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ABSTRACT

Our goal is to understand the reasons why firms adopt mobile technologies and analyse how these mobile technologies are appropriated by individuals, so that organizations can fully benefit from the implementation of mobile technologies. A qualitative research constituted of 80 semi-structured interviews in 10 firms was carried out. This paper presents a model which highlights the link between the reasons of adoption and the appropriation by the individuals. One of the main results of this paper lies in the fact that such a link between adoption and appropriation is likely to influence the fit between IT and strategic organizational goals.

Keywords

Mobile technology, Adoption, Appropriation, Fit

INTRODUCTION

The specificity of mobile technologies lies in an "anywhere-anytime connectivity" (Lyytinen & al., 2004). Organizations have only recently realized what opportunities are offered by the equipment of their employees with mobile technologies. Disrupting the spatial and global borders of the enterprise, mobile technology are indeed supposed to bring lots of benefits for organizations. However, the impact of a technology depends on the individuals' adoption behaviours.

Our purpose is thus to understand the reasons why firms adopt mobile technologies and analyse how these mobile technologies are appropriated by individuals, so that organizations can fully benefit from the implementation of mobile technologies.

What are the reasons of mobile technologies adoption? How are mobile technologies appropriated by individuals? Is there a link between the reasons of adoption and the way the technology is appropriated by individuals? How does this adoption of mobile technologies by organizations and individuals eventually fit the strategic goals of organizations? These are the questions that arise about the adoption of mobile technologies in organizations.

We first present the mobile technologies potential consequences in organizations. We then analyse the research question of technology diffusion and adoption. An exploratory empirical study, involving 80 managers in 10 companies, is presented to understand the adoption logics of mobile tools and their final added value for organizations. We then analyse the results and their implications.

MOBILE TECHNOLOGIES' SPECIFICITIES AND IMPACTS IN ORGANIZATIONAL CONTEXTS

Organizational benefits linked to mobile technologies' implementation within firms

Thanks to an IS literature review, we have identified several kinds of benefits of mobile technologies, which explain their rapid diffusion in organizations. Mobile technologies introduce in organizations a new form of "flexibility, in terms of space and time" (Varshney, 2003) and are thus very promising for businesses. Mobile technologies, which constitute a "set of technological, social and organizational interconnected elements allowing physical and social mobility" (Lyytinen & Yoo, 2002), can be used in various contexts. This connectivity enables the increase in individual productivity thanks to the removal of space and time constraints. Organizations are thus supposed to be more flexible, allowing an increase in reactivity towards customers. The reduction of coordination costs, the improvement of communication, an immediate access to information, and an increased performance in decision-making are other advantages generally identified by IS research (Gribbins, Shaw, Gebbauer, 2003; Davis, 2002). These potential advantages thus appear as many reasons which lead firms to adopt mobile

tools. Nevertheless, IS research also points out the fact that the introduction of mobile tools may have possible paradoxical effects.

Mobile technologies' paradoxical effects and potential drawbacks

Many authors see the mobile phone as a technology that is likely to have ambivalent and even contradictory effects (Arnold, 2003). As individuals have to remain reachable and available, mobile technologies raise concerns related to the blurring of boundaries between professional and private life and may put a certain pressure on employees (Cousins & Robey, 2005).

The use of mobile technology may also cause problems of fragmentation and disruption of work. Managers may also feel oppressed by this culture of instantaneity which forces them to take decisions in urgency situations or in contexts totally inappropriate to decision-making. Moreover, team and organizational levels may be affected by nomadic computing. The questioning of the space-time common to employees and face-to-face exchanges may deeply affect cooperation, trust, collective decision-making and interpersonal relationships.

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 are an ambivalent technology, whose effects are highly equivocal. Moreover potentially pernicious effects of mobile technologies on employees are factors which may influence behaviours by inhibiting use and mobile tools acceptance. That is why, face to this paradox, a question about adoption of mobile tools by organizations and individuals within firms arises.

TECHNOLOGY DIFFUSION AND ADOPTION, AN ESSENTIAL QUESTION

IT Adoption by organizations

The Theory of the Diffusion of Innovations (TDI, Rogers, 1962) studies the adoption of innovations within a given population. The diffusion process is influenced by different elements: the innovations' attributes, the communication channel, the social system and the change agent. Rogers (1962) adds that innovation characteristics (relative advantage, compatibility, complexity, triability and observability) determine the innovation adoption level. TDI was applied to IS in order to highlight the determiners of IT adoption within organizations (Moore and Benbasat, 1991).

In spite of several contributions, TDI entails numerous limits. Rogers (1962) considers diffusion as a communication process among individuals, thus generalizing findings at the individual level to a macro level, which has been largely criticized. That is why many researchers note that TDI can not be applied to the diffusion of innovations in complex organizational contexts. Moreover, TDI is criticized for its pro-innovation bias, which prevents from understanding behaviors of reject.

Other research have thus tried to consider organizational, environmental and tasks characteristics and suggested to add other factors to fully apprehend the adoption diffusion process (Cooper & Zmud, 1990). Nevertheless, many authors agree on the idea that the results of this major IS trend are mixed and sometimes inconclusive.

Analysis of the principal technology acceptance models in IS

IT expected benefits are often obstructed because of the limited use of the implemented technology, considered as one of the main causes of the "paradox of productivity" (Venkatesh and Davis, 2000). It is indeed necessary that IT are accepted, adopted, and then used by the organisational actors. Various models have studied IT adoption, such as TAM (Davis, 1989), TAM2 (Venkatesh & Davis, 2000), and UTAUT (Venkatesh and al., 2003). Thanks to the identification of determiners and adoption-moderating variables – expected performance, expected efforts and social influence - these models account for 70% of variance in use intentions.

Nevertheless, these models have some limits. These models seem to consider IT as univocal tools and thus seem unable to take into consideration the unanticipated effects of mobile technologies. Yet the effects resulting from the implementation of a technology may differ greatly from an organization to another or from an individual to another.
Furthermore, they only focus on the individual level of analysis, without tanking into account the influence of organization in the adoption logics, the logics of adoption by groups, and the fact that mobile technologies are used in various contexts (private and professional areas). Yet understanding adoption logics requires micro and macro levels of analysis to be combined so as to put forward the social dynamic of adoption. TAM models eventually seem to forget that IT implementation is above all a process of human and social change, which requires an appropriation of the technology by the

individual. A better understanding of mobile technology adoption thus clearly requires going beyond classical acceptance models.

Beyond Technology Acceptance Models: Structurationist and institutionalist models

Structurationist models highlight the equivocal nature of technology and unpredictability of the effects related to IT implementation. Orlikowski (1992) introduced the concepts of "duality of technology" and "interpretative flexibility", showing that IT are a social construct. The consequences of a technology in an organization above all depend on the individuals' appropriation (Desanctis and Poole, 1994) and on the meaning it is given by the actors. Based on a structurationist framework, Desanctis and Poole (1994) have developed the adaptative structuration theory (AST), which highlights the indeterminate effects of the close relationship between "social structure in technology" and "social structures in action". Structurationist models also offer new perspectives on the understanding of adoption logics as they put forward the recursive interaction between man, technology and organization. Thus structurationist models, showing that IT are equivocal and socially constructed, may thus enable us to grasp the mobile tools appropriation logics.

This analysis about structurationist models could be extended by the fact that external factors, out of the organization, are likely to influence the internal vision about IT. An institutional pressure and external representations can indeed contribute to the formation of an internal vision about technology ("Organizing Vision", Swanson & Ramiller, 1997). Isomorphism Theories (DiMaggio, Powell, 1983) also show that enterprises are brought to adopt solutions because of imitation phenomena. IT adoption by organizations thus not always lies in performance expectancy but also in imitation.

Nevertheless attention must be drawn on the fact that structurationist model do not take into account these external forces and more particularly the mimetic phenomena. Moreover, the structurationist models exclusively focus on appropriation and in a way disregard the adoption logic and reasons behind appropriation. Yet, institutionalist theories show that external factors of adoption can influence internal appropriation by the individual. For example, the fact that mobile tools can be adopted and used out of the firm may influence the internal appropriation by the individual inside the organization. That is why we will try to analyse the link between adoption and appropriation and understand the impact of such a link on the fit with strategic goals.

RESEARCH METHODOLOGY

As our purpose is to understand mobile technologies adoption-appropriation logics in an emergent manner and analyse their final outcome on organizational goals, an exploratory qualitative approach was selected.
We carried out a qualitative research constituted of 80 semi-structured interviews in 10 firms, representing various economic sectors: manufacturing, service, industry (both B2C and B2B). Different kinds of individuals were interviewed: CEO, CIO, other top managers, human resources managers, operational managers, middle-managers, area managers, and field workers.
This qualitative analysis was elaborated both from a deductive and an inductive perspective. Every interview began by general questions about the respondent himself and the mobile technology used within firms. More precise questions where then asked to respondents about the reasons of mobile tools implementation by firms, the origins of adoption decision, the role played by major actors, the attribution process of mobile devices within firms and the acceptance behavior of these devices by users. Other questions related to the advantages, drawbacks, impacts and fit with strategic goals of these technologies were also at the heart of the interviews.
The 80 interviews were tape recorded, transcribed, and then subject to a qualitative analysis through a coding procedure realised using Nvivo software. The qualitative analysis of data has enabled us to identify emergent dimensions of IT organizational adoption and individual appropriation and to highlight a link between these two notions.

RESULTS AND DISCUSSION

The content analysis of the interviews reveals the co-existence of different patterns of adoption and appropriation and shows that the topics of adoption and appropriation are tightly embedded. The reasons of adoption by organization can be classified into two main categories, which fit more or less the strategic goals of organizations: a mimetic logic or a strategic reflection. Moreover this analysis reveals that two kinds of users are concerned with the deployment of mobile tools within firms and that different patterns of adoption and appropriation apply to them: managers and field workers.

A mimetic logic in the adoption process

A mimetic logic at the organizational level and its consequences in terms of appropriation

The organizational decisions of mobile tools implementation are largely driven by imitation, in support of institutionalist theories. Organizations are led to adopt mobile technologies because their competitors do so or because their environment - constituted by media, vendors, social groups - exert on them an implicit pressure to do so.

> *"We started using theses technologies because we had noticed that other companies had adopted these things and had excellent results. We have copied them!" (Company F, Area manager).*
> *"When we realized that our competitors used such devices, we jumped on the bandwagon!" (Company C, Salesmanager).*
> *"Our competitor already had a 15-year lead over us." (Company C, Sales Director)*

A direct implication of this mimetic logic of adoption lies in the fact that the attribution of such mobile devices is linked to status and not to a reflection on users' needs. The attribution of such technologies indeed corresponds to a hierarchical, symbolic and statutory logic, insofar as the highest-ranking individuals are equipped of the most sophisticated and the most modern devices. This explains why managers are more concerned with this mimetic adoption logic.

> *"I really think that it's not me who profit the most from mobile technology. It would probably be more useful to somebody who has a nomad job. He will be equipped later whereas I am equipped immediately. It is the problem of this categorization by level, by downward layers, it is the simplest but probably not the most effective" (Company B, Human Resources Director).*
>
> *"A distinction is made in accordance with the colour of collar-workers" (Company J, IS Director)*

The fact that the adoption logics at the organizational level are closely linked to mimetic phenomena and statutory attribution policies has a direct implication on the way people appropriate and use mobile devices.
Some of them do not see the interest and the usefulness of the mobile tools they have. Lots of them do no use the mobile technologies that are at their disposal, or under-use the main functionalities of such devices. In other cases, some respondents told us that they do not have time to get used to a device, to learn to use it and, finally, to appropriate the technology.

> *"Our IS Direction continuously change our mobile phones, hardly do we get used to a device, that they tell us: wait, wait, we will give you a better one. It never stops !" (Company I, Managing Director).*
> *"I am sure that I have lots of functionalities that I do not need and that I will never use !" (Company J, Overseas Manager)*
> *"I under-use a big part of the possibilities that are offered to me" (Company G, Consultant Junior)*

A mimetic phenomenon at the individual level

In many cases, it appears that the adoption process of mobile technologies occurs before adoption by firm. In these cases, people have their own devices before they enter the firm, out of the organizational context, and use them for professional purposes. Mobile devices, in the first rank of which mobile phones, are indeed fashion tools subject to a contagion effect. The individual is thus subject to a phenomenon of mimicry, which comes from the pressure of mass media and from the social group he belongs to.

> *"Some people had a mobile phone before the policy was fixed and I did not asked to give them another device" (Company E, Commercial director)*
> *"I was already equipped before our firm equipped us" (Company F, Sales field worker).*

Such an adoption process may have serious implications in terms of appropriation. Because adoption can occur at the individual level before the adoption at the organizational level, the question of appropriation of such technologies is really complex and upsets the mobile technologies' deployment logic within firms. Private usage seems to inevitably govern the professional use of the mobile device. Moreover, such an adoption process is not without consequences on the organization itself, in terms of organizational justice and of security of information. The usage of the mobile tools developed by the individual is thus not necessarily in accordance with the usage the firm would like to promote.

Moreover, considering this mimetic phenomenon at the individual level, it happens that individuals, especially young individual and those who have an operational function, exert a certain pressure on their directions to be equipped with mobile devices. Use value is then sometimes perceived by the employees and not by the organization itself. Consequently, certain managing directors told us that they often have to "*slow down the employees' requests*" : "*We get led astray into this fashion…It's mimicry" (Company I, Managing director).*

Fit with strategic goals?

Considering this first kind of reasons of adoption (a mimetic logic, a statutory attribution policy, an individual pre-equipment and a pressure from employees) and the appropriation logics linked to them (under-use, questioning of mobile technologies' interest, disruption of professional use) we can wonder if mobile technologies really fit the strategic goals of organizations.

Mobile technologies testify to an adoption process that largely relies in mimetic phenomena. Consequently, no really strategic thought seems to guide the adoption decision and no managerial reflection accompanies the implementation process. Therefore 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, of strategic analysis about the added value by mobile devices, and of their fit with users needs.

> *"It creates a tension and we can wonder what is its added value" (Company B, HR manager)*
> *"We have never asked the question of the advantages brought by mobile tools" (Company F, Sales manager).*
> *"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" (Company B, HRDirector)*

These example lead us to put into question the added value of mobile technologies adopted in a mimetic manner within organizations. Nevertheless, such a mimetic logic of adoption is probably not devoid of rationality. Inter-organizational relations are more and more based on a competition by image, which is now considered as a resource. We can indeed notice that the imitation phenomenon is often linked to the image the firm wants to give to environment.

> *"The effect of imitation lies in the will not to be viewed as old-fashioned" (Company F, middle-manager).*
> *"If we told: we don't work with this type of technology, young people wouldn't want to work by us. It would give a retrograde image!" (Company I, Managing director).*
> *"It is a part of the image we want to give of the reputation of the firm" (Company D, Field worker).*

Moreover, beyond this competition through image, time-competition seems to legitimate the mimetic phenomenon which guides organizations. It seems that organizations do not let themselves the time to analyse the potential benefits and possible pernicious effects of mobile tools. They behave as if the risks linked to non-adoption of mobile tools were higher than those of too rapid adoption. *"We have to work at the same speed as competitors" (Company A, HR manager).*

A strategic vision at the heart of the adoption process

If we have shown before that the adoption of mobile technology intended to managers is largely driven by imitation, which has many impacts in terms of appropriation and leads us to put into question the fit of mobile technologies with strategic goals, the adoption decision as regards operational level seems to be conceived as a more traditional IS project driven by a strategic thought.

"Manifest function" of mobile technologies

Strategic vision is first driven by the "manifest function" of mobile technologies. The organizational adoption of mobile technologies indeed lies in the search for reactivity, an increase in flexibility thanks to a time optimisation and an immediate access to information. Another benefit for firms is the cost reduction, thanks to a decrease in the number of travels and the shrinkage of offices costs.

"These tools really enable us to be more efficient and more reactive" (Company F, Field worker).
"We had a goal of productivity gains. We had then another objective to come closer to the customer." (Company J, Middle manager, Environment)

Organizational goals pursued by the use of mobile technologies also remain in a better access to data and information. Specific databases are thus constituted and regularly updated, enabling operational workers to be more reactive and conclude more contracts than before.

"I will give you one example of the benefits we get with these tools. During a complex negotiation, a customer asked a salesman a question about the price and availability of a product. The salesman immediately sent an e-mail with his blackberry to his office. And before the end of the negotiation, he got the information. As a result, he achieved his contract in an hour and half, and not in two days as before" (Company H, CEO).

Eventually, organizations adopt mobile technology because it has a direct positive impact on the customer relationship. Thanks to the reduction of time response and the increase in reactivity, client satisfaction is largely improved. Moreover, mobile tools give an image of professionalism and modernity to customers, which has a positive effect on firms.

"It enables us to have a better customer service" (Company C, Operational Manager).
"The image given to clients is higher, the perception that the client has of these tools is a perception of professionalism" (Company B, HR Manager).

These different examples show that the reasons explaining mobile technology adoption by organizations answer clear objectives in terms of productivity and reactivity of field workers. Another dimension also has to be pointed out, all the more so as it may have a great impact on appropriation logics and thus on the final outcome of mobile tools.

"Latent function" of mobile technologies

It indeed appears that mobile technologies have a "latent function", which is not obviously expressed by managers within their own firm because of the social consequences it could have.

"We can not show immediately what are our ambitions with mobile technologies, otherwise it would be obvious that we can get an extraordinary increase in control with these tools. We need a patience of deployment" (Company D, IS Director).
"The introduction of these tools has to be progressive because it may be a chock on the tracking of activities. We have to find an equilibrium to introduce these tools harmoniously, for them to be accepted, in order to get productivity without any social reject on this question" (Company E, IS Director).

One of the main benefits for firms indeed lies in the capability to control field workers' activities. Such an implementation corresponds to a will of standardisation and process automation, and control of activities. Mobile tools are indeed a means for firms to optimise field interventions and eventually to control field workers' productivity. Moreover, mobile technologies are linked to softwares which enable to quantify productivity gains and to compare productivity ratios between field workers, and thus to exert on them a kind of pressure in order to increase their performance.

"What we want with these tools is the possibility to control field workers, that is to say the possibility to increase productivity" (Company E, Human Resource Manager)

"With these tools I immediately see and compare the productivity of each field worker, I can make comparisons of turnover per individual, per country, per company" (Company H, Sales Manager).

"With these technologies, we expect each maintenance technician to increase his number of interventions per week" (Company D, IS manager).

Therefore, mobile technologies have an effect on work practices and have then to be "socially" accepted. This latent function of mobile technologies may influence behaviours by inhibiting use intention, prevent appropriation, and have negative and counter-productive impact on motivation. We can thus wonder how mobile technologies are appropriated by employees in order to bring benefits to organizations.

A logic of counterparts

In spite of the control exerted over them, the increase in productivity and in the number of interventions, field workers paradoxically accept mobile technologies. It thus appears that organizational benefits can be grasped because individuals appropriate mobile technologies and take advantage of them. Employees indeed manage to profit from mobile technologies through a personal and private use, and a new personal organization: mobile technology use enable individuals to have a better personal autonomy, thanks to a time optimisation, a possibility of micro coordination and an increase in flexibility.

> *"The autonomy of people is recognized. I really appreciate that." (Company E, Area manager).*
> *"It messed up the notion of timework and of availability. An individual who has access to such devices can go home, take his diner, look at a film and go on working" (Company A, Marketing Manager).*
> *"These tools are really motivating, they give a sense of responsibility" (Company I, IS manager)*

There seems to be a logic of counterparts at the heart of the benefits brought by mobile technologies.

> *"People accept the time optimisation in the evening and also accept to do two or three additional interventions during the day" (Company C, IS Director).*
> *"We have a good social acceptance of these tools, and then a better productivity, thanks to the fact that the individual doesn't have to come back in the evening if he has an appointment at the far end of the area" (Company E, Human Resource Director)*

Moreover field workers generally accept mobile technologies because they feel more responsible and get the impression that mobile tools contribute to the development of their job. These tools are indeed perceived as symbolic and statutory devices, which give field workers a sense of self-worth, a certain amount of prestige. They get the impression that mobile technologies enable them to be more efficient in the achievement of their tasks.

> *"It is a social element. It gives them a social status which still exists" (Company A, Customer Relationship manager)*
> *"These tools were given to me to be more efficient. It is an inestimable progress" (Company F, Area manager)*

Toward a new model of IT adoption and appropriation

Our objective in this paper was to understand how mobile technologies diffuse in organizations and how they are adopted by users in order to bring benefits to organizations and fit its strategic goals. Our goal was also to go beyond classical acceptance models which present some limits to apprehend such processes. The following model represents the individual (personal area) and the organization (professional area), showing the tightly embedding of both micro and macro levels of analysis in the case of mobile technology adoption. As stated before, it appears that adoption and appropriation are closely linked. Different patterns of appropriation have indeed be identified, depending on the nature of previous adoption and of hierarchical level. Moreover, organizational and individual benefits are closely linked and the full benefits at the organizational level can only be reached if the employee get personal benefits from mobile technologies uses.

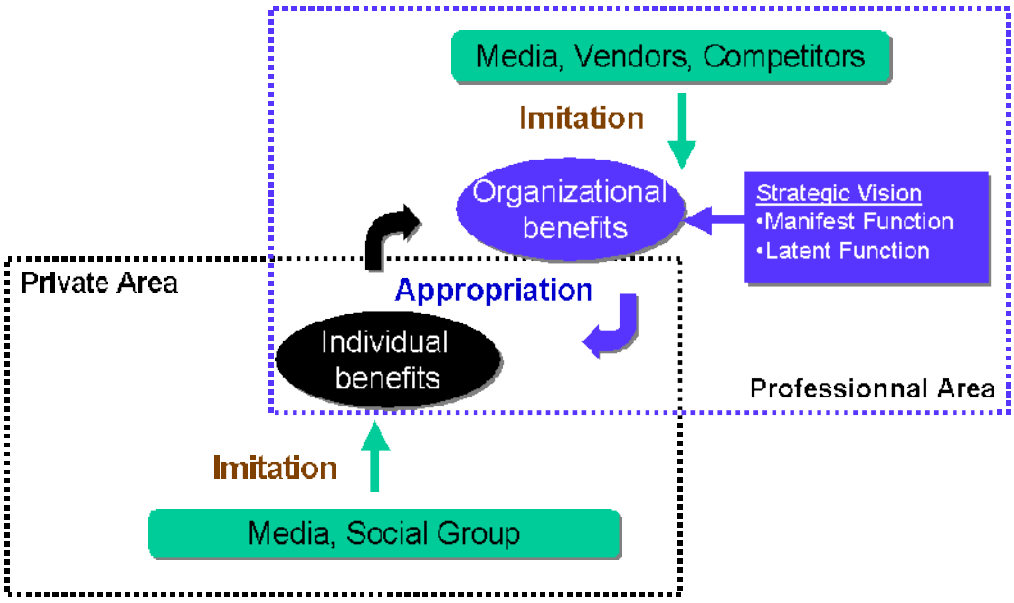

Figure 1: Toward a new adoption-appropriation model

CONCLUSION

This research has some limits, which have to be pointed out. This paper presents the results of an exploratory research, which has to be tested in a quantitative way. Moreover, this research focuses on French firms. The next step is thus an extension to European firms. Furthermore, we focus on the benefits of mobile technologies and we can wonder if their pernicious effects have an influence on adoption-appropriation logics. Nevertheless the interest of this research is two-fold: from a theoretical point of view, this question highlights a major trend in IS research and reveals for the first time a link between notions that have been for too long separated in the academic literature: adoption and appropriation. From a managerial perspective, this research shows that the link between adoption and appropriation is likely to influence the fit of mobile technologies with strategic goals. This research is thus an opportunity to understand the conditions and contexts that favour an efficient implementation of mobile tools within firms, enabling to see in these technologies an incredible way to improve firm reactivity and performance.

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