LUISS Libera Università Internazionale degli Studi Sociali

UNDERSTANDING
THE ADOPTION PROCESS OF ICT IN PRACTICE:
SMALL ENTERPRISES AND THE ICT "LEGO-ERA".

AN EXPLORATORY STUDY

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ABSTRACT

The aim of this exploratory work is develop a deeper understanding of the *adoption process* of information and communication technology (ICT) in small enterprises. SMEs are the majority of businesses in Europe and ICTs are often seen as potential enablers for their long-term organizational sustainability. However, statistics report small enterprises as being traditionally slow in keeping pace with technological advancements. Are they only lagging behind? The lack of research on this theme suggests the following question concerning SMEs: *How does the adoption process of ICT take place in practice*?

The RQ is sharpened through an incremental research design in that the SMEs, ICT and Organization literature are examined and combined with confrontation with experts. This study, informed by interpretive research assumptions adopts an exploratory and qualitative research design with the aim of obtaining thick descriptions on the phenomenon under study. Two case studies are developed in the Italian context: a pilot case on the adoption of a *non-core* ICT (e-Invoicing) in a small manufacturing firm and an in-depth one on the adoption of a *core ICT* (website) in a small publishing firm. These are then analysed through the lens of a double theoretical framework: Rogers' Diffusion of Innovations Theory (as overarching theory) and Leonardi's Theory of Imbrication (for in-depth insights into the dynamics of organizing). The analysis focuses specifically on the process of adoption in time and sheds light on the concepts of *re-invention*, *previous practice* and *technology clusters*. In doing so it provides an account of the organizational implications of organizing in the era of "lego-like" ICTs. Although limited by its exploratory nature, this study contributes to the literature in the field of Information Systems by directly addressing with the theoretical dimension of technology. It also contributes to the literature on SMEs and ICT adoption in that it engages with the specificities of SMEs rather than with critical adoption factors only.

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LIST OF ACRONYMS

ANT: Actor Network Theory

CAD: Computer-Aided Design

CAM: Computer-Aided Manufacturing

CMS: Content Management System

CRM: Customer Relationship Management

DOI: Diffusion of Innovations Theory

E-BUSINESS: Electronic Business

ECM: Enterprise Content Management

E-INVOICING: Electronic Invoicing

ERP: Enterprise Resource Planning

ICT: Information and Communication Technology

IOS: Inter-Organizational Systems

IS: Information System

IT: Information Technology

SME: Small and Medium Enterprise

INTRODUCTION

This work seeks to develop a deeper understanding of the adoption *process* of information and communication technology (ICT[1]) in organisations, and more specifically in Small and Medium Enterprises (SMEs). SMEs are the vast majority of businesses in Europe and their contribution is regarded as fundamental in terms of both national and international economic trend and growth. European Commission figures (European Commission Enterprise and Industry Portal) show their significant role in creating employment opportunities (small and micro-businesses alone provide respectively about 21% and 30% of all private sector jobs). The initiatives and the policies launched in the last years (European Commission 2008) clearly signal a strong will to support them in a globally changing landscape characterised by continuous structural changes and enhanced competitive pressures.

The advancements in Information and Communication Technologies (ICTs) are considered potential enablers for SMEs long-term organizational sustainability (Clemons and Weber 1990; Nadler and Tushman 1999). The increased data processing capability and new web-based intra- and inter-organizational linkages have indeed paved the way for unprecedented forms of collaboration beyond physical proximity (Lipnack and Stamps 1997). This is enabling smaller businesses to gain the efficiencies and cost savings that were once afforded only by larger businesses. Also, the development of lower cost, internet-based and flexible ICT solutions are supposed to be particularly suited for small enterprises aiming to emerge in a globalised economy.

Despite these potential advantages, official statistics and reports (The Sectoral e-Business Watch 2008) depict small enterprises as being traditionally slow in keeping pace with technological advancements. In response to this delay, an integral part of national or supra-national strategies of the European Union for the achievement of a "dynamic and competitive knowledge-based economy" (European Commission, 2006) directly address the question of how to promote a

[1] IT (Information Technology) and ICT (Information and Communication Technology) can be accepted as synonyms. ICT is used here to be more inclusive and signal a wider conceptualization.

more pervasive diffusion of ICTs, especially in the context of smaller businesses.

However, organizational research has shown that a techno-centric view – i.e. that conceptualizes ICTs as autonomous entities that enterprises espouse or which enterprises need to adapt to – risks to underestimate the organizational dimension linked to the employment of ICTs (Zammuto et al. 2007). An overly optimistic stance about the innate qualities of ICT-based solutions is even more risky in the case of small enterprises, where the dynamics are highly specific not only in comparison to larger enterprises, but also among small sized enterprises themselves.

In the academic literature the theme of ICT adoption in small and medium enterprises has been taken up mainly at the macro level of analysis. Most of the available research has focused on identifying critical adoption factors or barriers to a widespread diffusion of ICTs, so building a background in understanding the antecedents to ICT adoption. Recent contributions, however, have started questioning the usefulness of analysing adoption factors only (Castleman 2004; Parker and Castleman 2007a). Since SMEs are heterogeneous and idiosyncratic, future research should move beyond the identification of critical success factors and *engage with the actual adoption process in organizations*. In other words, by using a more micro level of analysis we might be able to get fruitful insights about the dynamics of small enterprises engaging with ICTs.

Furthermore, recent lines of research in the field of Information Systems have been pointing out how the advancements and the pervasiveness of contemporary ICT solutions require new conceptualizations and theoretical contributions, that reflect what we are observing in today's scenario. Pentland and Feldman (2007) effectively describe the contemporary setting as the "Lego-era", where the potentialities of new ICTs emerge from their functionalities as individual elements, as well as – probably even more – from their network-based recombination. Conceptualizing technology in abstract and static terms might therefore be misleading (Orlikowski and Iacono 2001; Orlikowski 2000): enterprises move in a scenario where large monolithic ICTs are not anymore the state of the art.

The present work proposes to embrace these suggestions by concentrating on the ICT *adoption process* in small enterprises. In doing so, it will conceptualize ICT not as a self-standing entity (having fixed and immutable characteristics) impacting enterprises, but in terms of *socio-technical elements feasible of recombination and interpretation*. It will also see small enterprises as highly social formations, where a formal decision process is not necessarily the rule. Most importantly, it will assume – as Castleman puts it (2004) – that non-adoption cannot be considered as a sign of failure, exactly as adoption cannot be considered as positive *per se*. A non-adoption decision can be absolutely appropriate and, indeed desirable, if an ICT solution does not address the specific needs of small businesses and context, or if their specific needs to not lend themselves to ICT-based solutions. Finally, the adoption of ICTs will be conceptualized not as a single decision (i.e. the final decision or the intention to invest in ICT), but as a process taking place over time, through various phases and involving multiple actors.

In sum, if at the policy level we can observe a general consensus about the potential benefits of ICTs for small enterprises, on the other side the relatively low diffusion rates, the less optimistic stance proposed by part of the organizational literature and the lack of research on this specific theme suggest that further inquiry is needed.

The aim of this work is to shed light on how the adoption process unfolds in small enterprises: by overcoming a so-called *technological expansionist view*, the spotlight shifts from trying to find generalized adoption factors towards a deeper understanding of ICT adoption *in practice*.

A focus on *practice* has a manifold value. From a *theoretical* point of view, it builds on recent contributions in both Organization and IS literature (Feldman 2000; Feldman and Orlikowski 2011; Feldman and Pentland 2003; Orlikowski 2000) that stress the recursive, incremental and situated nature of contemporary *organizing* (Weick 1979) and the necessity of novel conceptualizations of ICTs (Leonardi 2011). Granting everyday activity attention (and seeking for a specific explanation for that activity) is at the same time responding to the quest of more specific research on SMEs actual dynamics. Finally, from a managerial point of

view, it will hopefully provide some insights to how technology may be introduced and managed in SMEs.

According to these preliminary remarks and considering also that the academic literature in the organization-IS domain mainly focuses on large corporations, the research aims to fill this gap by answering the following research questions:

RQ1: *How does SMEs adoption process of ICT take place in practice*?

- **RQ 1a**: *How does the adoption process unfold in practice?*
- **RQ 1b**: *How do the specificities of SMEs shape the adoption process?*

According to an interpretive epistemological approach (Walsham 1995), the aim is to provide a thick description of the adoption process in practice and, inductively, develop further understanding and theoretical insights. Interpretive methods of research are aimed at producing understanding and making sense of the phenomenon under study. This involves the understanding of the studied phenomenon in its context, and the process whereby the phenomenon influences and is influenced by its context (Klein and Myers 1999). Interpretive studies "have the intent to understand the deeper structure of a phenomenon, which it is believed can then be used to inform other settings" (Orlikowski and Baroudi 1991, p.5). They are not intended to falsify theories, but to develop theories as "sensitising devices" to view the world in a certain way (Klein and Myers 1999).

The contemporary nature of the phenomenon under study has led towards an exploratory and qualitative research design. The case study approach (Yin 2003) seems particularly suited where the theory in the area is not well developed (Eisenhardt 1989). Figure 3. in Chapter 1 summarises the overall research.

After reviewing the literature on ICT adoption in SMEs, an exploratory phase is developed trough interviews with experts (in both the SME and the ICT domain) and academia according to the methodology proposed by Van de Ven (Van de Ven 2007). Then a pilot case study is conducted as per the methodology developed by Yin (2003) on the adoption process of a *non-core ICT* in a small Italian *manufacturing* firm. The conduct of an exploratory *pilot* case study is advisable, in that it helps developing relevant lines of questions and "possibly

even providing some conceptual clarifications for the research design" (2003, p. 79). The information gained during a pilot case can be matched with a parallel ongoing review of relevant literature. Specifically the RQ is sharpened with the following additional question:

- **RQ 1c**: *How does previous engagement with technology interplay with future adoptions?*

After completing the exploratory phase, one of the most influential theoretical frameworks in the adoption literature, Rogers' Diffusion of Innovation (DOI) theory (Rogers 2003) is chosen as starting point for a second, in-depth case study. DOI is used in its process model and as overarching theory, as suggested in the literature (Parker and Castleman 2009). Further questions derived from the pilot case study are then specifically addressed, especially as far as the mutual influence of *organizational and technological change*.

On the basis of extant contributions in the organization-technology literature (selected in line with the results of the pilot case), the specific question of how to conceptually addressing ICT in the contemporary era are discussed. Three main research streams will be highlighted, based on Orlikowski and Scott's analysis (2008): discrete entities, mutually dependent ensembles and sociomaterial assemblages. The resulting theoretical framework – Theory of Imbrication (Leonardi 2011) – is then chosen as alternative lens for understanding blind spots and opaque dynamics left unclear by DOI.

As far as Small and Medium Enterprises are concerned, a challenge is how to match the combinations of the characteristics of smaller businesses and of the different ICTs that might be analysed. In order to better focus the research a double delimitation was decided (which will be described more in depth in Chapter 1), on the basis of theoretical sampling (Eisenhardt 1989):

1) In the preliminary phase of analysis a choice is made on the following criteria:

- SMEs are restricted to small enterprises (10-49 employees, up to 10 million turnover or balance sheet total, according to the 2003/361/CE Recommendation)

- SMEs are restricted to a single national context (Italy). This choice is supported by their weight in the economy of this country, where they produce more than 70% of added value and account for more than 80% of employment (ISTAT) (these percentages are much higher than EU27).
- ICTs are restricted to e-business applications that need an explicit adoption decision (this helps putting more commoditized applications like e-mail software or average Internet connection on the background of the analysis).

2) After having completed the exploratory phase a second close up was done:

- Small Enterprises are restricted to small Publishing Firms
- ICTs are restricted to a subset of e-business solutions: Website development with its back-end technology, namely Content Management Systems (CMS)

The latter are subject for an in-depth case study on the adoption of *a core ICT* in a small Italian *Publishing* Firm, based on data gathered by a combination of interviews and ethnographic methods. It is conducted in a single setting, but it employs an embedded case study design (Yin 2003, p. 42), in that it involves a main unit (the organization) and multiple embedded sub-units (the adoption processes). The occurrence of such sub-adoptions – linked to the concepts of *re-invention*, *technology clusters* and *previous practice* with technology – are highlighted in the analysis and are specifically discussed in the case. Here the level of analysis is the organization, but the units of observation include individuals (the owner-manager and the employees). The analysis takes the perspective of SMEs (Van de Ven 2007, p. 76).

RESEARCH OUTLINE:

The rest of this work is structured as follows:

- **Chapter 1** outlines the literature review on ICT adoption and SMEs
- **Chapter 2** presents the preparatory phase through interviews with ICT, SME and industry experts according to which the background provided by the literature is sharpened in terms of focus, industry selection and overall research strategy

- **Chapter 3** develops a pilot case study on the adoption process of a non core ICT (e-invoicing) in a small manufacturing firm
- **Chapter 4**, according to the results of the pilot case, provides the overarching theoretical framework for the subsequent in-depth case study
- **Chapter 5**, according to the results of the pilot case, outlines the literature review in the domain of organization and Information Systems research
- **Chapter 6** defines the complementary research framework for the subsequent in-depth case study
- **Chapter 7** presents the in-depth case study on the website adoption process in a small publishing house. Conclusions about the specific case are presented here.
- **Chapter 8** closes this work by drawing conclusions on the study

CHAPTER 1 – ICT ADOPTION IN SMES

1.1 INTRODUCTION

ICT solutions are often considered, both in European programs and in part of the literature, a key passage to improve SMEs' competitiveness and long-term sustainability.

The increased data processing capability and new web-based intra- and inter-organizational linkages have paved the way for unprecedented forms of collaboration (Lipnack and Stamps 1997). These technologies – in particular those labelled as e-business solutions – may well serve as an enabler for the movement towards smaller organisations interacting in a networked fashion beyond geographical proximity.

Official statistics and reports (The Sectoral e-Business Watch 2008, 2010), however, depict smaller enterprises as being traditionally slow in keeping pace with technological advancements. In response to this delay, an integral part of national or supra-national strategies of the European Union for the achievement of a "dynamic and competitive knowledge-based economy" (European Commission 2010; 2006) directly address the question of how to promote a more pervasive diffusion of ICTs, especially in the context of smaller businesses. A number of policies and initiatives issued in recent years have even foreseen enforcing the use of ICT-based channels – for example in the interaction with the Public Administration – with the double goal of enhancing the innovation, efficiency and competitiveness of SMEs, and to fighting their traditional "inertia" in adopting information technology.

A similar attention to how to meet the needs of SMEs can be observed by taking into account the supply side of the ICT market. To overcome the issues of technology complexity and costs, the largest IT suppliers and providers are working to propose SMEs appropriately sized and configured products. Until recently, products for small and medium-sized businesses were nothing more than products for large enterprises, with reduced functionalities. In the last

years, however, almost all the IT suppliers are working to offer SMEs specifically created solutions (e.g. SAP's dedicated unit Global SME or Microsoft SME Business Centres Worldwide). It can be also noted that the supply side of ICT is moving from only developing applications to offering integrated solutions to support small enterprises, both in terms of customised and flexible applications (as Software as a Service - SAAS) and in terms of additional services (for the deployment, but also in terms of financial support, e.g. Microsoft Financing Programme).

Despite this diffused expectations and this attention devoted to SMEs by different players, then, are SMEs only slow in keeping pace with the developments of Information Technology? Are they only lagging behind also due to lower financial availability? Are they – so to say – only missing a chance, or are they facing challenges of a different kind on the organizational level?

Against this background, the topic of Small and medium enterprises (SMEs) and their adoption and use of ICTs is clearly becoming a relevant issue from many points of view. The next section presents a review the literature on SMEs' adoption with the aim of identifying extant findings on the theme, isolating possible gaps.

1.2 LITERATURE REVIEW

Even if the theme of the adoption of ICTs by small and medium enterprises has gained relevance in practice, it has been granted less attention in the academic literature. More precisely, due also to the interdisciplinary nature of the theme, the contributions are highly dispersed in a number of journals, especially non top-tier ones. The search for relevant literature has been therefore performed in iterative way by matching a key-word search on the Ebsco database and previous literature reviews on the theme. IS specific journals as well as non-IS journals have been included, in order to provide a more exhaustive overview of the literature.

The analysed studies have mainly concentrated on adoption factors and barriers to the diffusion of ICTs (in general or of specific e-business applications) in

small and medium enterprises. These studies have contributed in highlighting internal or environmental elements that are shown to influence adoption decisions on ICTs. Some recent works (Parker and Castleman 2007b; Ritchie and Brindley 2003), however, have stressed the idiosyncratic and highly relational nature (Ritchie and Brindley 2003) of smaller enterprises. Small firms differ from large ones not only in size. Their overall *nature* is stressed as specific, so that they cannot be considered large corporations of smaller size (Holliday 1995).

Accordingly, further research has been called for, in order to get a deeper understanding of *how* the adoption process unfolds at more micro levels of analysis and how it might involve heterogeneous and underestimated sources of influence. As will be clear from the next sections, what seems particularly interesting is the complex network interweaving around SMEs, more than these elements as single sources of influence.

1.2.1 Adoption factors and barriers to ICT adoption

According to Premkumar (2003) most research studies in leading IS publications have focused on information technology (IT) in a large corporate setting. Small firms, however, are different from large firms in a number of ways. For example, in small businesses, decision making is centralized in one or two persons, bureaucracies are minimal, standard procedures are not well laid out, there is limited long-term planning, and there is greater dependence on external expertise and services for information systems (IS) operations. Small and medium-sized enterprises have also fewer financial resources, lower technical expertise and weaker management skills (Blili and Raymond 1993). They have also have been traditionally seen as reluctant to invest in IS (Lees and Lees 1987).

By analysing also academic publications that are maybe less prominent, but that are directly focused on SMEs (e.g. International Small Business Journal or Journal of Small Business and Enterprise Development), the picture concerning problems, opportunities and management issues encountered by small

businesses when considering the adoption of ICT-based solutions gets richer.

Over the past decade evidence shows an increase in the awareness and management of IT in small businesses by owners and managers (Hussin et al. 2002). At the same time, the great variety of technological solutions – especially the web-based ones – have made ICTs more accessible, so that investments are not necessarily large.

Extant literature has in particular focused on the owner-manager adoption decision, both in terms of his characteristics and of the influencing factors that might affect his decision. The rationale is that with the decreasing of firm size the organizational and the individual levels tend to collapse.

The characteristics of the CEO, then, come to play a crucial role. Thong and Yap (1995) found that CEOs' innovativeness, attitude towards adoption of IT, and IT knowledge are important factors affecting IT adoption in small businesses. Enterprises with CEOs who have more positive attitude towards information technology are more likely to adopt IT. In addition, small businesses with CEOs who are more knowledgeable about IT are more likely to make informed decisions (Attewell 1992). Finally, the owner has often both the role of decision maker and of individual user. This makes his perceptions towards technology even more relevant. Other individual characteristics found to be critical in the adoption decisions are: age, educational level and gender (Burke 2005; Fillis et al. 2003); management experience (Burke 2005); attitude toward change (Fillis et al. 2003); innovativeness, creativity and attitude toward risk (Fillis et al. 2003; Wymer and Regan 2005).

Some authors have also pointed out that small enterprises need to be viewed as embedded and particularly sensitive to their social context (Beckinsale et al. 2006; Levy and Powell 2003; Taylor and Murphy 2004). Accordingly, the characteristics of the final decision-maker might not be the only adoption drivers.

In smaller businesses the CEO/ owner-manager tends to have more personal contact with other actors within and around the enterprise (Miller and Toulouse 1986). It has been documented that small firm owner-managers have disparate

business goals. Some have economically rational goals such as competitive advantage and growth (Al-Qirim 2005). Others, by contrast, chose to keep their firm small to focus on family or their personal preferences for living. Empirical evidence in Australia for example (Castleman 2004) highlights that many decision-makers can exhibit quite different rationalities, which are directed more by social and family issues, such as lifestyle, autonomy and stability.

The role of family members, for example, can influence e-business adoption decision. Family might hold managerial positions (Butler et al. 2007) or can be an external sources of advice (Gibbs et al. 2007). Home use of the Internet by family as well as knowledge about electronic business solutions has also been found to provide the stimulus for adoption in some small firms (Simpson and Docherty 2004).

Also employees (who in smaller enterprises have a more direct relationship with the owner, and with management in general, than in large ones) can influence adoption decision. Depending on their IT skills, their perceived value as contributors to decision-making by senior managers, and their power and trust relationship with managers, their role in promoting adoption might be more or less influential (Beck et al. 2005; Wymer and Regan 2005).

Advice is looked for through formal and informal channels. Some small firm decision-makers prefer to get their e-business adoption and general business advice via close, often highly social, business networks (Beckinsale et al. 2006; Gibbs et al. 2007; Simmons et al. 2008b). However, ICT specialists, ICT vendors and advisory services certainly play a major role. Their influence, however is found to have positive or negative effects on adoption, depending on their e-business capability and knowledge (Martin and Matlay 2003). An additional dimension is their readiness to understand small firms' business goals and needs (Simpson and Docherty 2004), to support them learn about e-business and to develop their e-business capabilities (Xu et al. 2007; Zhu et al. 2006). Failure by external parties to fulfil these roles often results in frustration and dissatisfaction with specialists and with business solutions themselves (Kyobe 2004). In general, trust towards involved third parties is found to be a significative variable.

E-business adoption can also be driven by trading partners. This stimulus is found to be inducing (isomorphic) or inhibiting adoption. Some owner-managers for example, value their personal relationships with trading partners and will not adopt e-business so they can maintain these (face-to-face) relations (Beck et al. 2005; Castleman 2004). Furthermore, a low transaction numbers or small customer base might also make the e-business solution unsuited.

Finally, the weight of competitors' pressure depends on the intensity of e-business use within the industry, whether e-business is the norm (Kaynak et al. 2005; Khazanchi 2005; McAdam et al. 2004; Simmons et al. 2008a; Xu et al. 2007) and the extent of globalisation in the industry (Fillis et al. 2003).

1.2.2 Whither with ICT-SME Research?

In proposing future research paths Parker and Castleman (Parker and Castleman 2007b) suggest to move beyond the identification of critical success factors only and to engage with the *actual adoption process* in specific SMEs. To do so, they synthesize all of the potential sources of influence both within and around the focal firm (Fig. 1). In red they highlight the less studied ones.

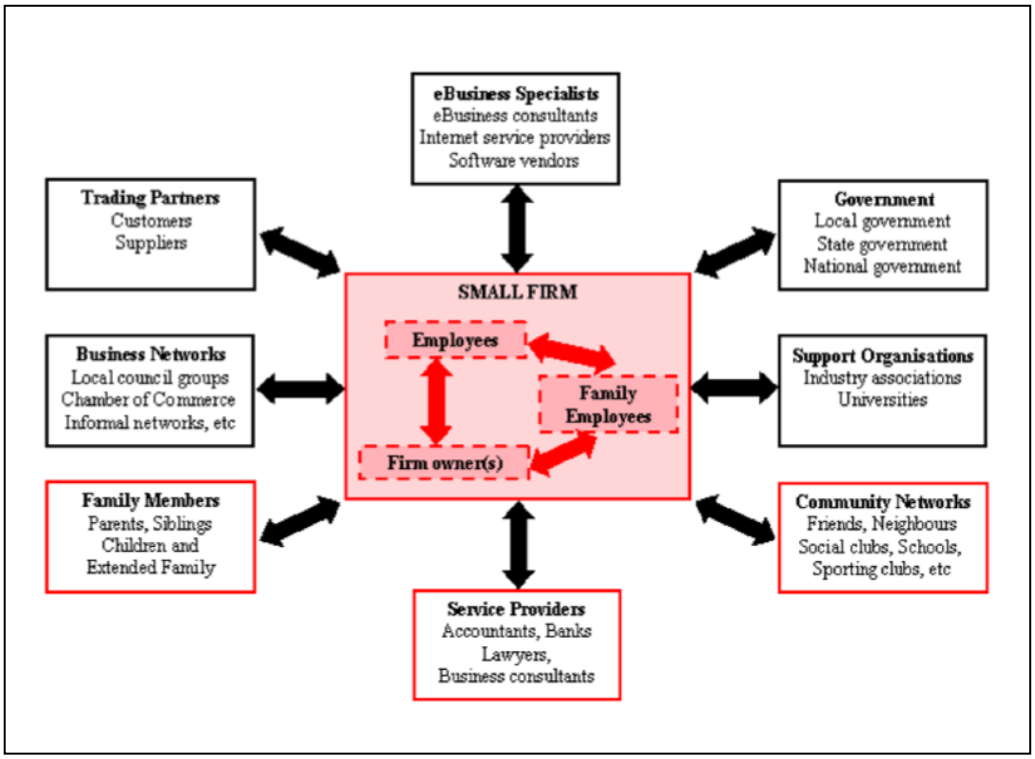


Figure 1. Relationships within and external to small firms (Parker and Castleman 2007b)

In line with this hint, the literature reported here serves to emphasize a number of open issues when dealing with ICT adoption in small enterprises.

First, the literature has identified a number of potential adoption/ inhibiting factors. This is doubtlessly a valuable contribution. But, given that there is still no common agreement of the relative effect of these factors, and that how and at which point in time they come to influence adoption is not clear, adoption literature might need to be complemented by research focusing more on the complex network of interrelated aspects than on the single adoption factors.

Then, there is a need to specifically address the heterogeneity of the enterprises included the broad category of "SMEs". The combinations of diverse SME characteristics (size, but also industry, national context, etc.) and varied ICT/ e-business applications would result in such a complex matrix that would undermine any attempt to conduct studies encompassing them all.

Furthermore, as clearly shown in Fig. 1, the core of the adoption process in SMEs (i.e. the internal dynamics, represented by the central red area) is largely understudied.

Finally, where does the ICT-component take its position in this picture? *How does the adoption process take place in practice* (Fig. 2)? These gaps justify the Research Question, the exploratory incremental research strategy and the research design.

Figure 2. How does the adoption process take place in practice? Adapted from Parker and Castleman (2007b)

1.3 CONCLUDING REMARKS

Fig. 1 shows the complexity of overlapping factors. The broad definition of SMEs is by itself a limitation, in that it aggregates non-homogeneous categories of enterprises, spanning from 11 to 249 employees. These highlighted factors can therefore be expected to vary to a great extent and to be interweaving in different ways, according to size, but also to industry or country: as Parker and Castleman put it, small enterprises are idiosyncratic. But this is a necessary assumption in studying them. I wish to underline that the aim of this research is not to achieve generalization, but to gain a deeper understanding of the adoption process in practice. This choice is motivated by gaps found in the literature.

However, an analytic close-up needs to be done and a subset of the broad category of SMEs is chosen. SMEs are restricted to small enterprises – (10-49 employees, up to 10 million turnover or balance sheet total, according to the 2003/361/CE Recommendation) – and to a single national context (Italy), due to their particularly relevant role in the economy of this country (ISTAT).

Furthermore, ICTs are restricted to e-business applications that need an explicit adoption decision. This focus helps putting more commoditized applications (like e-mail software or average Internet connection) on the background of the

analysis. E-business solutions include for instance Content Management Systems, Electronic Data Interchange, Customer Relationship Management, Knowledge Management applications, etc. This category of ICTs is a sort of overarching "label" that synthetically signals those applications that are explicitly directed to improve the management of the relationships within and around the enterprise (e.g. with customers, suppliers and business partners) in a complex and often global competitive environment. Moreover, these features are often proposed as being particularly suited to meeting SMEs' needs (The Sectoral e-Business Watch 2008). The fact that e-business applications are being promoted heavily at a policy level suggests a possible external pressure towards adoption. They therefore lend themselves to be comparatively analysed both in their "promoted" features and in their *actual* implementation (Orlikowski 2000).

The research design needs therefore to build on these premises and be qualitative, in-depth and longitudinal.

Before engaging into an extensive case, the methodology developed by Yin (2003) states that the conduct of an exploratory *pilot* case study is advisable, in that it helps refining the data collection plan. In contrast to *pre-tests* in experiments, pilot cases also assist in developing relevant lines of questions and "possibly even providing some conceptual clarifications for the research design" (2003, p. 79). The enquiry for the pilot case can be much broader and less focused than the "real" case. The information gained during a pilot case can be matched with a parallel ongoing review of relevant literature, so that the final research design will be more theoretically sound, empirically sharp and promising in terms of implications for practice.
Accordingly, the next chapter presents the exploratory phase of this work (Fig. 3) below summarizes the whole research strategy).

It consists of iterative rounds of interviews with experts (from practice and academia) following Van de Ven's engaged scholarship approach (Van de Ven 2007) and of an exploratory case study focusing on two of the "red areas" (internal dynamics and the role of e-business suppliers). The overall aim of the exploratory phase is to prepare for conducting a subsequent in-depth case study: it will help sharpen the research question, lay down the foundations for an

appropriate research framework and select data gathering techniques. It is also intended to help framing the appropriate industry and the specific case (selection of the SME).

As the results of the exploratory phase show, a different industry from the pilot case emerges as more suited and is selected through a second round of interviews. The research design is also fine-tuned by going back to the organization-IS literature.

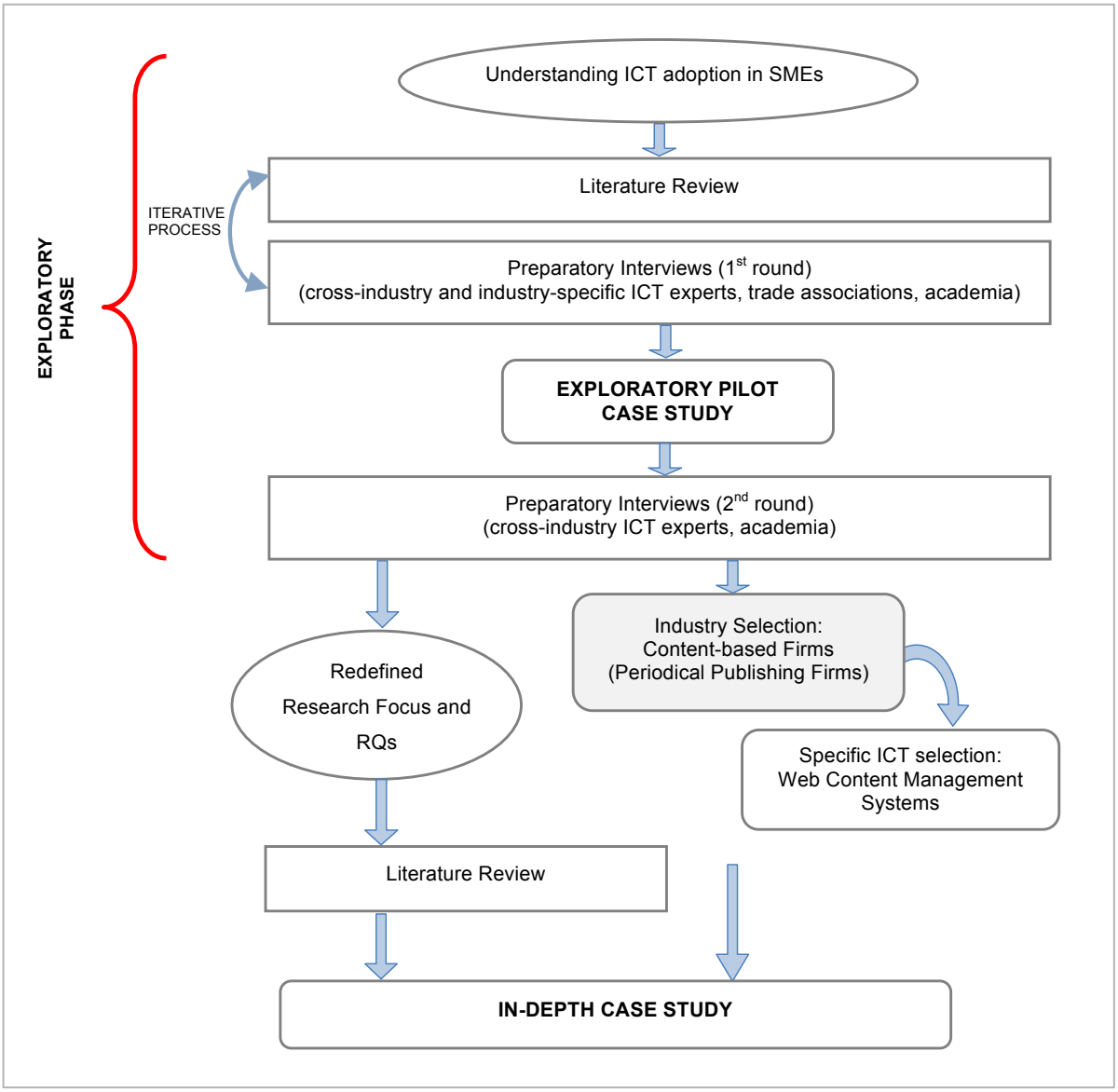


Figure 3. Overview of Research Strategy

CHAPTER 2 – EXPLORATORY PHASE: PREPARATORY INTERVIEWS AND INDUSTRY SELECTION

2.1 INTRODUCTION

In searching for enterprises to be analysed, trade associations in Lombardy were addressed. This advice was obtained during the first interviews in the academic and practice domain. The rationale was to gain support in contacting enterprises, and to obtain an overall view on the chosen sector from a knowledgeable subject outside the enterprises themselves (Van de Ven 2007). The selected association would also suggest relevant ICTs in the industry and/or solution providers to contact for gathering further interviews.

The choice fell then on an association, within Confindustria, in the sector of machinery components that represents about 200 enterprises, mainly small or medium. Besides supplying a number of services (including legal consultancy on contracts and normative updating, training and education, round tables, etc.) one of the aims of the association is to provide associates with seminars and initiatives on themes related to relevant topics for the industry. Primary themes are obviously technical ones linked to their core activity. Nevertheless, considering also the impact of the economic crisis on manufacturing and the rapid growth of global competition, the association has recently promoted programmes intended to spur a renewed managerial culture. This includes a higher collaborative attitude, innovation in processes (not only in products), new strategies for supply-chain management and accessing international markets. Subset of these wider-range goals is a higher awareness of the possibilities offered by ICTs, especially for their (re-) organisational implications.

As highlighted in the review presented in Chapter 1, adoption factors and barriers found in the literature outline an important background. But Parker and Castleman (2007) suggest engaging with the adoption process by SMEs in practice. To do so I have conducted an initial enquiry with experts in the domain

of ICT (specifically e-business applications) and SMEs (Tab.2), according to the methodology proposed by Van de Ven (2007). In a following phase, the strategy was to complete the set of interviews by opportunistically (Eisenhardt 1989) choose sector-specific informants: association representatives were asked for relevant ICT/ e-business providers of and informants within "their" enterprises.

First enquiry with experts in the domain of ICT and SMEs (unstructured interviews): Academia: 3 Specialised Providers: 3 Associations (other than Manufacturing Trade Association): 1
Industry-specific enquiry: Semi-structured open-ended interviews at Manufacturing Trade Association: 7 Participation at Association meetings and round-tables with enterprises: 5 ICT Providers (open-ended interviews): 4
Consolidation enquiry with experts in the domain of ICT and SMEs (open-ended interviews): Academia: 3 Specialised Providers: 1

Table 1. Overview of preparatory interviews

2.2 PREPARATORY OPEN-ENDED INTERVIEWS

2.2.1 Trade Association Representatives and e-Business Solution Providers

A preliminary revised model of analysis is proposed in Figure 4, as resulting from the first round of interviews. The model is a re-elaboration of Parker and Castleman's framework (Parker and Castleman 2007b) presented in Chapter 1, in that it includes technology (the to-be-adopted e-Business solution). Arrows symbolize relational aspects. The left side depicts external actors that might induce, push or inhibit adoption: business networks (especially customers and suppliers) usually have a more direct influence. The focal SME – with its internal dynamics (both social and organizational, both formal and informal) – is at the centre. The being-adopted ICT solution is on the right. The relationship between the adopting SME and the e-Business solution is both direct and mediated by the consultants the enterprise relies on for advice and knowledge: the e-Business provider/ supplier and business consultants in general (e.g. lawyers, accountants, etc.).

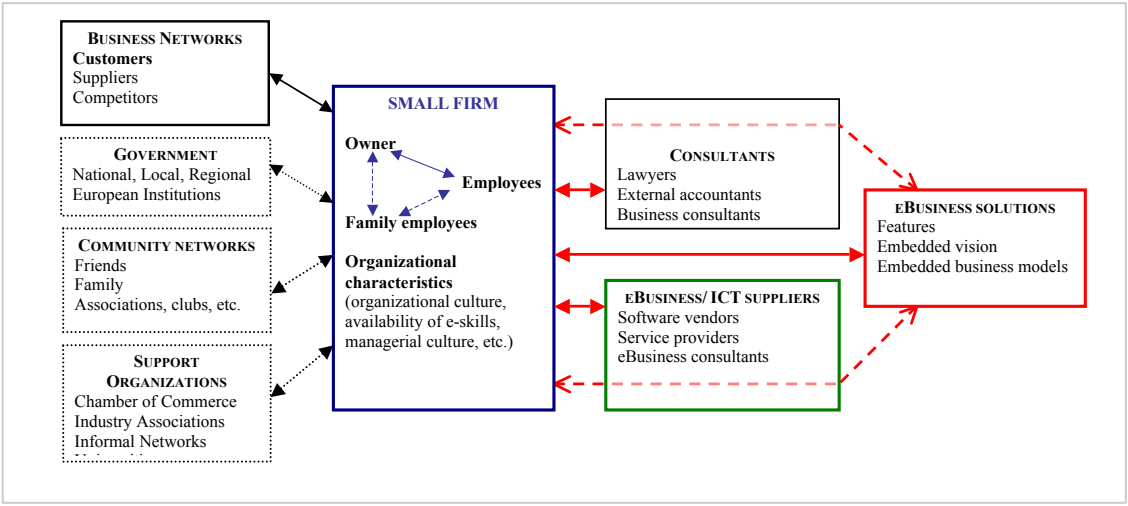


Figure 4. Revised framework (Parker and Castleman (2007) integrated with first round of preparatory interviews with industry informants

The feedback obtained during the interviews confirmed that the intricate network of interactions corresponds to the actual dynamics that can be observed in the SME domain. But it also was a chance to gain insights from ICT (e-business) *providers*.

Methodologically, in this phase the interviews were developed in an un-structured fashion and followed a less rigid protocol than data gathering in the case study. A second researcher was involved in order to grant a higher reliability. Underlying questions guiding the open-ended interviews were both concerning general background issues and more specific aspects (developed incrementally and iteratively in analysing and matching results from previous interviews). For example:

- *When small enterprises "successfully" adopt a new ICT, how do they do it?*
- *What adoption and implementation processes do small enterprises experience to (successfully) adopt ICTs?*
- *Which role do SME-specific ICT solution providers play?*
- More specifically: *What assumptions and visions underlie the development of "successful" solutions for SMEs?*
- *Can some further insights be gained through a comparison of such assumptions with real life experiences by SMEs?*
- *Can we expect that when an ICT implementation is successful, one of the*

prerequisites is a convergence of perspective (between SME management and provider) on which organizational, social, cultural changes the ICT solution will involve?

- *In which way is the approach adopted by SME-focused providers peculiar?*
- *How do ICT suppliers collaborate with SMEs to compensate the lack of skills and know-how typical of smaller enterprises?*

The word "successful" is not employed as an absolute concept, nor is it meant to provide a sort of normative benchmark or best practice for adoption. It is only meant as a way of ruling out non-adoption experiences in favour of actual adoptions. The extent to which an adoption is successful is in any case a relative concept linked to individual experience, but also to prior organizational background, as will be shown in the proceeding of the present work.

I wish to underline that the *ICT/ e-Business solution* in this phase of the research is one of the variables at stake (Fig. 4), but not the primary one. It necessarily needs to be analysed, but mainly in terms of assumptions and functional characteristics. Furthermore the organizational implications of its adoption are expected to emerge by closer enquiry. The technical aspects, on the contrary, will be for now only touched upon and just as far as strictly necessary to the analysis. The expression "solution" is used to shift the focus from the software only to a more inclusive view of ICT.

A supply side perspective seems also to be relevant in practice. Until recently, products for small and medium-sized businesses were nothing more than products developed in larger contexts, with reduced functionalities. But, as already mentioned before, in the last years leading ICT suppliers are working to provide SMEs with appropriately sized and configured solutions/ services.

These interviews furthermore helped to determine the coverage of ICT/e-Business applications in this specific industry:

As far as the production side is concerned:

- CAD/CAM software is used by almost all the enterprises (excluding some micro ones)
- ERPs are widespread, but often used in a non-integrated fashion

- Supply Chain Management tools are less diffused (and fully used only by medium-large enterprises), but a higher awareness of the problem is emerging. Production and procurement management tools are in place, but Excel sheets are often considered acceptable substitutes (with obvious problems in terms of maintaining, updating and sharing data with customers and suppliers).

The interviewees highlighted some episodes of isomorphic behaviour, like the occurrence of so-called ICT hypes or fashions (e.g. expensive SAP installations which are not suited to the size/typology of enterprise; massive isomorphic switch to a different CAD software; etc.). They also pointed out that in small firms the primary attention in the field of ICT is usually focused on those tools that directly improve the activities linked to the core business (in the field of machinery manufacturing CAD/ CAM applications).

On the administrative side processes are almost universally managed through IT tools. Here the level of sophistication, however, is generally relatively basic. In e-business terms, they often only involve managing internal processes. In some cases, though, some enterprises have started moving towards a more networked model, in that the flows from and towards suppliers and customers have been digitized.

2.2.2 Interviews outcomes and resulting framework

After concluding the initial round of interviews, the research framework of Parker and Castleman (Parker and Castleman 2007b) was focused on some of the aspects of the adoption process (Fig. 5). The interviews indeed highlighted some interesting directions for the subsequent phases of the research.

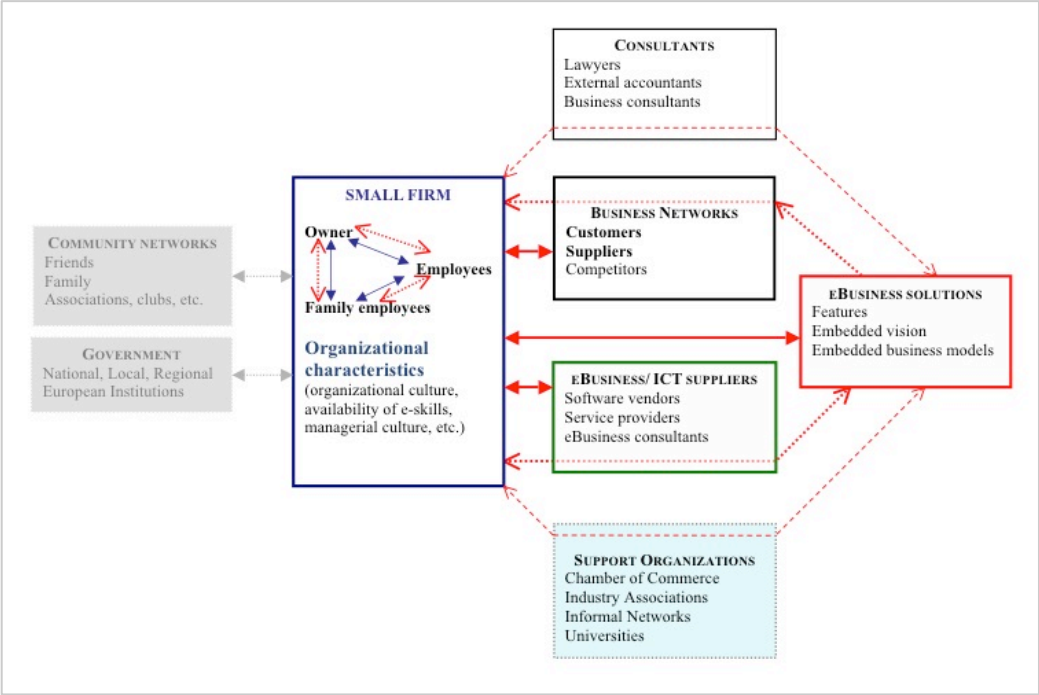


Figure 5. Framework of analysis for the pilot case study

As mentioned in the previous chapter one of the main difficulties SMEs encounter in dealing with the adoption of ICT is not only a strictly technical one. Solution providers have stressed how their own role is shifting from advising on technical choices and alternatives, to providing an integrated solution that matches the organizational characteristics of the adopting enterprise. They have furthermore pointed to organizational change processes as the humus for successful implementation. In plain words, in the ICT providers' experience one of the problems with SMEs is that they often try to replicate through ICT previously established ways of working. According to the interviews, on the contrary, a double course of matching is necessary. On one side the ICT solution needs to be developed from the beginning with a specific approach to the recipient organization (embedded scenarios and assumptions). On the other side, the adopting enterprise needs to espouse an approach that is open to change (they need to be aware that it is necessary to organize for change, and to prepare also for unexpected outcomes).

Furthermore, as far as the external sources of influence are concerned, the interviewees provided an overview of which to keep in the foreground of the analysis and which, on the contrary, could be considered more as environmental

factors. E-Business/ICT Suppliers and Business Networks are expected to involve more direct implications; Support Organizations and Consultants are expected to be relatively less indirectly involved; Government goes to the background and plays a contextual role. Finally the Community Networks, according to the interviewees can drastically vary according to the size of the enterprise: small enterprises usually rely on informal networks more than larger ones, where the social network tends to partially overlap with the business-relationships network. Although the aim of the present work is not to test the relative weight of the just mentioned factors, these considerations have been used for sensitizing the next steps in the research.

These results combined with interviews conducted in the academic domain suggested that the research strategy could be arranged as follows.

A first case study is conducted as pilot investigation, with a double concern of engaging with the actual dynamics in a real life setting, and of building the premises of the theoretical framework for a second in-depth longitudinal case study. The logic followed is a "most different" one (Yin 2003, p. 54).

Process / *Sector*	**NON CORE**	**CORE**
MANUFACTURING	Explorative (pilot) case study	
INFORMATION INTENSIVE		In-depth case study

Table 2. Logic of Industry selection for the pilot and the in-depth case studies

The pilot case study will therefore allow approaching the adoption of a specific ICT application or solution for managing *non-core* processes (such as administrative ones) in the setting of manufacturing. In particular, it will in part highlight the collaborative approach between provider and SME that were touched upon, and the concept of SME-specific solution.

However, it is expected that the heart of the dynamics might be better explored by developing an in-depth case study under radically different conditions, i.e. by putting under the spotlight *core* processes involving ICT, in an information

intensive industry. After concluding the pilot case a further consultation with experts is done in order to find a more suitable sector for the empirical part, which resulted to be Publishing. This will be reported of after presenting and discussing the pilot case in the next chapter.

CHAPTER 3 – PILOT CASE STUDY: THE ADOPTION PROCESS OF A NON-CORE ICT IN AN ITALIAN SME: E-INVOICING ADOPTION IN A SMALL MANUFACTURING FIRM[2]

This chapter develops a pilot case study, with the aim of consolidating the exploratory phase. The case describes the adoption process of an e-Invoicing solution by a small Italian enterprise in the machinery components industry. This adoption process is analysed on the basis of the framework presented in the previous chapter. This will lay down the foundations (in terms of focus, theory and methodology) for the subsequent in-depth empirical part of this work.

3.1 INTRODUCTION

In January 2007 the European Commission has presented an Action Plan (European Commission 2007) with the goal of a 25% reduction by 2012 of administrative burdens for businesses in Europe. An outstanding emerging topic is the optimisation of administrative flows that are still based on paper documents. Recent studies (The Sectoral e-Business Watch 2008, 2010) underline in particular how replacing paper-based processes is "relevant not just for exchanges between businesses (supply chain optimisation), but also for company-internal processes" so that also non-core processes potentially become a source of improvement in terms of efficiency. It is self-evident that the two aspects are strictly connected, the one producing the input-output documents that feed the other one, and that we are dealing with Inter-Organizational Systems (IOS). Theoretical and empirical researchers have devoted considerable attention to IOS since the 1980s. Although the body of literature both on the antecedents and the organizational consequences of IOS is vast, new directions

[2] The pilot case exposed here is an extended elaboration of the paper "Inter-Organizational e-Services from a SME Perspective: a Case Study on e-Invoicing" , presented at the VII Conference of the Italian Chapter of AIS, Università Parthenope, Naples, October 8-9 2010, and selected for publication in: D'Atri, A.; Ferrara, M.; George, J.F.; Spagnoletti, P. (Eds.), Information Technology and Innovation Trends in Organizations. Physica-Verlag, Springer, Heidelberg. 2010. ISBN 978-3-7908-2631-9

of research suggest to develop "theories that are more compatible with technologies in the post-[point-to-point] EDI [Electronic Data Interchange] era" (Robey et al. 2008, p. 509) and, in particular with the e-service approach.

In this line of reasoning, we propose a preliminary analysis on Electronic Invoicing procedures – that is to send/receive invoices without using a paper support – and the related theme of lawful e-archiving in the European scenario. Both of them are connected with the wider theme of the digitization of documents – also referred to as "dematerialization". The theme has been attracting high and growing attention in the public and in the private sector in the last decades – the first UE directive on the matter was issued in 2001, while the EU EDI Recommendation dates back to 1994 – since invoices are among the most numerous and pervasive documents in B2G and B2B exchange of information. In the 2001/115/EC, 2006/112/UE, and 2010/45/UE Directives, in the studies of official Working Groups (CEN/ISSS 2003) and in the literature (Fairchild and Peterson 2003) (Legner and Wende 2006) third parties (meant as *specialised providers*) offering e-invoicing and e-archiving services are regarded as crucial to allow a widespread adoption of new and more efficient administrative processes. Therefore e-invoicing and (lawful) e-archiving services are among the most important and relevant e-services.

Two main reasons motivate tackling this topic. First the issue is to our knowledge understudied in academic literature. Second, despite being heavily promoted by Public Institutions, the organizational implications of e-Invoicing and lawful e-archiving, especially in a SME perspective, are only occasionally analysed. The case study will analyse a specific case of e-Invoicing adoption by a small Italian enterprise and will attempt to answer the question: *How does the adoption process of e-Invoicing take place in a SME context?*

In the attempt to highlight the complexity and the forces pushing, inhibiting or shaping the adoption process, the case will also implicitly try to investigate: *what are the organizational entailments of shifting from paper-based to digital processes in the invoicing domain? Which organizational functions are (or should) be involved in this change process? How can e-service providers help enterprises facing all of these problems?*

This work is an exploratory attempt to understand the specific organizational implications and complexities of e-invoicing adoption, how they have been analysed in the scarce available academic literature and what the possible lines of enquiry might be. To do this, the next sections are structured as follows: first a clarification will be outlined on what e-invoicing is and what the economic system aims to achieve through its diffusion); then the perspective will shift to the point of view of a small Italian enterprise, through an exploratory case study to observe the adoption of e-invoicing using the ICT solution supplied by an Italian provider. The case is particularly interesting: in the exploration we unexpectedly met the opportunity to study also the problems arising in interfacing the original project with a similar solution adopted by a large customer of the enterprise under study. Through the analysis of the case study we will be able to isolate the organizational implications and challenges, to describe the interplay of factors around the adoption process, and to compare the different approaches towards SMEs of the e-Business providers. Finally, some preliminary conclusions will be drawn, along with directions for next steps in the present work.

3.2 E-INVOICING AND E-ARCHIVING

Extant literature assumes invoicing digitization as the necessary step towards a complete integration of the delivery and the payment cycles (Furst et al. 1998) (Legner and Wende 2006), allowing enterprises to considerably improve efficiency in the Financial Supply Chain management (Fairchild and Peterson 2003). Diminishing the administrative burden, making workflows more efficient, obtaining transparency are just some of goals the private and public sectors want to achieve. A widespread adoption of electronic invoicing could significantly reduce supply chain costs by 243 billion EUR across Europe (European Commission Informal Task Force on e-Invoicing 2007), but – despite an absolute convergence of opinions and expectations – the European market still carries more than 28 billion invoices per year, of which over 90% are still on paper, (Legner and Wende 2006) (European Commission Informal Task Force on e-Invoicing 2007, 2010). Given the quite evident benefits of

implementing e-invoicing procedures, why is their diffusion still slow (also in comparison to B2C transactions)?

A first consideration underlines the complexity of B2B transactions as they involve manifold participants and complex processes, so creating a long, intricate value chain (CEBP - NACHA 2001). These include procurement, agreement administration, financing, insurance, credit ratings, shipment validation, order matching, payment authorization, remittance matching, and general ledger accounting. Furthermore, B2B transactions are more likely to be disputed than B2C ones. Also, only large enterprises get economies of scale (Fairchild and Peterson 2003). Other main problems affecting a pervasive diffusion of e-Invoicing and e-archiving processes among SMEs are (Tanner and Wölfle 2005) (CEN/ISSS 2003): the diverse interpretations of the legislation; the continuing differences in national regulatory requirements, even within the EU; the lack of a common international standard for layout and data elements. Legner and Wende (2006) argue that "this low penetration can be explained by 'excess inertia' or 'start-up problems' typical of e-business scenarios in which positive network externalities prevail". The complexity of B2B transactions and major differences among e-invoices formats (PDF, txt, UN/EDIFACT, SAP IDOC, XML industry standards, own formats, etc.), transmission channels (FTP, e-mail, portals, point-to-point, etc.) and National legislative requirements (qualified electronic signature, advanced signature, no signature, e-archiving compliance) generate a many-to-many matrix of different procedures in the exchange of invoices among trading partners. Such a complexity is hardly manageable by big companies and, without the support of specialised providers, absolutely overwhelming for SMEs.

It is also important to underline that, in juridical terms, the expression "electronic invoicing" unifies under a common label lawful procedures that are heterogeneous even within the EU scenario. The main legal requirement for the invoice sender is to obtain the receiver's consensus to issue invoices through an electronic transmission. The reason is that the receiver might not have the instruments to receive and, mainly, to digitally archive and store (which is compulsory, since it is not allowed to print the received file) the electronic

invoice. In scenarios characterized by a prominent presence of SMEs this is a major problem. The Italian Government foresaw the question and in 2004, first country in EU – while France made something similar in 2007 –, introduced a second kind of electronic invoice. When the customer does not agree to receive e-invoices, the sender is anyway allowed to generate and archive them electronically and to send them in the way the receiver requires: using paper, or electronic devices. The receiver will print the documents for lawful archiving and storage. That is why Italy distinguishes between two kinds of e-invoice: the "symmetrical" one (electronic for both counterparties) and the "asymmetrical" one (electronic only on the sender side). Asymmetrical e-invoicing does not allow a full integration of systems, nevertheless it permits full digitizing of the sender processes connected to invoices issuing. The Italian approach has been effective in at least fostering an increasing diffusion of asymmetrical e-invoicing, while symmetrical e-invoicing is virtually inexistent (Politecnico di Milano 2010).

3.3 CASE STUDY

3.3.1 Methodology

The contemporary nature of the phenomenon under study has led towards an exploratory and qualitative research design. The case study approach (Yin 2003) seems particularly suited where the theory in the area is not well developed (Eisenhardt 1989). The aim is to provide a description of the organizational challenges faced by the organization, and to analyse the interplaying factors in the adoption process. To do so, a case was selected where the switching to e-Invoicing has been performed through an external provider, as foreseen in widely accepted adoption models. Both the focal firm and the provider have requested anonymity: they will be called respectively with the pseudonyms "ALPHA" and "BETA".

Data collection has been performed through interviews with key informants within the focal firm, along with participation to meetings. Triangulation of evidence was achieved by examining available documentation and available

artefacts (mainly the software and digital archives). Finally also BETA's managers were interviewed. The reliability of data collection was strengthened by collaboration with of a second researcher.

The formal interviews with the key-informants were conducted with a semi-structured approach. We started by letting the informants describe the flows of invoices (incoming and outgoing); we asked then for volumes, types of senders and receivers (exact data cannot be reported here due to an anonymity agreement with ALPHA). We then proceeded to asking more specific questions regarding the implementation of electronic invoicing: the motives, the challenges and the implications of the transition. By interviewing also informants at BETA we were furthermore able to obtain information on the same dynamics, but from a different perspective.

The interviews lasted from one to two hours. All interviewees were than met again or at least re-called for further clarifications (Tab. 3 does not reports the re-calls). We were not able to tape-record all interviews, however extensive notes were taken by one researcher, while the other was conducting the interview. The resulting case description was submitted to the interviewees for approval. Informal discussions were also included as sources of information.

Company	Function	Interview		
		Nr.	*Modality*	*Type*
ALPHA (focal firm)	*General Manager*	1	Face-to-face	Semi-structured
	CIO	3	Face-to-face	1 Informal 2 Semi-structured
	Accounting	3	Face-to-face	1 Informal 2 Semi-structured
	HR Director	1	Face-to-face	Semi-structured
	Legal	1	Face-to-face	Semi-structured
External Consultants	*Accounting*	1	Telephone	Semi-structured
BETA (e-Business Provider)	*General Manager*	1	Face-to-face	Semi-structured
	Project Manager	3	Face-to-face	1 Informal 2 Semi-structured

Table 3. Pilot case study interviews

3.3.2 The e-Invoicing Adoption Process at ALPHA

ALPHA is a small Italian enterprise producing machinery components, with 50 employees. ALPHA is facing the current economic crisis: its turnover heavily decreased during the last three years. Its supply chain structure is quite complex. On the upstream side the products are made of multiple components, which entail a very intricate sourcing network with dozens of little suppliers and few big multinational suppliers of standard machine components. On the downstream side ALPHA serves with customized products customers of all dimensions in Italy and abroad. In order to improve coordination with suppliers and customers and to obtain real time business intelligence, ALPHA has developed a quite sophisticated in-house supply chain and inventory management system, integrating it with the accounting system. This effort has allowed substantial advance in terms of efficiency and effectiveness and, according to its managers, has proven to be fundamental in gaining competitiveness.

About a year before the authors begun this research, ALPHA started evaluating the possibility to digitize also the invoices generated by the supply chain flows of materials and goods. This decision was prompted on one side by the possibility of gaining efficiencies and obtaining "straight-through" management of data flows (i.e. full automation of in an end-to-end fashion). On the other side, participation to dissemination initiatives organized by the local trade association also made ALPHA's management more sensitive to the topic.

The option of choosing the symmetrical e-invoicing option was rejected immediately, because it was clear that the many little suppliers were neither interested, nor prepared to send and store e-invoices. On the other side the recipients of the invoices were characterized by differences in terms of size, stability of the relation, number of invoices received from ALPHA, country of origin (which means different legislations), preparation or interest in receiving invoices electronically. ALPHA therefore opted quite straightforward for an asymmetrical invoice issuing model, whereby the real decision to be made was the "classic" make or buy one. An internal pre-analysis phase was therefore launched, giving as a result a number of main requirements and critical issues.

No deficiencies were detected *per se* in the IT infrastructure and resources as well as in the managerial and legal competences available to ALPHA. Nevertheless e-invoicing processes resulted to be implying peculiar problematic aspects, especially linked to the necessity to store documents securely (and according to the law) in the long run. This made the in-house option less desirable and the main e-invoicing providers were therefore contacted. After analysing their offers carefully the "buy-option" resulted to be preferable. The cost of the services were in fact convenient especially considering that the provider's solution (for document elaboration, storage and shipment to receivers that have requested a paper-invoice) would avoid creating a dedicated infrastructure, consisting of specific:

- software for automatically (and massively) appending a digital signature to the documents;
- software to support multi-channel and multi-format sending of invoices;
- servers to archive the documents securely for a period of at least 10 years;
- resources for monitoring the rapidly evolving legal framework.

All of these aspects would be supplied by e-business specialists, with a break-even point for personalization expenses of less than one year. The main criteria on which the selection of the provider was based on were the following: reliability and traceability of the technological infrastructure; competencies of the legal staff; competency and rapidity of response in managing the integration between the systems of ALPHA (based on SAP, with its well-known rigidities) and of the provider; modularity of the service (with the possibility of subsequent integration with further functionalities); experience in the industry; and, last not least, the degree to which the service would impact on existing processes (one of the interviewees used the term "not-intrusive" model). A medium-sized Italian provider (BETA) was eventually selected and the project was launched in three months (a very short time if compared to the twelve foreseen for the in-house hypothesis).

It is worth noting that ALPHA had a clear awareness of the multidisciplinary nature of the project. Even the interviewees at BETA pointed out that they

perceive this aspect as a critical aspect in influencing the rate of success (or at least the speed of implementation) and that it usually becomes evident from the very first meeting. ALPHA in fact involved from the beginning all the following functions and competences in all phases of the project: accounting (both internal function and external consultants), IT, legal (both internal function and external consultants), logistics, organization and HR. As mentioned above, ALPHA had a quite sophisticated IT infrastructure in place and its management had an integrated approach to the development of any additional component. They reported that previous engagement with other technological developments within and around the company provided them with a "more holistic" stance towards technology, if compared to past implementations. They had reached the belief that the key variable at stake, so to say, is not technology *per se*. On the contrary, all the involved organizational components need to take part to the process. Of course, in the case of e-Invoicing adoption, "the Accounting and IT departments sit in the front row", but their assumption was that any adoption of technological innovations needed to be accompanied by all of the (directly or indirectly) involved functions. In sum, during the interviews they had a clear vision of the organizational implications of (any) ICT adoption.

According to the collected interviews within ALPHA, the main perceived results can be summed up in:

- savings on costs of paper, mailing, printers, maintenance, errors;
- possibility to move human resources from administrative tasks to core business activities;
- improvement of response time in the supply chain (up and down-stream).

A very interesting aspect encountered in the case exploration is that when ALPHA had just started the implementation of the project with the selected provider BETA, an outstanding foreign customer of ALPHA (TECHNO, a pseudonym) asked to receive its e-invoices through another (foreign) provider (SELCO, a pseudonym) used by TECHNO to manage a full, symmetrical, e-invoicing system. Obviously the aim of TECHNO was to integrate all its own administrative flows. SELCO's offer (the service had to be paid by ALPHA)

included the possibility to adopt its services also for ALPHA's own invoicing processes. Important aspects for the purposes of the study are, in ALPHA's opinion:

- the services offered by SELCO were not flexible enough to match ALPHA's needs for not-intrusive solutions;
- SELCO's standard service needs for customisation seemed underestimated;
- there were problems in matching ALPHA's standard invoicing data with the data needed by SELCO's service;
- the complex juridical aspects of Italian rules on e-invoicing and legal e-archiving seemed to be undervalued;
- fees and prices were very high in comparison with the Italian average charges;
- finally, the number of invoices issued towards that customer was very low (but the amount invoiced was not!).

Obviously a main issue for ALPHA was to safeguard the relationship with its important customer. But, for our analysis, it is important to note how the integration with SELCO's service (for the invoicing towards that particular customer - while obviously ALPHA refused to use SELCO's service for its own needs) was expensive and complicated. More importantly, it caused a duplication of procedures and processes. In other terms invoicing costs towards that specific customer would be largely increased, not diminished. The problem was ultimately solved by BETA, who succeeded in integrating its system with the features needed to manage the doubled invoicing flow: but, still, ALPHA's costs were encreased and it was further obliged to manual data input.

The time sequence of incidents (qualitative data) (Van de Ven 2007) can be can be sketched out in two broad time-phases: pre-adoption and actual adoption (Fig. 6).

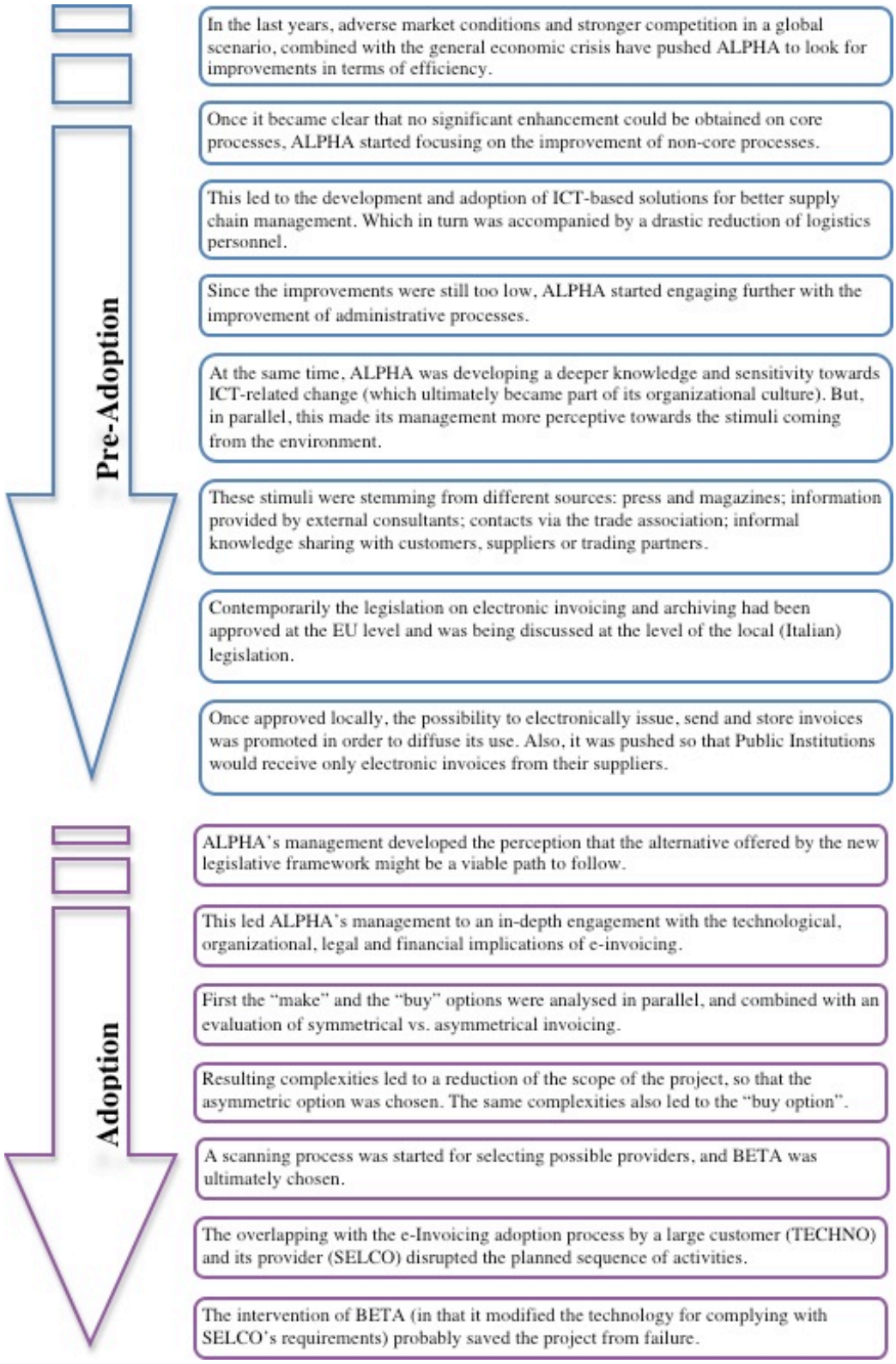


Figure 6. Incidents in time sequence

3.3.3 Case Analysis

The case will be now analysed in light of the revised framework developed in the preparatory phase (Fig. 5), which is presented again below for clarity:

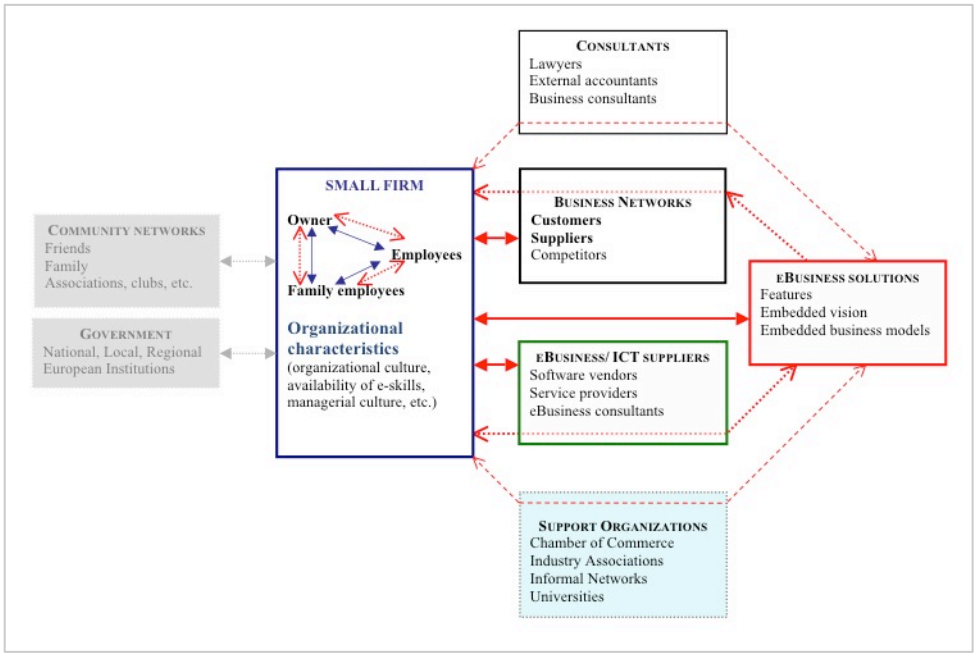


Figure 5 Framework of analysis for the pilot case study

A closer engagement with the adoption process at a lower level of analysis (if compared with extant adoption literature) clearly shows a complex interplay of overlapping factors.

The background for adoption can be tracked back to environmental elements such as Government and Support Organizations. The latter have been briefly mentioned in that they have acted as sensitizing agents, seeking to diffuse knowledge and information about the general issue of digitization of documents and of supply-chain integration within the industry. As far as "Government" is concerned, we have sketched out the various layers of influence, from overarching European Union to the specific Italian legislation. We briefly add that from the point of view of public institutions e-invoicing is being heavily

pushed for gaining at least the following macro-outcomes: reducing administrative burdens for enterprises, enhancing overall efficiency within the European system, obtaining drastic savings in the Public Administration and fighting the grey market. Precondition for obtaining all of these results are high adoption rates.

The most important part of the framework is represented by the four central elements, i.e.: the role of the e-Business provider, the e-Business solution (ICT), the business network and the firm itself (with its internal dynamics). As we will see, these are better understood in highlighting their interconnection.

The Provider, the ICT solution and the Business Network

The case study has raised some insights concerning the *perspective* with which ICTs (or ICT-based solutions) are implemented and offered. BETA and SELCO bid e-services in the same field of application and virtually to the same target (BETA manages processes also for large firms). Nevertheless BETA grew and is established in a typical SME business scenario, the Italian one, where enterprises are not able to impose – or simply to propose – a full integration of invoicing systems neither to suppliers nor, more obviously, to customers. Suppliers are either too big and powerful, or too small and not sufficiently structured to achieve advantages from document digitization or to manage it.

In other terms BETA – although serving also large enterprises – has been able to develop its technological solution from the *perspective* of a SME. These assumptions are embedded in the offered e-service and it was precisely this sharing of a same vision that made the service proposed by BETA "successful" for ALPHA. That these features are embedded, means that they are evident and observable only to a certain extent. As anticipated in the preparatory chapter, the technical aspects of the solution (per se) are not taken to the foreground. To our analysis it is sufficient to point out the characteristics that manifest the embedded assumptions developed by software designers within the e-business solution. Such features are flexibility, modularity, unobtrusiveness, vertical knowledge of regulation problems (in a *civil law* scenario), implemented in a

low cost device.

On the contrary, SELCO (the other provider) seems to have built its product starting from a *large enterprise perspective*. At least in this occasion, SELCO has replicated the behaviour and the needs of its huge customers. The service is rigid, it aims at standardising the processes of little suppliers (to customer advantage), it is expensive, its juridical features aim to support cross-border e-invoicing but are over-simplifying the national legal requirements for e-archiving.

We have underlined how ALPHA was obliged to pay for two services instead of one, so generating a duplication of processes and procedures, in order to comply with the requirements of its customer TECHNO. What if other important customers of ALPHA will adopt other solutions, with different specifications or integration requirements?

Here the intervention of the provider BETA has been crucial for finding a suitable solution through partial integration, but nevertheless we cannot but point out that the initial project was deviated from the planned direction. Also, the advantages in terms of efficiency have been reduced due to the overlapping of two different adoption processes (that of ALPHA and that of TECHNO), where one forces the other to adapt to an external pressure.

It is worth noting how the threshold between "successful" and "unsuccessful" adoption is problematic and how a sharp distinction between adoption and non-adoption could also be questionable in this case. From ALPHA's point of view the adoption process is reported to be only partially satisfying in respect to the initial goals, but this is not due to the solution provided by BETA or the technology itself.

The adopting firm

As far as the adoption process within ALPHA, the most relevant aspect is how the process was accompanied by a specific approach, which the interviewees themselves defined as "holistic". It has been described how, from the beginning, the involved functions within the enterprise were not only the directly interested

ones (IT and Accounting), but also those that would be indirectly touched by the new ICT, like HR and even external accounting professionals. Here the possibility to include in the analysis also the provider's point of view was essential, in that it reported how this kind of approach is not obvious at all. On the contrary, their counterpart is sometimes even only IT. Sitting around the table with all the internal stakeholders is for them a signal that the adopting enterprise has an integrated vision of the upcoming organizational entailments.

According to ALPHA's interviewees, this multidisciplinary view is strongly endorsed by its management. It has been build over the years, both formally and tacitly, also due to past implementation experiences. In their account this stance is part of their organizational culture so that it is taken for granted. It has to do with technology, but only to a certain extent: it is deeply rooted in their organizational fabric.

These remarks prompt further questions on the conception of technology throughout the adoption process, which we will unfold in the next section.

3.3.4 Discussion

E-invoicing and (lawful) e-archiving services are considered among the most important and pervasive e-Business developments, with deep implications in the private and in the public sector.

Robey et al. (2008) in their review on IOS adoption literature, ideally identify three groups of research: factors influencing IOS adoption; the impact of IOS on governance over economic transactions; and the organizational consequences of IOS.

In the e-Invoicing field, both the available literature and the reports produced by working groups or Institutions concentrate mainly on the first subset of research and tend to highlight which factors are leading to or inhibiting adoption. Typical drivers are efficiency, effectiveness and competitive position. The latter is particularly worth focusing on for our analysis. Morrell (Morrell and Ezingeard 2002) underlines how competitive pressure and imposition by trading partners push SMEs to IOS adoption even if they are not prepared to gain full advantage

from it. Chen and Williams (Chen and Williams 1998) show how SMEs efficiency might even be reduced if external pressures are uncontrolled. In the case study we have observed similar problems: we have seen how ALPHA was obliged to pay for two services instead of one, in order to comply with the requirements of its customer TECHNO. This overlapping of competing forces within the adoption process at ALPHA resulted in a deviation from the initial adoption decision, which ultimately risked to sink the whole e-Invoicing project, or at least to undermine its overall success.

The analysis of the case has indeed shown from up-close the actual complexity of overlying dynamics, as depicted by the framework derived by extant literature. But for the purpose of the research the most relevant results of the pilot case can be identified in the open questions it leaves unanswered.

First we have commented on the problems in discerning "successful" and "unsuccessful" adoptions, where itself a sharp distinction between adoption and non-adoption might be questionable. From ALPHA's point of view the adoption process is reported to be satisfying in respect to BETA's solution. But the overall e-Invoicing adoption has been only a relative success if the initial goal of increasing efficiency is considered. The deviation from the initial plan led to the adoption of an additional technological element, implemented by BETA. So, if only the strictly initial technology is considered, we should talk of a *partial* adoption. If the project is regarded as a whole, then we should possibly consider it to be a *double* adoption.

- The inclusion of the two adoption processes can be done analytically, by concentrating only on the main overarching one. But would this give a faithful account of actual dynamics?

Therefore, we can also note how technology is not a given entity with immutable characteristics: BETA changed its solution *during* the adoption process, in order to help ALPHA fulfil an unexpected requirement (compliance with an important customer).

- The intrinsic flexibility of contemporary ICTs needs to be carefully taken in consideration.

Third, as suggested by the adoption experienced by ALPHA, the boundary between the technology itself and the overall organizational process tends to be blurred.

- Tentatively, the broad concept of e-Invoicing is often referred to as a technology adoption process, but what about the organizational entailments?

The "holistic" approach of ALPHA is deeply rooted in previous adoption processes. The notion that preceding engagement with technology leaves a sort of residue in the organizational fabric needs further theoretical development. So the relationship between the adopting enterprise and the ICT solution is not only direct and mediated by external parties (as per the framework in Fig. 5):

- Is this relationship also somehow influenced by previous engagement with other technologies?

A limitation of the pilot case study is that we were able to directly observe (real time) only the deviation from the initial project, whereas the main adoption process could only be tracked through retrospective reconstruction. Moreover, the research site did not allow a full and more in-depth reconstruction of the various phases preceding actual implementation.

- A direct observation of the adoption process – at least in a more extended part – would allow richer and stronger empirical results.

Finally, the time span covered by the adoption process is critical. Where does the adoption start? The answer is analytical, in that prior conditions are bracketed on the basis of the phenomenon under study.

- The theoretical framework needs to account for the role of time and specify different phases in the adoption process.

3.4 Conclusions and final remarks on exploratory phase

The pilot case study has been conducted as exploratory investigation, with a double concern of engaging with the actual dynamics in a real life setting, and of building the premises of the theoretical framework for a subsequent in-depth case study. According to Yin (2003) a *pilot* case also assists in developing relevant lines of questions and "possibly even providing some conceptual clarifications for the research design" (2003, p. 79).

The pilot study analysed above has revealed the complexity of interacting facets in ICT adoption, in line with

RQ1: *How does SMEs adoption process of ICT take place in practice*?

- **RQ 1a**: *How does the adoption process unfold in practice?*
- **RQ 1b**: *How do the specificities of SMEs shape the adoption process?*

It has also shown why taking into account the interplay of the disparate sources of influence allows rendering a more faithful picture of what actually happens in real life scenarios. In this sense adoption factors identified in the literature are the starting point for moving beyond the "intention to adopt" to actual dynamics.

Furthermore, the analysis also prompts a conceptual refinement to the research. The case suggests that the organizational fabric around the adoption of technology needs further investigation. How is this organizational fabric built in time, so that a specific approach towards technology adoption becomes taken for granted?

An extension to the research question is therefore addressed in the in-depth case study:

- **RQ 1c**: *How does previous engagement with technology interplay with future adoptions?*

Accordingly, the blind spots left by the pilot case suggest the following direction for the next phases of the research.

The focus shifts at the core of the research framework presented in Fig. 5 and deals prevalently with internal dynamics. External factors gain relevance, but

only in relation to their involvement in the adoption process.

The research design needs to build on the above-mentioned premises, to be qualitative and to be in-depth. The in-depth case study has therefore to be longitudinal, to allow taking into account the role of time and analysing the different phases of the adoption process. It is also expected to possibly reveal the occurrence of multiple adoption processes.

Methodologically, data sources are required to also include a greater amount of direct observations, besides interviews, document and artefacts analysis.

As far as the sample selection is concerned, the logic followed is a "most different" one (Yin 2003), as anticipated in Chapter 2. It is indeed expected that the heart of the dynamics might be better explored by developing an in-depth case study under radically different conditions, i.e. by putting under the spotlight core processes involving ICT in an information intensive-industry.

An additional round of informal consultation with (cross-industry) ICT experts and academia was done in order to find a more suitable industry, which resulted to be Publishing. The specific motivations that sustain this choice are explained at the beginning of the in-depth case study (Chapter 7).

Finally, Yin suggests that information gained during a pilot case can be matched with a parallel ongoing review of relevant literature.

On the basis of the extant literature on ICT adoption and SMEs, five theoretical frameworks (used sometimes only partially, sometimes combined with each other) have been employed in addressing adoption of ICTs in small enterprises:

THEORY	TOPIC	REFERENCES
Resource-Based View (RBV) of the firm	Underlining the e-business capabilities small firms must and can acquire in order to gain competitive advantage from e-business applications	(Caldeira and Ward 2003) (Ray and Ray 2006)
Porter's model	Highlighting how small firms can proactively improve their strategic positioning	(Olsen and SÊtre 2007) (Pavic et al. 2007)
Theory of Planned Behaviour Technology Acceptance Model	These individual level theories aim to predict behaviour intentions and have especially focused on owner-managers	(Grandon and Pearson 2004)
Diffusion of Innovations Theory (Rogers 1995)[3]	Explain the social and relational aspects of innovation diffusion and how this occurs over time in a social system.	(Al-Qirim 2005) (Chong 2006) (Woerndl et al. 2005) (Lee and Kim 2007) (Roffe 2004) (Ramsey and McCole 2005)

Table 4 Theoretical frameworks employed in the literature on SMEs ICT adoption

Building on the sequence depicted in Fig. 6, the theory that is deemed most appropriate in matching the pattern of incidents and the deriving events is Rogers' Diffusion of Innovation Theory (Rogers 2003). This is one of the most employed theories in ICT adoption studies (not only in the SME context). It includes different categories of adopters (so recognizing the heterogeneity of SMEs); the innovation (in this case the new ICT); an adoption decision-making processes; the social context in which adoption takes place; communication channels and time. Also, it accounts for prior conditions, knowledge building in various phases, the notion of (continued) adoption or (continued) rejection, and finally it includes the concept of "reinvention" of a technology during the adoption process.

One interesting point to note about the literature is that it primarily applies the DOI innovation characteristics, i.e. relative advantage, compatibility, complexity, trialability, observability (e.g. (Al-Qirim 2005; Chong 2006). A few studies have applied Rogers' adopter categories (innovators, early adopters, early majority, late majority and laggards) to small firm e-business adoption

[3] In the next citations I will refer to the most recent edition of the book (2003 – 5th ed.)

(Lee and Kim 2007; Pavic et al. 2007; Woerndl et al. 2005). Other studies have identified subsets of Rogers' adopter categories (Roffe 2004) or differentiated only between adopters and non-adopters (e.g. Ramsey and McCole 2005). A large part of Rogers' framework is surprisingly unexplored, in that these aspects have been usually analysed individually, whereas the full potential of the theory as a whole is under-researched.

However, DOI will only be used as overarching theory to guide the identification of the potentially critical aspects to be analysed and to help detect the different stages of adoption. The aim of the in-depth case study is not to test the theory, but to provide alternative understanding on possible blind spots with other theoretical contributions, in order to zoom in on the organizational dimension. I contend in fact that DOI cannot provide an adequate theoretical lens (and language) for fully examining *RQ1c*: the interplay between previous engagement with technology and the organizational residue it leaves over time, between organizing and technology.

In the next chapter I will therefore start by outlining Rogers' DOI Theory in more detail. In doing so I will specify to what extent it is suited to answer the research questions guiding this work.

Then, in the effort of iteratively fine-tuning the theoretical framework, contributions derived from the Organization-ICT domain literature are reviewed (Chapter 5). Specifically two blind spots will be addressed: how to theorize ICTs and how to develop the concept of "reinvention" proposed by Rogers. Finally a second theoretical framework will be identified in the metaphor of imbrication as developed by Leonardi (2011).

CHAPTER 4 – THEORETICAL FRAMEWORK: DIFFUSION OF INNOVATIONS AS OVERARCHING THEORY

4.1. DIFFUSION OF INNOVATIONS THEORY

Rogers' diffusion theory (Rogers 2003) is a dominant theory in understanding the process of diffusion and adoption of innovations. It can be considered an overarching framework that explains the social and relational aspects of innovation diffusion and how this occurs over time in a social system. Although the name of the theory might suggest that it mainly addresses the diffusion of innovations at the population level, it also zooms-in on how the adoption takes place at the individual level or within the single organization. The adoption process as theorized by DOI is synthesized in Figure 7.

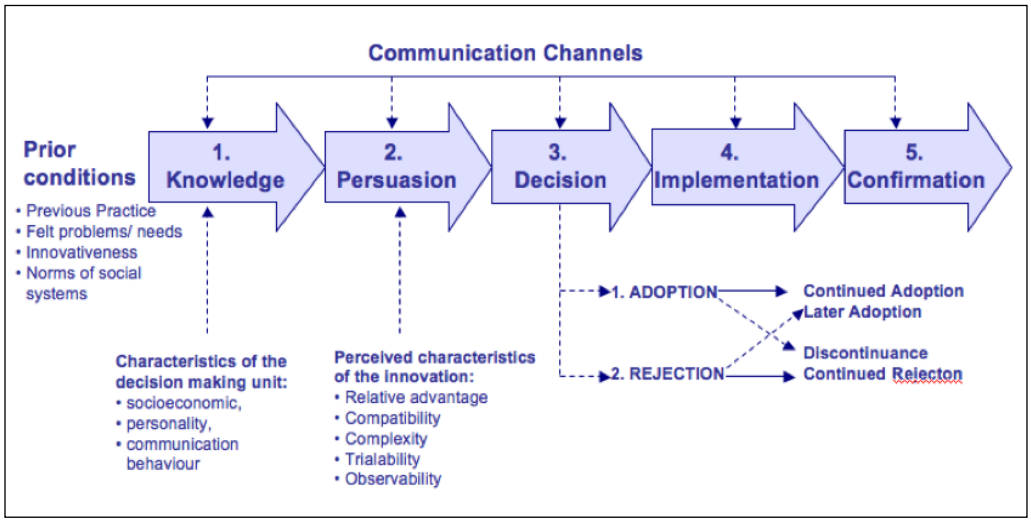


Fig. 7 Rogers' Process Model (Adapted from Rogers 2003)

In Rogers' framework an *innovation* is "an idea, practice, or object that is perceived as new by an individual or any other unit of adoption" (Rogers 2003, p. 12). Its diffusion is intended as the process by which it is communicated through certain channels over time among the members of a social system. The

portion of the population that adopts an innovation is approximately normally distributed over time. Breaking this normal distribution into segments five typologies of adopters can be distinguished: innovators, early adopters, early majority, late majority, and laggards.

The four key elements that govern the adoption of an innovation are: the *innovation* itself; *communication channels*; the *social system*; *time*.

Knowing of a new idea or object creates uncertainty in the potential adopter, in terms of advantages and outcomes of adoption. Accordingly, the adoption decision process is defined as essentially an information seeking activity in which the adopter is motivated to reduce uncertainty about the advantages and the disadvantages of the innovation. In doing so it accumulates *knowledge* on the innovation and forms a positive or negative *attitude* towards it on the basis of the characteristics of the innovation.

Among other innovations, Rogers stresses the importance technological ones have gained in the DOI literature. He defines technology (in general) as "a design for instrumental action that reduces the uncertainty in the cause-effect relationship involved in achieving a desired outcome" (ibid., p. 13). It usually has both a hardware (the physical tool embodying the technology) and a software (the information base for the tool) component. The tendency to think of technology only in terms of hardware has potentially obscured the soft side implied by any technology.

A critical issue in studying technology is to determine its boundaries: where does an innovation stop and where does another begin? Rogers uses the term "*technology clusters*" to signal those technological innovations that consist of several distinguishable but related elements ("package effect") (Rogers 2003, p. 249). This definition applies well to contemporary ICTs. For example, e-business applications are usually conceived as inter-linkable or as multi-purpose applications, dealing with the most different tasks (online payment, procurement, enterprise resource planning, etc.). Electronic publishing software is usually released in families of applications, all inter-connectable with one another. Customer relationship management rely on a number of underlying technologies. However, it should be noted, these interconnections are not always

visible to the adopter.

The innovation is *perceived* by the potential adopter through the following five attributes:

- *relative advantage* (the degree to which it is perceived as better than the idea it supersedes, in economic but also in prestige, satisfaction terms etc.);
- *compatibility* (the degree to which it is perceived as being consistent with existing values, past experiences and needs);
- *complexity* (the degree to which it is perceived as difficult to understand and use);
- *trialability* (the degree to which it can be experimented with on a limited basis);
- *observability* (the degree to which the results are visible to others).

An additional dynamic Rogers has added in the most recent formulation of his theory is the concept of *re-invention*. It is the degree to which an innovation is changed or modified during the process of *adoption* and *implementation*. In early DOI studies – and in most of the subsequent publications, especially in the IS field – an innovation was assumed to have invariant qualities. These fixed characteristics were not supposed to change during the diffusion of the innovation. Rogers recognizes that the possibility to adapt the innovation (e.g. customization in computer software) plays a crucial role in terms of likelihood of adoption.

Communication channels are all the means through which the innovation is communicated from an individual to another. These include both *mass media* but also *interpersonal* channels (both face-to-face and Internet-based). Near peers that have already adopted the innovation are the most powerful source of influence on new adopters. The theory underlines that communication occurs more frequently between two individuals who are similar (or homophilus), when they share common meanings, language and interests (e.g. by belonging to the

same social group, by sharing work experiences, etc.). *Change agents* (like experts or external consultants) face this as a critical issue: they are more technically competent than their clients, but this difference might paradoxically turn out to be a disadvantage if this leads to ineffective communication.

Time is an important variable throughout the theory: in the earliness/ lateness of the adopter, in the diffusion rate of an innovation (at the population level) and in the decision process at the individual or organization level.

The adoption process is conceptualized as taking place in five main steps:

1) *Knowledge*. The potential adopter learns of the innovation's existence and gets some understanding on how it functions. Three types of knowledge are conceptualized in the theory: *awareness-knowledge* (the adopter knows that the innovation exists), *how-to knowledge* (he has the necessary information on how to use it properly) and *principles-knowledge* (he has information on the functioning principles underlying how an innovation works).

2) *Persuasion*. The potential adopter forms a positive or negative attitude towards the innovation. This stage involves the affective dimension. The perceptions about the characteristics of the innovation are formed at this stage.

3) *Decision*. The potential adopter engages in activities that lead to adopt or reject the innovation. Here adoption is defined as the *intention* to make full use of an innovation. Rejection can be active (as a consequence of a decision) or passive (non-adoption: the innovation was never really considered).

4) *Implementation*. The innovation is put into use. Problems arising at this stage (following unexpected consequences of the implementation) are usually more complex when the adopter is an organization. First, a number of individuals are involved in the adoption decision; second, these can be different from the actual implementers.

5) *Confirmation*: the adopter seeks reinforcement of the already taken adoption/ rejection decision. The decision can be still changed, if the

adopter is exposed to conflicting messages about the innovation.

The *social system* is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. The members of a social system may be individuals, informal groups, organizations or subsystems, which appear at different levels, including national community. Every social system has its *norms* of expected behaviour that influence diffusion. For example, innovators are often seen as deviants (heterophilus) by other system members. *Opinion leaders*, rather than innovators, are more likely to affect adoption or rejection by informally influencing others' attitudes, because they have earned respect based on competence, social accessibility and norm conformity. A different kind of individual influence can be exerted by *change agents* who, in contrast to innovators, represent change agencies outside the social system. They often use opinion leaders in trying to promote (or inhibit) diffusion. Change agents are usually technical professionals with a university degree. The communication with their clients might be ineffective due to a difference in technical knowledge. To overcome this gap they often employ *aides* (less than professional change agents) that exhibit homophilous characteristics with potential adopters.

4.2 COMMENTS ON DOI

The main critique moved to Diffusion of Innovation research is its tendency to produce endless lists of factors (Fichman 2004). This might be related to the fact that the traditional diffusion research has been based on variance research seeking to investigate the variables related to innovativeness in a generalised way and across different innovations.

In addition to variance research, however, Rogers promotes *process research* to explore the dynamics of the adoption of the innovation and explain the causes and sequences of related events over time. He addresses the question of the very existence of a stage-based adoption decision process in the following terms: "The scarcity of process research on the innovation decision process is a basic

reason why we lack definitive understanding of the degree to which stages exist" (Rogers 2003, p. 197). Moreover, the decision on different ICTs (*technology clusters* in the "Lego-era" of combinable and configurable technologies) might well come to be linked to each other, and could therefore give raise to multiple, overlapping adoption processes.

Concepts such as "*perceived characteristics*" and "*reinvention*" in this processual view make it also more sensitive to interpretivistic approaches. The adoption of technology can therefore be conceptualized more as a social phenomenon, than as a phenomenon driven by technology and by its inherent and immutable characteristics (Wang 2009). The notion of universally valid best-practice solutions has also gradually come to a fall. Many researchers have demonstrated that organisational changes due to newly introduced ICTs are often emergent and unanticipated. The adoption of these technologies is not necessarily intended or deliberate (e.g. Orlikowski 1996).

Another extension in the literature on ICT diffusion has been the focus on the communication channels and networks by which (potential) adopters learn about innovations. Rogers accounts for a number of communication channels, including opinion leaders and change agents. A first limitation is however that this communication network is mainly based within one social system. Other studies develop the notion that adopters are not part of one social network, but a variety of social networks through which ideas are communicated (Tushman and Scanlan 1981).

Other authors concentrate on to the political dimension of communication. Some aspects of the innovation can be selectively communicated, according to the interests of the change agents. The way IT suppliers, vendors and consultants selectively communicate about new IT innovations has been highlighted as being influential in the adoption of innovations, even pushing adopters to embrace technologies that were not appropriate for their needs (Newell, Swan et al. 2000).

Newell, Swan et al. (2000) also contribute to broaden Rogers' framework by presenting a knowledge-focused perspective: the centre of analysis should not be the spread of particular technological artefacts related to the innovation, but

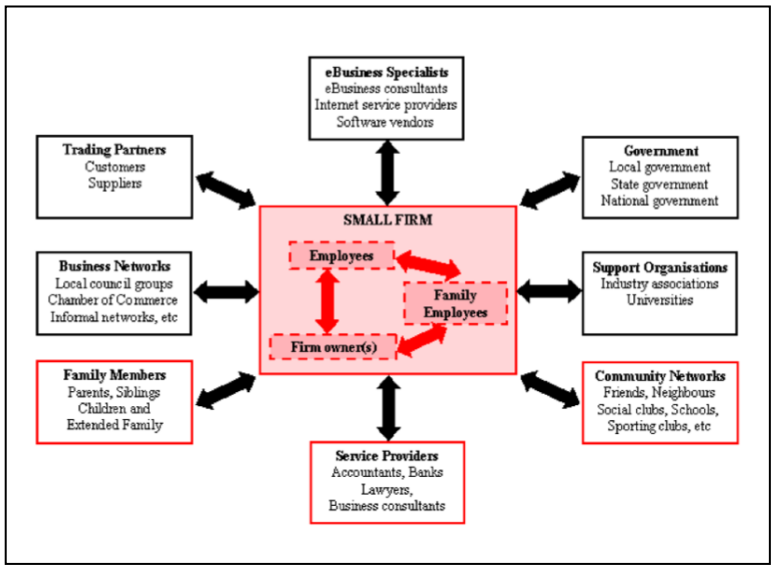
rather on the spread of *ideas* and *knowledge* underpinning a technology. In a similar vein, Wang (2009) proposes "popularity" as one of the channels through which social cognition drives the diffusion of the innovation. He suggests in particular to differentiate the *objective* aspect of Information Technologies – which most of extant literature refers to – from its *conceptual* form, i.e. the "*collective idea* for the development and utilization of an IT innovation" (Wang 2009, p. 2).

Further understanding of diffusion can be built from studies in the social constructivist tradition (specifically, the social construction of technology (Fulk 1993; Weick 1990). In analysing the promotion of computerisation Iacono and King (Iacono and Kling 1996) show that all kinds of actors (colleagues, trade associations in the computer industry, professional societies, regulatory agencies and the media) come to interact and shape diffusion (in their work, the promotion of computerisation). This approach to diffusion has been labelled as "emergent", since the innovation can be seen to be influenced by unpredictable and inevitable setbacks and surprises, arising out of the organisational and social context (Baskerville and Pries-Heje 2001).

In contrast to traditional theories of diffusion, building on a general notion of consensus, politics, conflicts and competition has entered the contemporary understanding of innovation diffusion. This can also be noted by the growing presence of alternative explanations, drawing on New Institutional Theory (DiMaggio and Powell 1983; Powell and DiMaggio 1991) or managerial fads and fashions (Abrahamson 1991; Carson et al. 2000). These contributions overcome the pro-innovation bias of part of DOI-based research, by demonstrating why and how the *inherent characteristics of a technology might not be determinant in guiding the adoption process*. They furthermore seek to explain why innovations might be adopted and maintained because of their *acquired legitimacy*, irrespective of whether they produce or not its expected technical value (Avgerou 2000).

I propose to use the diffusion theory as promoted by Rogers in his most recent elaboration (Rogers 2003) which is more socially informed and has a more qualitative nature than diffusion theory that stems from variance research.

Figure 8 depicts the link Rogers' framework with the influencing factors provided by Parker and Castleman (Parker and Castleman 2007b).



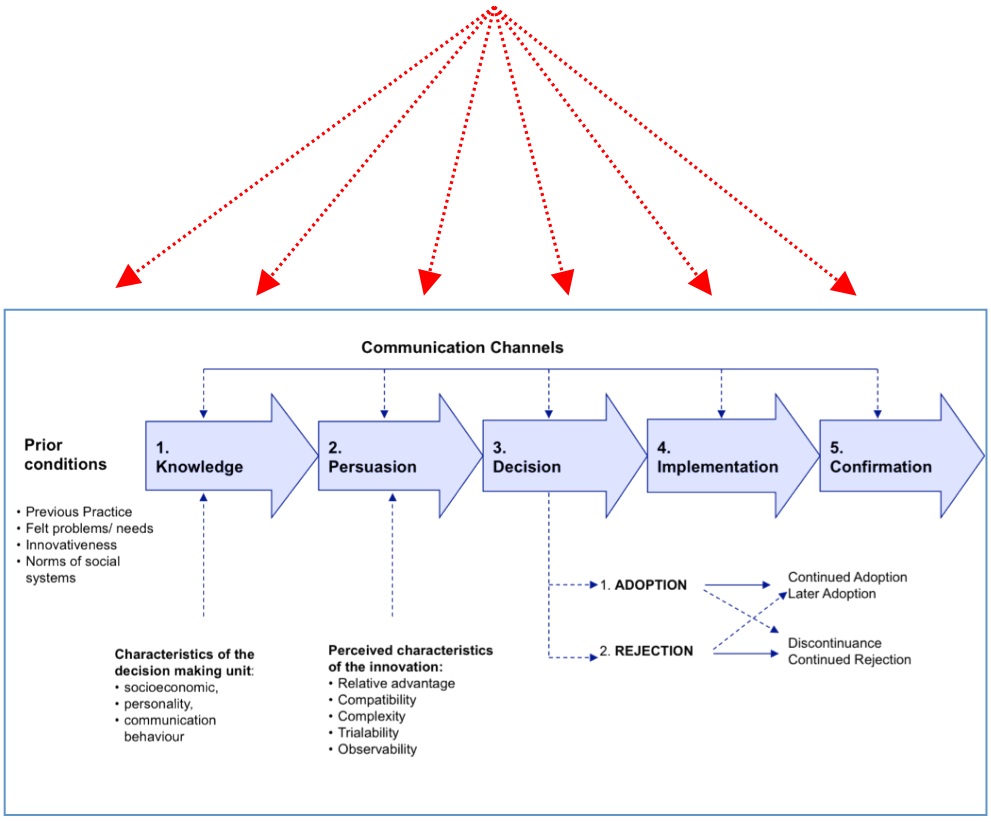


Figure 8 Adaptation of Rogers' Process Model to small firms context

However, as anticipated earlier, it is only used as in a first phase in that it provides a structured approach. The aim is not to validate the framework provided by DOI, nor to discover most influencing factors. The purpose is to provide an up-close analysis of the various phases of the adoption process. However, I contend that DOI it might leave undiscovered all those dynamics that might be taken for granted or hidden to the main decision maker. In short, in drawing only on the perceptions of respondents DOI is expected to uncover just those aspects they have made sense of.

In contrast, the main aim of the research is to observe also less transparent dynamics. Specifically, as a result of the pilot phase, the organizational dimension needs to be concentrated on through a complementary (and to some extent alternative) theoretical framework that directly addressers the relationship between technology and organising. To move beyond a step-based understanding of ICT adoption, I propose using theories stemming from actor-network research, for gaining a deeper understanding of the adoption process in practice.

The following chapter outlines the background literature in the organization-IT domain from which the second research framework is derived: that of Leonardi's Theory of Imbrication (Leonardi 2011).

CHAPTER 5 – LITERATURE REVIEW IN THE DOMAIN OF ORGANIZATION AND INFORMATION SYSTEMS STUDIES

5.1 ICT AND ORGANIZATIONAL CHANGE

Organizational change as a determinant, consequence, or outcome of the development of new ICTs has been a central concern in the field of Information System research since the '50s (Markus and Robey 1988; Orlikowski and Baroudi 1991). As Robey and Boudreau (1999) highlight, be it the introduction of mainframe computers or the diffusion of the world wide web, each new generation of IT and each major technological advance has been accompanied by energetic claims that organizations as we know them will be radically and fundamentally altered. Considerable work has been done in terms of contributions drawing on organization and strategic management literature to assess the impact of IT on organizational performance (Reich and Benbasat 1990).

The outcomes and organizational implications of ICTs, though, are characterized by a high degree of uncertainty. The failure rate of IS projects – as high as 50-70% according to (Gartner 2007) – indicates the severity of the problem. The IS literature has not been more successful in obtaining consistent results. For instance, researchers have found that IT both up-skills and deskills employees (Attewell and Rule 1984; Braverman 1974); increases and decreases organizational hierarchy; has positive, negative or insignificant impacts on firm productivity and profit – the so-called 'productivity paradox' (Brynjolfsson 1993). In particular the literature is controversial on the assessment of returns on IT-investments (Im et al. 2001; Porter and Millar 1985) and on the value of IT. Whereas some authors tend to consider it as a commodity (Carr 2004; Carr 2003) other have pointed out that the crucial source of value creation is the alignment of technical possibilities and economic interests, i.e. "IT-business alignment" (Henderson and Venkatraman 1993; Luftman 2003). In sum, the introduction of a new technology can have both intended and unintended

consequences, so producing a vast array of outcomes that can only be observed in the long period.

Several causes have been attributed to these inconclusive results, including methodological problems (Chan 2004); the use of quantitative aggregated firm performance measures (Barua et al. 1995); and the use of productivity measures as the ultimate dependent variable (Kohli and Devaraj 2003).

Other streams of research, however have explored these inconsistencies at the conceptual level. The deterministic logic implicit in most MIS studies – i.e. one that sees "technology as an external agent capable of transforming organizations" (Robey and Boudreau 1999, p. 168) – is failing to provide coherent empirical findings, as compared to a logic of opposition – i.e. one seeks an explanation for organizational change through the identification of forces both promoting and impeding change. Drawing on Pfeffer's (Pfeffer 1982) perspectives on action in organization theory, Markus and Robey (Markus and Robey 1988) have identified three conceptions of causal agency in the literature on Information Technology and Organizational Change: the technological imperative, the organizational imperative, the emergent perspective (Fig. 9).

A *technological imperative* approach assumes that technology is an exogenous force, impacting (so determining and or strongly constraining) the behaviour of individuals and organizations.

The *organizational imperative* assumes on the contrary that organizations (through managers and system designers) can *determine* organizational impacts of IT, by carefully designing information systems according to organizational needs.

An *emergent* perspective, in contrast to the former two, does not assert a dominant cause of change. It holds that the uses and consequences of information technology emerge (more or less) unpredictably from complex social interactions. Technological features and actors' interpretations are interwoven in such a composite way, that outcomes cannot be unproblematically predicted a priori. Central to this view are concepts like the interplay of

conflicting goals or preferences and the operation of non-rational objectives or choice processes. In Barley's well-known study on CT scanners in radiology, for instance, technology becomes a social object "whose meanings were defined by the context of their use" (Barley 1986, p. 106). It is an occasion for structural change (organizational and occupational change in radiological work), but not the determinant of which of the possible alternatives actually came out.

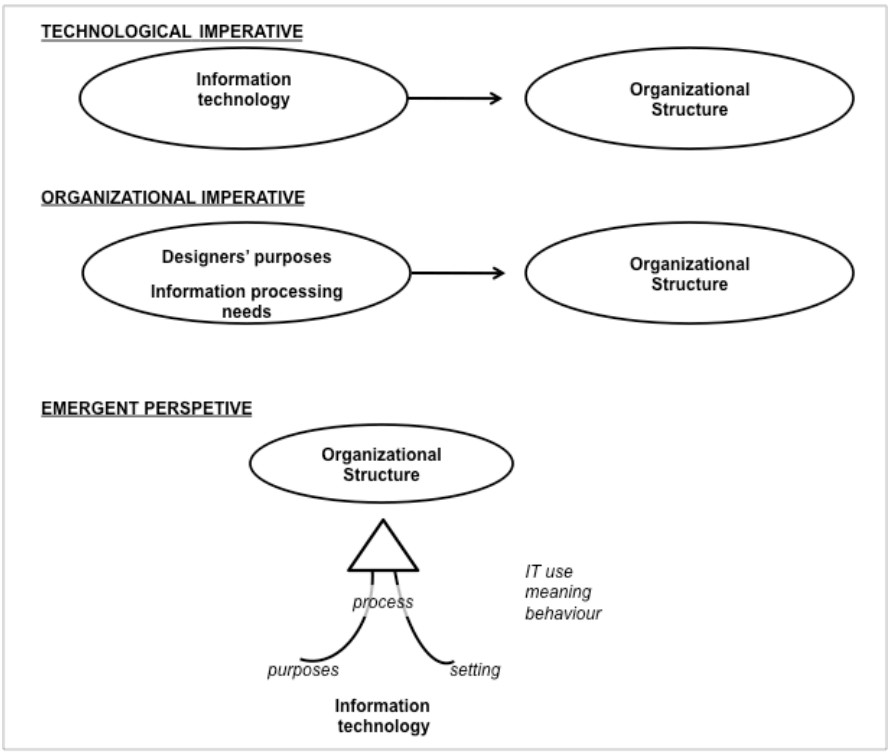


Figure 9. Causal agency conceptions in IT-Organization literature (Markus and Robey 1988)

An emergent stance – which is embraced in this work – is therefore inherently dynamic and "accounts for conflicting findings about the organizational outcomes of ITs by demonstrating the different meanings that the same technology acquires in different social settings" (Markus and Robey 1988, p. 595). It also espouses a more limited definition of prediction: the analyst is only able to say that some outcomes are likely under some conditions and unlikely under others. But this does not mean that the goal of generalizability is

abandoned, it is only restricted (according to a process approach) trying to correspond more faithfully to actual events in organizations.

In this line of reasoning, then, conceptualizing adoption in static terms in respect to technology (as the final decision to adopt or as the intention to adopt), would not allow to capture the full picture of the phenomenon. Also, how is ICT to be conceptualised?

5.2 DEFINING AND THEORISING ICT

In the introduction to this work it has been specified that it would primarily refer software applications, in particular those named "e-business" solutions, a sort of overarching label that synthetically signals those applications that are explicitly directed to improve the management of the relationships within and around the enterprise. This choice had also an empirical motivation, in that it implies an explicit and intentional adoption (in comparison to more commoditized applications like e-mail or Internet connection).

Beyond this delimitation, however, a review on how the literature has conceptualised ICTs is a necessary first step for developing a sound theoretical framework. Although apparently obvious, recent contributions have pointed out that paradoxically the IT itself tends to disappear from view in most studies dealing with technology (Orlikowski and Iacono 2001). The next section will therefore review alternative conceptualisations of technology.

5.2.1 Theorising ICT in the "Lego-era"

Defining ICTs is problematic given the diversity of technical elements that may be included, the rate at which these are developing and the appearance of new technologies providing significant shifts in capability. Pentland and Feldman (Pentland and Feldman 2007) effectively describe the contemporary setting as the "Lego-era", where the potentialities of new ICTs emerge from their functionalities as individual elements, as well as – probably even more – from their network-based recombination. Conceptualizing technology in abstract and static terms might therefore be misleading (Orlikowski and Iacono 2001;

Orlikowski 2000): enterprises move in a scenario where large monolithic ITs are not necessarily the state of the art. Information systems are designed in flexible and modular units, so that they can be recombined and extended with additional applications. Standard software packages can be – and usually are – customised. Moreover new solutions on a rental basis (like Software-as-a-Service, designed for web use and serving several customers, or Cloud Computing) are becoming an alternative both to off-the-shelf and to proprietary applications.

Given the dynamic, distributed and interdependent nature of technologies in today's work environment, and given also the multiple and unprecedented ways in which they contribute shaping organizational realities (and reasonably will continue to in the future) any attempt to analyse ICTs' role in organizations cannot but start from a reconsideration of conventional views of technology.

I will therefore draw on the work of Orlikowski and Scott (2008), that has developed a review of academic papers dealing with technology and organizations in the last decades. The authors underline the apparent paradox that, while technology is everywhere to be found in organizational practice, its presence seems to be decreasing in organizational literature. Or better, they notice that the growing complexity and presence of ICTs in everyday practices should encourage organizational scholars to engage more deeply in new research streams that reflect such complexity.

A definitive definition of technology is problematic (the concept of technology spans from tools and crafts, to methods and techniques, to cultural forces) and it is more useful to understand the term as *theoretically and historically contingent* (Orlikowski and Scott 2008, p. 438).

In this line of reasoning the authors analyse extant literature with a specific focus on how scholars have conceptualised and analysed technology. According to the taken theoretical stance, three research streams (Tab. 5) are identified. Of these the first two are dominant, whereas the third is reported as promising for developing new conceptual lenses and alternative research approaches.

	Research Stream I	Research Stream II	Research Stream III
Ontological Priority	Discrete Entities	Mutually Dependent Ensembles	Sociomaterial Assemblages
Primary Mechanisms	Impact Moderation	Interaction Affordance	Entanglement Performativity
Logical Structure	Variance	Process	Relationality
Key Concepts	Technological Imperative Contingency	Social Constructivism Structuration	Actor-Network Mangle of Practice
View of Social and Technical Worlds	Humans/organizations and technology are assumed to be discrete, independent entities with inherent characteristics	Humans/organizations and technology are assumed to be interdependent systems that shape each other through ongoing interaction	Humans/organizations and technology are assumed to exist only through their temporally emergent constitutive entanglement
Examples	Blau et al. (1976) Huber (1990) Aiman-Smith and Green (2002)	Barley (1986) Prasad (1993) Boudreau and Robey (2005)	Callon (1986) Pickering (1995) Suchman (2007)

Table 5 Three Streams of Research on Technology and Organizations (Orlikowski and Scott 2008)

A first research stream reflects the ontological assumption of discrete entities, linked by uni-directional causal relationships and having determinate effects on each other. Technology is here conceptualised as a distinct unit, having inherent characteristics and *impacting* or having a *moderating* effects on organizational dimensions. In some studies it interacts with various aspects of the organization, as independent variable having a variety of effects on organizational outcomes (dependent variables). In other theoretical models technology is considered a moderating variable, that influences the relationship between organizational variables (e.g., structure, culture, inter-organizational relations) and certain outcomes (e.g., efficiency, innovation, learning).

Studies in this stream of research tend to adopt a variance approach in their research designs and the advice for further research urges for large samples and extensive replication. Examples in this research stream are: relationships between plant technology and dimensions of internal structure (differentiation, size of personnel components, supervisory spans of control and decentralization of decision-making authority) (Blau et al. 1976); effects of computer-assisted technologies on organizational design, intelligence, and decision making (Huber 1990); effects of technology characteristics on user learning activities (Aiman-Smith and Green 2002).

A second research stream focuses on the dynamic interactions over time

between people (or organisations) and technology. Technology is understood as part of the complex process through which *organizing* is accomplished. This process, and in particular outcomes, are conceptualised as *emergent* and (at least partially) unpredictable. Theories belonging to this research stream are mainly based on a *process logic* and do not posit any dependent or independent variables. Rather, the rationale is one of co-evolution and of mutually dependent interactions.

This group of works draws heavily on Social Constructivism (Walsham 1995) and Structuration Theory (Giddens 1984). Issues of concern span from technology as an occasion for structural change (Barley 1986); to symbolic processes involved in the computerization of work in organizations (Prasad 1993); to resistance and reinvention in information technology use (Boudreau and Robey 2005) or shifts in the nature of work linked to the design and use of information technology (Orlikowski 2000).

More recent contributions also build on New Institutional Theory (DiMaggio and Powell 1983). On one side technology can become inscribed with institutional forces (Powell and DiMaggio 1991), on the other they are carriers within the environment contributing to the structuring of organisations (Scott 1995).

Common to the academic production here is a detachment from *deterministic* stances – be it technological or social (Barley 1988) – and a call for research that is more engaged with understanding the changing relationship between (fast evolving) technologies and contemporary organizations (Zammuto et al. 2007). Accordingly next steps for organization and IS scholars imply: avoiding unidirectional models and instead engaging with the complexity and equivocality that can be observed empirically (Barley 1988); using more longitudinal studies (Roberts and Grabowski 1996); rediscover the principles of sociotechnical systems theory (Trist 1981) by simultaneously unpacking the "black boxes" of technology and organization – through the notion of *affordances for organizing* – for increasing our understanding of the changing fabric of contemporary scenarios (Zammuto et al. 2007).

Orlikowski and Scott (Orlikowski and Scott 2008) finally identify a third

research stream for studying the practices of contemporary organizational life, defined as *sociomaterial approach,* which expands research stream II and on which I will draw for the theoretical framework of the in-depth case study.

5.3 A SOCIOMATERIAL ACCOUNT OF TECHNOLOGY

Although not discarding previous studies, and drawing on the second research stream for further elaboration, the authors propose the notion of *sociomateriality* as an additional perspective to the "palette of approaches that [they] believe may advance the way we study technology, work, and organizations" (Orlikowski and Scott 2008).

The authors contend that one of the limitations of previous approaches is that by treating technology as a separate entity (be it occasional or ongoing) the researcher loses the possibility of conceptualising and analysing it as an integral part of today's organising. To overcome this limitation, they challenge the unquestioned ontology of separation and propose instead to embrace a *relational* ontology that blurs analytical boundaries between technologies and humans (Knorr Cetina 1997; Latour 2005). This conceptual shift is obtained through a move from analysing actors and object as self-contained entities, to focusing on *agencies* that are so systematically and recurrently saturated that previously taken for granted boundaries are dissolved. This necessarily implies including in our frameworks how the *material* dimension is intrinsic to everyday activities.

Acknowledging the importance of materiality of Information Technology has been advocated by different authors, calling for a deeper engagement with the technological *artefact* in IS research (Orlikowski and Iacono 2001; Zammuto et al. 2007). As Leonardi and Barley (2008) note, accounting for the material dimension of technology does not imply a deterministic stance. On the contrary, developing more analytic attention to the (often overlooked) material constraints or affordances of technology is indeed compatible with agential theories of organizational change. This means to analyse, along with interpretations and perceptions, what actually a technology lets users do and what it doesn't. The motivation for this call is also rooted in how the observed technologies have

changed in the last years: authors today more narrowly identify artefacts than, for example, early contingency theorists. Whereas Woodward (Woodward 1958) or Perrow's (Perrow 1967) definition of technology broadly encompassed techniques, processes and work practices, today the object of study are specific artefacts, such as email systems, enterprise resource planning software or customer relationship management applications. However, the fact that these are not solid objects (but software) has led authors to overlook their material aspect. Material properties are defined not as necessarily touchable properties, but as those "features that provide opportunities for (or constraints on) action" (Leonardi and Barley 2008, p. 162).

The suggestion for research, then, is to provide accurate accounts of the way people work. Unquestionably, today people in almost any field, recursively interact not only with other individuals, but also (in a way or another) with information technologies. The latter have material properties that (despite being designed by others) engage users with real constraints or real opportunities for carrying out their everyday work. A deeper understanding of how people actively deal with such constraints or affordances is integral to a full account of organizing and it is also necessary for developing a language for describing such dynamics.

Within this stream, the body of research that the authors indicate as most prominent belongs to *Actor Network Theory* (Callon 1986; Latour 1987), which will be explained in more detail in the next section.

5.3.1 Actor Network Theory

Like other network theories of organizing Actor Network Theory (ANT) adopts a relational ontology. However, peculiar to ANT is that the networks it is concerned with are heterogeneous: they are made of human and non-human elements. Actor-network theory views society as a completely interwoven socio-technical web (Hanseth and Monteiro 1997). It consists of a highly heterogeneous network of actors, institutional arrangements, textual descriptions, work practices and technical artefacts. The theory is granting all

entities of such a heterogeneous network the same explanatory status.

This is one of the most controversial aspects of ANT. As Law clarifies (Law 1992), however, treating the human and non-human actors as symmetrical is an *analytical* stance, not an *ethical* one. Symmetrical treatment does not imply that they are literally the same, nor is it meant to reduce human actors to mere objects (Hanseth and Monteiro 1997). It means that they are analysed as *enacted* and *relational effects*, and that they are explored in their configuration and reconfiguration of those relations. More specifically, allowing not distinguishing a priori between social and technical elements of a sociotechnical web encourages a detailed description of the concrete mechanisms at work, which glue the network together.

ANT has become an increasingly popular way to analyze information systems (Doolin and Lowe 2001; Faraj et al. 2004; Hanseth et al. 2004; Walsham 1997), with varying developments in the theory. There are many variants of ANT (Latour 2004; Law and Hassard 1999), yet the core concepts can be synthesized as follows.

Two main assumptions underlie this theory (Hatch and Cunliffe 2006). First, the social world is materially *heterogeneous*: human actors as well as buildings, machines, physical material and talk are all involved in the process of sociotechnical ordering (which includes making sense of, constructing and maintaining a network). Second, the elements of a network only achieve significance in relation to other elements (*principle of relationality*).

In one of the first works on ANT, Callon and Latour (Latour and Callon 1981) showed how micro-actors (i.e., individuals) form alliances, enrol other actors, and use artifacts to strengthen such alliances. In doing so they create heterogeneous networks made of humans and nonhuman artifacts. These networks are found to *act as if* they were independent autonomous actors; hence, they are referred to as "actor-networks". In the field of IS, ANT has been recognized as having immense potential for understanding the complex social interactions associated with IT (Hanseth et al. 2004) and has been widely used to interpret the social processes in technology implementation initiatives (e.g. (Hanseth and Monteiro 1997; Walsham and Sahay 1999).

As mentioned earlier, ANT employs a "radically relational approach" implying that each actor can be defined and understood only in relation to other actors. (Law 1992). For example, when driving a car we are influenced by traffic regulations, previous driving experience, and the car's manoeuvrability (Monteiro 2000). To understand the phenomenon of "driving a car", we should consider all these influencing factors together. In ANT, it is the actor-network that makes up the event that should be analysed. The actor-network, in short, is those elements in a context that shape action.

As previously mentioned, the symmetry between human and nonhuman actors is one of the distinguishing and most controversial characteristics of ANT. While many critics have expressed disagreement with the theoretical position that non-alive objects (e.g.. an ERP system) can have their own interests, others have argued that this position can provide researchers with a useful metaphor for analyzing complex socio-technical networks in detail.

But how can artefacts have interests? The interests of an artefact can be equated to the interests that have been inscribed in it. The notion of *inscription* refers to the way technical artefacts embody *patterns of use* (Hanseth and Monteiro 1997). From this perspective, artefacts are not merely physical; they include and embody the active projection of actors, hence the label "actant". Akrich (Akrich 1992, p. 208 - cited in Hanseth and Monteiro 1997) explains the notion of inscription in the following way: "Designers define actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of 'inscribing' this vision of (or prediction about) the world in the technical content of the new object… The technical realization of the innovator's beliefs about the relationship between an object and its surrounding actors is thus an attempt to predetermine the settings that users are asked to imagine ....".

By inscribing programs of actions into a piece of technology, the technology becomes itself an actor by imposing its inscribed program of action on its users. The inscribed patterns of use may not succeed because the actual use deviates from it. ANT allows the investigation of such questions as how technologies

come into being and how users and other actors conform, ignore, modify, or usurp the original designers' interests. When studying the use of technical artefacts one necessarily shifts back and forth "between the designer's projected user and the real user" in order to describe this dynamic *negotiation* process (Akrich 1992, p. 209 - cited in Hanseth and Monteiro 1997). Some technologies inscribe weak/flexible programs of action while others inscribe strong/inflexible programs.

Translation, in ANT vocabulary, refers to the process of creating a temporary social order, or the movement from one order to another, through changes in the alignment of interests in a network. Latour (1991, pp. 105–106) identifies translation as the "first principle" in studying technology: In spite of what its designers may intend, the fate of an artefact is "in the hands of others." In some cases, the extent of translation may be so minor that it goes unnoticed (e.g., when Web browsers are used for browsing the Web). In other examples, the translation is more striking (e.g., when cell phones are used as bomb detonators). Translation is fundamental to our ability to recombine artefacts in different ways (Pentland and Feldman 2008).

Problematization is the moment during which a focal actor frames the problem in its own terms, identifies other relevant actors, and highlights how the problem affects the other actors. The second moment of translation, referred to as *interessement*, involves convincing other heterogeneous actors that the interests defined by a focal actor for them are, in fact, consistent with what their own interests should be. If interessement is successful, then *enrolment* is said to occur. Enrolment involves a definition of roles of each of the actors in the newly created actor-network. Since any enrolment is necessarily temporary, betrayal by an ally (i.e., enrolled actor) – in the sense that it acts in contradiction to the interests it has agreed to support – is always a possibility.

Often, as part of the enrolment process, *inscription* occurs. Once an agreement between actors (i.e., enrolment) has been reached, the commitments need to be recorded into the shared memory of the social system (i.e., "stabilized") through inscription. Strategies for inscription in the context of computing include creation of texts (e.g., software manual) or technical artefacts (e.g., security

systems). Irreversibility is another important concept and refers to the degree to which the sociotechnical system is incapable of going back to a point where alternative translation paths existed.

Finally, ANT brings up the idea that organizational forms can be conceptualized as stabilized, heterogeneous networks (Law 1992). As Latour (Latour 2004) argues, the "social" lies in associations between the actants. Heterogeneity refers to the inclusion of both human and nonhuman actants, as discussed above. Stabilized networks occur when patterns of actants appear together repeatedly. If the pattern is sufficiently stable, it may become a "*black box*" (Latour 1987).

ANT overcomes the separation between the social and the technical. It also allows overcoming a perspective in which the social context or the inherent properties of the technology are the drivers of change. According to an ANT perspective, it is the associations between the innovation and its surrounding actors that can account for the observed phenomena. ANT does not reduce a priori technology adoption to discrete factors, but it is able to analyse it in all its complexity. It offers a language for describing the many small, concrete technical and non-technical mechanisms, which go with the adoption of new ICTs. Accordingly it goes a long way in describing which and how actions are *enabled and constrained* (Hanseth and Monteiro 1997).

5.3.2 Other relevant concepts in the sociomateriality research stream

Other concepts that draw on a relational ontology need further attention.

One is Pickering's concept of "*mangle of practice*"(Pickering 1993, 1995) that advocates the "insistence that material and human agencies are mutually and emergently productive of one another" (Pickering 1993, p. 567). This notion gave impulse to further enquiry by Rose and Jones (2005) with the notion of "double dance of (material and human) agencies"; and Suchman's (2007) research of the sociomaterial dynamics configuring everyday practices.

Another is *performativity* (Barad 2003; Callon 1986) indicating those elements that contribute to the constitution of the reality that they describe. Stemming from Austin's "performative utterances" (e.g.: "I do" at a wedding executes

action) it draws the attention of researchers on the enacted-in-practice: boundaries and relations between technology and people are not fixed, but on the contrary recurrently enacted. This concept is being elaborated on within the so-called "practice turn" (Schatzki et al. 2001) in management and organization studies. Here an organization is conceptualized as a recurrently enacted and patterned set of relations, reproduced over time and space. Focus of analysis is the flow of situated actions (e.g.: Feldman and Pentland 2003; Orlikowski 2002). In this line of reasoning, Orlikowski and Scott (2008) suggest that "since technology and contemporary work practices saturate each other, further efforts to theorize practice must encompass technology in organizations. We believe a way to achieve this is with the notion of sociomateriality".

5.3.3 Final remarks on sociomaterial approaches

Suggestions for further development of research in this stream include finding novel ways of thinking and talking of the social and material worlds as inseparable, as constitutively entangled. Furthermore sociomateriality studies should seek to find ways to bring to the foreground patterns (not processes or events) within the constitution of everyday work practice. And, most interestingly, it is deemed essential to find a way to reveal the *taken-for-granted*, invisible dynamics of sociomateriality. The authors suggest that it is exactly the hidden-from-view dynamics of sociomateriality that permeate it with such far-reaching consequences. This will enable generating deep insights into the contemporary world: since work practices are inherently sociomaterial, to understand work, we must understand its sociomaterial (re)configurations. Because these practices don't just mediate work, they perform organizational realities.

Building on this understanding, the next chapter presents the theoretical framework used in the in-depth case study to complement the analysis performed through Rogers' Diffusion Theory.

CHAPTER 6 – THEORETICAL FRAMEWORK: A THEORY OF IMBRICATION

6.1 INTRODUCTION

At an ontological level, a sociomaterial approach to technology and organizing would suggest that these are indistinguishable phenomena (Orlikowski and Scott 2008). Orlikowski argues that this stance compels researchers to view the relationship between coordinated human action (the social) and the features of technologies (the material) that people use as central to the organizing process. In other words, a sociomaterial approach asserts that materiality is an integral dimension of organizing, positing that the social and the material are *constitutively entangled* in everyday life (Orlikowski 2007). Such a position challenges conventional views of separation by drawing to the foreground the material aspect of ongoing organizing in practice. It does not privilege either humans or technology (in one-way interactions), nor does it link them through a form of mutual reciprocation (in two-way interactions). Instead, the social and the material are inextricably related: "there is no social that is not also material, and no material that is not also social" (Orlikowski 2007, p. 1437). As Leonardi clarifies: "technologies are as much social as they are material (in the sense that material features were chosen and retained through social interaction) and [patterns of organizing] are as much material as they are social (in the sense that they are enabled and constrained by material properties)" (Leonardi 2009, p. 299).

Yet, at empirical level, technologies are relatively easy to discern from the organizational context. This apparent dissonance between ontological claims and empirical observations is elaborated on by the work of authors engaging with the nature of the relationship between technologies and routines (Leonardi 2009; Pentland and Feldman 2007, 2008).

Leonardi in his most recent work (Leonardi 2011) develops an explanation of *how* the social and the material become interwoven and also of how they *continue* intermingling, so building the infrastructures that people use to do their

work on an ongoing basis. He does so by articulating his Theory of Imbrication, which interestingly succeeds in reconciling theoretical perspectives in organization literature (bridging between the second and the third research stream identified by Orlikowski and Scott), so that technology is specifically addressed (both as transcending changes in context and in terms of perceived affordances or constraints), but at the same time granting primacy to human agency.

6.2 THEORY OF IMBRICATION

The concept of imbrication is derived from names of roof tiles used in ancient Roman and Greek architecture. In order to make roofs waterproof, these were built of interlocking tiles: tegulae (a plain flat tiles positioned on the roof) and imbrexes (semi-cylindrical tiles laid over the joints between the single tegulae)[4]. Leonardi draws this metaphor from recent contributions in the IT and organization literature (Ciborra 2006; Taylor 2001) to suggest the notion of distinct elements that are arranged in overlapping patterns, so that they will function interdependently. However, Leonardi does not restore an ontology of separation between the social and the technological, in that he collocates his theoretical development at the lowest level of abstraction, i.e. that of human and material agency.

6.2.1 Human and Material Agencies

Human agency is defined as the ability to form and realize one's goals (Giddens 1984), whereas *material agency* (Pickering 1995) is the capacity for non-humans to act on their own (apart from a direct human intervention). A human agency perspective has underlined how people's work or actions are not determined by the technologies they use, because they can always use their discretion for deviating from or shaping the effects of those technologies

[4] Leonardi cautions that "clearly, using the imagery of imbrices and tegulae has its problems. Both tiles are made of 'material' in the sense that they are physical creations of clay. The struggle to find a suitable image with which to describe the imbrication of human and material agencies points to the conceptual difficulty of integrating these phenomena. Thus, the analogy is meant to be illustrative rather than to be read lite rally." (Leonardi 2011, p. 151)

(Boudreau and Robey 2005; Orlikowski 2000). Furthermore, people often *enact* their human agency in response to technology's material agency (Volkoff et al. 2007). An example of a technology that exercises agency is a software code running, without any direct input by the user.

Most of extant literature tends to depict people as dynamic and technologies as static: in the relationship between technology and organizing, people who have goals and the capacity to achieve them (human agency) face a technology that does specific things that are not completely under their control (material agency). In so doing, they can find ways to round on technology if it does not comply with their intended goal (DeSanctis and Poole 1994; Markus 2004). In this process change most often happens in organizational routines (sequential patterns of social action) (Leonardi 2007; Schultze and Orlikowski 2004), so that individuals can still achieve their goals through the technology, but despite the constraints it poses.

However, defining technology in static and immutable terms does not render a faithful account of what technologies today are like. Orlikowski describes contemporary forms of organizing as "increasingly constituted by multiple, emergent, shifting, and interdependent technologies" (Orlikowski 2007, p. 1435). Not only are ICTs designed for being flexible and modular, they can also be customized in a number of ways. Even if users do not have the capacity to directly alter technology, they can easily have it done by the internal IT function, or by external services.

Therefore the scenario of present-day organizations is increasingly becoming one of *flexible technologies* and *flexible routines*. This is particularly the case for smaller enterprises, where the ostensive (Feldman and Pentland 2003) side of routines is not well laid down and the performative side is extremely flexible. And it is also the case for website-related technologies (that will be analysed in the in-depth case study), which are typically built of multiple modules and often based on open-source software.

A context where people can chose whether to change their routines or technologies, then, is ideal for analysing the intertwining of human and material agencies. Leonardi states that "although they interact directly with one another,

human and material agencies are distinct phenomena. By themselves, neither human nor material agencies are empirically important. But when they become interlocked in particular sequences they together produce, sustain, or change either routines or technologies" (Leonardi 2011, p. 150).

If it is possible to alter either technologies or routines, how and when do people decide to change the one or the other? The answer according to Leonardi is to be looked for in the *imbrication* of human and material agencies.

6.2.2 Imbrications of Human and Material Agencies

Drawing on Structuration Theory (Giddens 1984), agency is defined as "the capacity for action". Although not all actions achieve one's goal (so that unanticipated outcomes are always possible) Giddens grants human intention a foreground role, in that action involves motivation and reflexivity. A structurational approach provides a framework for examining how people *actively* structure their environments. But the fact that it does not directly address technologies (and so fails to theorise the role of technological artefacts, if not as *prop* for human action) has been underlined by some authors (e.g. Orlikowski 2005) as being a limitation for IS studies.

An integration to a structurational approach with concepts derived from Actor Network Theory (ANT) has been therefore proposed (Walsham 1997). As described before, in the explanation of people's construction of outcomes ANT does not give priority either to humans or to technologies. Rather, both are equally involved. To move beyond this controversial claim of equivalence Taylor (Taylor 2001) provides a integrated position in between Structuration and Actor Network Theory: human and material agencies both shape people's actions, however their influence is unbalanced, because human agency has a "head status" while material agency has a "complement status". Artefacts have purposes that have been incorporated in them by designers and, in this sense, also have interests (in ANT terms). But these interests are not completely autonomous: those who have designed the artefact have granted it to them. Therefore "that to which we accord intentionality becomes, ipso facto, an agent

– individual or not" (Taylor 2001, p. 71).

In sum, Taylor succeeds in recognizing that technologies have a material agency that transcends changes in context, while at the same time giving primacy to the people who design and use them. The *metaphor of imbrications* described at the beginning of this section is used to provide an account of this conceptualization. Tegula and imbrex have distinct shapes, however they can be arranged so that they build a visible and unitary pattern. In organizational terms, according to Leonardi, this pattern is the *infrastructure* of routines and technologies that is produced by the imbrication of human and material agencies. So the ontological (sociomaterial) claim of inseparability is not referred to technologies and organizing (which, as noted before, are quite recognizable), but to human and material agencies, which *in practice* become inseparable. These can be interwoven in many different ways, which in turn produce empirically distinct figurations (technologies and routines). As Leonardi notes, this view is consistent with seminal contribution in organization literature (Pentland and Feldman 2007) and IS studies (Orlikowski 2000).

The metaphor of imbrications has the advantage to conceptualise human and material agencies as separate, but interdependent *in producing outcomes*. As a consequence, technologies and routines are empirically distinguishable, but are built of the same building blocks: human and material agencies. It also highlights the organizational residue that such imbrications produce: through recurrent use, routines and technologies become *infrastructure*. They provide context and means for organizing, but they are taken-for-granted: they become black-boxed, so that they are no longer questioned. Finally, it accounts for accumulation over time, without any deterministic implication. Past imbrications have an effect on future ones, but the path followed is not determined or predictable a priori. People in sum work to actively reconcile their goals (human agency) with the possibilities a technology offers (the things a technology can or cannot do, i.e. material agency), but they always do so within the framework built by prior imbrications.

What guides change (in either routines or technologies) is explained through the perceptions of *affordance* or *constraint* that arises in between human and

material agencies. Change, as posited above, requires new imbrications. In assuming, with Orlikowski (2000), that insomuch as technologies allow people to fulfil their goals change is unlikely to happen, it is important to recognize the role played by the awareness of technology as an obstacle or as an enabler.

The concept of affordance stems from studies in the perceptual psychology domain (Gibson 1986). *Affordance* refers to all those actions an object invites doing (for example a flat surface affords support for up-right walking, a steel fork affords a prop for eating, etc.). However, it is important to discern between the physical properties of an object (being flat, being made of steel) and the affordances it invites (upright walking, eating). The latter are not abstract properties or attributes of the object, they are *relative* to the observer (e.g. chopsticks or forks do not offer a universal affordance for eating). In a similar vein, although a technological artefact has some material properties that remain unaltered across different contexts, the perception of affordance (or constraint) does not.

Applied to technology, authors (Hutchby 2001; Markus and Silver 2008) stress the *relationality* of affordances in that they do not reduce it to "designed-in" properties, but highlight how they arise in between people and artefact. Accordingly, Leonardi claims that affordances and constraints are constructed in the space between human and material agencies. In the effort of matching their goals with the possibilities of a technology, people actively construct perceptual affordances and constraints and they make choices about how they will imbricate human and material agencies. This can lead to the generation of new goals with the same technology or the same goals with a different technology. Or better, they could decide to change their routines or the technology. A perception of constraint towards technology tends to engender a sequence of imbrications that changes technologies, whereas a perception of affordance tends to produce a sequence of imbrications that changes routines.

6.2.3 The Theory of Imbrication as alternative framework in this work

For the purposes of the present study, the Theory of Imbrication as developed by Leonardi offers an opportunity for providing further understanding of the organizational entailments of technology adoption. It indeed lays out a number of concepts that will guide the analysis of the in-depth case study presented in the next chapter.

The Theory of Imbrication first of all works on the theorisation of technology, which has been advocated by prominent extant literature (Orlikowski and Iacono 2001; Zammuto et al. 2007) in search for more relevant and engaged contributions in the organization-IT domain. Specifically, it provides a useful language for addressing the questions on the mutual implications of technology and organising that have emerged from the pilot case analysis. Without implying any deterministic direction for change, imbrications emphasise *interweaving* as opposed to *impact*. Change is the result of overlapping of both material and human agencies, where the latter nevertheless keep primacy: imbrications are always *actively* arranged by someone. Organizations can be better conceptualised as imbricated systems of human and material agencies, where past imbrications form the organizational fabric in which any new ICT is being adopted.

Furthermore, change is not a prerogative of the organizational dimension: technologies as well are theorised as feasible of being altered at any time. This helps accounting for changes in technology during the adoption process, due to external interventions (as in the pilot case), but also in response constraint or affordance perceptions constructed by people when engaging with the technology, in respect to their goals.

Another concept developed by this theory is that of the organizational residue left by past imbrications. This infrastructure, as referred to by Leonardi, is the organizational structure on which subsequent organizing is built on. The resulting image is that of a continuous flow, guided (but not determined) by past dynamics. As for of a river (Leonardi 2011, p. 165) where its currents (a direction of flow) become visible to geologists through the imbrication of rocks, for an organization the structuring process can become visible to the researcher trough the patterns of imbrications crystallised in the resulting infrastructure.

Although the sociomaterial approach provides an important way of thinking about technologies, it does not offer much guidance in specifying how researchers might depict sociomaterial dynamics. Longitudinal, ethnographic approaches are suggested for capturing the sociomaterial dynamics of organizing (Leonardi and Barley 2010; Orlikowski and Scott 2008). However, given that the chain of imbrications is potentially endless in the past, and most probably ongoing towards the future, the researcher needs to arbitrary decide where the beginning and the end point of the analysis are. According to Leonardi: "The analyst should be more interested in explaining how imbrication occurs and the effects that prior sequences of imbrication have on future actions" (Leonardi 2011, p. 155).

In following this hint, the theoretical framework is selectively applied as interpretive lens in the case study for analysing the adoption process, but at the same time granting an account of antecedents and context.

6.3 CONCLUDING REMARKS ON THE THEORY OF IMBRICATION

As outlined in Chapter 6, an analysis through Rogers' Diffusion of Innovation Theory will help identifying the main phases of adoption and will help sensitise for relevant sources of influence across the adoption process. However the pilot case has risen further questions (*RQ1c*) concerning how to conceptualise technology (especially how to cope with its flexible nature throughout the adoption process) and how to account for technical-organizational implications of adoption.

The metaphor of imbrication is deemed an ideal candidate for providing an alternative interpretation of the adoption process of ICTs. Complementing the analysis provided by the overarching framework of DOI with in-depth insights of Imbrication Theory has a double aim.

On one side it helps explaining opaque concepts in DOI (which result being: previous practice, re-invention and technology clusters); on the other it implicitly provides the possibility of comparing the understanding deriving from alternative theoretical frameworks.

CHAPTER 7 – IN-DEPTH CASE STUDY

THE ADOPTION PROCESS OF A CORE ICT IN AN ITALIAN SME: WEBSITE ADOPTION IN A SMALL PUBLISHING FIRM

7.1 MOTIVATION FOR SELECTING THE PUBLISHING INDUSTRY

The pilot case has concentrated on ICT adoption where the information managed through ICT is not directly the core business of the enterprise. In this context ICTs are intended to improve administrative data and flows management (customers and suppliers data, order fulfilment, accounting and administrative processes and reporting). Main advantages are in general expected in terms of error reductions, improvements of time and speed, information sharing and more generally efficiency in terms of subordinate processes. For most SMEs, however, this kind of need is still weakly perceived. These processes are not directly perceived as creating added value to the product/service performance. This might also partially explain why some ICT-related practices are not yet widespread.

Interesting implications might in contrast emerge if the centre of the analysis is on cases where *information itself constitutes the core business of the enterprise*. According to a second turn of consultation with experts (see Fig. 3 for reference), in such a scenario a stronger attention to the tools for improving the management of such information can be expected.

This focus implies a choice on both a specific industry and on a specific technology. The decision for the in-depth case study is to focus on small periodical press publishing firms and on website adoption (with its backend technology *Content Management Systems*).

Website and new media are emerging as new and complex challenges for small publishers, in that competition is extremely vast and new business models are being defined. Therefore is seems justified to select this as ideal setting for an in-depth analysis on ICT-related organizational change process: *how does the adoption process take place in practice, small in information-intensive firms?*

This choice seems to be also relevant, because few article in the literature addressed this topic, and only indirectly, with some studies focusing topics like printing technologies (Glykas 2004), e-books (Jiang and Katsamakas 2010), e-commerce (Javalgi and Todd 2004).

ICT adoption in firms that base their core business on information contents are very different from manufacturing or service firms. In publishing firms information is both the input and the output of their processes, so that managing information through a Content Management System has both strategic and organizational implications.

A further selection is done within the publishing industry: although some dynamics are common for example to books, magazines or newspapers publishers, each of these has its own specificities. Therefore only one is chosen, that is periodical publishing.

As for the specific ICT, Content Management Systems (CMS), a precise definition is partially problematic (Vitari and Ravarini 2009) in that they are sometimes identified as subsets (or sharing some characteristics with) the wider category of Enterprise Content Management Systems. The latter can be defined as the totality of strategies, tools, processes and capabilities to manage the firm informative asset, in four lifecycle stages: capture, organize, process, maintain (Smith and McKeen 2003).

In the case study we refer to website management: Content Management Systems are defined as an integrated approach for storing and organizing contents, based on a "software systems that provide website authoring, collaboration and administration tools designed to allow users with little or no technical knowledge (e.g. of programming or mark-up languages) to create and manage website content with relative ease". These systems include the layout of the website (the so-called front end, i.e. the part visible to the end users who visit the website) and a back end (i.e. the administration interface for managing the contents). Web CMSs are installed on a web server and are connected to a database for storing different sorts of documents (e.g. text, photo, video).

7.2 THE CASE STUDY

This section presents the case study at PUBLICOM (a pseudonym) a small Italian publishing house active in specialised periodical publications in the field of tourism and travel. PUBLICOM has engaged in the creation and development of websites for its publications. The analysis is focused in particular on the first (and still main) website. This section is structured as follows.

First the employed methodology is explained. Then a synthetic overview of the periodical publishing industry is presented. After that, the background history of the company is provided, followed by a premise on the evolution of employment of ICTs previous to the development of the website. Data gathered on the website and Content Management System adoption process at PUBLICOM are then presented though a narrative (Pentland 1999) developed in a time-ordered sequence. An account of the current and future situation of PUBLICOM is finally described.

The case is then analysed initially through the theoretical framework of Roger's Diffusion of Innovations Theory (as integrated with the literature on SMEs in Chapter 4, Fig. 8). After discussing the results, the case is then re-analysed by a more in-depth through the lens of Leonardi's Theory of Imbrication.

A concluding section completes the case study, by discussing how the understanding gained through the case study contributes to the overall research presented in this work.

7.2.1 Methodology

The decision for this case was to focus on a single research site based on the argument that very rich data could be acquired from a complex adoption process in a single setting, and that studying multiple different enterprises would not guarantee additional insights into the phenomena of interest. Unlike quantitative research design, which is driven by requirements for sample size and power, qualitative research design is driven by the potential for thick data that a field site may offer, specifically if taking an interpretive stance (Walsham 1995).

The contemporary nature of the phenomenon under study (and the results of the pilot case) led towards a longitudinal and qualitative research design, based on an in-depth case study (Yin 2003).

The selection of cases in qualitative research can be driven by theoretical concerns rather than random or stratified sampling. Eisenhardt and Graebner state that "theoretical sampling simply means that cases are selected because they are particularly suitable for illuminating and extending relationships and logic among constructs" (2007, p. 27). The specific case was therefore chosen by opportunistically referring to knowledgeable informants in the industry, who have helped selecting the case. The main criteria, besides being a small enterprise, were: that it had to be an established firm and that the web project had to be ongoing. Ten candidates emerged from this search process, of which PUBLICOM was considered the most suitable, in that the project had been launched three years prior to data collection and was ongoing, with particularly articulated dynamics.

Data collection in qualitative research can be accomplished using a variety of methods with the three most common being qualitative interviewing, observing and participating, and the use of visual methods and documents (Mason 2002). Furthermore, the use of multiple methods provides the advantages of strengthening the triangulation of evidence (Eisenhardt 1989) and facilitating a broader set of opportunities for gathering relevant data. Eisenhardt also suggests that using flexible and opportunistic data collection methods can allow the investigator to "take advantage of emergent themes and unique case features" (1989, p. 533). Upon these recommendations, a combination of interviews, observations, documents and artefacts analysis, was deemed as appropriate methods of data collection for this study.

The research on site lasted overall eight months. In a first phase data collection was performed by a combination of 20 formal (semi-structured and open-ended) interviews mainly based on Rogers' framework and of informal meetings. Informal conversations have proved to be essential for guaranteeing rich insights. In this phase the interviews were mainly directed to PUBLICOM's owner and the editor-in-chief of the magazines. These would last about an hour and would begin with letting the interviewee describe the topic being asked for and guiding his account with more specific questions. A second researcher joined the meetings for guaranteeing the solidity of resulting data. Interviews

were only partially tape-recorded, due to a specific agreement with PUBLICOM. All interviews were transcribed within 24 hours from data collection.

After having gathered a first group of interviews, a twofold strategy was decided. First of all a period of detachment from the research site was necessary to start analysing data. After about two months a second phase of data collection started, where interviews have been complemented with direct observation of day-to-day activities. Direct observations were specifically needed for the second framework, which requires tight engagement with practice and also which aims at unfolding taken-for-granted dynamics (potentially unnoticed by respondents). These visits also allowed for including the perception of emloyees (journalists) and direct observations of artefacts (website and CMS).

Available documentation was also analysed, although not particularly extensive. Mainly it consisted of technical reports about the website.

For granting reliability to the study, the case was proofread by PUBLICOM's manager.

A confidentiality agreement with PUBLICOM prevents us from providing financial data or information about web users (number or generated traffic). The information provided in the next sections are however deemed sufficient for the purpose of this study.

7.2.2 Brief background on periodical publishing: from paper to online

Since about 1990's publishing firms have increasingly moved to the Internet, through portals and websites. If in the first phase towards the digital world the tendency was to propose a showcase of paper-based products (so called "business card websites", with a mere promotional goal), in the following years they evolved towards proposing original *contents* developed ad hoc for the new medium. The evolution is approximately sketched out in Fig. 10.

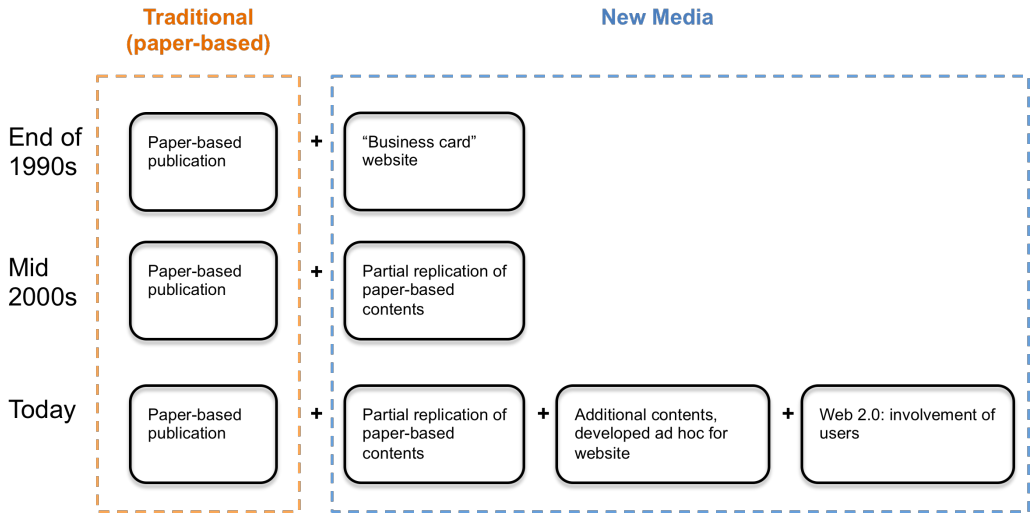


Figure 10. The Publishing Industry evolution since the 1990's

The present-day scenario, sees the industry of publishing (and information in general) engaged in a complex struggle to develop novel business models and face a new and diversified number of competitors. The traditional business model of magazine publishing is undergoing a fundamental challenge: finding new and profitable revenue sources is the prime objective of today's publishing houses. Low entry barriers on the Internet, accompanied by decreasing costs of technology and an increase of knowledgeable actors, have indeed opened the scene to a number of independent actors providing information on the web, through small portals or even personal blogs.

The decrease of readers and the necessity to face the above-mentioned new competitive scenario have given the first impulse towards a rethinking of the role of contents on the Internet. A second push lays in the diffusion of new devices. Evolution in the web domain and new capabilities of PCs, of smartphones and tablets (together with the availability of ubiquitous wireless connections) have changed the expectations of readers and, on the production side, require specifically conceived contents and approaches.

The challenge for all publishing houses is to deliver contents in an integrated fashion (the so-called "360° Opportunity"), building multimedia platforms. Transforming this challenge into a real opportunity, however, is at the centre of discussion for managers and entrepreneurs in the industry, especially for small

ones. Even more so for small enterprises. Two issues in particular are in the foreground: contents and organizational implications of website adoption.

7.2.3 PUBLICOM: History and Context

PUBLICOM is an established small publishing firm, a family owned business active in Italy since over 25 years in specialised periodical publications the field of tourism and travel.

The internal organizational structure is quite simple and consists of 13 people: the owner-manager, five journalists, two graphic professionals, two secretaries, one advertising responsible and two accountants/ administrative employees. There is no specific internal ICT function. Consultancy and assistance is externalised to a service provider. Later, after implementation of the website, PUBLICOM hired an additional consultant (specialised in website development) who joins the editorial team at least once a week.

The strictly editorial team is the same for all the published magazines, and is composed of the owner-manager as publisher, an editor-in-chief, the other journalists and graphics. Of the two secretaries, one is dedicated to the editorial team.

However, as in most editorial structures, the bulk of employed journalists is complemented by a number of independent free-lance collaborators (journalists and photographs), who contribute to the magazines for specific themes and additional articles. Advertising is managed by one internal resource in charge of directional advertisers and of coordinating planning with two external advertising agencies (one for paper and, after the development of the website, one for online). At the time of this study human resources had remained unaltered since about year 2004. Furthermore, a separate web unit has been created for managing the websites of the magazines. The unit is managed by the editor in chief, one dedicated resource full time and one half-time. The constitution of this additional unit was formally decided about two years after launching the first website.

For clarity, the two figures below ideally outline two *typical* editorial processes. The first (Fig. 11) takes place when a new magazine is developed (editorial

project) and is usually a one-time event (even if it is revised typically once a year, but only for small restyling). The second (Fig. 12) takes place for every new issue of each magazine.

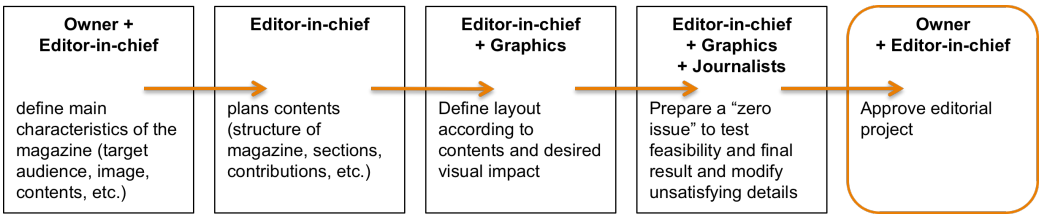


Figure 11. Typical editorial project process (one-time)

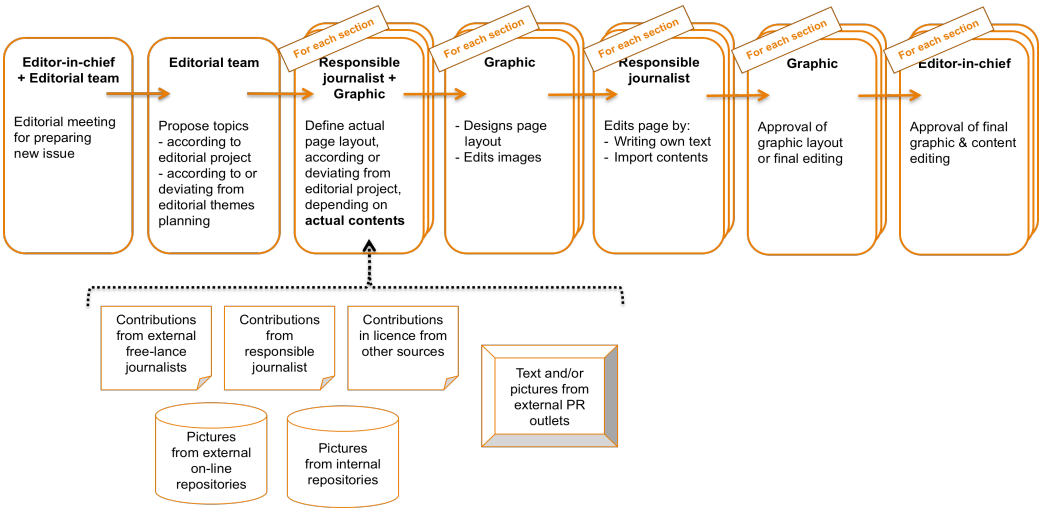


Figure 12. Typical editorial process for every issue

7.2.4 Employment of Electronic Publishing Devices at PUBLICOM

As for most small publishing houses, the move towards the production of magazines by means of specific software applications has started in the 1990s. Publishing software suites are industry standards: the market leader Quark Xpress has been substituted in the last years by Adobe's Creative Suite, mainly in its two component InDesign and Photoshop. Other two applications are available in the package, i.e. Illustrator and Bridge (a media manager that provides centralized access to all creative assets), but its use is less frequent. This latter element points to an important characteristic of publishing houses: their networked nature. As shortly mentioned in the overview on PUBLICOM,

most editorial teams rely on a bulk of permanently employed journalists that are flexibly complemented by free-lance journalists in case of need. Moreover, cost cutting aims in the last two decades have favoured the birth of external service providers (editorial services) that develop contents on behalf of publishing houses.

This networked organisational structure and the interplay of contents (texts, images, graphic elements, etc.) entering the editorial process from a variety of sources makes coordination and management of such contents a highly critical and complex task. Accordingly, technologies (CMS) developed to archive, manage and exchange such contents are strategic.

As said, the use of digital publishing devices can be considered an industry standard, prompted by the necessity to improve internal performances, to take advantage of new creative options made possible by the device and finally to comply with technical requirements imposed by printers. Without going too much into technical details, once the magazine is completed and approved, it is sent to the printer in the format of high quality (non editable) PDF files. In organizational terms, this means that the editorial team is now in charge of the definitive layout, and has de facto internalised part of the process that was previously responsibility of the printing house.

The introduction of publishing software devices was accompanied back then with adequate training in PUBLICOM. The company registered low resistance to this change, also due to a contemporary exit of older employees and hiring of new resources. At the management level a similar generational turnover can be noted, between the owner and his son, who has currently taken over the business.

At the time of this study, therefore, both management and staff can be defined almost “digital natives” (a popular label to indicate a person who was born during or after the general introduction of digital technologies). The simple structure typical of SMEs, in this sense, can be seen as enabling factor towards a higher uniformity of knowledge among people. Of course graphics professionals, for example, hold a vaster and deeper array of skills in layout design and production. However, every journalist (and the owner himself) has also gained some expertise on how to operate at least basic functionalities. In

order to speed up processes, in fact, the manager (also by suggestion of the editor-in-chief) had decided to change the editorial flow as roughly depicted in the following figure:

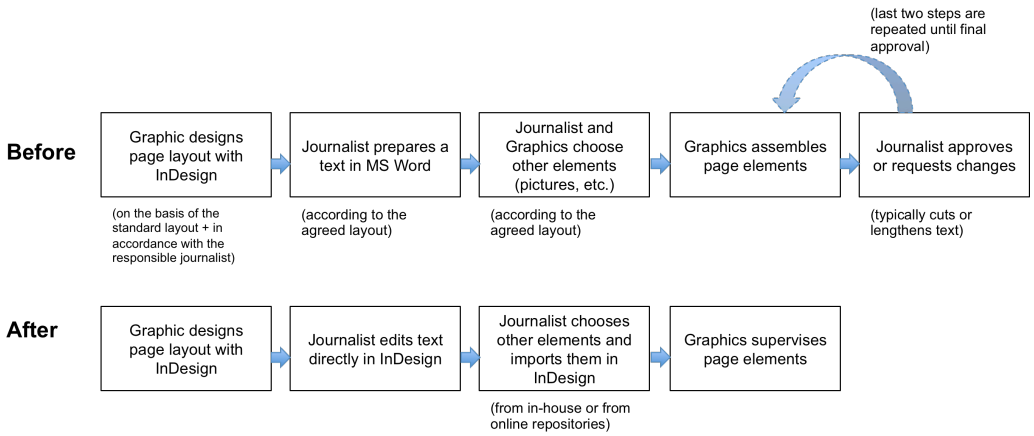


Figure 13. Editorial process change after the adoption of digital publishing devices

This process helped on one side in making the production of magazines faster. On the other it made the journalists work with a different mindset, i.e. that of the finished product as opposed to a text that would almost certainly have to be cut or made longer once inserted in page.

Moreover, the aim was to increase efficiency with external contributors. Free-lance journalists were able to virtually work as if they were physically present at the workplace. An additional aspect should also be highlighted: the journalists were more and more becoming independent in the use of digital publishing devices. The editor-in-chief had proposed and obtained to go beyond their strictly "expected" tasks, in favour of a vaster undertaking. To put it with her own words: "It is quite obvious to me. Can you imagine, writing, cutting, adjusting texts over and over? It is like working twice or thrice on the same thing. By working side by side with a graphic, you simply see how it works. And the next step is quite automatic. You are just not used any more to patience. You just want the work done, because you have so many other things to do. At least in a small editorial team this is how things go." The editor-in-chief reports not having found much opposition to this change in her staff, but for one case

where it was objected by an employee "that he was not sure if this way of working was exactly a thing for a journalist". However, after actually testing this new procedure for some time it became taken for granted.

7.2.5 Going on-line and the adoption of a Content Management System

The "Business Card Website" Era

Since the early 2000s PUBLICOM perceived the importance of being visible also on the Internet. In this early phase, the aim of being online was only a promotional one. This first web presence can be described as a typical "business card website", in that it was only an additional channel though which readers and potential advertisers could get knowledge of PUBLICOM's magazines. Contacts of the publishing house and covers of the magazine portfolio were the only contents. These were sent to the external ICT consultant, who would then publish them on the website. The timing of these updates was driven by the periodicity of the published magazines. Approximately it can be said to have happened every three weeks.

The "Real Website" Era

Around 2007 the owner took a more strategic approach to its online offer and launched a website for one of PUBLICOM's leading magazines. He described this as a "real website" to stress the difference from the previous one. He was not certainly a first mover – the online publishing market was already populated at that time – and a number of contextual factors led him to this decision.

On one side there was an overall "legitimacy" issue. As he said: "You cannot be absent from the web nowadays. It is not an option. The real question is *how* to do it".

On the other side the owner, supported by his editor-in-chief and employees, understood that readers would expect them to be on the Internet and to find an engaging, fresh, dynamic product when accessing the website. Although having good knowledge of the medium (as a user), the steps ahead (as a provider) were far than clear. In particular he was uncertain on how to make the online contents coexist with the traditional paper-based magazines that constituted his core

business: “Our fear was that by giving away for free contents from the magazine, this would lower the interest of readers for the paper edition. And developing extra contents was an issue for us in that moment”. The revenue model was unclear, the dynamics and logic were unclear, the internal organizational implications were unclear. “In terms of organising, compared to online, traditional magazine publishing is relatively simple: you have a publishing date, a publishing schedule, publishing procedures you have been used to for years. But with online it is a totally different question: how many resources are needed to ensure that the website is always updated? Will I need to integrate the editorial team with an online-dedicated person? How will I ensure that paper and online are always synchronised? How does one make sure that the positioning and branding are consistent?”. Online is often presented as an opportunity, but making a website profitable requires, at least, time, engagement and deep understanding of the phenomenon.

Along with his personal feeling that a change in approach was needed, the owner had also been sensitised by his participation to educational activities of a trade association of the industry, as well as by the local Association of Journalists. Seminars and conferences were proposed to help managers (especially SMEs ones) and journalists absorb information from leading actors in the online scenario, to foster exchange and sharing of ideas with other associates, to build informed decisions on how to formulate the most appropriate strategy. This advice-seeking activity proved to be very helpful and constructive. The owner noticed: “Publishing is a small world in the end. I realised that we were all experiencing the same difficulties. And having exchanges of ideas or best practices is always an opportunity. The role of the trade association has been useful, beyond my expectations.”

On the strictly technological level, the initial plan of developing the new website from scratch was superseded by the possibility to partially join forces with a business partner. A publishing house with which PUBLICOM sometimes collaborated for its magazines, proposed to cooperate on the new project. The agreement concerned testing the proprietary Content Management System (which hereafter we will call CMS-1) the partner had developed for feeding his website. For clarity’s sake, we are dealing with a software that includes the

interface visible to users (front end), feeding contents on the website and administering all the back office work related to it (back-end). Web server space (the hardware) was rented at an external supplier (so-called server farms) on the basis of load and bandwidth necessities.

Some contents from the business partner would be available at no cost as part of the test-phase. PUBLICOM, on its side, would be free to build up its own independent site (with his contents), but had to provide feedback on functionalities, additional features needed, required integrations, etc. This allowed PUBLICOM to experience web site management with only a reduced investment in technology.

After consulting with the editor-in-chief during several meetings, one of the employed journalists was then moved half-time to online. She was chosen also for her declared interest in the project. The project in its early phase foresaw in general two subsets of contents: basic contents available to all users (e.g.: some contents from old issues and a short preview of the upcoming issue) and "premium contents" for registered users only (e.g.: an extended preview of the upcoming issue with abstracts, some extra contents readable for free). Furthermore, a community was put in place, through forums for registered users dealing with the various topics object of the magazine. The job of the online journalist was to supervise the community and upload contents. But, as she reports, by engaging with these relatively new activities she realised that a step further was needed: "For instance, by answering questions of users, I kept noticing how experienced they were of new media. Sometimes they would ask why we did not implement the one or the other functionality, this or the other section. An accurate reply forced me to look into other websites from a different angle: not as a user but as a content producer. And in doing that, without really meaning to, I developed a more proactive stance. And more skills, too. I have to admit: it was more challenging – but also exciting – than I thought at first."

But this step further was also needed in the internal dynamics. Exact timing between paper and online was a first issue. A second one was how to link the two media. The owner and the editor-in-chief agreed that the basic/premium dichotomy might be the path to follow: "As a speaker put it during a conference,

in the future paper is going to be *Premium* (like Haute Couture in fashion), online and mobile are going to be *Mass Media* (like prêt-a-porter in fashion). And to do this you need one *digital kitchen*, many different restaurants. Although I am not completely sure that only paper can be *premium*. It is just that in online no one is well-disposed to paying for contents. Unless they are scarce, original and really valuable. In this case I think online can be *premium* as well". So, the owner had also developed the concept that paper and online were not mutually exclusive. On the contrary they were mutually enriching.

The "Content is King" Era

After about two years from the first launch of the website the motto "content is king" was guiding future developments. However, although the principle might seem straightforward, PUBLICOM experienced that actually following it is not simple at all.

A first necessary move was to hire an additional journalist with previous experience in online, as well as in paper-based publishing. This choice was stressed in the interviews as fundamental, in order to guarantee that anyone who is dealing with the website is fully aware of the dynamics of the "traditional" editorial scenario. To do this, it was decided that the desk for online would definitely have to be placed in the same room of "traditional" journalists (in a sort of newsroom fashion).

The other key person in creating a link between on- and off-line was the other journalist, who was already working half-time on both sides.

Connections among the two media were created in various ways. Initially textual links were added in the paper edition (at the end of some articles), in order to redirect readers to the website. Then website-specific articles were developed. These dealt in part with topics from the published magazine (e.g. supplementary information for travel or accommodation, events, interviews, etc.) and in part with neighbouring topics (e.g. overviews of newest products like: special luggage, unusual beauty packs allowed on board on flights, innovative GPS or satellite navigators, etc.). The logic was to provide valuable information and to consolidate also on the website the readership stemming

from the paper edition. Subsequently the feedback from the community showed that the website was able to attract an interesting percentage of new readers, who were not (already) buying the paper edition.

Linked to this, the question of multimedia contributions came to the foreground. The owner reports first of all a convergence on the demand of videos by his staff. On one side the advertising manager saw in videos the highest likelihood for substantially increasing revenues from online advertisement. Banners and classic display advertising were relatively successful in the beginning, but with time the need for different solutions became evident. Videos (for example video interviews, but also reports from touristic destinations) are increasingly considered promising in that they are effective in attracting traffic, but also because advertisers perceive them as more valuable content. Furthermore, they are of interest for a wider audience, and this has, in turn, good potential for increasing not-yet-fidelized readership.

PUBLICOM obviously had no experience in video production. In the owner's words: "In the beginning, seemed to be science and fiction for us. Then my collaborators brought to my attention something I was fully unprepared to hear: users could be potential competitors for us. My readers, or even my former employees can potentially (and easily) build their own blog in the Internet and gain their own audience. Access to technology is also not a big problem nowadays. The key is that they build a reputation, they are reliable, simple and transparent. And they don't have to protect a brand. They can afford not to be excessively sophisticated". The fact that this potential threat was coming true (videos on You Tube for example) convinced the owner to start testing the different options in video production. These were finally produced by freelance video journalists or in co-production with advertisers.

At the same time the editorial team felt that the website overall should take a more multimedia turn. So that by about the beginning of 2010 the following features were felt as needed for the website.

First a tool for uploading user-generated images had to implemented. User videos were not considered, due to the load these would cause to the servers (rented at a local server farm), but also to the amount of time that would be requested for controlling them. Pictures, on the contrary could be limited as far

as their resolution and load are concerned and their supervision seemed to be more manageable.

Furthermore, the community forum was to be complemented by a chat activated only maximum every two weeks (as a sort of event) for live-dialogues with experts or with the editorial team.

Also, the web-only contents needed to be drastically increased, in a way that would be feasible without hiring additional personnel. It is important to note that by this time the website had not produced relevant revenues and that the business model was only about to take a more clear-cut turn towards sustainability.

Finally, an e-commerce section had to be implemented. PUBLICOM's target audience is extremely vertical, in that it is specifically interested in topics in the domain of tourism (e.g. travelling with children, ethical tourism, wellness destinations, etc.). These attract readers in both the B2C and the B2B domain.

The "Traffic is also King" Era

Until this point the report of the website adoption process at PUBLICOM is based on retrospective accounts by the interviewees. Starting 2010, when data collection begun, the research could also be complemented (in a second phase) through direct observation of how adoption was taking a fundamental turn.

Given the above-mentioned requirements for additional features and functionalities, the owner of PUBLICOM had decided that it was time for a new Content Management System (which we will call CMS-2). The previous one (we remind that it was a *proprietary* technology developed by a business partner) was abandoned for two main reasons. On one side the technology would not allow further development, in that additional modules could not be implemented for technical reasons. On the other, due to the experience with the "old" system, PUBLICOM had developed the belief that for the future the back-end technology for managing the website should be under a more direct control. Therefore, after analysing different providers and solutions, the decision was to adopt a new CMS that would be built on bulk of commercially available off-the-shelf software adapted through a specific personalisation. The software chosen

was based on three configurable open-source platforms (contents, community and e-commerce) that would be integrated with each other. For the purposes of this work, we will however not deepen the technical aspects. These platforms are very diffused in the industry and allow different levels of upgrading depending on the necessities. This avoids typical lock-in effects of proprietary applications.

Along with the technology, also the approach to the website was changing in that a more sharp business model had also emerged.

Developing and managing a website in itself can originate huge costs, depending on how sophisticated it is. The direction taken by PUBLICOM was that of a multimedia and articulated site, so that it would not be justified by the intention to only retain current readers or to gain potential new users. By this time, PUBLICOM had been exposed to a number of direct experiences and of indirect information about publishing on the Internet (among others through the local trade association). The resulting understanding can be summed up as follows.

The value of a website comprises at least two inter-related factors: the traffic it generates and the (loyal) users who produce this traffic. The logic is that a highly attended website will have greater chances to appear in the very first pages of search engines (especially Google), which in turn makes the likelihood of attracting new visitors higher. Also, it potentially generates more advertisement revenues (which are also based on the number of viewed pages) and attracts new advertisers.

Users are, obviously, important because they engender the above-mentioned traffic, but they are even more valuable if they have registered to the website with personal data and privacy authorization. First, their number is a quite objective datum about the amount of fidelized users. Second they can be addressed with marketing actions (like newsletters or co-marketing initiatives).

PUBLICOM realized that the number of users could be increased in different ways (all of which it undertook). First by providing valuable, updated, interesting contents. Second, through an active and engaging community. Third

through marketing initiatives also developed in partnership with other enterprises.

An additional source of revenues is e-commerce. This can take a number of forms (e.g. direct seller or intermediary only; tangible goods or downloadable articles). As for the goods, PUBLICOM decided not to directly sell, but to act as an intermediary towards final sellers in order to avoid managing a warehouse. As far as this research is concerned, at PUBLICOM the most interesting aspect of e-commerce was its intuition for selling product-like contents. It planned for example to develop practical guides (e.g.: specific itineraries for touristic purposes; downloadable GPS maps). The source of the sold articles would partially stem from the archives of the magazine, which would be elaborated and integrated so that they can be provided as stand-alone items. The e-commerce section was however still a work in progress at the end of data gathering.

Finally, PUBLICOM recognized that traffic could be increased by augmenting the number of users, but also by structuring the website so that the same user would generate more viewed pages (for example: by splitting the same article on more pages; by displaying pictures in photo-galleries instead of on single pages; by automatically suggesting related contents at the end of each page).

Status at the end of data gathering

By the end of data gathering the new Content Management System (CMS-2) had been in place fore some months.

The technical implementation of CMS-2 had been assigned to an external solution provider, specialized in web development and publishing. The selection process comprised well-known players in the industry and providers suggested by both personal and business related contacts. The choice fell on a medium sized provider that would guarantee technical support on the basis of a service level agreement, but also a collaborative approach in consulting for further developments. This means, for example, suggesting case by case the most appropriate technical solution also in financial terms. The development of the

new modules of the website indeed followed a step based approach, so that continuous fine-tuning of the CMS was necessary.

The website had been re-launched also with a new graphic layout. Some time after implementation the contract with the solution provider was extended, in that one web-optimization specialist was to join the editorial team once a week for ongoing website quality check.

Traffic had also reached satisfying results (no specific data can be reported here due to an agreement with PUBLICOM, but it is sufficient to say that it almost doubled). A Facebook page was also opened.

Interestingly, in the meantime all the journalists (not only on-line people) were writing contents for the web as part of their everyday job.

Other new developments were planned for the future (like: the e-commerce section, a You Tube Channel and an integrated CMS for all digital assets, i.e. paper and web). These are however out of scope for this work and will be not be analysed.

7.3 CASE ANALYSIS

The previous section described the time sequence of what happened at PUBLICOM during the introduction of electronic publishing devices and then more specifically of website and Content Management System adoption.

In this section the case is analysed by applying the theoretical insights as outlined in Chapter 4 and Chapter 6. The goal is to provide a deeper understanding of the adoption process in practice, with a double aim:

- To understand the dynamics of adoption in SMEs in practice (RQ1 a/b: *How does the adoption process of ICT take place in SMEs*?)
- To develop theoretical insight in the domain of the organization-technology studies. (RQ1c: *How does previous engagement with technology interplay with future adoptions?)*

The case is first investigated on the basis of Rogers' Diffusion theory (DOI), sensitized by the literature on SMEs (Chapter 4, Fig. 8). As explained earlier,

this is a widely applied research framework in the IS literature, to study the adoption and spread of ICTs. Also according to the results of the pilot phase, it seems justified to use it to see how much understanding can be gained in analysing the in-depth case study. Although some limitations concerning DOI have been pointed out in Chapter 4, we employ it here to analyse the case of PUBLICOM in that it offers a structured approach and to see where it leaves questions unanswered. We further show how using Leonardi's Theory of Imbrication provides a complementary understanding of observed dynamics, specifically concerning the concepts of *re-invention*, *technology clusters* and *previous practice*) that result opaque after the analysis through DOI. Compatible with Orlikowski and Scott (Orlikowski and Scott 2008), the intention is not to combine the two theories, but to add a further lens to the "palette of approaches that [that might] advance the way we study technology, work, and organizations" (Orlikowski and Scott 2008).

7.3.1 Case Analysis according to Rogers' Diffusion of Innovations Theory

Rogers underlines that, although there is evidence in favour of the stages outlined by the model, the lack of *process research* limits our understanding of the degree to which these stages actually exist (Rogers 2003, p. 197). As he puts it, we should not expect sharp distinctions. However, further research is encouraged for understanding the dynamics of the series of events over time.

Although the aim of the present analysis is not to test theory, but that of developing an analysis through a sensitising theory, in investigating the different stages of the adoption process we will highlight blind spots in Rogers' model.

With this premise in mind, and only for analytical purposes, the adoption process at PUBLICOM is depicted in a very approximate timeline, as follows:

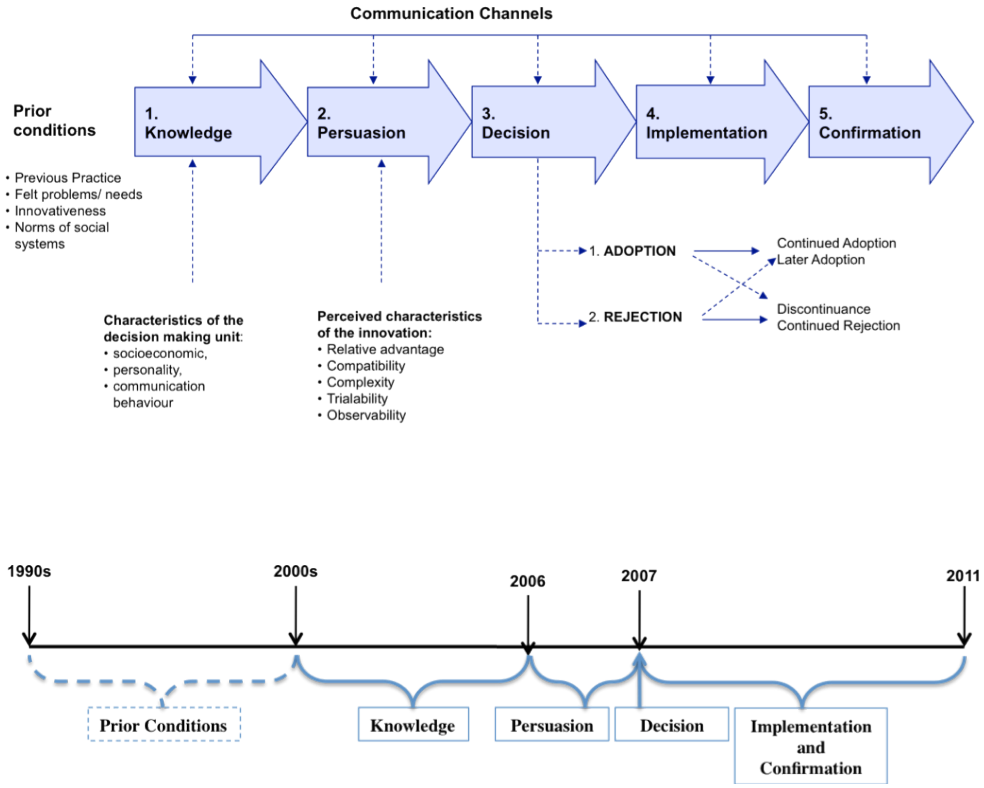


Figure 14. Rogers' model and a tentative timeline of adoption phases at PUBLICOM

Website adoption seen as the adoption of an innovation

The online domain was a completely new dimension of publishing for PUBLICOM, so that the website can be defined as an innovation ("an idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers 2003, p. 12). The accent is purposefully set initially on the website in its entirety rather that on the specific technology: this will help showing the parallel adoption of the *concept*, the *idea* for the development of a IT-based innovation (Wang 2009) (which comprises multiple technologies) and the actual ICTs (the artefact), which will result undergoing multiple adoption processes. To clarify this notion, we can borrow the distinction between "ostensive" and "performative" from Feldman and Pentland (2003). This suggests the difference between the abstract idea and the specific actions, by specific people, in specific places and times.

The main focus of the analysis is on what PUBLICOM's owner defined the "real website" of 2007: this can indeed be considered the first engagement with a complex and organizationally challenging on-line project for the focal firm.

DOI Phase 1: Prior Conditions and Knowledge

The first step in understanding adoption, according to DOI, is to analyse prior conditions that influenced being aware or perceiving the need of the innovation.

In the case of PUBLICOM prior conditions can be traced back to the '90s, in that the adoption of electronic publishing devices had completely altered the process of producing magazines. Since then, the seeds of using technology for everyday activities had produced an effect not only on the way work was done, but also on generating sensitivity towards new technologies. *Previous practice*, in this case, does not directly concern the online domain (or in a just very limited way, due to the "business card website"). However it can be considered as an important antecedent. As described before, publishing software suites have enabled the employees to find (relatively autonomously) novel ways of working and have helped them develop an open mind towards technology-related change.

By delimiting our analysis strictly to website adoption, the process can be considered beginning with the "business card website" approximately in the early 2000's, when the *knowledge phase* started. By then, the market saw leading publishing houses offering websites along with their paper edition and smaller enterprises slowly start following a similar path. In the next years online became increasingly a priority. Strategies and product characteristics were about to evolve with unprecedented speed. In 2006 when the adoption of "the real website" went in its more actual phase, both the *market* and *internal* forces were converging on the necessity of being online.

For *internal* forces both the owner and PUBLICOM's employees played a role. The owner in his position of entrepreneur expanded his perception of the scope of his activity, in that he realised that online would be an additional – and inevitable – field of competition. As the main decision making unit he certainly

directly drove this change. But also employees, who in smaller enterprises interact more directly with management, were an active part of this process.

The journalists in particular felt that offering online contents would satisfy expectations of their readers. They therefore started developing a favourable approach towards the new scenario. Previous practice with technology at work (digital publishing), even if definitively different from online, had a key part. But what was also making the difference were the internal organizational culture and the strong external image of PUBLICOM (*social norms*). The publishing house had been active for 25 years and had built a strong reputation for always publishing very accurate magazines. This shared value prompted PUBLICOM (owner and employees) to a careful approach towards online. In short, they could not afford experiments with their readers: "Online is a double-edged sword. It can both build and destroy brands". So the *internal* social norm (quality first) was in a way conflicting with *external* social norms (legitimation through being online) pushing towards quick adoption.

Other circumstances influenced the adoption process to its first phase. Beyond the legitimacy issue, competitors (in the print domain) were exerting an indirect pressure, in that they were entering the new market as well. Moreover, new players were entering the online market: other publishers but also bloggers and other independent content producers.

Furthermore the market of paper magazines was undergoing a profound contraction in the last years so going online was also considered by PUBLICOM as an opportunity for creating additional revenues and new business models.

These main pre-conditions (in favour or against) accompanied PUBLICOM in becoming aware of the need for developing a website. The causality path is unclear. What came first and what caused what: did the market drive change? Did technology? Did social norms? Did the individual characteristics of the owner? The answer is most presumably that it was a combination of mutually influencing factors.

It is important to note that although the *idea* of adopting the innovation was encouraged, the question of *how* to *actually* deal with (and the consequences and

implications of) the new scenario was completely open. This aspect is developed further in the next phases, however it is important to note already that until this point the adoption at PUBLICOM is related to the overall *concept* of a website, rather than to a specific *technology*.

According to DOI, during the knowledge stage, information about the innovation is looked for via a number of channels. In the early phases of adoption PUBLICOM gained knowledge about on-line publishing mainly through a direct knowledge of how the industry was evolving. It was however not until the persuasion stage got closer (about end of 2006) that this knowledge-seeking activity really took a faster pace. Interviewees report that at this stage PUBLICOM was conscious of the option to go online, but it was not yet considering this possibility seriously. According to Rogers' framework, PUBLICOM had developed *awareness-knowledge* that is, knowing that an innovation exists (which, in the context of the case study, corresponds to the question: *what is* a website?).

Other two types of knowledge (how-to and principle knowledge) were only reached later in the adoption process. *How-to knowledge* implies knowing how an innovation is to be used (it corresponds to the question: *how* does a website work?); *principle-knowledge* concerns knowing what functioning principles support it and how it *actually* works (it corresponds to the question: *why* does a website work?). *How-to knowledge* came only later on, with actual implementation. *Principle-knowledge* was built towards the end of the time span analysed here.

This observation suggests that the knowledge phase is a continuing also after the persuasion stage started. As Rogers underlines, although there is evidence in favour of the outlined stages, it is important to understand to what extent the model is a retrospective mental framework, and to what extent it is empirically possible to observe it. Usually awareness-knowledge is concentrated at the knowledge stage. This knowledge might then motivate to seek further how-to knowledge. Accordingly, the knowledge process is ongoing.

The case study also shows that it is recursive and that necessary information is sought for through different channels. As DOI posits, communication channels

accompany the adoption process through all of its phases. Communication channels can be: *mass-media* or *interpersonal*. The first are usually more relevant at the knowledge stage, the latter at the persuasion stage.

In PUBLICOM's case, however, interpersonal channels are predominant throughout the whole adoption process. As explained in Chapter 1 small firms are characterised by a high degree of social interaction that has been depicted by Parker and Castleman. In particular we observe the high degree of what Rogers defines *localite* (as opposite to *cosmopolite*) channels, i.e. those linking with sources inside the social system. In the DOI framework localite channels are expected to be relatively more important at the persuasion stage. In the case of PUBLICOM, on the contrary, localite interpersonal channels are perceived as being more reliable during all the adoption process. As the owner reported sceptically: "You always have to be very careful about buzz-words and hypes! It always looks simple. Much too simple…" Interpersonal communication here includes all face-to-face exchanges. In PUBLICOM's experience, the interpersonal communication channels that have proved to be most influential are the internal dynamics, business networks and support organizations. The latter have gained increasing importance after the implementation phase, when the owner started participating to activities promoted by the local trade association.

The knowledge stage is completed when the adopter is exposed to the existence of the innovation and gains understanding of how it functions (Rogers 2003, p. 168). It can be noted that in the case of PUBLICOM, before actually engaging with the "real website" (towards the implementation phase) this understanding is limited to some of the logics underlying a website and is above all mainly indirect. The only previous experience with online publishing was the "business card" website, which was managed by an external consultant and was limited to very few contents. Neither the owner, nor the editorial team had ever directly accessed the technology for uploading contents on the website. So the evolving perceptions that PUBLICOM was building about website adoption are both referring to a sense-marking activity about past experiences and to forward looking about the innovation. However, the seeds for change had already been

spread, so that PUBLICOM was leaning forward to a more complex website offer.

DOI Phase 2: The Persuasion Stage

At the persuasion stage favourable or unfavourable attitudes are formed. Whereas the knowledge stage is *cognitive*, the persuasion stage is *affective*. The potential adopter develops a general perception of the innovation and forms beliefs about it (that will favour or hinder future action), depending on the characteristics of the innovation. In parallel, the adopter seeks to reduce uncertainties about the expected outcomes of the innovation. Forward planning is involved in this phase, in that the adopter tries to apply the innovation to his present and future situation.

For PUBLICOM this phase was accompanied by strong "*near peer"* support (Rogers 2003, p. 175). A business partner with which the company collaborates proposed PUBLICOM to use a proprietary back-end application (CMS-1) for managing the new website, in change for feedback and collaboration for future developments of the software. Only an informal agreement for using the software was settled and no economic reward was foreseen. The support of an established partner had a number of advantages for PUBLICOM.

First of all the close relationship with the partner solved the financial aspect of the project, in that almost no investment was required. It also made knowledge gathering much faster than before. On one side the owner had a trusted counterpart with which to exchange opinions and share perspectives about next steps to take. On the other the feedback provided by PUBLICOM would help strengthening the collaboration between the two enterprises.

Also uncertainty about which specific technology to use was reduced, in that the software for administering web contents was already in place at the partner's offices and it could be observed, examined and tested. This was the first moment in which PUBLICOM was called to directly address the Content Management System (CMS-1) software issue. Until then, the manager was aware that a back-end technology would be necessary for internally managing the website he had

conceived with his employees, but he had only a broad idea of its actual characteristics.

Therefore it should be underlined that until this point the attitude formation in PUBLICOM is mainly referred to website adoption. It will be shown how analysing the perceived characteristics of the innovation makes this previous ridge between the adoption process of the *idea* and that of the *technology* visible.

As far as the innovation characteristics (relative advantage, compatibility, complexity, trialability and observability) trialability has been recognized by PUBLICOM as the most influencing factor.

Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. This is usually found to be the strongest predictor of adoption. If in the case we examine the *technology* in itself, relative advantage should be probably referred not to a technology it supersedes, but to the search process it avoids: PUBLICOM's owner has avoided time consuming research for a suitable technology. If we examine the website as a broader *concept*, it can be better depicted as what Rogers calls a "preventive adoption", that is when an innovation is adopted quickly in order to avoid the probability of some unwanted future event. In this phase the prevailing motivation was to provide a website for users who expected it and to gain legitimation in a changing industry. In sum, avoid lagging behind especially in a context where competition is coming also from unexpected directions (e.g. bloggers).

Compatibility is the degree to which an innovation is perceived as compatible with existing values, past experiences and needs of the potential adopter. Again, if we consider the *technology*, no incompatibility feeling is reported by PUBLICOM. Also, past experiences with overall publishing software favoured a positive attitude formation. If we consider the *idea*, PUBLICOM was forming a mixed stance. On one side it felt on-line as a necessary step that would strengthen its image. On the other it also wanted to comply with its quality-first motto, according to which no false steps would be acceptable for the sake of its strong brand. Also, before implementation, the compatibility of paper and on-line editions was still unclear.

Complexity is the degree to which an innovation is perceived as difficult to use and understand. Here, the agreement with the business partner proved fundamental. In a sort of vicarious trial (Rogers 2003, p. 177) fashion, PUBLICOM heavily relied on the trust relationship of the partner, for both the *idea* and the *technology*. The same applies to the last two characteristics: trialability and observabiliy.

Trialability is the degree to which an innovation can be experimented before implementation. The CMS-1 technology could be thoroughly tested at the partner's offices, where PUBLICOM's staff (for now the owner and a half-time journalist) also received an introduction to the system and training. Here the *idea* and the *technology* get closer: the means-ends relationship was clarified through this initial use of the CMS. The ridge between technology and idea became smaller, in that the two aspects were made sense of as complementary.

Observability is the degree to which the results of an innovation are visible to others. Rogers refers here to the fact that some ideas are easier to communicate than other. For example talking about computer hardware might be easier than talking about software applications (Rogers 2003, p. 259). This parallel with our case might be tricky: even if we are dealing with software technology, the soft side here is represented by the *idea* of website hold by PUBLICOM. So, in contrast to Rogers expectation, it was easier to recognize the soft side of website adoption, than the hard side, i.e. the *technology*.

DOI Phase 3: The Decision stage

The decision stage takes place when the adopter engages in activities that lead to adopt or reject the innovation. Rogers notes that a trial period leads generally to a positive outcome if compared to innovations that cannot be tried out before implementation. As described above, the trialability (directly and through a peer's experience) of the technological solution was an important turning point for PUBLICOM. The actual decision to adopt took place relatively quickly after the test phase with the partner.

It is interesting to note that Rogers specifies two types of rejections: active or passive. The latter consists in never really considering the innovation as viable. Passive rejection has seldom distinguished in adoption literature (Rogers 2003, p. 178). Here the parallel between *idea* and *technology* raises some doubts: whereas the idea kept on growing as a perceived need, the technology underwent various passive rejection stages until PUBLICOM was able to collaborate with his business partner. As already highlighted, until this moment the technology was never really examined.

DOI Phases 4 an 5: Implementation and Confirmation stage

Implementation takes place when the innovation is put into use. It represents a sort of moment of truth, because, as Rogers points out, here overt behaviour and actual change are implied. One thing is the mostly mental exercise of thinking and deciding, another is changing organizational activities. Implementation usually follows quite directly after the decision stage.

At PUBLICOM implementation was indeed relatively quick because there was just necessity for a short technical setup. The only in part newly produced part of the website was the graphic layout (the front end visible to users), which was designed in a quite minimalistic way and, in its logic structure, remained like the website of the business partner.

The decision to adopt or even implementation are not the terminal stages in the adoption process. Rogers accounts for the possibility of a reinforcement of the previously taken decision (confirmation) of for a dismissal (rejection). These can be both continued or discontinued. This possibility is related to the concept of *re-invention*, that, due to its importance, will be addressed as a separate section.

Re-invention in DOI

Unlike most adoption literature assumes, innovations are not immutable or fixed entities. An innovation can be reinvented during its diffusion (at the population

level), but it may also be re-invented during the adoption process at the adopting unit level. Re-invention is defined as the degree to which an innovation is modified or changed by the adopter. The range of this change is however unclear in the framework provided by Rogers, in that it is mainly equated with customization. Some technologies are easier to modify because they are purposefully designed to adapt different organizational contexts. Other on the contrary embed the vision that re-invention by users is not a desired outcome. Above all, suggests Rogers, in analysing any innovation we should keep in mind that users at least shape it by giving it *meaning* while they are using it. Importantly, Rogers highlights the role of the adopter not as passive receiver, but as *active* shaper.

The concept of re-invention is particularly important in the analysis of the case because it opens up a number of aspects that require further understanding. Did PUBLICOM perform re-invention? How?

In comparing the rough timeline depicted in Figure 14 the analysis of the case has reached approximately 2007, when the "real website" was launched. After this moment the following steps of the adoption process could be defined as an iterative confirmation, rejection and especially re-invention process.

Here the distinction between the *idea* of the website and the *technology* comes to the foreground. From the viewpoint of PUBLICOM until this point the two adoption processes have been depicted as approximately parallel, with a preponderance of the "ostensive" aspect and cross points when coming closer to the implementation phase. When an actual engagement with the activity of managing the website started also the technology increasingly entered the process of adoption (as experienced by PUBLICOM).

We can note that on the *organizational* side PUBLICOM started developing new ways of thinking about the logic underlying online publishing. In the three years between the first site launch and the redesign in 2010 the scenario at PUBLICOM underwent a profound change.

First of all the company started evaluating contents on the web in a different way, so that the motto "content is king" had become a guiding principle. This in

turn led to a specific online unit, an additional journalist. The users/readers themselves started having a new role in that on the website the so-called web 2.0 (or social) contents were gaining an unforeseeable status. The overall business model for online required deep rethinking, so that ultimately "traffic" became an important metric on which to measure the performance of the website. Finally also the business model of the *paper*-based edition ended up being modified, in that a new equilibrium between traditional and online contents had been elaborated.

On the *technological* side, in parallel, the attitudes towards the CMS (CMS-1) changed, in that, at a certain point, the possibilities offered by the software and the limitations imposed by the informal collaboration with the business partner engendered a sense of constraint in PUBLICOM. This led to the rejection of the old technology (CMS-1) development of a new CMS (CMS-2) and progressively to the integration with additional technological modules for managing the in the meantime arisen necessities.

But Rogers' framework is unclear on this issue: how should this be considered: re-invention or a second adoption process?

If we analyse this as a second adoption phase, we could depict it in the following terms.

In PUBLICOM's case there have been two *technology* adoption processes: those of the first and the second Content Management Systems (CMS-1 and CMS-2). In keeping the analysis focused on the technology, for CMS-2 the phases took an analogue pattern as CMS-1, with knowledge, persuasion, decision, implementation and confirmation phases. The critical difference is the speed of the process (the knowledge phase in particular was shorter). Prior conditions, especially previous practice, made knowledge gathering easier for PUBLICOM. Internal and external forces were exerting a more directed pressure towards the adoption of a new CMS, in that the need for new (multimedia) contents was equally perceived by the users, the editorial team, the advertising manager and the owner. The behaviour of PUBLICOM was also more focused, in that it had in the meantime developed and embedded in its organizational background both technical knowledge and understanding of web dynamics. In the persuasion

phase, of the characteristics of the innovation *relative advantage* had a higher weight if compared with the first CMS-1 adoption, because PUBLICOM had a clear idea of the desired characteristics, but even more of the undesired features (i.e. lock-in effect of proprietary applications). At the decision stage we can observe contemporarily the rejection of the old technology and the adoption of the new one. Implementation was accompanied not by a *near peer* but by a solution provider. Here we can note that a sort of vicarious trial was indirectly obtained, in that the provider exerted an approach that was highly collaborative and already applied to other small publishing houses. Trust in the provider therefore accelerated implementation. The confirmation stage is ongoing at the end of data gathering.

Similarly, also the subsequent modules (user-generated pictures tool, video flow player, chat, etc.) could be treated as separate adoption processes.

Analysing these as separate adoption processes is however problematic, each of these components is strictly related to the other. Rogers suggests that some technologies exert cluster-like characteristics. This means that although distinct, they might be perceived as so much linked to one another, that one adoption triggers the other. To the adopter, though, this disconnection is not always visible, so that he reports of a single, cumulative adoption process.

This might well apply to the case of PUBLICOM – and to ICTs in general (in the Lego-era) – where the glue to all of the adoption process is represented by the overall (ostensive) *concept* of website. But it has been underlined how the *idea* itself had also changed during the adoption process: was it re-invented or did a new adoption process start?

In sum, whereas at the "ostensive" level, i.e. the *idea* of website, the concept or re-invention seems to provide a more clear explanation, at the technology level it poses an analytical and conceptual dilemma. By separating the adoption processes, the connections between cluster-like components of web adoption (and of today's ICTs in general) would be lost from sight. And, conversely, by analysing them as bracketed into a single adoption process, the specificities, the dynamics and the complexities of adopting cluster-like technologies would be blurred.

7.3.2 Discussion on the case analysis according to Rogers' DOI

After analysing the case study through the theoretical framework of Diffusion Theory, some preliminary considerations can be drawn.

DOI proved to be a good initial candidate for the analysis of our case. It offers a language and a structured approach to the study of ICT adoption in small enterprises. It includes different categories of adopters (so recognizing the heterogeneity of SMEs); the innovation (in this case the new ICT); an adoption decision processes; the social context in which adoption takes place; communication channels and time. Also, it accounts for prior conditions, knowledge building in various phases, the notion of (continued) adoption or (continued) rejection, and finally it includes the concept of "reinvention" of a technology during the adoption process.

The theory also puts in relief some aspects that are critical to understand the adoption process in small enterprises. As posited by the framework proposed by Parker and Castleman (2007a) communication channels and localite relationships are typical for SMEs. For PUBLICOM drawing on interpersonal channels is recurrent throughout the whole process of adoption. The most explicit case is the adoption of CMS-1, where implementation was speeded up by the intervention of a close business partner. The trust relationship acted as a trigger to adoption, and in turn ICT adoption was a way to consolidate the business relationship between the two enterprises. A similar trust relationship is reported in the selection of the provider of CMS-2, which indeed exerted an approach that PUBLICOM recognized as collaborative. Furthermore it was mentioned that the local trade association was involving its associates in dissemination activities on ICT-related topics, so also favouring dialogue among them.

A further outcome of using the framework provided by DOI is that, if applied in its entirety, it accounts for ongoing adoption or rejection. If compared with the approach prevailing in adoption research, the original (and most recent) elaboration of DOI recognizes the adoption process as highly dynamic and theoretically assumes the possibility of deviation from the expected path

sequence. More socially informed that mainstream variance research, the framework applied with a process logic opens up to concepts as meaning giving and perceptions. A criticism to Diffusion Research is its tendency to produce endless lists of adoption factors (Fichman 2004) based on the characteristics of the innovation. It is worth noting however, that the tendency to conceptualize these characteristics as *attributes* of the innovation is probably a misunderstanding of the theory: Rogers clearly defines these characteristics as *relative* to the perceptions of the adopter.

Finally the framework accounts for prior and contextual conditions for adoption: previous practice, social norms, felt problems and needs are indeed shown as important highlights in the analysis of the case.

As far as the observability of subsequent phases the analysis shows that these are not easily ascertained in practice, especially in the case of cluster-like technologies. As assumed by Rogers', no clear-cut separation can be expected in the various phases of the adoption process. The picture resulting from the analysis of the case is one of iteration and partial overlapping. Knowledge development in particular is an ongoing process.

Rather than precisely consequential steps, the adoption phases can be tentatively depicted as in Figure 15 either as overlapping phases, or, better as less sharply defined cycles. The figure does not mean to be exhaustive, nor to report the importance of the various phases it is only meant to visually layout the adoption process.

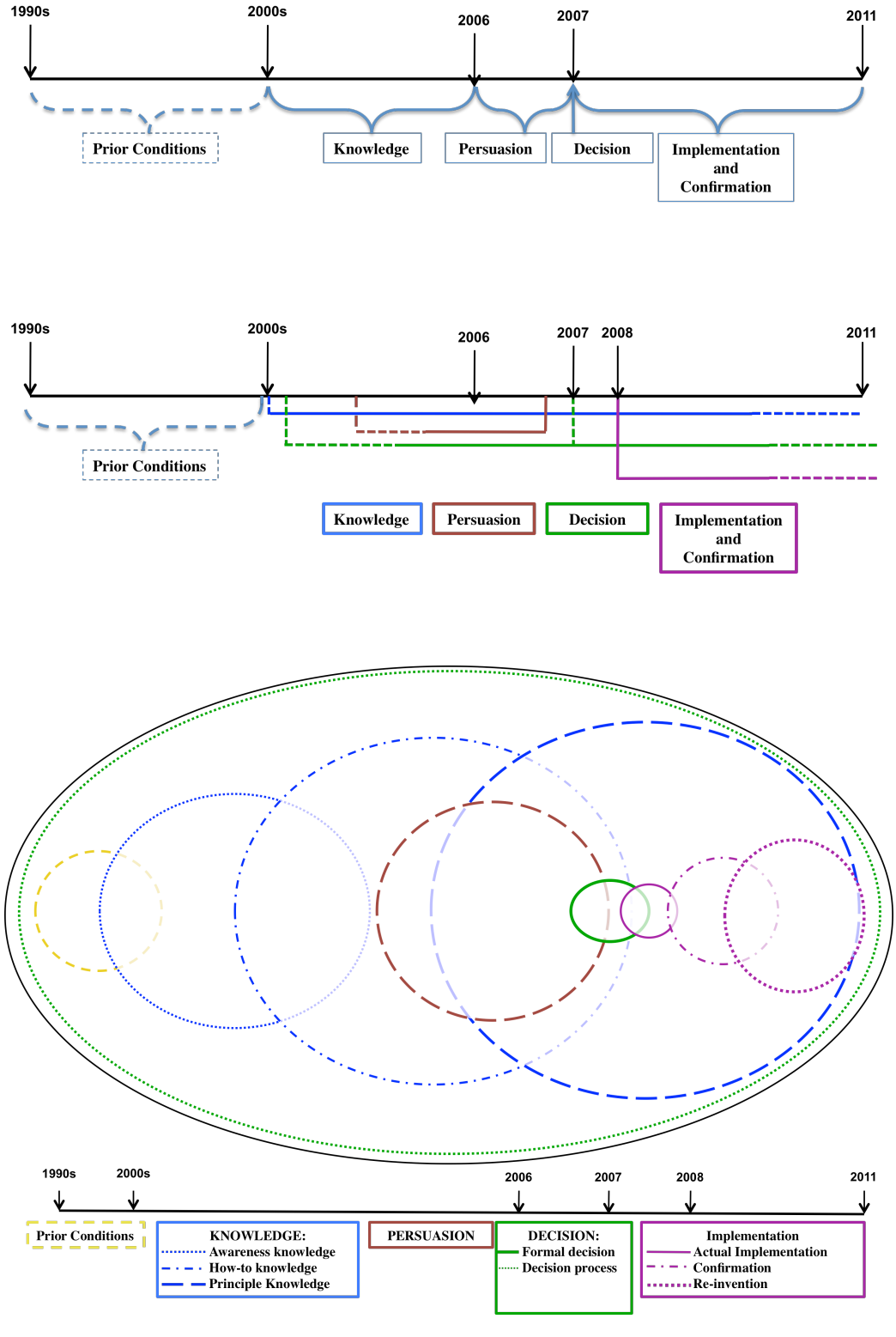


Figure 15. The adoption process at PUBLICOM analysed according to DOI

The fact that the phases are not exactly identified does not deny the value of the framework. Rather, it triggers further analysis for uncovering some aspects the framework does not directly address.

Rogers suggests that the adopter is not a passive receiver of an innovation created somewhere in the environment. He conceptualizes the adopter as active shaper of the innovation at least because of the attribution of meaning. Furthermore innovations can be re-invented. On this point we have underlined, however that a problem with the analysis of the case is that all the complex dynamics described in the background to the case, risk to become bracketed into broad "re-invention" process and "confirmation" stages (as depicted in Fig. 15), which do not allow further analysis. Also, the distinction between the *idea* of website and the *technology* has been addressed. At best the complexity of what happened between the first website launch and what can be observed today, could be analysed by analytically separating the single processes and by analysing the different adoption behaviours PUBLICOM undertook (so repeating Fig. 15 for each single technological element adopted subsequently).

The aim of this work, though, is to reach a thick description of the adoption process in practice and to render the observed dynamics in all their complexity. This is not to be confused with any expectation of depicting an objective truth in absolute terms. The purpose, according to an epistemologically interpretive stance, is to read the dynamics observed in practice through an alternative lens. Specifically, RQ1 c the interplay between previous engagement with technology and the organizational residue it leaves over time, between organizing and technology.

The case at PUBLICOM suggests that this relationship can be best understood as taking place in everyday activities and on an ongoing basis. In order to open up the black box of re-invention and to gain deeper insights of these dynamics, a complementary analysis of the case is developed in the next section through the framework offered by the Theory of Imbrication. This helps uncover further dimensions of re-invention and highlight how engagement with technology can be best theorised as part of an organizing process, rather than just an antecedent to adoption.

7.3.3 Case analysis according to the Theory of Imbrication: Website adoption seen as the imbrication of agencies

Leonardi states that the researcher can arbitrarily decide where to start and stop analysing the chain of imbrications and that "the analyst should be more interested in explaining how imbrication occurs and the effects that prior sequences of imbrication have on future actions" (Leonardi 2011, p. 155).

The theoretical framework is therefore selectively applied as interpretive lens in the case study for zooming into the adoption process, and at the same time for keeping an account of antecedents and context. The intention is to show how an imbrication led to another and how these ultimately had an effect on the process of organizing. In recognizing that a faithful account of all imbrications is beyond feasibility (and probably not even desirable), the main imbrications given the overall aim of this work are analytically taken to the foreground.

In Chapter 5 concerning the sociomaterial approach it has been underlined that not much guidance is offered in specifying how researchers might depict sociomaterial dynamics. The approach used here is to interpretively read the adoption process (presented in the narrative at the beginning of this chapter) and to summarize the chain of imbrication at the end of each fragment of the narrative. These boxes are thought to be readable in sequence.

In doing so, it is shown how the resulting picture is enriched by further details, both in terms of organizing and of technology, and how the metaphor of imbrications allows for details, context and connections. Especially, it gives an engaged account of the adoption process *in practice*.

Understanding antecedents to website adoption

When the digital PUBLICOM switched to digital publishing tools for producing its magazines, technology turned into an integral part of everyday activities and to some extent disappeared as a separate item. Or better, it was so taken for granted that the activity of working on a magazine was inextricably and

implicitly linked to the technology that helped performing the activity.

Furthermore, as for most software, regular updating of the publishing suite was done at PUBLICOM, so that the release in use at the editorial team could preserve compatibility with the same software in use externally (e.g. freelance journalists). Every new release comes with new embedded features. On one side the technology enables novel possibilities for creating appealing magazines, on the other it requires new learning about how to use these new features.

Along with practice with technology, PUBLICOM also formed a new attitude towards the editorial products. As highlighted by the editor-in-chief, the mindset shifted towards writing articles inside a definitive page layout (in InDesign format), as opposed to using standard word processors (Word) and then copy, paste and cut the text.

At this time the "business card" website was created, but no direct involvement by PUBLICOM's team was foreseen. The website was managed externally and therefore the only link to online was periodically sending the covers of the magazines to the web manager as well as possible updating of the contacts of the publishing house.

Overall, well before the development of the "real website" PUBLICOM had developed knowledge about publishing tools and a habit to small changes in its work routines due to small changes in the technology in use. No specific attitude towards the online domain was formed yet.

PAST IMBRICATIONS:

Pushed by PUBLICOM's management goal of speeding up the elaboration of magazines (*human agency*), journalists – not only graphics – were prompted to use electronic publishing tools on a daily basis. Engaging with embedded features of the technology (*material agency*) on an ongoing basis engendered a perception of *affordance* in the journalists, who relatively autonomously, kept looking for novel and quicker ways to assemble all the elements of the magazine section they were responsible of. In turn a new habit became routinized at the organization level: that of writing a definitive article as opposed to text only.

Understanding the "real website" era

By the time the "real website" started, PUBLICOM was approaching online publishing by a double goal: that of "legitimation" from its readers and that of not being superseded by competitors (traditional and new ones, like bloggers). The decision to build a website took also a more technological connotation at this point, in that by first testing and then actually using the CMS provided by a business partner (CMS-1) the broad idea of website got more and more linked to the perceptions generated by direct engagement with technology. One half-time journalist, supervised by the editor in chief, was assigned the management of the website.

Whereas at first the tasks undertaken by the web-journalist were relatively simple (uploading existing contents), the more the website grew the more the journalist formed a proactive stance. After getting experienced with the website, she felt that larger amounts of contents should be offered to the readers. Also, by directly interacting with the community of users she was prompted to look more deeply inside the functionalities of the website, in that she was directly addressed by the request of specific features the readers expected to find on the website.

The fact that CMS-1 was very intuitive, engendered the perception that more could be done on the website. After consulting with the editor in chief, PUBLICOM's manager felt that the basic/premium dichotomy would be a valid approach to online publishing.

On the technology side, CMS-1 was modified to reserve access to part of the contents to users only. On the organizational side, the "traditional" journalists were requested to make their files accessible to the online journalist.

Related to this, another technological change also took place, concerning the "traditional" editorial team. As mentioned before, journalists at PUBLICOM were used to develop the articles of the magazine in a sort of "finished product" fashion. This meant that they were also collecting pictures and other material from external sources (e.g. free-lance journalists or online picture repositories).

Not all of these contents were of exclusive property of PUBLICOM. For example, the rights of pictures might be bought for print only. Also, the pages the journalists worked on could always be modified until final approval for print. In order to help the coordination between on and off-line, an additional module of the digital publishing suite was activated (Bridge). This tool allows managing and sharing all creative assets, interfacing with the other components of the suite (InDesign and Photoshop) and finally marking the single files as "in progress", "revised", "approved" or "available for online". Therefore all the journalists, graphics and external contributors were required to use a central repository for storing their files, to name them following a specific coding (i.e. magazine code_year_issue_section_page) and to mark the files according to their status (e.g. in progress).

The expected outcome was to provide the on-line journalist with a consistent archive of contents from which to draw. An unexpected outcome was that of better coordination and control on the (in part distributed) "traditional" editorial team. A second unexpected outcome was that this change in the off-line domain, prompted the editor-in-chief to ask for a similar feature in the CMS. CMS-1 was then modified by the technical staff of PUBLICOM's business partner, in order to allow marking the single items in the backend as "in progress", "approved", "publish" or " to be published on (a certain) date and (certain) time". This way the editor-in-chief was able to better coordinate the activities of the online journalist, who could prepare contents for the website ahead and automatically obtain the desired timing of updates on the website (even during holidays or week-ends).

IMBRICATIONS IN THE "REAL WEBSITE" ERA

With the goal of providing users with an appealing website and with the assumption that the publishing house could not afford experiments with its well established brand (*human agency*), PUBLICOM's owner accepted the offer of a business partner to use his proprietary backend technology (CMS-1). The use of the technology engendered a perception of *affordance* in the online-journalist. The possibilities offered by the software and the dynamics of the website (*material agency*) led to a change of approach. More contents were needed for the website, some of which would be only available to registered users. This choice had also the goal of preserving part of the

contents to fidelized users only (*human agency*). The technology did not offer this option (*constraint*) and it was modified in order to comply with this new aim.

The same goal of providing more contents (*human agency*) induced a change on a different technology in that Bridge, a still unused component of the publishing software used for creating the magazines, was activated. This (*material agency*) in turn led to a change in overall work routines of the editorial team in that Bridge forced to store and mark the files in a specific way.

This new way of working triggered the expectation to transfer the same approach (*human agency*) to CMS-1 which was ultimately modified. The automation features of CMS-1 (*material agency*) also brought better coordination of activities for the online journalist.

Ultimately coordination between on- and off-line was obtained. This coordination is in part reflected in the new equilibrium between paper and web edition PUBLICOM conceived in the following period.

Understanding the "content is king" era

The management of the website challenged PUBLICOM more than expected. A growing community and positive feedback from the users led the owner to hire a full time journalist who would be exclusively dedicated to the website. The matured experience with online publishing directed the manager and the editor-in-chief to a specific choice about the profile of the candidate. It was necessary that the new resource had a background in both paper and web publishing. This would allow better internal communication and above all it would guarantee that everyone in the editorial team understands the logic of how the publishing house is developing. At the same time also the other off-line journalists were instructed on the basic functionalities of CMS-1. Moreover, the website was always on the agenda of weekly editorial teams meetings, so that suggestions would possibly arise from all the team.

At this time the link between the traditional paper magazines and the website had been sharpened, in that the two media were perceived as complementary and mutually enriching.

However, the website was starting to exert its limitations. On one side the

structure of the site could not be modified much from the initial project (importantly, it reflected the logic structure as conceived by the business partner that originally developed it). For example, it was designed with a large central text area, which made the usability of the website very low; its navigation was conceived as occurring in a sequential way, whereas users usually jump erratically from one page to the other.

Moreover the website was not conceived for being multimedia oriented. Accordingly neither CMS-1 was supporting video files or the uploading of user-generated pictures. Nor was an e-commerce section possible. The limitations of using a technology that was developed by a business partner came to the foreground. The website design and the CMS to manage it were reflecting assumptions and aims from the business partner. In the meantime, however, PUBLICOM had developed a more complex strategy towards online, that was conflicting with the inherent limitations of the technology. The agreement with the business partner was not allowing drastic (and expensive) changes.

IMBRICATIONS IN THE "CONTENT IS KING" ERA

PUBLICOM had developed the concept of complementarity between magazines and on-line publishing. Specifically, the website needed to offer appealing contents, without destroying the traditional and established business, so attracting new potential readers and consolidating old ones. Conflicting with the overall goal of developing a more complex website (*human agency*) the use of CMS-1 (*material agency*) engendered a sense of *constraint* in respect to the desired developments. The website itself reflected such *constraint*, in that its graphic layout was not any more compatible with the understanding PUBLICOM had reached in terms of product and advertisement support. To comply with the new goals of PUBLICOM (*human agency*) CMS-1 was discarded and a new CMS-2 was adopted.

Understanding the "traffic is also king" era

PUBLICOM decided to switch to a new CMS (CMS-2) and to a new design for the front-end of the website. The experience with CMS-1 guided the choice of the new software. Some features were retained (e.g. the validation process of the single articles), while some others were rejected (e.g. CMS-1 was hierarchic,

whereas the new CMS needed to allow for semantic inter-linking of the articles). The new CMS also needed to integrate three modules: web contents (including videos), community (including user-generated pictures and live chat) and e-commerce. These were however not adopted at the same time. The first two were given priority, while the e-commerce part was postponed. What was especially adopted in the beginning is the main platform, according to a specific understanding PUBLICOM had gained in its first experience with on-line publishing. The CMS included from the beginning the possibility to manage a fully developed community (user data, newsletter, forum, live chat and user-generated pictures) and a video section. But it needed to be extremely flexible, in order to guarantee for further developments in the future. This is not only referred to the e-commerce component, which was already foreseen, but more broadly to adaptations in general. The so-called lock-in effect created by the proprietary technology of the first adoption phase prompted PUBLICOM's manager to direct towards open-source platforms, that by themselves are conceived for being modified. Very briefly, open-source is not a synonym for "for free". It only means that the code of the software is open to the community of developers that work around it. As a consequence the developments, ideas and even finished components built by one developer can be released and provided to other developers. Using an open-source platform therefore implicitly keeps the adopter open to change in the technology.

A vertical close-up on the underlying logic of website management is worth at this point. In the illustration of the case we said that the value of a website is in the traffic it generates and in the recurrent users it holds. Why?

First of all, in order to be "*read*" a website first needs to be *found* among the millions existing on the web. Part of the users directly access a website through its URL (e.g. www.websiteXY.com) because they already know it, have it in their bookmarks or read it somewhere (e.g. in the magazine). 90% of traffic (Gartner 2012), however, comes from search engines. Or better from one search engine, Google. Here the figures are mixed between those who are searching a specific website but don't know the exact URL; those who are looking for a topic and find, according to the perform search query, specific websites they did

not know before; and those who already know the specific website, also know the specific URL address, but anyhow as a habit just digit the main name in Google and then click on the results. Whatever the reason for performing a search through Google, it is extremely important that the focal website appears in the very first pages of results. Statistics prove that few users go beyond the third page when scanning the results provided by Google.

The exact technical details about how search engines function are beyond scope for this analysis, however the account of at least the main principles is necessary. The engine of Google relays on software applications (called spiders) that scan the whole web, retain information about every single website, and store this information on its servers. This process can be assimilated to instant pictures of websites in a certain point in time. The scanning process is performed on an ongoing basis for guaranteeing that information is always updated. Spiders' scrutiny is performed on contents of the website, meta-tags (that is, labels web designers can implement to signal "what is this web page about") and links from and to other websites. The logic is: the more external websites refer to the focal website, and the more the focal website refers to external websites, the more the inference can be done that the focal website contains valuable contents for others (who create links to it) and that it is active (in that it conveys traffic to other websites). When an end user does a research, the words he types are matched with the information collected by spiders. Google's engine algorithm will then provide results according to this matching. The websites that are ranked as first ones are accorded, implicitly, a value. Beyond being highly visible, this value is also that first results are attributed higher reliability by users, in that it is assumed that these are the outcome of a neutral and objective selection by Google's algorithm.

Rather than being passive object of an research algorithm developed by others, websites today are more and more conceived for *actively* taking advantage of this logic. This means that they can be built so that it is easier for Google's spiders to "understand" what the website is about. Search Engine Optimization (SEO) techniques work on a technical niveau (e.g. on meta-tags) but also at the level of contents. For example, it is important that the title of any article displays

the main "key words" identifying its content and that these key words are repeated as many times as possible. As additional detail – although not used yet by PUBLICOM – website owners can purchase key words from Google. Websites retrieved according to purchased key words are those displayed at the very beginning of the results page, marked in a different colour so that they are recognizable by users (therefore preserving the neutrality of the results). Even in this case, however, it is important to note that it is then an active responsibility of website managers to use these key words extensively *within* their website.

Search Engine Optimization was performed at PUBLICOM in three ways. First the new CMS-2 had embedded SEO functionalities. Second, a technical expert was hired as consultant and assigned ongoing quality check of the website. Third the journalists were instructed on how to write for the Internet. The journalists involved here are above all the two dedicated on-line persons, but also the other working in the editorial team. Due to the amount of needed contents, the whole editorial team had undergone change. In short, when preparing the articles for the magazine every journalist was expected to also think to online. Shorter versions of the articles were therefore prepared as part of their daily tasks. This included already preparing suitable titles, more synthetic and readable (on PC screens) texts and dividing the texts in self-standing sections. The latter, in particular, would allow the on-line journalist to split a same article on more pages without much proofreading or re-elaboration. It is worth noting that contents on the Internet potentially last forever: at PUBLICOM this splitting of texts was done also according to what elements of each article could be kept as ongoing repository (e.g. descriptions of the historical monuments of a city) and which would need to be removed (e.g. specific events or fairs taking place in that city).

This strategy is motivated by a second logic implicit in website optimization. The frequency with which users view pages is, again, one of the parameters used by the algorithm of Google to "judge" a website (highly visited websites receive a higher ranking). But also, page views increase the potential for advertisement placed in that page. Banners and other forms of advertisement are indeed paid on the basis of the frequency of uploads by users. Vertical websites like

PUBLICOM can reach about 15 € per thousand page views (CPM - Cost Per Mille). Since this amount is certainly not high and since advertisers' budgets are small and dispersed on a number of different websites, the goal then is to have as many pages as possible and obtain continuous rotation of advertisement displays. Accordingly, if one article is split on a number of subsequent pages, if pictures are displayed in galleries (with forward and backwards buttons), if at the end of each page contextual or related contents are automatically proposed to the user, it is very likely that a single user will generate much more traffic than if he only viewed one page comprising text and images.

How are viewed pages measured? Through cookies (small software applications) that get uploaded from the website to the browser of the end user. These track the behaviour of the reader inside the focal website. The results of such tracking can be analysed by the website manager through so-called analytics (the most popular of which is Google Analytics). Different degrees of sophistication are available in products currently on the market, but at least they produce a report of: where the user comes from (e.g. search engine vs. direct access), how many times the same user visits the website, how many pages he visits, for how long, how he moves from page to page within the website.

As PUBLICOM experienced, however, the backdrop of cookies-based analytics is that these data might not completely be reliable. Users that employ different browsers or different devices (e.g. PC, smartphone and tablet) or that cancel cookies, for example, would not be tracked as one consolidated user, but as multiple sporadic ones.

PUBLICOM realized that it was vital that the website succeeded in having registered users with personal data and privacy authorization. Beyond being more objectively counted, these users could also be addressed through marketing campaigns, directed to PUBLICOM's website itself (for example for promoting internal e-commerce) or to co-marketing partners (so leading purchases on an external e-commerce site).

This digression into the functioning logics of websites is valuable for understanding PUBLICOM's case.

All of the knowledge about the above-mentioned dynamics was acquired by PUBLICOM through different sources, ranging from contacts in the industry, to local trade association conferences, to mass media. The two most important sources of information, however, can be attributed to the past experience developed by PUBLICOM in the last years and to the collaborative approach of the solution provider selected for implementing CMS-2 and the new website layout. It is worth noting that the latter is not an ICT supplier only. It is a solution provider in that the approach is one of strict collaboration in developing not only the actual website but also an overall strategy to content management. Importantly one his SEO experts would visit the editorial team to guarantee continued fine-tuning.

The other source of information is PUBLICOM's background of previous engagement with technology and online publishing, on which it developed the necessity for a new CMS, for new features in the website, and ultimately new coordination among people working in the publishing house.

IMBRICATIONS IN THE "TRAFFIC IS ALSO KING" ERA

The sense of *constraint* engendered by working with CMS-1 brought PUBLICOM to a drastic change (*human agency*) in technology. Overall the logic of the leading search engine (Google) (*material agency*) permeated PUBLICOM's approach to online publishing. This led the publishing house to give interrelated priority to traffic, contents and users (*human agency*). CMS-2 and a new web layout were therefore implemented, with specific features that would allow full management of the website but also Search Engine Optimisation activities.

With the goal of examining fruition of the website (*human agency*) Google Analytics were activated and used on a daily basis. These (*material agency*) in turn engendered a perception of *affordance* because they allowed monitoring the website. Furthermore they also provided a direct feedback (*material agency*) on the single articles published on the website, so that even off-line journalists started consulting Analytics reports. By allowing specific monitoring (as opposed to the whole magazine in traditional print) as well as comments by users, the off-line journalists started taking the website as a reference.

Previous experience with online, along with using CMS-2 engendered a perception of *affordance*, so that the overall way of working of the editorial team changed, as well as

the goals of the owner. With the aim of increasing traffic (*human agency*) further modules of the CMS-2 platform were about to be activated (at the end of data gathering the e-commerce module was about to be launched).

The possibilities offered by the CMS-2 (perception of *affordance*) had indeed triggered a further evolution, in that another by-product of content management could be obtained (*human agency*): the contents might be sold as stand-alone products.

7.3.4 Discussion on the case analysis through the Theory of Imbrication

The analysis of the case study through the Theory of Imbrication illustrates how the process of imbrication of human and material agencies has led to changes alternatively in the technology or in the work routines at PUBLICOM. The context of small enterprises, where a simple organizational structure allows for flexible behaviour in repeated patterns of work and web-related ICTs, that are inherently flexible and modular, are deemed to be an ideal setting for understanding how these changes take place.

Overall the Theory of Imbrication is particularly valuable in that it proposes a language and a conceptual background for understanding three blind spots left by the analysis through DOI: previous engagement with technology, re-invention and technology clusters. This understanding stems from the conceptualization of technology as inextricably linked to organizing.

The perspective advanced here, on the basis of Leonardi's framework, is that in order to understand the adoption process of technology (and the emerging organizational implications), we should better conceptualize it as a continuous imbrication process of human and material agencies. Insofar as people are able to alter their goals and have the possibility to change technology's features, their perception of *affordance* or *constraint* might urge them to make new imbrications of human and material agencies.

As shown in the case of PUBLICOM this sequence is not always automatic or linear. The pattern of imbrications is also conditioned by contextual conditions, so that it is not always possible to alter technology or routines in any moment. But the most important aspect to be noted is how imbrications (whatever the

sequence in time) end-up forming a pattern, an infrastructure of routines and technologies, on which people draw for future action. This organizational residue left by imbrications, is what accompanied PUBLICOM in taking a renewed approach in the most advanced phase of adoption (i.e. the new concept of website and CMS-2). This approach includes technological *and* organizational change, where one influences the other but in a more profound way than assumed by extant literature. *Interweaving* substitutes *impact*, *pattern of past imbrications* substitutes Rogers' more generic *previous practice*.

The notion of *re-invention* also acquires a deeper meaning. If we conceptualize technology not as an external entity impacting on the adopting enterprise, but as an organizational element (technology that exerts material agency) which is actively imbricated in the fabric of organizing, then we might better reconcile also the dichotomy between the idea of website, its logic, the technology underneath it and the overall organizational picture observed at the end of data gathering. The technology is not simply re-invented through different interpretations. It gets imbricated into ongoing organizing and gets shaped by the goals of the adopter, and viceversa. The perception of the CMS in PUBLICOM, for example, *co-evolves* with emerging goals for web management (more contents, more multimedia, more traffic, etc.). As a matter of fact, technology, in turn, has an effect on the organizational dimension and might trigger further change in terms of goals (like better internal coordination). But at the same time these new goals shape how technology is being changed (i.e. the characteristics of CMS-2 like: being open source, SEO oriented, etc.).

In PUBLICOM this process is evident by considering the website adoption process in its entirety. If we compare the initial adoption phase to the last developments, PUBLICOM has switched to being a passive receptor of an existing artefact to an active shaper of the technology, but also of what can be done with that technology. This process is not only equated to a voluntaristic intention in that unexpected consequences are also taken into account. For example the coordination between on and off-line editorial team is in part also the result of engagement with technology. At the same time, the actual configuration of the subsequently adopted technology (CMS-2) is informed by

the process developing in the organizational dimension.

Technology clusters also gain in theoretical deepness. Rather than conceptualising them as bracketed into a single innovation or analytically separated as distinct items, the imbrication metaphor allows for analysing them in all their complexity, without loosing the connections between the individual components. In the case of PUBLICOM probably the most striking example is the connection to external technologies like Google or Analytics. Would their place be within or outside the technology clusters conceptualised by Rogers? How would the organizational implications of a logic embedded in an external technology (like Google, but also like the CMS-1) be accounted for?

By considering them in light of an imbrication process, the researcher is able to include this in the resulting picture without loosing its actual details.

7.4 CONCLUSIONS

This in-depth case study was built also on the basis of relevant lines of questions resulting from a pilot case study on a non-core ICT adoption process (e-invoicing) in a small manufacturing firm. In discussing the pilot case a number of open issues were addressed (Chapter 3), which are synthetically reminded hereafter.

First it was underlined how the adoption process might follow unexpected patterns, in that deviations from the initial plan might take place due to the intervention of external agents (in the case: an important customer). Linked to this aspect, a conceptual difficulty was highlighted, in that the to-be-adopted technology underwent change *during* the adoption process. Then, the organizational dimension was proposed as field of further enquiry, in that an holistic approach to ICT adoption developed by the focal firm, as well as organizational implications, could be observed in the conduct of the pilot case but could not be fully accounted for. Specifically, previous engagement with technology (and the conceptualization of ICT in general) was deemed necessary of clarification. Finally, from a methodological point of view longitudinal and direct observation were expected to be included as data gathering instruments,

so that time would be integrated and so that also more opaque dynamics would come to the foreground.

Accordingly, this in-depth case study was developed longitudinally and has used a mixed technique for data gathering that complemented interviews with direct observations. The case was guided by the research question of *how the adoption process of ICT in small enterprises takes place in practice*.

To answer this question two theoretical frameworks were applied: Diffusion Theory and the Theory of Imbrication. The first was intended as overarching sensitising theory, which would provide a structured approach for horizontally analysing the sequence of events in time, while the second one was expected to vertically shed light on the role of contemporary (Lego-like) ICTs in today's organizing. According to an epistemologically interpretive stance the aim was not to test the theoretical frameworks, but to apply them for gaining further understanding.

The in-depth case study has reported the website adoption process of a small Italian publishing firm (PUBLICOM) over four years, by following the evolution of its main website from its early to its more recent developments.

By analysing the case through Rogers' DOI we were able to outline different phases of adoption from first knowledge to ongoing confirmation, although we have excluded the possibility of sharp distinctions. In so doing, we also highlighted the potential sources of influence the enterprise experienced. DOI is indeed a structured sensitizing element, in that it directly addresses the importance of the social system and the communication channels surrounding the adopter. Directed by the literature review presented in Chapter 1 and by the pilot phase (Chapter 3) the case has highlighted the importance of local and inter-personal networks. Moreover, it has emphasized the important role of collaborative attitudes of ICT solution providers.

Furthermore, the organizational dimension has been investigated closely through the theoretical framework provided by the Theory of Imbrication, which was specifically intended to clarify the concepts of *previous practice*, *re-invention* and *technology clusters*. This allowed for deep insights in the dynamics of

everyday organizing in small firms. Internal collaboration transpires in the analysis: the simple structure typical of SMEs can in this sense be considered an enabler for a uniform spread of knowledge in the enterprise. Here we can note that although not a first mover in online publishing (PUBLICOM would be considered a late adopter in Rogers' categorization) the pace of development has speeded up towards the end of the observed time span. So, we could consider PUBLICOM a late adopter in respect to the overall website, but an advanced one as far as the organizational dimension is concerned, so that a coordinated approach towards both on- and off-line publishing has been developed. Also, a deep engagement with technology has generated an established background of imbrications, so that the most recent implications of website management could be relatively quickly made sense of and were embedded into taken for granted dynamics of the organization.

On the organizational side the question of how adoption takes place is framed within ongoing issue of the relationship between technology and organization, in IS and organization literature. The alternative framework of Imbrications provides a powerful picture of how technology can be theorized and ultimately about the conceptualization of today's organizations. By granting organizing a sociomaterial dimension, *change* in practice is both organizational and technological. That is, although the social and the technological can be observed as distinct, *in practice* they depend on one another.

Even if employed from an interpretive stance, the use of two different theoretical frameworks within a single study provides implicitly a comparison between alternative explanations stemming from two different ontological assumptions (as per (Orlikowski and Scott 2008). Diffusion of Innovations Theory and the Theory of Imbrication hold some aspects in common. Both theories deal with the socio-technical domain, account for how the characteristic of a technology are perceived (beyond its intrinsic attributes), consider prior conditions as important, recognize the flexibility of technology and finally conceptualize the adopter as active shaper. Different in the two theories is however the ontological assumption: of separation in DOI (technology and organization are distinct entities); of inextricable imbrication in practice for the

Theory of Imbrication (routines and technology are distinct empirical phenomena, but they are ontologically related in practice, because they are both constituted by imbrications of human and material agency).

Although not intended to be prescriptive some practical implications can be derived from the in-depth case study at least for small enterprises engaging with contemporary (lego-like) ICTs.

In the pilot case we have posed the question whether the adoption process could be considered "successful" in that a deviation from the initial project de facto diverged the planned pattern. The same question arises in the case of PUBLICOM because of the change in technology decided in the last phases of development of the website. Here we have seen how the proprietary CMS-1 and the relationship with a business partner ended up constraining PUBLICOM's plans for the future. We have also underlined a different and more strategic approach to online and off-line management. On one side this takes to the foreground a sort of trial and error approach to the new field, which is typical of smaller, unstructured enterprises. But the metaphor of imbrications helps putting in relief also a different aspect: what is it in the end that gets adopted with technology?

The answer in line with the Theory of Imbrication is that, *in practice*, by adopting technology new imbrications into the organizational fabric potentially take place. Consequently it needs to be managed as all other organizational elements. Critical in the case of configurable technologies is that by being deeply linked with work routines (due to underlying imbrications) if a new technology is a small module completing a larger platform, this adoption might go unnoticed but its organizational entailments are not.

As we have seen in the case of website adoption at PUBLICOM this kind of understanding was only built after a relatively long period of direct engagement with the website and CMS-1. The expectation of PUBLICOM in adopting the existing technology was that of little change and indeed only a half-time journalist was assigned to the website. Though the recursive imbrications of everyday activities and technology, then, more effort that expected was needed in order to manage the website, but also new competences were necessary.

These skills are not only those needed for *using* the technology, but especially the managerial skills to *organize* technology. As we have shown in the case study small sub-adoptions of additional modules also took place along with the more general website adoption. Particularly critical with Lego-like ICTs, then, is that these additional modules might enter the organization almost as taken for granted elements. The risk then is that the organizational implications of such adoptions are underestimated.

As the metaphor of imbrication suggests, every single tile or imbrex needs to find its proper place so that in the end it will build a roof. The question then is not so much to organize *for* technology adoption, but to organize technology. Similarly, the question is not only to have resources who can *use* technology, but mainly to have resources who have the skills to *organize the use* of technology, who are able to estimate the possibilities or limitations of technology not as invariant attributes, but in respect to the organizational infrastructure built by previous imbrications.

For SMEs this consideration might be highly problematic, due to a lack in managerial background. Accordingly also the adoption process, which in the end can be considered successful, is reached through tentative imbrications.

CHAPTER 8 – CONCLUDING REMARKS, CONTRIBUTION AND LIMITATIONS

The main conclusions to this study are developed in the previous chapter. In closing this work, this section proposes some final comments on the research on its contribution and on its limitations.

The aim of this exploratory work was to develop a deeper understanding of the *adoption process* of information and communication technology (ICT) in organisations, and more specifically in Small and Medium Enterprises (SMEs).

SMEs are the vast majority of businesses in Europe and the potentialities of Information and Communication Technologies (ICTs) are often promoted as potential enablers for SMEs long-term organizational sustainability (Clemons and Weber 1990; Nadler and Tushman 1999). Despite these potential advantages, official statistics and reports (The Sectoral e-Business Watch 2008) depict small enterprises as being traditionally slow in keeping pace with technological advancements.

Are they only lagging behind? Are they – so to say – only missing a chance, or are they facing challenges of a different kind on the organizational level? What are the complexities experienced by small enterprises in the engagement with ICTs?

If at the policy level we can observe a general consensus about the potential benefits of ICTs for small enterprises, on the other side the relatively low diffusion rates, the less optimistic stance proposed by part of the organizational literature and the lack of research on this specific theme suggest that further inquiry is needed.

Against this background the following three research questions have guided this work:

RQ1: *How does SMEs adoption process of ICT take place in practice*?

- **RQ 1a**: *How does the adoption process unfold in practice?*
- **RQ 1b**: *How do the specificities of SMEs shape the adoption process?*
- **RQ1c:** *How does previous engagement with technology interplay with future adoptions?*

The questions have been sharpened through an incremental research design in that the SMEs, ICT and Organization literature has been combined with confrontation with experts and practitioners according to the methodology proposed by Van de Ven (2007). This study, informed by interpretive research assumptions (Walsham 1995), has adopted an exploratory and qualitative research design based on case studies (Yin 2003) with the aim of obtaining thick data on the phenomenon under study as well as on its context.

The two case studies (a pilot and an in-depth one) combined with an engaged research of theoretical contributions have hopefully shed further light on the dynamics of SMEs engaging with ICT adoption, but also on conceptual issues concerning contemporary ICTs, which Pentland and Feldman (2007) "Lego-like", and *organizing*.

Both case studies have underlined the (sometimes subtle) organizational entailments of ICT adoption. The choice of most different cases has been in this sense fruitful. On one side we described how a *non-core* ICT was adopted in a small manufacturing firm. The assumption was that less attention might be granted to this new ICT, particularly in the selected case where the application is defined as "non intrusive" by the same interviewees. Conversely, by selecting a case where the adoption of ICT addresses the *core* business of the enterprise, it was expected that the organization (and specifically the owner) would be more focused on the adoption process, as well as on the organizational implications.

These expectations were met only to a certain extent. Whereas in PUBLICOM (in-depth case) the adoption and its implications are more overt, in the case of ALPHA (pilot case) these are more subtle, but nonetheless pervasive on the organizational dimension.

We have underlined in the conclusions to the in-depth case study that

PUBLICOM's approach to the CMS-based website (in its entirety) changed during the adoption process, so that at the end of data gathering both the *idea* and the *technology* resulted profoundly different (if we use the terminology of Rogers they were *re-invented*; if we adhere to Leonardi's interpretation they were the outcome of how *imbrications* of material and human agencies had taken place). The critical issue identified is that what profoundly changed in PUBLICOM was not so much the attitude or the attention granted to ICTs, but the capacity to organically *organize the use* of technology. In this sense, what unexpectedly emerged in the comparison of the two cases is the similarity of understanding and of overall approach towards technological adoptions: held by ALPHA since the beginning and developed by PUBLICOM during the adoption process (in its entirety).

Arguably then, the answer to RQ 1b concerning the specificities of SMEs also involves which characteristics they do *not* exert, along with their typical features. In this line of reasoning then, this work contributes to research on managerial IT skills (the non technical skills for managing IT) (Mata et al. 1995) in prompting further research on how these skills are developed in contexts where managerial skills in general are lacking.

The assumptions stated in introducing this work (and its exploratory nature) prevent from drawing generalizable conclusions about the adoption of ICTs by SMEs: in recognizing their idiosyncratic nature this study did not try to add further critical adoption factors to the literature. However some general considerations can be drawn, in respect to contemporary ICTs.

One one side we have underlined the importance of the collaborative attitude of providers, in that (in the two cases) they have not only taken the role of ICT *suppliers* but of *solution* providers. Accompanying SMEs during the adoption process entails taking their perspective. Furthermore, Leonardi cautions, ICTs always embed the assumptions of those who developed it. This collaborative attitude, then, needs to be reflected also in the technology. Conversely, however, the necessity of internally developing a managerial approach towards organizing ICT adoption comes again to the foreground: Rogers stresses that change agents often take advantage of their higher *principle knowledge* to only selectively

communicate innovations.

Overall, the simple organizational structure typical of SMEs is reflected especially in the adoption process at PUBLICOM, where a strategic approach was only developed after intensive engagement with website management. Modular technologies, then, add a further dimension to the already complex matrix of characteristics. The lego-like nature of today's technology has been highlighted in both cases: be it an e-Invoicing software, an entire website or even its smallest components, technology might be adopted in extremely variegated ways. In line with Leonardi and Barley (2008) future research might be interested more in understanding how different technologies have similar implications in different contexts, than how the same technology has different outcomes in similar organizations.

This study aimed at contribution also specifically to the literature on Information Systems. By directly engaging with how technology is conceptualised it has hopefully generated a contribution in line with the request of further attention to ICT (Orlikowski and Iacono 2001).

Furthermore it has also provided further clarification on the concepts of *re-invention*, *technology clusters* and *previous practice* with technology, which have been underestimated in the diffusion literature.

As far as "re-invention" is concerned, an additional consideration can be done about its desirability. Changing the expected use of a technology has been often considered a turnaround from an intended path (Orlikowski 2000). Today's technologies, on the contrary *embed* the concept of change (most strikingly in open source software, but also in more diffused technologies like smartphones and tablets). Here then might be detected an additional critical issue or opportunity for SMEs: an overload of applications which, once combined, imply unclear organizational configurations; but that at the same time if *guided* into organizational fabric, can become potential sources of fruitful outcomes.

This work has taken a focus on *practice*. This has a manifold value. From a *theoretical* point of view, it builds on recent contributions in both Organization and IS literature (Feldman 2000; Feldman and Orlikowski 2011; Feldman and

Pentland 2003; Orlikowski 2000) that stress the recursive, incremental and situated nature of contemporary *organizing* (Weick 1979). Granting everyday activity attention is at the same time responding to the quest of more specific research on SMEs actual dynamics. Finally, from a managerial point of view, it will hopefully provide some insights to how technology may be introduced and managed in SMEs.

The main limitation of this work is its exploratory nature. The limited number of case studies has been however complemented also through methodological engagement with mixed methods of data gathering, which have included interviews and direct observations.

Although compatible with an interpretive quest for deep insights, this work will definitively take advantage of further studies planned by the author in the Publishing industry.

APPENDIX 1 – OPEN-ENDED QUESTIONS GUIDING THE INTERVIEWS

The questions reported here represent the initial questions for guiding the interviews. As explained previously, however, other questions were eventually added opportunistically to take advantage of upcoming issues.

Interviews (with….) concerning general information about the enterprise

Data of interests:

- Year of establishment
- Partnerships
- Description of main and secondary activities
- Data concerning the ownership
- Data concerning the board
- Data concerning dimension (assets and annual turnover and their evolution during the time, number of employees and its evolution, seats, geographical markets of interest, etc.) – balance sheets, income statements, brief description of cash flows
- Data concerning products and/or services
- Organisation chart – Average age of employees
- Data concerning customers and suppliers (kind, number, turnover, etc.)
- Description of the supply-chain
- A brief history of the enterprise
- Projects

Interviews (with….) on ICT organizational aspects and context attitude towards ICT

- Are the owners directly and constantly involved in managing ICT aspects of the business?
- Which is the level of their competence?
- In the organisation is there a function specifically devoted to ICT management?

- How many people are directly and specifically involved in ICT management?
- In general terms, people that are non directly involved in ICT management have an ICT culture?
- Which is their general attitude towards ICT and ICT based innovations?
- Are ICT users positive in their interaction with it and do they propose improvements of ICT tools configuration and in their usage?
- How are education courses concerning ICT organised (if any)?
- In general terms, is ICT is a topic of discussion among employees? And with management?
- Is any process formalised to collect spontaneous suggestions about ICT tools?
- What was your first impression of the ICT?
- Did this change in time?
- Did you first have an idea of what organizational implications it would have?

Interviews (with ……) dealing with the adoption of the specific innovation

- Are you able to outline how the idea of improving the ICT based activity did settle in the enterprise?
- Can you describe in general terms how the adoption process took place?
- When, how, did you first think to adopt it?
- For solving which problem or need?
- With which aim?
- How did you get knowledge about it?
- Could you remember who was the first promoter(s) and supporter(s) of the idea?
- Were you able to immediately determine the actors involved?
- After the idea got a better defined shape, did you establish a process to manage its development and (whether affirmative) how?
- When did the idea become a prior project?

- To develop the project did you necessarily need the support of external actors (consultants, providers)?
- How did you take in account their attitude about matching your actual needs with their own interests?
- Which were the factors that suggested to pursue the idea as a prior project?
- Where you able to outline an advance cost – benefit analysis?
- Have you made a final cost – benefit analysis of the project or could you be able to do it?
- In preceding answers you depicted the whole adoption pattern as a stop-and-go process, characterized by errors, changes of mind, direction changes and so on: do you think that this experience have improved your capacity of manage ICT related innovations?
- Have you something to point out or some suggestion about topics to further focalise on?

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