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Adoption and appropriation: towards a new theoretical framework. An exploratory research on mobile technologies in French companies

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ABSTRACT

The objective of this research is to propose an alternative theoretical model that goes beyond the well-accepted separation between adoption and appropriation. The theoretical analysis of appropriation ignores the question of adoption of the technology. As mobile technologies can be used for private or business purposes, and because employees have often a prior experience with mobile technologies before joining a company, the linkage between adoption and appropriation of mobile technologies should be taken into account at the theoretical level. The uses developed at the individual level, outside the company environment and before entering the company, can influence organizational usage and the processes of appropriation at the organizational level.

Our purpose in this article is to see if there us a link between mobile technology adoption and appropriation, and usage. We first present the numerous specific characteristics of mobile technologies that generate paradoxical effects for the user. We then examine the traditional models of adoption to show their limitations, specifically in the case of mobile technologies. The principal models of appropriation are then discussed. An exploratory empirical study, involving 76 managers in eight French companies is presented to understand the logic of adoption and the uses of mobile technologies. This research highlights the complex logic of adoption and usage that diverges from the existing models that are discussed in the theoretical section. In the final part of the paper, the discussion of the results makes it possible to outline a new theoretical framework that combines the adoption process and the appropriation process.

Key-words: Adoption, Appropriation, Mobile technologies, Mobile phone, Laptop computer.

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RÉSUMÉ

L'objectif de cette recherche est de proposer un modèle alternatif qui dépasse les approches classiques de l'adoption et de l'appropriation. En effet, les approches théoriques de l'appropriation ignorent souvent la question de l'adoption des technologies par les individus. Or, les technologies mobiles sont utilisées dans la sphère privée et les individus possèdent souvent une expérience antérieure à leur utilisation dans le cadre professionnel. Par conséquent l'analyse de l'adoption et de l'appropriation au sein des organisations devrait intégrer l'analyse de l'adoption au niveau individuel. Cette recherche tente d'identifier dans une perspective exploratoire, au travers de 76 entretiens semi-directifs centrés auprès de managers dans huit entreprises françaises. L'analyse empirique met en évidence une influence certaine des logiques d'adoption individuelles sur les différentes formes d'appropriation organisationnelle. Un modèle théorique combinant l'adoption et l'appropriation est proposé en conclusion.

Mots-clés : Adoption, Appropriation, Technologies mobiles, Téléphone mobile, Ordinateur portable.

1. INTRODUCTION

The technological environment has dramatically changed in the last decade with a new set of technologies available at an individual level: broadband Internet access at home, worldwide mobile phone networks, wireless internet access in public spaces such as airports, railway stations, hotels, universities, and even streets. The pace of mobile phone adoption has been very high in the European Union (42% each year from 1995 to 2003 according to Eurostat[1]). In less than ten years the penetration rate of mobile phones has been over 80% in the European Union. In March 2005, 20% of European households were connected with broadband access[2]. Many individuals use mobile technologies on a daily basis though companies have been slower to adopt them. The logic of the personal adoption process is different from that of companies. Companies must justify all investments and be able to show a return on investment (ROI) on any project whereas individuals' choices are based on other factors. In addition, it is sometimes hard to demonstrate the ROI on mobile projects (Worthen, 2002). At the same time, however, mobile technologies can be used by individuals for their own purposes or for business goals. In fact many people use their own devices, such as mobile phones, personal digital assistants (PDAs) or laptops, when their company does not provide them. Still, some employees do not want to be equipped with these technologies, fearing enslavement. On the other hand, companies often do not want to adopt mobile technologies because of the difficulties related to supervising nomadic workers (Chen & Nath, 2005). Indeed, the specific nature of mobile technologies and their characteristics do not allow us to define a priori beneficial usages for the individual and for the company insofar as these technologies appear to have paradoxical impacts at various levels (Arnold, 2003; Jarvenpaa & Lang, 2005). So the logic of mobile technology use within companies can be strongly affected by the logic of adoption. From a theoretical point of view, the separation between the models of adoption relying largely on an individual logic, on the one side, and models of appropriation of technology by the organizations on the other side, seems no longer justified.

The objective of this research is to propose an alternative theoretical model that goes beyond the well-accepted separation between adoption and appropriation. The theoretical analysis of appropriation ignores the question of adoption of the technology. As mobile technologies can be used for private or business purposes, and because employees have often a prior experience with mobile technologies before joining a company, the linkage between adoption and appropriation of mobile technologies should be taken into account at the theoretical level. The uses developed at the individual level, outside the company en-

1. See http://epp.eurostat.cec.eu.int/portal/page?_pageid=0,1136250,0_45572555&_dad=portal&_schema=PORTAL
2. http://www.websiteoptimization.com/bw/0504/

vironment and before entering the company, can influence organizational usage and the processes of appropriation at the organizational level.

Our purpose in this article is thus to see if there us a link between mobile technology adoption and appropriation, and usage. What are the reasons for mobile technology adoption within organizations both at the individual and organizational levels? What are the uses of mobile tools developed by individuals? Is there a link between different kinds of adoption and appropriation? These are the questions raised by the problematique of mobile technology adoption and appropriation.

In this article, we first present the numerous specific characteristics of mobile technologies that generate paradoxical effects for the user. We then examine the traditional models of adoption to show their limitations, specifically in the case of mobile technologies. The principal models of appropriation are then discussed. An exploratory empirical study, involving 76 managers in eight French companies is presented to understand the logic of adoption and the uses of mobile technologies. This research highlights the complex logic of adoption and usage that diverges from the existing models that are discussed in the theoretical section. In the final part of the paper, the discussion of the results makes it possible to outline a new theoretical framework that combines the adoption process and the appropriation process.

2. MOBILE TECHNOLOGIES' SPECIFIC CHARACTERISTICS

We have chosen to focus our analysis about ICT (Information and Communication Technology) adoption and appropriation on mobile technologies for two reasons. On the one hand, mobile technologies are considered essential to businesses. Organizations have recently realized that mobile technologies offer them lots of opportunities (Varshney, 2003), in terms of flexibility, productivity and responsiveness. This explains, as underlines the CIGREF[3] report with regards to the uses of mobile technology (2004), that "about half of the surveyed companies consider mobility a priority and have investment projects in this domain." On the other hand, mobile technologies have specific characteristics, more particularly an equivocal dimension and a multicontextuality, which lead us to raise the question of their adoption and appropriation within firms.

2.1. Mobile technologies' equivocal dimension and indeterminate effects

We will first analyse the equivocal dimension of mobile technologies, which may directly affect the adoption process by individuals. Like other technologies, such as e-mail, mobile technologies have unforeseen consequences and their usage sometimes differs, in an unfaithful manner, from their initial "spirit" (DeSanctis & Poole, 1994). Nevertheless, an IS literature re-

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view about the use of mobile devices leads us to notice that these technologies have specific characteristics and paradoxical effects, which may largely influence individual perceptions and behaviours.

Mobile technologies appear as particularly equivocal tools, the effects of which cannot be predetermined, either on the social interaction level or on the level of management in firms. The indeterminate characteristic of the effects of mobile technologies clearly appears in the use of the mobile phone, which is the most used mobile technology in the world. Mobile phones may be considered as a specific technology, in comparison with desktop computers. Unlike desktop or even laptop computers, the mobile phone is typically always with its user, which has numerous advantages in terms of access to information, personal safety and micro-coordination possibilities (Jarvenpaa & Lang, 2005, p. 7). However, since they can be used any place and at any time, mobile phones may have consequences on the individuals present at the place and time of use, for example in terms of creating a disturbance and disrupting conversations. "The mobile phone system... is not reducible to a direction or valence tipped with a singled arrowhead, but better understood as a conflation of tangential implications, at least some of which can be read as ironically and paradoxically self-contradicting phenomena" (Arnold, 2003, p. 234). Arnold (2003) then sees the mobile phone as a technology that is likely to have ambivalent and even contradictory effects. Many researchers aiming at the analysis of mobile phone use confirm the ambivalent dimension of this technology. For instance, Ling and Yttri (1999) reach the following conclusion: mobile phones lead to two principal types of use: instrumental and behavioural.

In the context of enterprises, the use of mobile technologies has significant impacts on the organization and its structure, on relationships and on work practices; impacts which may eventually affect individual perceptions. The emergence of nomadism, and the overturning reshaping of work practices that has followed, are not without consequences for employees' perceptions of their new situation. In fact, it is a new form of work organization that arises in an implicit manner with the advent of mobile technology. The use of mobile technologies, contrary to other technologies, implies that work no longer consists of a place, but rather an activity, likely to being executed out of traditional spatial and global frames (Agre, 2001). In the definition of mobile technology developed by Lyytinen and Yoo (2002), these mobile tools constitute a "set of technological, social and organizational interconnected elements" (p. 1) allowing "physical and social" mobility of actors at the same time (Kakihara & Sorensen, 2002).

The following analysis goes further by showing that mobile technologies bring many advantages for organizations, but also have unforeseen and pernicious effects on employees, which may finally inhibit use and adoption. As Varshney (2003) underlines, mobile technologies are a means of introducing in organizations a new

form of "flexibility, in terms of space and time" and in that sense, they are very promising for businesses. The ubiquity thus created means that employees can connect to their firm's IS or be reached at any time and place (Robey *et al.*, 2004). Among the many advantages that can be drawn from this are the increase of individual productivity thanks to the reduction of space and time constraints in the achievement of tasks, the increase in flexibility, the reduction of coordination costs, the improvement of communication, the immediate access to information, increased performance in decision-making and the increase in responsiveness towards customers (Gribbins *et al.*, 2003).

However, it seems that employees gradually become aware of the new requirements related to the use of mobile technologies and of a new form of constraint gradually imposed on them (Isaac, 2004). Although mobile phones may very well appear as instruments serving the employees' independence and mobility within businesses, they are also the symbol of "hierarchical fetters" being maintained beyond the firms' boundaries. Through an intensified form of digital "tracking", mobile phone use by the employees potentially enables businesses to exert on them a continuous monitoring and control beyond the workplace, which can cause a certain amount of stress. Consequently, the nomadic approach made possible by these technologies raises concerns related to the violation of private life and the blurring of boundaries between professional and private life (Cousins & Robey, 2005; Boullier, 1997). The use of mobile technology by employees is also a source of concern as it causes problems of fragmentation and disruption of work. In the same vein, managers may feel oppressed by the emerging "culture of speed and instantaneity" which forces them to make decisions as a matter of urgency, or in contexts totally inappropriate to decision-making. Moreover, as Lyytinen and Yoo (2002) point out, the team level and the organization level are affected by what they call "Nomadic Computing": the questioning of the common space-time to employees and face-to-face exchanges deeply affects cooperation, coherence, and trust between the individuals within the firm. It also affects collective decision-making and interpersonal relationships in general.

Cousins and Robey (2005) thus emphasize the opposition between expected advantages and unexpected social consequences of nomadic IS environments. The existence of these indeterminate effects eventually shows that mobile tools, more than other ICTs, are an ambivalent technology, whose effects are highly equivocal. Even if mobile technologies bring many opportunities for firms, they also have potentially pernicious effects on employees, which may influence behaviour by inhibiting use and mobile tool adoption. That is why, faced with this paradox, a question about adoption of mobile tools by organizations and individuals within firms arises. The problematique we have raised thus seems highly significant in the specific context of mobile technologies. Moreover, mobile technologies have another particular characteristic which leads us to consider a possible link

between the way mobile technologies are adopted and their appropriation by individuals: multicontextuality.

2.2. Mobile technologies' use in various contexts

The specific nature of mobile technologies also lies in the fact that they can be used in various contexts, both in organizational and personal spheres, thus blurring the borders of mobile technology use. Contrary to other kinds of technologies used in organizations, such as ERP, CRM or the Intranet, mobile technologies can be used both in professional and private contexts, which may have consequences on the usages developed by individuals. According to Lyytinen and Yoo (2002), we should move beyond the "theoretical models of the past [...] to understand how users adopt, use, conceive and set up a variety of mobile services over time and in various contexts" (p. 384). Mobile technology indeed goes beyond the firm's boundaries and is often used in contexts other than the firm's. Henfridsson and Lindgren (2005) highlight that "multicontextuality, that is to say the coexistence of different contexts of use is unique and specific to nomadic information technology" (p. 96). According to these authors, exploring the consequences of this multicontextuality on mobile technology use has become a necessity. As some authors point out, the influence of extraorganizational contexts, as well as the relationship between virtual and physical work contexts, should be taken into account (Sørensen and Pica, 2005). In the same spirit, Cousins and Robey (2005) have drawn attention to the spatio-temporal and social dimension of context and they show that different types of behaviour appear when mobile technologies are being used. These researchers demonstrate how all observed employees manage to keep their mobility under control and maintain a clear-cut line between their professional and private lives, relying on logics that differ greatly. The use of the same mobile technology may then result in highly different use behaviours depending on the individuals, their past experience, their projection in the future, the space surrounding them and conflicts between work and personal contexts (Cousins and Robey, 2005, p. 179). Other studies have also shown that mobile technologies lead to different behaviours and different kinds of communication and can be used for diverse purposes: discussion, relationships, transmission and contact (Boullier, 1997).

This analysis of the multicontextuality enabled by mobile technologies leads us to consider a potential reciprocal influence of each context on use: for example, the fact that private mobile technologies can be used for professional goals or, conversely, the fact that professional mobile devices can be used in private life may affect representation, perception, behaviour and usage. That is why certain research studies put an emphasis on the necessity to re-examine the notion of adoption and implementation of technology in light of nomadic computing and the sense of ubiquity enabled by mobile technology (Lyytinen and Yoo, 2002), and more particularly on the need to take into consideration the social, per-

sonal and contextual factors which may be part of this process.

This analysis of mobile technologies' specific characteristics leads us to understand the issue of mobile technology adoption and appropriation within firms. Let us now analyse the theoretical frameworks developed in relation to ICT adoption and appropriation.

3. REVIEW OF INDIVIDUAL-LEVEL INNOVATION ADOPTION MODELS

3.1. The question of ICT adoption

Analysing the adoption of ICT by users and organizations appears as much as a priority to practitioners as well as to researchers in IS. "The adoption of information technologies by individuals and organizations is part of the process of IT implementation, a research area which has received substantial attention during the last 25 years. Understanding how to implement IT successfully is one of the challenging issues facing the IS field" (Moore & Benbasat, 1991, p. 193). From a practical point of view, the explanation of the factors of ICT adoption allows managers to undertake actions to improve ICT configuration so as to favour use by organizational actors. On the theoretical level, the analysis of the adoption of a technology by individuals within organizational contexts quickly became a major trend in IS research which has led to the development of numerous theoretical models taking root in disciplines such as sociology, marketing and psychology.

The adoption of innovations within a given population was first analysed by the Theory of the Diffusion of Innovations (TDI, Rogers, 1962). According to Rogers (1962), diffusion of an innovation "is the process through which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). The TDI thus identifies the factors of adoption at the individual level and then analyses the diffusion mechanisms of the innovation within society through a communication process. Different elements influence the individual adoption: the perception of the innovations' attributes, the kind of decision, the communication channel, the social system and the role of the change agent. Rogers (1962) adds that an innovation's characteristics (relative advantage, compatibility, complexity, triability and observability) determine the innovation adoption level. Different phases of the diffusion process have been put forward, ranging from individual exposure to adoption or rejection of the innovation.

The TDI was applied to information systems in order to highlight the determiners of ICT adoption within organizations (Moore and Benbasat, 1991). In the same spirit, another model, entitled "Technology Acceptance Model" (TAM, Davis, 1989), has some similarities with the TDI. The TAM has been developed to understand the users' perceptions of adopting an IT innovation. The similarity between these two models lies in the fact the TDI and the TAM both refer to individual use intention as their dependent variable. While the TDI aims at understanding the whole process of adoption, from attri-

butes of the innovation to communication channels within a social system, the TAM has a narrower goal by analysing some of the predictors of ICT acceptance and use by individuals.

3.2. Analysis of the principal Technology Acceptance Models (TAM) in IS

TAMs focus on the perceived attributes of innovation considered as key predictors of ICT use. Davis (1989) has indeed noticed that the expected performance gains of ICT implementation are often limited because of hesitations on behalf of users to use this technology. In fact, the limited use of the implemented technology is considered today one of the main causes of the "paradox of productivity" (Venkatesh & Davis, 2000). If the benefits derived from the integration of ICT are undeniable for enterprises, it is however necessary that the ICT are accepted and used by the organizational actors. The TAM, based on Ajzen's Theory of Reasoned Action (TRA, Ajzen, 1985), is considered to be a fundamental model in IS research on technology adoption. According to the TAM, the intention of an individual to use ICT depends on the user's acceptance of the tools, measured by the use or use intention of an IS, represented by two variables: perceived usefulness and perceived ease of use. Posterior studies have extended the TAM by applying it to other types of technology (Agarwal & Prasad, 1998), and adding to it other variables: culture, gender, type of task, and type of user (Straub, 1994; Gefen & Straub, 1997) or even by making a distinction between short- and long-term perceived utility (Chau, 1996). The model entitled "TAM2" (Venkatesh and Davis, 2000) is an extension of the TAM, which takes into consideration subjective norms and cognitive factors as additional determiners of intention. In parallel, other models based on the Theory of Planned Behaviour (TPB, Ajzen, 1985) have been developed in order to integrate the constraints linked to the adoption of a behaviour and the effect of facilitating conditions (Mathieson, 1991; "Decomposed TPB", Taylor & Todd, 1995). The TAM is nowadays regarded as robust, conceptually accomplished and directly operational. To synthesize these "acceptance models", Venkatesh *et al.* (2003) have validated a "Unified Theory of Acceptance and Use of Technology" (UTAUT), which identifies three constructs as determinants of intention of use: performance expected from use, expected efforts and social influence. Thanks to the identification of determinants and adoption moderating variables, the UTAUT model, which accounts for 70% of variance in use intentions, enables a much more sophisticated analysis of acceptance behaviours. Nevertheless, these traditional models have some limits that should be highlighted and overcome.

3.3. Adoption and acceptance models' limits: The necessity to go beyond the TDI and the TAM

3.3.1. Generalization problems of these traditional models

As regards the TDI, it appears that some problems emerge in the understanding of innovation adoption pro-

cesses when the TDI's basic assumptions are not achieved, for example in cases where complex and advanced technologies are concerned (Eveland & Tornatzky, 1990). According to Swanson (1994), the explicative power of classical innovation theories is very limited, as they were carried out in specific contexts about particular applications, which do not affect the whole IT organizational structure.

The validity of the TAM also seems to be verified only in cases where factors of the real environment linked to "the structure, roles and responsibilities" are not taken into consideration (Legris *et al.*, 2003, p. 202). In addition, these models were usually worked out in the framework of the introduction of relatively simple technologies aimed at the individual (such as office automation), to the detriment of more complex and sophisticated technologies (Venkatesh *et al.*, 2003; Legris *et al.*, 2003). The possible generalization of acceptance models can then be questioned. Indeed, many authors agree that the TAM cannot explain users' perceptions of specific systems (Agarwal & Prasad, 1998; Lu *et al.*, 2003). Another reason that is often cited to illustrate the weakness of acceptance models lies in the measurement of the system's degree of use by the individual (Straub *et al.*, 1995; Legris *et al.*, 2003). Some authors have protested against perceptual and subjective measurements of use, showing the superiority of objective measurements (Straub *et al.*, 1995). Finally, some authors think that the TAM is only relevant when certain conditions are met (in this respect when research is done on a certain type of application and with a sample of students). According to these authors, it would then be appropriate to add other factors to the TAM to increase its potential for generalization (Mathieson, 1991; Agarwal & Prasad, 1998; Legris *et al.*, 2003).

Nevertheless the criticisms concerning the development conditions and possible generalization of these traditional models do not seem to be the most serious limitations which may be attributed to them.

3.3.2. Consideration of ICTs as univocal tools

According to Zmud (1982), "Much of the inconclusiveness of prior research [TDI] can be attributed to a failure to recognize that innovation attributes can be perceived very differently according to the specific organizational context involved". Rogers (1962) has developed a positivist vision of ICT, insofar as the individual plays a passive role in the diffusion process. Moreover, the TDI is largely criticized for its "pro-innovation bias" (Downs & Mohr, 1976). According to the TDI, every innovation would have a positive value, so that laggards or late adopters are considered as irational individuals. Nevertheless, such a focus on innovation benefits does not enable us to understand why rejection behaviour sometimes appears and why it is sometimes rational for individuals not to adopt an innovation.

TAM models consider IT as univocal tools and do not consider the fact that the effects of a technology may differ greatly from one organization to another or from one individual to another.

These models seem all the more questionable as they do not take into consideration the unanticipated effects of ICT, for example, ambivalent consequences of mobile technologies and the fact that they are used in various contexts. These models thus fail to account for the adoption logic of mobile technologies, nowadays regarded as essential to businesses. A better understanding of mobile technology adoption and acceptance thus clearly requires us to go beyond these traditional models.

3.3.3. "Micro- macro levels dilemma"

As Markus and Robey demonstrated (1988), theories developed in the field of ICT rely on a micro or macro level of analysis and may even take into consideration both levels at the same time. Both the TDI and the TAM focus on the micro level and fail to take into consideration the macro level, which affects the understanding of adoption phenomena within organizations. The question of ICT adoption and acceptance can indeed be found at the organizational level.

First, the TDI considers diffusion as a communication process among individuals, thus generalizing findings at the individual level to a macro level, a tendency that has largely been criticized. A bias indeed seems to emerge as soon as results obtained at the individual level are aggregated at an organizational level, without any consideration of the differences and interactions between these two levels of analysis. That is why many researchers note that the TDI cannot be applied to the diffusion of innovations in organizational contexts (Chau & Tam, 1997) and they question the validity of the TDI.

As regards the TAM, it tries to isolate determinants of the individual's acceptance and exclusively focus on the micro level of analysis. TAM models are indeed viewed as not adapted to the understanding of the adoption logic by groups: "There is often a complex social interaction process in which members of the group try to influence others so that a common orientation emerges" (Sarker *et al.*, 2005, p. 39). The explanation of adoption phenomena would then remain incomplete if restricted to a focalisation on the micro level of analysis. Many authors highlight that understanding adoption logic requires that micro and macro levels of analysis be combined so as to put forward the social dynamic of adoption. Certain researchers have then tried to compensate for the disregard of the macro level by taking into consideration factors related to the context: degree of training and organizational support, external variables (Venkatesh & Davis, 2000), social influence or the context of use (Venkatesh *et al.*, 2003). However, despite the addition of these contextual variables, we must acknowledge that these classical acceptance models only partially take into account the recursive interaction between organizations and individuals in adoption logics. They still seem to be focusing too much on the micro level, losing sight of the fact that individual perceptions have an influence upon the organization that in turn affects individual perceptions in a dynamic process similar to the process of enactment described by Weick (1979).

This micro-macro dilemma is all the more significant as it has serious implications on the adoption concept itself.

3.3.4. Adoption: a complex two-step process

The TDI and TAM models consider adoption as an individual binary decision to use or not use an innovation. Nevertheless, adoption seems to be far more complex and needs to be deeply studied enriched. Adoption appears rather as a longitudinal two-step process, including both micro and macro levels. In fact, the TDI and the TAM do not sufficiently take into consideration the fact that adoption decisions are generally taken at the organizational level, so that individuals do not really have the choice to accept or reject the innovation. "These core frameworks have received widespread validation for many technological innovations where individual autonomy is permitted to adopt or reject an innovation. Increasing evidence suggests that these traditional frameworks neglect the realities of implementing technology innovations within organizations, especially when adoption decisions are made at the organizational, division or workgroup levels, rather than at the individual level" (Gallivan, 2001, p. 51). Some authors (Zaltman, Duncan & Holbeck, 1973) thus analyse ICT implementation within firms as a two-step process, which includes, first, the adoption decision at the organizational level, then the individual adoption by users (designed as IT acceptance in the TAM).

In fact, this two-step process and the embedding between micro and macro levels imply the existence of different categories of adoption.

- First, in some cases, organizations constrain the behaviours of their members by compelling them to use ICT. That is why, above all, it ought to be stressed that the presupposition of ICT adoption and acceptance by the individual may be too strong in traditional frameworks.
- Second, in other cases, ICTs are adopted by organizations but this does not mean that the innovation will be used by potential users. In cases where use is not mandated, adoption may thus occur but not lead to ICT use.
- Third, adoption is not necessarily "top-down" but may also be "bottom-up". Individuals sometimes take the initiative of ICT adoption and use themselves. This kind of individual adoption largely depends on the knowledge burden linked to ICT use. Attewell (1992) thus shows that ICT implementation involves individual skills and experience, which will then "become embodied in organizational routines, practices, and beliefs". As mobile technologies present low knowledge barriers, they can be easily adopted outside of organizational contexts and then used in organizational areas.
- Other cases also exist, when organizations and individuals do not adopt the innovation.

Different kinds of adoption can thus be distinguished, as the following figu-

		Does the organization adopt the innovation?	
		Yes	No
Do employees in the organization adopt the innovation?	Yes	Authority-based innovation adoption	Bottom-up adoption
	No	Adoption but no deployment	Non adoption

Figure 1: Matrix of two-step innovation adoption types (source: Gallivan, 2001).

re developed by Gallivan (2001) shows (Figure 1).

Furthermore, if the TDI and the TAM have identified factors of individual adoption, only a few studies have analysed the factors of ICT adoption decisions by organizations. For Instance, Daft (1978) focused on the role of organizational leaders in the innovation process, showing that two distinct cores, technical and administrative, can be at the origin of the introduction of innovations in the organization. Here again, the author identifies a close relationship between individual and organization in the innovation process. Tornatkzy and Klein (1982) identified the main factors of organizational ICT adoption, but only relative advantage, complexity and compatibility were consistently related to adoption. Other frameworks focused, through the concept of infusion, on the implementation of a technology in organizations along a linear logic (Kwon & Zmud, 1987), but did not really study the determinants of organizational adoption. Moreover, these ICT implementation frameworks view adoption as a "rational and political negotiation" within organizations (Cooper & Zmud, 1990). Adoption is thus seen as an internal decision based on internal criteria. Nevertheless external factors may influence the organizational adoption decision. Isomorphism theories (DiMaggio & Powell, 1983) indeed show that external pressures lead firms to adopt the same innovations or to behave in a similar way manner. For example, enterprises sometimes adopt solutions, such as ICT, because of imitation phenomena. Perhaps is it the case with mobile technologies adoption.

The analysis of mobile technology adoption by and within organizations thus requires one to go beyond classical adoption and acceptance models. We can moreover wonder what are the impacts of these different adoption processes – such as voluntary, mandatory and bottom-up ones – on usage, on individual behaviour, and more particularly on ICT "appropriation" by individuals. We have indeed put forward in the third part of this paper the main reasons for, and logic of, mobile technologies adoption but it is now necessary to understand how individuals react faced with mobile technologies and what kinds of usage develops. The theoretical frameworks about ICT appropriation will help us to

grasp individual reactions, behaviour, perceptions and usage of mobile technologies.

4. BEYOND ICT ADOPTION: STRUCTURATIONISM AND APPROPRIATION

4.1. Equivocality and ICT appropriation

Models showing different stages of ICT implementation have been proposed in order to understand ICT infusion within organizations, through an identification of the main factors of ICT infusion (Zmud & Apple, 1989; Saga & Zmud, 1996). These models nevertheless consider ICT routinization and infusion as linear mechanisms, and not recursive logics including an interaction between micro and macro levels of analysis. That is why we prefer to focus on the appropriation concept, developed by structurationist frameworks.

If individuals do not always have the choice to adopt, accept or reject an innovation, they nevertheless have the possibility to develop different kinds of usages of the technology, to adapt to it through reinvention and appropriation mechanisms. Structurationist and institutionalist theories enable one to grasp such logic. These frameworks offer new perspectives on the understanding of ICT adoption logic as they put forward the equivocal characteristic of technologies and the importance of appropriation processes. Structurationist models indeed show that ICT do not only include a material dimension (that is to say a technical system) but also a dimension linked to "meaning structures" (interpretation, understanding, perception). As Weick (1990) underlines, ICT are fundamentally equivocal as they can be conceived and used in many ways. ICT are indeed subject to a "sense making" and an interpretation by organizational actors. The effects resulting from the implementation of a technology may then differ greatly from one organization to another or from one individual to another.

Similarly, Orlikowski (1992) introduced the concepts of "duality of technology" and "interpretative flexibility" which put forward the fact that technology is a human creation. On the one hand, technology is "dual" as it both represents the result and the means of action for organizational actors: "technology is physically constructed by actors working in a given social context, and technology is socially constructed by actors through the different meanings they attach to it" (p. 406). On the other hand, "interpretative flexibility" indicates that actors are capable of affecting the development of technology. Finally, this analysis about the equivocal nature of technology puts forward the unpredictability of the effects related to the introduction of ICT. The consequences of the introduction of a technology in an organization above all depend on the individuals' appropriation of it (DeSanctis & Poole, 1994), and on the meaning it is given by the actors. That is why structurationist models, which put forward the equivocal nature of the technology and the necessary appropriation of ICT by individuals, seem

particularly appropriate to analyse the question of ICT use, especially in the case of non-voluntary adoption processes.

4.2. The emergence of "socially constructed uses"

The contribution of structurationist models embodied by Orlikowski (1992), and DeSanctis and Poole (1994) also relies on the recursive interaction between the individual, technology and organization, that they put forward. Based on a structurationist framework, DeSanctis and Poole (1994) have developed the adaptative structuration theory (AST), which highlights two key concepts: spirit (that is to say the general intention of technology) and the appropriation of technology by individuals. Two important sources of structuration influence the actors' appropriation (DeSanctis & Poole, 1994): the first is called "social structures in technology" and is composed of a spirit (the local normative frame) and structural characteristics (architecture of the IS); the second is called "social structures in action" and corresponds to the different resources within a very large social framework (norms of the group, environment, tasks). DeSanctis and Poole (1994) show that both types of social structures shape one another, and that organizational innovations and technological innovations interact together unpredictably.

In the same way, as we noticed before, Orlikowski (1992) puts forward the idea that ICT is a social construct that links together the individual, the technology and the organization through its institutional properties. "People generate social constructions of technology based on norms and interpretive schemes embedded in the organizational context" (Straub *et al.*, 1999).

In this way, structurationist models take into consideration the interaction of several levels of analysis, and more particularly the link between organization and individual in the appropriation logic of the technology. That is why these models, by showing that ICTs are socially constructed, seem to enable one to grasp the mobile tool appropriation logic and to go beyond the "micro-macro levels dilemma" raised by the TDI and the TAM.

4.3. The influence of external factors on the internal vision of ICT: The Organizing Vision

This analysis about structurationist models could be extended by the fact that external factors, which go beyond the organizational boundaries, are also likely to influence the internal vision of ICT. The fact that ICT is socially constructed indeed leads us to notice that an institutional pressure (linked to media, vendors or the social group) contributes to the sense construction around ICT perception and use. Thus institutionalist theories, which focus on the influence of environment, are likely to enable a comprehension of the mobile technology appropriation process. More particularly, the concept of "organizing vision" (Swanson & Ramiller, 1997), shows how enterprises are under the influence of institutional

pressures linked to their environment, which contribute to the collective "sense making" around the innovation. According to Swanson and Ramiller (1997), the "organizing vision", constructed in an extraorganizational context, plays an intraorganizational role which includes three functions: an interpretative function, a legitimating function and a resource mobilization function. Swanson and Ramiller's model of "Organizing Vision" has been tested in several studies, which emphasize the interrelationships between organizational and interorganizational levels as regards the decision for ICT implementation by firms (Carton, de Vaujany &, Romeyer, 2003, p. 5). These authors have shown that organizational actors are largely influenced by the "authorized discourses" about ICT, which lead firms to conform to major trends in IS.

Attention must be drawn to the fact that structurationist models do not take into account these external forces and more particularly the mimetic phenomena put forward by institutionalist theories. Moreover, structurationist models focus on appropriation and in a way disregard the adoption logic behind appropriation. Yet, ICT adoption logic may influence appropriation by individuals: for instance, the fact that individuals do not always have the choice to use or reject a technology may have consequences on their usage behaviour and on their appropriation of it. Moreover, institutionalist theories show that external factors of adoption can influence internal appropriation by the individual. For example, the fact that mobile tools are adopted and used outside the firm may influence the internal appropriation by the individual inside the organization. The people who arrive in the firm with their own mobile technology will thus probably influence the internal representations of this technology. That is why it seems fundamental to us to link the concepts of adoption and appropriation in order to understand the full process of mobile technology diffusion within firms. These two notions have always been separated in IS research but this study about mobile technologies is an incentive to go beyond such a distinction. To conclude, our objective in this paper is to understand the adoption and appropriation processes of mobile technologies by taking into account the interaction between the individual, the organization and technology.

4.4. Towards a new framework

It is now time to clarify the definitions of the main concepts we have studied up to this point. This theoretical analysis puts forward the concepts of adoption, acceptance and appropriation. In order to clarify these terms, we will, in the rest of the paper, focus on the notions of adoption and appropriation, which refer to two clear distinct ideas. The notion of acceptance, on the contrary, has in the literature the same meaning as adoption as it refers to use intention as the dependent variable. We prefer not to employ the term "acceptance" any more considering its limits in practical situations (cf. supra, 3.3.3).

- **Adoption**: Longitudinal two-step process leading to a decision for ICT use.

The literature review shows that adoption has essentially been analyzed

at the individual level (through a binary choice between ICT acceptance or rejection), but may also appear at the organizational level, when the firm decides to invest in an innovation (Zaltlman, Duncan & Holbeck, 1973). A distinction can indeed be made between "primary adoption" (the firm's decision to adopt the innovation) and "secondary adoption" (ICT implementation and adoption by the individuals). Adoption is thus a complex phenomenon where individual and organizational levels closely interact. We have moreover seen that different kinds of adoption may appear, depending on this interaction.

- **Appropriation**: ICT technical and cognitive mastery, which integrates practices into the daily use in a significant and creative manner.

"Appropriation is the process by which people incorporate advanced technologies into their work practices" (DeSanctis & Poole, 1994). Through appropriation, individuals interpret and give sense to ICT. Appropriation opens possibilities of reinvention and diversion (uses are faithful or not to the "spirit" of technology, DeSanctis & Poole, 1994).

The literature review also enabled us to put forward the main constructs of ICT adoption and appropriation, which were directly used in the creation of the interview guide and in the thematic coding procedure.

Concept	Determinants or main constructs	Conceptual frameworks
Adoption	Performance expectancy, Relative advantage, Perceived usefulness	Rogers (1962), Tornatkzy and Klein (1982), Davis (1989), Venkatesh *et al.* (UTAUT, 2003)
	Effort expectancy, Complexity, Perceived ease of use	Davis (1989), Venkatesh *et al.* (UTAUT, 2003), Tornatkzy and Klein (1982)
	Social influence, subjective norms	Venkatesh and Davis, (2000), Venkatesh *et al.* (2003), Ajzen (1985)
	Moderating variables (gender, age, experience, voluntary aspect of use)	Straub (1994), Gefen and Straub (1997), Venkatesh *et al.* (UTAUT, 2003)
	Knowledge burden	Attewell (1992)
	External variables, isomorphism	DiMaggio and Powell (1983)
	Role of organizational leaders	Daft (1978)
Appropriation	Actors: designers, users, managers	DeSanctis and Poole (1994), Orlikowski (1992)
	Technology: Material artifact, structural features, spirit, equivocality	DeSanctis and Poole (1994), Orlikowski (1992), Weick (1990)
	Institutional properties of the organization: organizational structures, size, culture, control mechanisms	Orlikowski (1992), DeSanctis and Poole (1994)
	Organizing vision, institutional pressures	Ramiller and Swanson (1997)

Table 1: Core constructs of ICT adoption and appropriation.

This literature review about innovation adoption and appropriation has enabled us not only to clarify the definitions of these notions and identify their main components, but also to raise the issue of a potential link between adoption and appropriation. This question is significant insofar as the context in which the innovation is adopted could influence its usage and appropriation by individuals. The goal of this research is to see if we can find some evidence of this linkage in organizations. Our purpose is to show if the different kinds of adoption identified above have an influence on appropriation.

This problematique highlights several research questions:

- Can we establish a distinction between individual and organizational adoption? If such a distinction exists, is there a link between individual and organizational adoption?
- How are usages developed in mobile teams and mobile managers' work practices?
- Can we identify different kinds of usages at individual and organizational levels?
- How do individuals eventually appropriate mobile technologies?
- Is there a link between different kinds of adoption and appropriation?

5. METHOD

5.1. Research design

As our goal is to understand the linkage between adoption and appropriation of mobile technologies, and as no other research has been conducted on this perspective, an exploratory approach was selected. In order to grasp the adoption logic, appropriation and the usage of mobile technology, a qualitative research constituted of semi-structured interviews was carried out. More particularly, our purpose in this paper is to understand adoption and appropriation processes and analyze if there is a link between these processes. The constructs listed in the previous table have enabled us to identify the adoption processes (factors of adoption, initiative and level of adoption – individual or organizational – adoption context, voluntary vs. mandatory use) and appropriation processes (mobile technology usage, perceived goals, spirit and equivocality of mobile technology, interactions between organizational actors, influence of institutional properties of the organization on appropriation and usage). We also tried to identify mobile technologies' specificities such as private and professional adoption and use contexts. One purpose was thus to identify organizational and individual elements of adoption and to see if mobile technologies multicontextuality is effectively met in practical situations. We eventually aimed at analysing whether these specificities have impacts on appropriation processes.

Different levels of respondents were interviewed: CEO, CIO, and other top managers, human resources managers, operational managers, middle managers, area managers and field workers. This qualitative analysis was developed from both a deductive and an inductive perspective: on the one hand

and in accordance with the deductive principle, we identified a priori the major topics related to ICT adoption and appropriation (such topics comprising the interview guide) and on the other hand, in accordance with the inductive perspective, other themes, as expected, emerged from the corpus of transcriptions. The length of each interview was about one hour.

An interview guide had previously been prepared based on a literature review of ICT adoption and appropriation (see Appendix 1). Different guides were prepared in order to take into consideration the different functions performed by respondents. Every interview began with general questions about the respondent (his or her role and responsibilities) and the kinds of mobile technology used within firms. We then used the main components of adoption and appropriation dimensions identified in the literature review to ask questions about the determinants and reasons for organizational/personal adoption. As regards appropriation, we focused on the relationships between organizational actors (users, designers and managers), on the technology used (its perceived goal, or "spirit", its consequences and its potential equivocality), and on the organizational properties likely to influence the interaction between ICT and individuals. We also focused on the environmental pressure.

More particularly, precise questions were asked of respondents about the reasons for mobile tool implementation by firms, the origins of the mobile technology adoption decision, the goals pursued by the mobile technology implementation, the role played by major actors in the adoption process, the allocation process of mobile devices within firms, the context of use (voluntary or mandatory), the relations between users and the initiators of mobile technology implementation, the reactions of individuals vis-à-vis the introduction of these technologies, the usage of mobile tools developed by individuals, and the users' perceptions about the use of mobile devices. Other questions relating to the advantages, drawbacks and impacts of these technologies on management, organization, structures, processes and work conditions were also at the heart of the interviews, in order to comprehend the entire adoption and appropriation processes of such technologies.

5.2. Data collection

The research was conducted in eight large French firms. If the selection of these firms relied on convenience, it ought to be stressed that these firms are nonetheless representative of two economic sectors: manufacturing and the service industry, (both B2C and B2B). Seventy-six interviews were conducted by the research team during the first half of 2005 (January-June). The interviews were tape recorded and then transcribed. The interviews were then subject to a qualitative analysis through a coding procedure using Nvivo software, in order to identify the main logic of mobile technology adoption and appropriation. We applied a mixed thematic coding: in fact we used the main components of adoption and appropriation identified in the literature review to code the transcripts

of interviews. Other codes also emerged from the corpus of interviews, representing dimensions of adoption and appropriation processes ignored by the conceptual frameworks we had previously studied.

5.3. Data Analysis

A wide range of managers and fieldworkers were interviewed including top and middle managers and managers in different functional areas (marketing, HR...). See tables 2 and 3.

6. RESULTS

6.1. Mobile technologies portfolio

One of the first results of this exploratory qualitative research lies in the fact that the firms we studied all use a set of mobile technologies in order to serve workers' needs in mobile situations. Mobility can thus not be reduced to the use of a single mobile technological artifact. As we mentioned previously, we have applied Lyytinen and Yoo's definition of mobility as "a set of technological, social and organizational interconnected elements" (2002). That is why we did not carry out this research with a postulate in mind about the mobile technologies a priori used within firms. On the contrary, we asked people how they viewed mobility, what kinds of devices they used, and all respondents answered that they used a portfolio of mobile technologies. Far from using only one mobile technology and several applications to satisfy their needs, these workers all combine a set of mobile technologies to perform their tasks in mobile contexts. Table 3 summarizes the mobile technology used in the firms surveyed. For instance, some companies use Tablet personal computer (PC) (essentially for fieldworkers), others equip their workers with PDA and smartphones (essentially managers and top managers). Eighteen per cent of respondents also mentioned the fact that they used USB keys,

	Top Managers	Middle Managers	Operational managers	Fieldworkers	Total
IT and service provider Company	3	5	0	0	8
Insurance Company	2	2	1	3	8
Distribution Company	3	6	2	0	11
Energy 1 Company	4	2	4	0	10
Cosmetics Company	4	0	2	3	9
Utilities 1 Company	2	3	5	0	10
Energy 2 Company	6	2	0	4	12
Utilities 2 Company	3	5	0	0	8
Total	27	25	14	10	76

Table 2: Surveyed population.

Firm/Technology	Executive directors	Managers	Field Force	Sales Representatives	Tele-workers
IT and Service Provider Company	x	x	x		x
Insurance Company	x	x		x	
Distribution Company	x	x		x	
Energy 1 Company	x	x	x		
Cosmetics Company	x	x	x	x	
Utilities 1 Company	x	x	x		
Energy 2 Company	x	x	x	x	
Utilities 2 Company	x	x	x		

Table 3: Different types of users of mobile technologies.

considering it a mobile technology. Let us mention other kinds of mobile technologies, which nevertheless remain marginal: global positioning systems (GPS), used in two companies for protection and tracking purposes, and dedicated devices, which are specific to certain contexts and activities which require meter readings and data transmissions.

One salient result of this research thus lies in the fact that the enterprises under study all deploy a set of mobile technologies. As 100% of them use both laptops and mobile phones, we have focused our analysis of adoption and appropriation on these two mobile technologies.

The description of mobile technologies used in firms, and the people concerned reveals that the firms we studied are representative of a wide variety of firms, thus showing that the results we found are not linked to one kind of technology, category of user or nature of activity.

Now that the context of mobile technologies used in the firms studied has

Firm/Technology	Tablet PC	PDA	Laptop	Mobile Phone	Smartphone	USB Key
IIT and Service Provider company		x	x	x	x	
Insurance company	x		x	x		
Distribution company			x	x		x
Energy 1 company		x	x	x		
Cosmetics company		x	x	x		
Utilities 1 company			x	x	x	
Energy 2 company	x	x	x	x	x	x
Utilities 2 company	x	x	x	x	x	

Table 4: Mobile Technologies Portfolio.

been described, let us analyze the adoption process of such technologies within firms. Several results show that the topics of adoption and appropriation are tightly embedded.

6.2. First step of adoption

As shown in the theoretical part regarding technology adoption, the adoption concept has essentially been studied at the individual level, and sometimes at the group level of analysis. Nevertheless, the literature review put forward the fact that adoption is a two-step process, which involves a close interaction between organizational and individual levels of analysis. We will first focus on the initial step of adoption.

Thanks to the data analysis we have found different origins for the first step in adoption. In order to go beyond the individual logic of adoption, we first identified the reasons for mobile technologies adoption at the organizational level. We also put forward that this first step of adoption can appear at the individual level, due to the specificity of mobile technologies.

6.2.1. Performance Expectancy

One of the first reasons for mobile technology adoption by organizations is linked to the increase in performance and productivity, especially in the case of fieldworkers. The content analysis of the interviews indeed reveals that organizational adoption of mobile technologies lies in the search for responsiveness, an increase in flexibility, time optimization, an immediate access to information, and a permanent reachability.

"These tools should allow us to drastically increase commercial productivity" (Top manager, Insurance Company)

"For the technical workforce, with a massive workload since we have millions of clients and appointments with high levels of activities, what the company wants to do with these tools, it's to increase productivity, that is very clear in everyday work" (Top manager, Energy 1 Company)

"If my company provides us with these tools, it's mainly to improve performance. The company is expecting me to be and/or stay a high performer" (Line manager, Cosmetics Company)

"It comes from the search for productivity and efficiency" (Europe Marketing Director, Energy 2 Company)

"We had a goal of productivity gain through the reduction of 15% of total workforce. We had then another objective to get closer to the customer. We have developed a fleet that could move from the main office base and we have given them necessary tools to be able to give their clients precise information and answer their questions..." (Middle manager, Utilities 2 company).

The adoption of mobile technologies thus seems to be linked to the mobile nature of activities. These different examples show that the reasons explaining mobile technology adoption by organizations fulfil clear objectives of increase in productivity and responsiveness of fieldworkers. In fact, these

determinants, that were already identified in traditional adoption models, all deal with the idea of "relative advantage", "perceived usefulness" and "performance expectancy" (UTAUT, Venkatesh *et al.*, 2003), intended to improve the customer relationships and increase productivity gains. In these cases, the adoption logic thus appears as a rational process driven by strategic thought (Kwon & Zmud, 1987).

6.2.2. Social influence at the organizational level

Another reason guides the mobile technology adoption process by organizations: social influence. Traditional adoption models all considered the role of social influence, but at the individual level (UTAUT, Venkatesh *et al.*, 2003). Yet, we identified a significant role played by social influence, not at the individual level, but at the organizational one. Above the performance expectancy, the discourses indeed show that the organizational decisions of mobile tool implementation are largely driven by imitation. It seems that organizations sometimes adopt mobile technologies because others – particularly concurrent firms – do so, or because their environment – constituted of media, vendors and social groups – exert on them an implicit pressure to do so. Mimetic phenomena were therefore observed in all businesses studied in this research. As with Carton, De Vaujany, and Romeyer (2003) regarding other technologies such as Intranet and ERP, we see through this case analysis that the firms under study are in an "open logic", as they are receptive to the "Organizing Vision", which leads to a reinforcement and a reproduction of the "authorized discourses" about mobile technologies. Organizational actors are thus even more convinced of the necessity to adopt mobile technologies.

The adoption process is therefore far from always being driven by a cogent and well define strategic thought and rational negotiations (Kwon & Zmud, 1987). There seems to be a lack of "mobile strategy" in the firms studied, which is reflected in the absence of financial analysis before the launch of mobile investments and the lack of strategic analysis about the value added by mobile devices. In fact, social influence also has a significant impact at the organizational level. Following are some of the main striking examples, derived from the respondents' comments, representative of this imitation logic:

"Our competitor X already had a 15-year lead on us. It was not in our culture, you could say it had the effect of an atomic bomb" (Sales Director, Distribution Company)

"When we realized that our competitors used such devices, we jumped on the bandwagon!" (Sales Manager, Cosmetics Company).

"Our competitors do the same things. Considering our competitive environment and the consumption habits, these technologies were obvious!" (Human Resources Manager, Insurance Company).

"We started using these technologies because we noticed that other companies had adopted these things and had excellent results. We have copied them

and now we are waiting for the next revolution!" (Area Manager, Cosmetics Company).

"In the field of energy or water, I would say they [competitors] have a two-year lead on us. For them, it [mobile technology] has been effective for a long time" (Project Leader, Utilities 2 Company).

We can even notice that this imitation phenomenon is often linked to the image the firm wants to give to people – customers and competitors – that is to say, the environment. By adopting such technologies, firms are willing to improve their image and show that they are modern and innovative:

"The effect of imitation lies in the desire not to be viewed as old-fashioned" (Middlemanager, Cosmetics Company).

"Nowadays, if we said: we don't work with this type of technology, young people wouldn't want to work with us. It would give us a retrograde image!" (Managing Director, Energy 2 Company).

"It is a part of the image we want to give to the reputation of the firm" (Fieldworker, Energy 1 Company)

Therefore one of the salient results of this qualitative analysis lies in the fact that mobile technology adoption at the organizational level relies largely on mimetic phenomena. Social influence thus plays a significant role at the organizational level, and not just the individual one, as shown by the TAM models and other researchers (Gallivan, 2001).

This adoption process, driven by mimetic phenomena, has several consequences on the allocation policy within firms. More particularly, a direct implication of this mimetic logic of adoption lies in the fact that the allocation of such mobile devices is linked to status. Unequal allocation logic has thus been observed in the firms we studied, especially between managers and fieldworkers. The studied cases clearly show that the allocation of such technologies corresponds to a hierarchical, symbolic and status logic, insofar as the highest-ranking individuals are equipped with the most sophisticated and most modern devices.

"With these technologies, people position themselves with regard to others: 'I've got one, you, you are not in the same class as me'. It's a shame – I really think objectively that I'm not the one who profits the most from it. It would probably be really more useful to somebody who has a nomad job. He'll be equipped later whereas I'm equipped immediately. It's the problem of this categorization by level, by downward layers, it's the simplest but probably not the most effective" (Human Resources Director, Insurance Company).

"A distinction is made in accordance with the colour of workers' collars" (IS Director, Utilities 2 Company)

"The mobile phone is paid by the firm, as soon as we are managers" (Manager, Utilities 1 Company)

"The less high the function is, the fewer technologies there are" (Overseas Manager, Energy 2 Company)

These examples show that different populations in the same firm are not equipped with identical mobile technologies. The adoption decision at the organizational level thus does not mean a generalization of mobile technology use across the whole organization. The organization can indeed decide to adopt mobile technologies but not to equip some categories of employees – who nevertheless have a nomad job – with these tools. Such an unequal allocation logic leads to adoption decisions at the individual level.

6.2.3. Individual auto-equipment and pre-experience

Since no clear allocation policy exists within firms, some people feel unsatisfied and excluded from the allocation logic. Some mobile employees indeed consider mobile technologies as indispensable tools considering the nomadic nature of their tasks, but they are not equipped by their firm. The unequal allocation logic therefore explains why some people "auto-equip" with mobile tools, and finally adopt by themselves the mobile tools their firm does not give them. Use value is thus sometimes perceived by the employees and not by the organization itself. The case of consultants is particularly striking. Mobile phones are only given to managers, who mostly stay at the office, while junior or senior consultants, who are by definition nomad, are not equipped with such devices. Given the fact that no mobile phones are allocated to them, consultants acquire such mobile tools themselves and have to use their own mobile devices in order to perform their tasks.

"The mobile phone is not furnished by the firm, in any case for junior consultants" (Junior consultant, Utilities 1 Company)

"I am forced to use a personal mobile phone to give professional phone calls" (Senior consultant, Utilities 1 Company)

"It's not a work phone I use, it's my own. I have to use it when I'm on trip, when suppliers want to contact me, in show rooms ... Everyone has my personal phone number, my colleagues and my superiors" (Project Manager, Distribution Company)

The adoption initiative may thus appear at the individual level – not only at the organizational level – although such an individual adoption is largely due to the firm's decision not to equip all its employees with mobile tools.

Other cases of individual initiative also occur, as mobile technologies are sometimes considered status symbols.

It should be stressed that mobile technologies are not only considered as work and communication tools but also symbols of social promotion and equity. It thus happens that individuals, especially young individuals and those who have an operational function, exert a certain pressure on their supervisors in order to be equipped with mobile devices. Mobile technologies are thus sometimes claimed by the employees themselves. Consequently, some supervisors told us that they often have to "slow down the employees' requests".

"Young people tell us: if you don't give us this kind of technology, we'll go to your competitors. It's a real culture of zapping" (Human Relation Manager, Utilities 1 Company).

At the individual level, another adoption logic has to be pointed out, insofar as it has an impact on the organizational deployment of mobile tools within firms.

6.2.4. *Effort expectancy*

It indeed appears that individuals generally have significant personal experience with the use of mobile devices before they enter the firm. The knowledge burden (Attewell, 1992) linked to mobile technologies' use is very light, so that perceived ease of use of these devices favours the individual adoption process.

In many cases, the adoption process of mobile technologies may thus occur before adoption by the firm. In some cases, people have their own devices before they enter the firm, which they use outside the organizational context. Mobile devices, beginning with mobile phones, are indeed fashion items, easy to use and subject to a contagious effect. There is moreover a network effect that leads people to adopt mobile technologies as soon as a critical mass of users exists. Therefore the utility derived from the adoption of such an interactive technology increases as soon as a threshold in the number of adopters is reached. This explains why so many people have adopted their own devices before they enter the firm.

"I was already equipped before X equipped us" (Sales fieldworker, Cosmetics Company).

"There is a real demand linked to the fact that people have their own PCs at home" (VP, Energy 1 Company).

Such an adoption process has serious implications on mobile technology deployment logic within firms. Considering the fact that mobile technologies are easy to use, not complex and that individuals generally have a personal pre-experience of mobile technology use, organizations are led to adopt such technologies and to equip their employees with mobile devices. As mobile technologies are used in private life and do not present high knowledge barriers, organizations are influenced in their adoption decision. The usage developed in private life thus contributes to the reinforcement of social influence on the organizational adoption decision.

"Using such devices won't be difficult because people have already learned to use other technologies and they will learn more and more quickly" (IS Director, IT and Service Provider Company).

To conclude, as "effort expectancy" linked to mobile technology use is very low, and mobile technologies are commonly used in private life, organizations eventually consider that it is generally not necessary to accompany their deployment in the firm with training programs.

"When we don't know how to use a device, there is inevitably somebody in our family or among our friends who knows how to use it, so it is mutual learning. It is part of the culture to know

these tools". (Human Resource Director, IT and Service Provider Company).

We can nevertheless notice a distinction, between managers and fieldworkers, in the training and support offered by organizations during mobile technology deployment. As mobile technologies are not adopted for the same reasons – considering these two kinds of users – the training and support that accompany mobile technology deployment is also different. Whereas the adoption of mobile technologies at the management level is characterized by mimetic phenomena and a lack of strategic thought, the adoption decision with regards to the operational level is conceived as a more traditional IS project, corresponding to a search for productivity and performance, a desire for standardization and process automation. It explains why the deployment of mobile technologies for fieldworkers is accompanied by training campaigns and mobile technology presentations. On the contrary, mobile technology functionalities, purpose and way of use are not often presented to managers.

"An explanation and training stage is necessary for people to understand how to change their way of working" (IS Director, Energy 1 Company)

"Mobile technologies are presented to us, there is training, and some people are available to help us if we have difficulties" (Sales Representative, Cosmetics Company).

"When I see what other directors do better than me, what others do worse than me, I think we don't all have the same level and we should, there would be a great advantage in imposing training. We could significantly progress" (IS Director, Energy 2 Company).

This analysis of the first step of mobile technology adoption shows that the adoption process is far more complex than in traditional models. We eventually see that different kinds of adoption coexist within the same firm: the adoption may appear at the organizational level, for different reasons, depending on the nature of potential uses, but also at the individual level. We have even shown that organizational and individual levels of adoption both exert an influence on each other. For instance, on the one hand, the unequal adoption process at the organizational level leads employees to equip themselves with mobile technologies. On the other hand, the fact that mobile technologies are generally adopted and used in private life reinforces the role of social influence on the adoption decision at the organizational level. This analysis about organizational reasons of adoption also enables us to go beyond classical adoption models by showing that the elements of individual adoption (performance expectancy, social influence and effort expectancy) can be found at the organizational level.

Considering these different adoption processes, we can now wonder if they lead to distinct appropriation behaviours.

6.3. Appropriation logics of mobile tools by workers

We have examined in the previous section that different adoption logics

coexist, leading to distinct allocation policies of mobile technologies, addressed to two kinds of users: managers and fieldworkers. Our purpose now is to see how managers and fieldworkers appropriate mobile technologies, and analyze if the distinct adoption processes we have identified lead to different appropriation behaviours.

6.3.1. Managers' appropriation logics

Lack of consideration of users' needs

We have seen earlier that the allocation of mobile technologies is often linked to status and not to a user's needs analysis. The highest-ranking individuals are thus equipped with the most sophisticated mobile technologies, whereas they do not necessarily need such devices.

Many managers have for example pointed out their fact that the lack of involvement of the Human Resources department in the adoption process leads to a poor fit between mobile technology deployment and users' needs.

"We should select categories of users, and enable a collaboration between IS and HR that we have not done yet. We should say: 'such function needs such mobile technology.' [...] I think we would really be more effective" (HR Director, Insurance Company).

"The Human Resource department is not really involved" (HR Manager for Fieldworkers, Insurance Company).

The managers we interviewed often pointed out the fact that they did not see the interest in, and even the utility of, the mobile tools they were given. Most managers told us that they were equipped with devices they did not need, blaming in certain cases the IS department for the unilateral nature of its decisions, especially in cases of replacement of mobile devices.

"The last time they changed my mobile phone, I hadn't even asked for it" (Managing Director, Energy 2 Company).

"Our IS department continually changes our mobile phones, we hardly get used to a device and they tell us: 'wait, wait, we will give you a better one.' It never stops!" (Managing Director, Energy 2 Company).

The fact that oversophisticated mobile technologies are allocated to managers moreover has consequences on the usages made of such devices.

Low use of mobile technologies

As shown by the previous example, many managers told us that they do not have time to get used to a device, learn to use it and, finally, appropriate the technology. As mobile technologies are too sophisticated and not adapted to their needs, many managers do not use the mobile technologies that are at their disposal, or they underuse the main functionalities of these devices.

Moreover, we have seen in the previous part of this paper that the adoption decision with regards to managers is not accompanied by training campaigns and presentations of the mobile technologies' functionalities and

purposes. Mobile technologies, with regards to managers, are indeed adopted because of mimetic phenomena and correspond to a status allocation logic. Mobile technology use is thus voluntary and training is not considered essential. This lack of mobile technology training and presentations probably explains the fact that managers are not always aware of the possible functionalities of the mobile devices with which they are equipped.

"I'm sure I have lots of functionalities that I do not need and will never use!" (Overseas Manager, Energy 2 Company).

"I try to use it as often as possible, but I underuse a large part of the possibilities that are offered to me" (Junior consultant, Utilities 1 Company).

"Everybody uses it at a strict minimum" (Sales Manager, Cosmetics Company).

Furthermore, it appears that the adoption logic of mobile tools influences managers' uses of such tools. The potential of mobile technologies really seems to be underexploited by managers in the firms we surveyed. Lots of possibilities and functionalities are indeed offered by such technologies, but managers limit their usage of them to communication.

"For company leaders and managers, uses are essentially office tool ones, that is to say to be able to make appointments and send e-mails" (IS manager, Insurance Company).

"I rarely take my laptop, [...] the main use that I make of it is e-mail" (Human Resources Manager, Insurance Company).

"These technologies enable you to stay in contact and to make access to information easier. Having a laptop or a mobile phone enables you to transmit information more easily and to receive information" (Area Manager, Energy 2 Company).

These examples clearly show that the adoption logic has consequences on mobile technology usage. The data analysis has also enabled us to see that paradoxical appropriation behaviours sometimes emerge in the cases under study.

A paradoxical appropriation process linked to functions and responsibilities

Most of the managers we interviewed focused on the drawbacks mobile technologies can have on the boundaries between professional and private life, or on the dangers linked to the instantaneity of decision-making. That is why many of them question the value of such technologies.

"I don't think that I'm more efficient. I'm really more busy than before, so I think that these tools probably mean an increase in work time" (Area Manager, Energy 1 Company)

"Information overload and the permanent reachability make us less efficient" (IS Manager, IT and Service Provider Company).

"If everybody measured everyday the time lost because of all these devices, we would see that it can really make us waste time...And I'm not even bringing up the psychological impacts it can have!" (Marketing Manager, Energy 2 Company).

"For private life, it is a real intrusion on intimate life, we are always interrupted, we can't deny it!" (Human Resource Manager, Insurance Company)

Nevertheless a paradox emerges as the managers we interviewed eventually appropriate such technologies. Most of them think that using such mobile technologies is an integral part of their function, considering their responsibilities and the fact that they are well paid. Therefore they appropriate directly mobile devices, and, indirectly, all the potential impacts on their professional and daily lives. Finally, these managers appropriate mobile technologies by admitting that the use of these technologies and the inconveniences that accompany them are normal considering their function.

"People accept such an invasion because of their objectives and because they are company managers" (Human Resource Director, Insurance Company).

"It's part of the function and responsibilities" (Area manager, Energy 2 Company).

To conclude, these examples reveal that the adoption logic of mobile technologies has impacts on usage and appropriation in the case of managers. We will now pursue our analysis with another kind of adoption process (authority-based innovation adoption) towards another category of users (fieldworkers).

6.3.2. Fieldworkers' appropriation logics

Mandatory use of mobile technologies

With regards to fieldworkers, we have previously shown that the adoption decision lies in the search for performance, process rationalization, standardization, and control of activities aimed at increasing the productivity of operational workers. It indeed appears that mobile tools are a means for firms to standardize operational processes, optimize field interventions and eventually control fieldworkers' productivity.

"What we want with these tools is the possibility to control fieldworkers, that's to say, the possibility to increase productivity" (Human Resource Manager, Cosmetics Company).

"With these tools I immediately see and compare the productivity of each fieldworker, I can make comparisons of turnover per individual, per country, per company" (Sales Manager, Utilities 2 company).

"It enables the technician to have all necessary tools to make his service call. As he will have access to all the data concerning the customer, we will thus maximize the efficiency of the operation and avoid unnecessary travel" (IS Manager, Utilities 2 Company)

"We improved productivity because before there were people who typed the data in our information systems! We made lots of productivity gains." (IS Manager, Insurance Company).

The benefits the enterprise can obtain from mobile technologies are obvious, in terms of responsiveness, productivity and control. That is why the implementation of mobile technologies with regards to fieldworkers corresponds to an authority-based innovation adoption and mandatory use. Mobile technologies moreover have an effect on work practices: the operatio-

nal managers we interviewed generally pointed out the fact that mobile technologies are linked to software which allow them to quantify such benefits and make statistics in order to compare productivity ratios between fieldworkers or between areas, and thus exert on them a kind of pressure in order to increase their performance.

"We cannot reveal immediately our ambitions for mobile technologies to employees, otherwise it would be obvious that we can have an extraordinary increase in productivity and control with these tools. We need patience in deployment" (IS Director, Energy 1 Company).

"The introduction of these tools has to be progressive because it can be a shock on the tracking of activities. We have to find an equilibrium in introducing these tools harmoniously, for them to be accepted, in order to have productivity without any social rejection on this question" (IS Director, Cosmetics Company).

Thus mobile technologies then have to be appropriated by individuals to bring benefits to organizations. We therefore can ask how fieldworkers appropriate these mobile technologies. In fact, in spite of the reduction of the operational workers' professional autonomy, the control exerted over them and an implicit increase in work time linked to the use of mobile tools, it seems that fieldworkers finally appropriate such technologies. Fieldworkers are indeed aware of the potential drawbacks of mobile technologies in terms of tracking and control but they eventually consider that the advantages of such devices are far more important.

An appropriation process linked to individual benefits obtained in the professional sphere

Several reasons for mobile technology appropriation by fieldworkers have been identified: first, fieldworkers appropriate mobile technologies because they can obtain professional benefits from mobile technology use. Mobile technologies are indeed perceived as status symbols, which give fieldworkers a sense of self-worth, a certain amount of prestige.

"When the [Energy 1 company] agent goes to its customer, without his paperwork his image is raised. It is really an instrument of validation" (IS Director, Energy 1 company)

"There is a social element. Some of our colleagues, when we gave them laptops, were extremely proud of it vis-à-vis their family. Children admire a father who brings a laptop home. It gives them a social status which continues" (Customer Relationship Manager, IT and Service provider Company).

"At the beginning, there is a social aspect in the firm. Mobile phones or laptops gave a status" (IS Manager, Cosmetics Company).

Many fieldworkers appropriate mobile technologies because they feel more responsible with them, having the impression that mobile tools contribute to the development of their job which in turn leads them to assume more responsibilities. Many of them feel more integrated into their

firm and think that it increases the prestige of their profession. The use of mobile tools indeed sometimes leads the individual to achieve new tasks and assume more responsibilities, in terms of reporting, costs improvement or team management.

"It enhances the image of their job" (IS Director, Cosmetics Company).

"These tools are really motivating, they give a sense of responsibility" (IS manager, Energy 2 Company).

In the same spirit, fieldworkers think that mobile technologies enable them to be more efficient in achieving their tasks and helping them in their job. Employees thus feel valued and empowered as their firm gives them the means to perform better.

"These tools were given to make us more efficient. It is an inestimable progress" (Area manager, Utilities 1 Company) "Mobile tools enable me to better organize my work. So for me, it's really important" (Area manager, IT and Service Provider Company).

Moreover, fieldworkers appropriate mobile technologies because they can benefit from them in their private life.

Individual benefits in the private sphere

Mobile technologies may be used in the private sphere and even sometimes enable fieldworkers to use professional time for private goals. These employees indeed try to take advantage of the technologies they are equipped with through personal and private use, an increase in personal autonomy, a new personal organization thanks to time optimization, the possibility of micro coordination and an increase in flexibility. It indeed appears that individuals really appreciate the new form of flexibility that is offered to them and the possibility to better manage their time. For example, the fieldworker is not necessarily compelled to go back to the office in the evening after his day of work – mobile technologies enable him to go back home and work there. Another example lies in the fact that the individual also has the possibility of spending more time with family and working later.

"It mixed up the notion of work time and availability. An individual who has access to such devices can go home, have his dinner, watch a film and then go on working" (International Sales and Marketing Manager, IT and Service Provider Company).

"It enables us to work anywhere" (Fieldworker, Energy 2 Company).

"Every week at the same time, we have a team meeting. Then, I work really well. Also, because I work at home, I do this properly. I don't work from 8 in the morning to 5 at night. I don't do that. I take my kids to school, I work in the morning and the early afternoon. My kids come home from school and I'm home. We do their homework in the afternoon. But I always eat with the family. And I often used to work 9 p.m. to midnight. But I have very flexible schedules" (Marketing Research Manager, IT and Service Provider Company).

These examples show that the benefits of mobile technologies to fieldworkers in their private life enable them to

appropriate the technologies in the professional sphere. While adoption of mobile technologies can be considered as a constraint by fieldworkers, who do not have the choice to reject such devices, these users finally appropriate them because they find useful counterparts in their private life.

7. DISCUSSION

This exploratory research shows that the problematic nature of individual versus organizational levels of analysis, as well as the topics of adoption and appropriation, are very complex and tightly embedded. The analysis of usage shows that different appropriation behaviours appear according to different adoption logics. This analysis thus puts forward a link between adoption processes and appropriation. The data collected in this study show that the appropriation of mobile technology by individuals is largely conditioned by the way it is adopted. There has generally been a distinction between adoption and appropriation in IS research but this first result leads us to a conceptual renewal aiming at better comprehending the adoption and appropriation logics and the link between these. This first exploratory result would thus deserve to be verified in future research.

- P1: Under which conditions is appropriation linked to adoption? Can we generalize such a link to other kinds of technologies?

The results also reveal that in mandatory adoption situations, extraorganizational benefits are necessary to the appropriation process of mobile technologies. As individual benefits in the organizational and private sphere are necessary to the appropriation of mobile technologies, we are prompted to go beyond the organizational context to analyze adoption and appropriation notions.

- P2: Can this preliminary result be generalized to technologies other than mobile phones and laptops?

The data analysis also shows that organizations equip, or not, different kinds of workers. This unequal allocation process thus leads some individuals to equip themselves, which is a new phenomenon in organizational contexts. Non-allocation at the organizational level thus implies adoption at the individual level.

This research eventually shows that the individual pre-experience and adoption in the private sphere influence organization's decisions to adopt mobile technologies.

These different results have enabled us to propose a draft of an adoption-appropriation model where the extra-organizational context plays a more significant role than in traditional models.

This model represents the individual (personal sphere) and the organization (professional sphere), showing the tight embedding of both micro and macro levels of analysis in the case of mobile technology adoption. The adoption process can start at the individual level (prior to the adoption by the organization) or can start by the adoption decision made at the organizational level. Different reasons, linked to performance expectancy, social in-

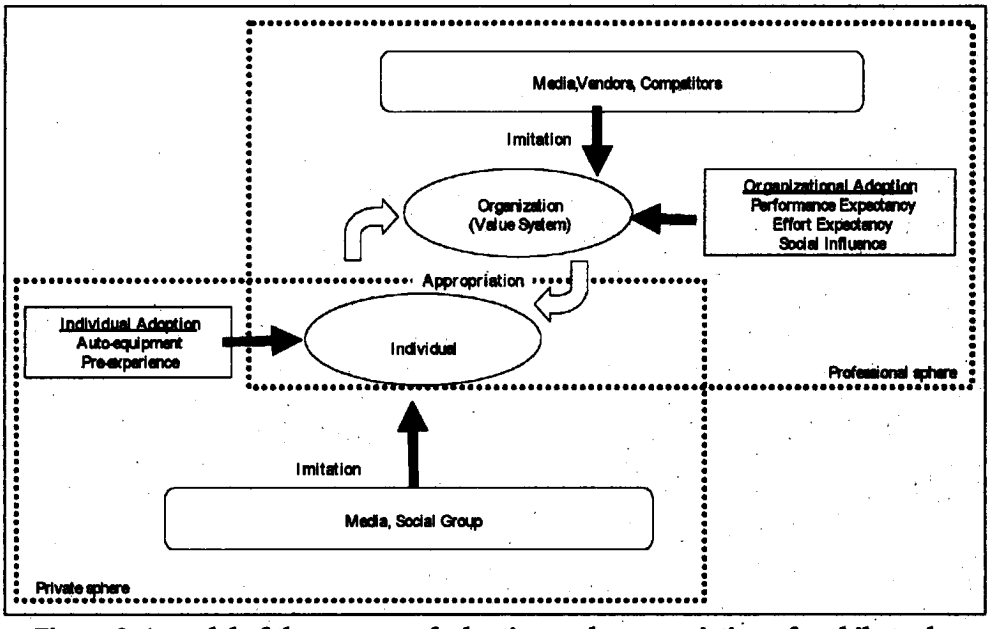

Figure 2: A model of the process of adoption and appropriation of mobile tools.

fluence and effort expectancy lead firms to adopt mobile technologies. It is the value system of the organization that drives the allocation policy, which consists of a symbolic and status logic. Due to this specific allocation policy, the individual is sometimes compelled to acquire mobile technologies him or herself, as represented by the term "auto-equipment". The individual is also subject to social influence through a phenomenon of imitation, coming from the pressure of mass media and from the social group he or she belongs to, which enables the individual to develop a "pre-experience" of mobile technologies, which also influences the organizational adoption decision.

As stated before, it appears that adoption and appropriation are closely linked. Different patterns of appropriation have indeed been identified, depending on the nature of previous adoption and the hierarchical level. With regard to managers, even if they question the value of mobile tools, they finally appropriate such technologies because they are linked to the nature of their activity and function. Regarding fieldworkers, mobile technologies are eventually appropriated because they can benefit from them, both in organizational and extraorganizational contexts.

To conclude, this model enables us to understand the adoption process by making a link between notions that have been for too long separated in the academic literature: adoption and appropriation. In fact, it seems that these notions are closely interrelated and that the appropriation logic is largely governed by the adoption logic.

Nevertheless, this model has several limits. This model indeed represents the adoption and appropriation of mo-

bile technologies, and shows that individuals largely use them at the extraorganizational level. We can thus wonder if all other technologies or applications used within organizations can be assessed in this model. It seems that this model could enable us to comprehend the adoption-appropriation logics of other technologies, such as instant messaging and e-mailing, insofar as their usage is common in the private sphere.

8. CONCLUSION

This first exploratory research on mobile technologies adoption and appropriation by companies shows that the two concepts cannot be theoretically separated. Indeed, the large diffusion and adoption of mobile technologies in the private life of people has a strong influence on the adoption process by companies. At the organizational level, companies often follow a mimetic behaviour rather than a rational adoption process. The consequences are that the appropriation process is mostly dictated by organizational characteristics such as hierarchical and symbolic logics. Very few surveyed companies (only two) had a formal mobile project with a classical ROI analysis and an evaluation of the gains created by a mobile organization. This logic of adoption generates different type of uses among employees. Managers only use a very limited number of possibilities of mobile technologies, thus limiting the benefits for the organization. Employees use mobile technologies differently as they are obliged to use them to manage operations and also to report to their hierarchy.

By their specific characteristics, mobile technologies show us that the traditional concepts used in the IS field to understand ICT adoption and appropriation should no longer be separated as they traditionally have been. Moreover this research points out that the relation between the individual level and the organizational should also be reconsidered, as the appropriation process of mobile technologies is the result of strong interactions between these two levels. These first results should be confirmed in the future by a quantitative analysis.

This research indeed leads us to different propositions, which would deserve to be verified in future research. For example, we wonder under which conditions appropriation is linked to adoption. Can we generalize such a link to other kinds of technologies? We have moreover seen that in mandatory adoption situations, extraorganizational benefits are necessary to the appropriation process of mobile technologies. We can thus wonder if this preliminary result can be generalized to technologies other than mobile phones and laptops. This research also has shown that individual pre-experience and adoption in the private sphere influence organizations' decision to adopt mobile technologies. Can this preliminary result be applied to other kinds of technologies? These are some of the main propositions derived from this paper for future research.

From a managerial perspective, the research shows that companies do not manage mobile projects as they

should. This situation is certainly linked to the fact that mobile technologies are still new for many companies and that their understanding is limited. Moreover, mobile technologies introduce many changes relating to time, space and control, which can frighten employees. A true nomadic culture (Chen, Nath, 2005) is then needed to get the most from mobile technologies.

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10. APPENDIX 1 INTERVIEW GUIDES

Fieldworkers

Introductory Questions:

- Could you present yourself (experience, hierarchical position, activity) and describe your current responsibilities?

Basic questions:

- Kinds of mobile technologies used
  - o What kinds of mobile technologies did your firm give you?

- Who do these mobile technologies belong to?
- For which activities do you mainly use these mobile technologies?
- Who are the other users of mobile technologies in your firm?
- Do you personally have mobile technologies?

- *Reasons for adoption*
  - Could you explain the reasons that led your firm to adopt and give you mobile technologies?
  - Strategic reasons? The search for responsiveness and productivity? An improvement in customer relationships?
  - What are, according to you, the goals pursued by the implementation of mobile technologies in your firm?
  - Do you think your competitors used mobile technologies before you?
  - How would you characterize your organization's culture and do you think such a culture had an impact on mobile technologies implementation?
  - Did you ask your superiors to be equipped with mobile technologies?

- Mobile technology deployment
  - When were you informed of the decision to implement mobile technologies in your firm?
  - How was this mobile project presented to you?
  - Do you think the potential benefits, drawbacks, and costs were analyzed?
  - Did you express your needs before implementation?
  - Did you feel associated with this project?
  - Could you describe your role in this implementation process?
  - What was, according to you, the role of the Information Systems Department in the mobile technology initiative and deployment?
  - What was the role of the Human Resources Department?
  - Did other departments have a specific role in this implementation process?
  - How do you think these mobile technologies are allocated in the organization?

- Individual reactions and perceptions
  - How did you react to the introduction of mobile technologies? Did you have negative reactions? Did you have difficulties?
  - Were you willing to use such technologies?
  - Do you think these mobile technologies address your needs?
  - Do you think that the use of mobile technologies improves your performance?
  - Do you feel satisfied?
  - Do you think that mobile technologies are symbolic tools?
  - Do these technologies have an impact on stress?
  - Do these technologies have an impact on your private life?
  - Do you feel supported by your superiors or by IS function when you use mobile technologies or when you have problem with them?

- Usages
  - How often do you use these mobile technologies?

- o Do you have to use your own mobile technologies for professional purposes?
- o Is use of mobile technologies mandatory or do you have the choice to use them or not?
- o Do you feel a certain pressure from your superiors to use mobile technologies?
- o Are there incentive mechanisms to encourage you to use mobile technologies?
- o Do you have the possibility to use these mobile devices for private goals?
- o Do you exploit all the functionalities of these mobile technologies?
- o Do you think mobile technologies are easy to use?
- o Did you get training in order to use mobile technologies?
- o Did your personal circle (family, friends) have an influence on your use of mobile technologies?

- Impacts
  - o What benefits do you get from mobile technology use?
  - o Are there drawbacks of mobile technolog use?
  - o What is, according to you, the impact of mobile technologies on work practices, organization, structures, processes and values?
  - o Does it have an impact on your personal organization, on the time you work?
  - o Do you feel more autonomous?
  - o What is the impact on management?
  - o Does it have an impact on image? Does it give you a better image toward clients?
  - o Has the introduction of mobile technologies changed the culture of your firm?
  - o Do you feel that you have to be more responsive?

Top managers and middle-managers

Introductory Questions:

- Could you present yourself (experience, hierarchical position, activity) and describe your current responsibilities?
- Could you describe your firm? What are the main strategic orientations in your firm? Size? Structures?
- Could you describe the evolution of your environment (in terms of technology, competition, customer relationships...)?

Basic questions:

- Kinds of mobile technologies used
  - o Could you tell me what kinds of mobile technologies are deployed in your firm?
  - o For which activities do you mainly use these mobile technologies?
  - o Who are the different categories of users of mobile technologies in this firm?
  - o Do you personally use mobile technologies? Did your firm give you mobile technologies?
  - o How many people use these mobile technologies within firm?
  - o Who do these mobile technologies belong to?

- Reasons for adoption
  - o Could you explain the reasons that led your firm to adopt and use mobile technologies?
  - o Strategic reasons? The search for responsiveness and productivity? An improvement in customer relationships?
  - o What are the goals pursued by the implementation of mobile technologies in your firm?
  - o What is the link between your strategy and the implementation of mobile technologies?
  - o Did your competitors use mobile technologies before you? Did it have an influence on the decision to adopt mobile technologies?
  - o How did you have the idea to implement mobile technologies?
  - o How would you characterize your organization's culture and do you think such a culture had an impact on mobile technology implementation?
- Mobile technology deployment
  - o When was the decision taken to implement mobile technologies in this firm?
  - o Did you plan the implementation decision?
  - o Did you analyze the needs satisfied by such technologies?
  - o Did you analyze potential benefits, drawbacks and costs?
  - o What was the role of Information Systems Department in the mobile technology initiative and deployment?
  - o What was the role of Human Resources Department?
  - o Did other directions have a specific role in this implementation process?
  - o How were these mobile technologies allocated in the organization? What is the allocation logic?
  - o Were there some difficulties in the deployment of mobile technologies?
- Individual reactions and perceptions
  - o How did individuals react to the introduction of mobile technologies? Were there negative reactions?
  - o Were they reluctant or were they willing to use such technologies?
  - o How was the implementation of mobile technologies announced to employees?
  - o And you, how did you personally react when you were equipped with mobile technologies?
  - o Do you think that the use of mobile technologies improves your performance?
  - o Do you feel satisfied?
  - o Do these technologies have an impact on stress?
  - o Do these technologies have an impact on your private life?
- Usages
  - o Is use of mobile technologies mandatory or do individuals have the choice to use them or not?
  - o Are there incentive mechanisms to encourage people to use them?
  - o Do they have the possibility to use these mobile devices for private goals?
  - o Do you think mobile technologies are well used? Misused? Underused?
  - o Are the functionalities of mobile technologies fully exploited?
  - o Do you think mobile technologies are easy to use?

- o Were people trained to use mobile technologies?
- o Do you personally use mobile technologies outside of organizational contexts, during the weekend or holidays?
- o Does it have an impact on the decisions you take?

- Impacts
  - o What benefits do you get from mobile technologies use?
  - o Are there drawbacks to mobile technologies?
  - o What is, according to you, the impact of mobile technologies on work practices, organization, structures, processes and values?
  - o What is the impact on management?
  - o Does it have an impact on the firm's image?
  - o Does the introduction of mobile technologies change the culture of your firm?
  - o Do you expect more responsiveness from your teams?

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