business is conducted in organizations. As m-business becomes more mature and widely adopted by organizations to support and leverage their business processes, we will be able to identify new and different ways in which m-business can improve organizational performance. Thus, future research

should also take into account the maturity aspect of mobile technologies when analyzing the value of m-business.

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APPENDIX. INTERVIEW GUIDE

1. Context questions (those questions will determine which of the questions from group 2 should be asked).
   1.1. What is m-business for you? (then tell them how m-business is defined in this research)
   1.2. M-business value is defined by . . . in this research. What other elements do you consider important in defining mobile business value?
   1.3. Which of the following mobile business functionalities is your company actually using, and which are the ones you wish to be using?
   1.4. Which are the main reasons for you adopting m-business? (Is m-business part of your company's overall strategy?)
   1.5. What are the initial goals for your m-business initiatives?

1.6. Do you know how much is the total amount expended on m-business initiatives?

2. Value questions.
   2.1. Impact on downstream dimension (sales)
      2.1.1. How much did sales volume increase with the implementation of mobile business? Can you give any examples?
      2.1.2. How much did the sales widen?
      2.1.3. How much did m-business initiatives improve product and service innovation?
      2.1.4. What impacts do you think m-business also had on customer service improvement?
      2.1.5. What about customer satisfaction and convenience to customers? Did they increase?
      2.1.6. To what extent do m-business initiatives facilitate communication with your clients? Can you give any examples?
   2.2. Impact on Internal Dimensions (internal operations).
      2.2.1. To what extent do m-business initiatives have impact in terms of making internal operations more efficient (for example, speed up processing, reduce bottlenecks, reduce errors, allow notifications, allow controlling emergencies)?
      2.2.2. What impact does m-business have on staff productivity? Can you give any examples?
      2.2.3. What impact does m-business have on facilitating communication among employees?
      2.2.4. What about the employees' motivation?
      2.2.5. How much does the number of employees decrease?
      2.2.6. What about the amount of administrative work?
      2.2.7. To what extent do m-business initiatives have impact in terms of the compression of business process? Which ones?
      2.2.8. What impact does m-business have on decision-making improvement? How?
      2.2.9. What impact does m-business have on the organization profitability? Can you quantify this?
   2.3. Impact on Upstream Dimensions (procurement).
      2.3.1. How much did inventory costs reduce with the m-business initiatives?
      2.3.2. How much did procurement costs reduce with the m-business initiatives?
      2.3.3. To what extent do m-business initiatives have impact in terms of coordination with suppliers and partners?
      2.3.4. And, what about communication with suppliers and partners?
   2.4. Are there other impacts that m-business have in your company that were not mentioned yet?
   2.5. Because your m-business definition is not exactly the same as we have in this study, are there any aspects that you think it important to mention?