

'Bricolage' in the Implementation and the Use of IS by Micro-firms: An Empirical Study

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Abstract. The purpose of this research is to explore the implementation and the use of IS (information systems) by micro-firms. Micro-firms are characterized by simple IS and low formalization. Recent research shows that bricolage occurs in small business IS. Bricolage as a theoretical framework provides a new perspective for small business and IS literature. In this research, we focus on micro-businesses (less than five employees) and explore if and how bricolage occurs in the implementation and the use of IS. To do so, we realized 64 semi-directive interviews with French owner-managers. Results show a distinction in the implementation process and the use of the IS.

Keywords: Micro-firm, bricolage, information systems, owner-manager.

1 Introduction

Micro-firms are characterized by simple and informal information systems (IS) [1] and intuitive strategies based on subjective decision criteria [2] [3]. IS management is essential in small business development by supporting one or several organizational functions. Numerous research showed the role of IS management in SMEs [4] [5] but few of them focused specifically on micro-firms [6] [7] [8]. Among them, a recent survey [8] characterizes IS in micro-firm as "bricolage" practices. This survey continues this research and focus on the implementation process of IS. Bricolage is defined as 'making do by applying combinations of resources already at hand' (p.33) [9]. This concept is particularly relevant for micro-firm analysis.

The purpose of this research is to analyze IS implementation in micro-firms and to describe if and how bricolage occurs during this process. To do so, we first present a literature review of IS in micro-firm and organizational bricolage. The second part explains the research method (sample, data collection and data analysis). The third part exposes the results and we finally discuss the managerial and theoretical implications of this research.

2 Theoretical Framework

2.1 IS in Small and Micro-firms

Literature focusing on IS in micro-firms is growing [10]. At the organizational level, micro-firms are distinguished by their simplicity and lack of resources, resulting in:

small size, centralized management directly linked to the owner-manager's personality, low specialization of employees, intuitive strategy, high proximity with stakeholders, and a simple (internal and external) information system with low formalization and direct contacts [11]. Moreover, micro-firms are characterized by short-term vision [11]. According to Benghozi [12] the organizational context strongly influences how IS are managed. Poorly adapted IS can cause growth problems for micro-firms because of inadequate information on which to base decisions [13]. As micro-firms only have minimal resources, they can access and effectively process a very limited amount of information to shape strategic decisions [14]. Indeed, micro-firms have few people for accessing, processing, or interpreting the whole environment data, competent staff in information system is often lacking, and the responsibility for information is concentrated in the hand of a limited number of people [15].

Micro-firms are primarily looking for information in the immediate environment [11]. Owner-managers thus focus on social or business networks to take advantage of strategic information, or passively acquire information by locating themselves geographically close to rich information sources such as universities [16]. The owner-managers therefore prefer to monitor the immediate environment by setting up a cheap and informal information system based on a network of relationships [14]. Consequently, decision-making is often intuitive and based on incomplete information. This information is also altered by the subjectivity of the owner-manager [3], which stems from cognitive bias influence (mistakes or anomalies). Owner-managers prefer information which confirms what that they have already registered, and tend to ignore the ones which invalidate them. They use little information to take a decision, referring to available information. Consequently subjectivity weakens strategic thinking.

Several studies have shown the role of IS in the survival and development of small businesses [19] [20]. Perks [13] showed that IS can cause growth problems because of its inadequacy or inability to provide relevant information for decision-making. Other research showed that investments in IS are usually disconnected with the strategy of the firm [21] [22]. This gap is linked to the level of competences of the owner-managers. The choice of implemented technologies is usually out of their domain of expertise. Consequently they are influenced by social or professional network to choose the tools (ICT or IS) to implement: social network [23], external advisors or software sellers [21] or public accountant [24].

Literature admits that the implementation phase determines the use and therefore the success of the IS. The use of IS is primarily linked to the satisfaction of the users [25] [26]. The level and the quality of the use is also linked to the way the IS were conceived and implemented in the firm [27]. Implementation and use of IS are contingent. The organizational and strategic context highly influences the type of tools implemented and the way they will be accepted and used by the employees [28]. Recent literature also shows that bricolage occurs in small business management, especially in information system management.

2.2 The Concept of Bricolage in Information Systems

Over the last ten years, the theory of "organizational bricolage" has become increasingly widespread in information system literature [1] [29] [30]. First introduced by Levi-Strauss in 1966 [31], bricolage is defined as the act of making do with what is available,

and of combining (tinkering) the available resources in order to create new opportunities [9] [32]. This concept implies a certain amount of improvisation, mixing the organized and the spontaneous, the routine and the non-routine, and the automatic and the well-thought-out in everything, from decision making to innovation practices [33]. It thus requires a high capacity for adaptation in unstable situations.

The concept of bricolage has also been studied by IS literature [34] [1] [30]. Ciborra [1] considers bricolage as a strategy of IT appropriation consisting in reassembling IS in order to adapt it to the immediate need of information. Indeed bricolage implies that information (such as other resources in micro-firms) is collected independently of a project or a specific purpose. Thus, the final use of the IS is rarely the one for which it was initially conceived [33]. IS is re-created and recombined in order to adapt it to the organizational structure.

Several studies underlined that bricolage also characterizes adoption and utilization of IS in small and micro-businesses [35]. For instance, the underutilization of IT is linked to the lack of experience and knowledge of the staff, who consequently tinker and improvise when using the tools [36]. The lack of time, training and communication after the IS implementation also implies tinkering behaviors, resulting in an incomplete utilization, a misuse, or an avoidance because of a resistance to change [8].

On the opposite, other studies show that new ventures manage to transform resources in innovations through bricolage, even if these innovations are usually incremental rather than radical [37]. Bricolage in micro-firm IS refers to improvisation, flexibility, opportunism and creativity. Consequently, organizational bricolage framework can be relevant to analyze the IS issues in micro-firms. Most studies which focus on small businesses indicate the relevance of bricolage concept, but there are still few empirical studies which describe bricolage practices and their managerial consequences [30] [8]. This research focuses on the bricolage practices in the implementation and the use of IS in micro-firms.

3 Methodology

3.1 Sample and Data Collection

The sample is constituted by firms of less than five employees operating in traditional sectors: trade, industry, craft, and services. They are located in South of France, this region is particularly representative because it comprises 95% of firms with less than five employees. The sample size is critical in qualitative research, as a minimal size requirement is observed to ensure the internal validity of the research and to provide a satisfactory level of confidence in the results. According to Yin [38], size can be determined by replication or saturation. In the present study, we determined the sample size using the saturation principle: theoretical saturation is reached when no further information to enrich the theory is found. Our sample was formed through the random prospecting of telephone and email contacts using an iterative approach. Thus, the sample was built gradually through successive iterations, with each component selected by reasoned choice [39]. Using this method and the saturation principle, we halted the process after 64 iterations.

We then conducted 64 semi-directive face-to-face open-ended interviews with micro-firm owner-managers with the objective of gathering discursive data reflecting

the conscious or unconscious mental universe of the owner-managers [40]. Secondary data were also collected from websites, firm brochures and catalogues.

We used a pre-structured interview guide divided into pre-defined topics: history and activity of the firm, aspirations and aims of the owner-manager, growth intention, competences and resources of the firm, IS and information technologies, implementation process, perception of the tools, operating mode, decision-making processes. For better analysis, we grouped the tools into three categories:

- Company websites, owner-manager emails, blogs, Facebook group and other “Communication” tools,
- “Monitoring” tools, i.e., previous sales and margins, customer tracking (sales, reminders, late payments),
- And “Forecasting” tools, e.g., sales forecasting.

The interviews were conducted between 2011 and 2013, tape-recorded to ensure that the collected data were exhaustive and reliable, and transcribed within 24 to 72 hours.

3.2 Data Analysis

The data were analysed via a discourse analysis based on a thematic content analysis [40], which can classify data into categories or ‘ideal types’. First, the gross database was analysed through thematic coding. This analysis consisted of determining the units of meaning (words, sentences or phrases related to one of the three pre-determined themes) and counting the respective occurrences (to measure the weight of each in the discourse). The occurrences were noted in ‘intrasite matrices’ (i.e., firm-by-firm matrices) that included personal observations and certain particularly striking or illustrative remarks by the interviewees.

Second, we synthesised all of the intrasite matrices into ‘intersite matrices’ (double-entry tables for each theme, with the three themes in the columns and the 64 firms in the rows). The aim was to compare the owner-managers’ discourses concerning each theme and to identify the constants and differences.

Third, we established ‘meta-matrices’, or crossed tables for each theme, in which the responses of all managers were simplified using keywords and classified as variables. We established two subgroups by isolating the common features and differences. When contradictions appeared in discourse, we conducted a rational comparison of the numbers of occurrences to choose the subgroup.

4 Results

The discourse analysis on the topics “implementation process” and “use of IS” showed the regular presence of the occurrences “adapt/adapted” (37 occurrences), “particular” (31 oc), “personalized” (25 oc), “tinkered” (24 oc), “according to the needs” (19 oc), “create/created” (18 oc). The owner-managers either created the tools themselves, adapted them from standard software, or “borrowed” them from colleagues or friends and family. The data analysis revealed two lexical groups.

- The first group contained 40 firms and the main terms related to practicality. In this group we found the following occurrences: “quickly”, “minimum”, “simple”, “practical”, “sufficient”, and the notion of lacking time (“no time”,

- few time", "not enough time"). We named this group 'necessity bricolage'. Necessity bricolage implies a provisory, constrained, basic and reactive practice.
- The second group contained 24 firms and the main terms related to efficiency. In this group we found the following terms: "unique", "in each case", "differentiate/differentiating", "created", "synthesis", "computerized", "web/Internet", "efficient". The owner-managers spoke about "gaining time". We named this group 'strategic bricolage', because it implies the creation of new resources and a voluntary combination of available resources in order to create new opportunities.

We then analyzed the characteristics of the two groups. Table 1 shows the main results.

Table 1. Characteristics of the groups

<i>Themes of the interview guide</i>	<i>Necessity bricolage</i>	<i>Strategic bricolage</i>
<i>Implantation of IS</i>	IS not created by the owner-manager (or bought) Basic IS, essentially Excel tables Independent and mono-function tools Preference for manual tools Implementation by the owner-manager (often with the advice of an external actor) without communication to the staff	Bespoke IS created by the owner-manager Multifunction databases Preference for computerized IS Commitment of employees in the implementation (or at least consideration of their needs) Initiative of the owner-manager for the implementation
<i>Use of IS</i>	Non regular utilization, and/or incomplete Utilization essentially by the owner-manager IS provide basic and operational information Low actualization of the IS after the implementation Adoption problems by the employees (misuse, bypass or reject)	Regular and spontaneous use by the owner-manager Important use of ICT Monitoring tools provide performance indicators and relevant information for decision-making Incremental improvements of the IS according to the needs Sometimes problems occurring in utilization (misuse or bypass), essentially due to a lack of training
<i>Strategic goals for the firm</i>	Smallness Newness Sustainability Survival	Development Growth Opportunity Competitive advantage Employment
<i>IS Competences within the firm</i>	None (40%) Owner-manager (30%) Employee (30%)	Owner-manager (73%) Employee (23%)
<i>Main IS/IT used</i>	-Website (30%) -Limited use of monitoring tools (35%) -Preference for manual tools (schedules, binder, notebook) -Externalized accountancy -Limited use of forecasting dashboard (7%)	-Website (59%), Extranet (8%), blog and social network (7%) -Several independent IS, sometimes integrated: customer database or CRM (100%), supplier database (45%), financial spreadsheet (100%) -Preference for computerized IS -Accountancy software and/or externalization -Project management (18%), forecasting dashboard (100%)

4.1 Necessity Bricolage: Practicality, a Posteriori Control and Constraint

The first group of owner-managers (62,5% of the sample, 40 companies) implements the IS by necessity. The IS is not created by the owner-managers and is limited to basic functions. The owner-managers of this category tend to prefer manual tools. The use is perceived as “necessary” for their business, non-regular and incomplete. The following verbatims are associated with this category: “obligation”, “craft”, “intuition”, “pleasure”, “quality”, “job”, “check”, “turnover” and “technique”.

Only 30% of owner-managers have some computer skills and 70% have no skills in this field. There are no forecasting dashboards, and the vast majority of owner-managers do not follow their activity regularly. Those who do use “monitoring tools” assert that they don’t use them regularly enough to capture relevant information. In this case, decision making is “intuitive”; as owner-manager 31 said: *“I have everything in mind”*. Decision-making is usually intuitive in this group. Owner-manager 36 explains: *“It’s so boring [laughs]... I like to be in my studio to create, sculpt and spend hours thinking about the good raw material [...]. IT, computers and so on... it’s not really my cup of tea. However, I can tell you, off the top of my head, the turnover since the beginning of the year, which customers have still not paid me [...]. Even my mail, I do not always open it”*.

This kind of entrepreneur is very focused on the product or service he or she is offering. The priority for these owner-managers is either to survive (especially when the firm has structural weaknesses, this is the case of nine businesses), or to pursue a professional passion. In this group, they tend to reject (or outsource) any task outside of their core business. Personal satisfaction is more important than financial performance.

Necessity bricolage in micro-firm seems to be mainly linked to cost control and is characterized by a certain improvisation. Indeed, the implementation is adapted as needed or done under the guidance of personal network (family, friends, colleagues, accountant). The use of IS is often perceived as an obligation with a minimal utilization. The potential of the IS is only partially exploited. Owner-managers of this category create and implement IS in order to avoid a loss of information (high usage of notebook for example), rather than to create relevant information for decision support. The use is usually incomplete, *a posteriori* and not spontaneous.

4.2 Strategic Bricolage: Efficiency, Anticipation and Optimization of Resources

On the opposite, the second group of owner-managers (37,5% of the database, 24 companies) are proactive in implementation process and use IS spontaneously and regularly. They perceive IS as useful, key, and potentially differentiating. All possess one or more monitoring activity tools and use them regularly. The majority of the group has a website (59%) and other social media (blogs or Facebook groups, 7%). The following verbatims appear frequently: “future”, “understand”, “see”, “strategy”, “customers”, “technology”, “web”, “create”, “grow”, “communicate”, “visible”.

We also observe that 96% of these businesses report possessing the necessary technological and computer skills. Although most of the owner-managers personally

have computer skills (73%), in other cases there are employees who compensate for a lack. In fact 23% of the micro-firms in this group have an employee with computer skills, who is usually the key staff member. Only 4% of these firms do not have expertise in this area.

In addition, this group is characterized by the use of forecasting dashboards (100% of owner-managers). As owner-manager 5 says: *"It is essential! I'm on it every day! My background is techno-commercial, so intelligence, dashboards and stuff, this is my thing. And it is crucial... It's impossible to do otherwise [...] At the moment I'm thinking about my growth strategy... I don't know if I move or not, so you can imagine that if I don't have the right tools it doesn't work. [...] I have to make decisions, knowing where I'm going"*.

In this group we found the highest number of businesses with employees. Owner-managers have a strategic awareness and a management or trade background. They intend to develop their business and have perceived the importance of IS.

Strategic bricolage intends to optimize the internal organization. The objective is clearly to improve the coordination and the process efficiency. From an external point of view, the aim is to optimize flows with customers (communication, appointments, ordering, invoicing, online payment, recovery). If the IS is tinkered, it is "tailored" and regularly improved in order to increase its sophistication, in a search for greater efficiency.

5 Discussion

This research contributes to the knowledge on micro-firms and owner-managers by exploring the bricolage in IS implementation and used. Several studies [7] [41] describe IS practices of small business, but without linking them to bricolage concept. Yet this framework is appropriate to micro-business analysis. Crossing these two theoretical fields provides new knowledge at several levels: owner-managers behavior, implementation of IS, utilization of IS, strategy and link with the personal aspirations of the owner-manager. Moreover, this research contributes to the framework of organizational bricolage, which is of growing interest in academic literature [33] [42] by proposing an empirical observation of bricolage practices. Our results show two types of bricolage (necessity bricolage and strategic bricolage) and we could go deeper in future research by observing under which conditions these two types can be compatible.

This research also provides managerial contributions. We found several successful examples of tinkered implementation of IS. Bricolage may be synonymous of creativity. This is consistent with the results of Halme et al. [42]. If the definition of "bricolage" is negatively connoted by the idea of "making do", this strategy can be efficient. Indeed, IS which are tailored by the owner-managers themselves may provide more relevant information than standard softwares. This can be helpful for decision-making. This research contributes to the comprehension of owner-managers behavior. The first point is that owner-managers that use necessity bricolage tend to keep their business small and to avoid recruitment, whereas those who use strategic

bricolage aim success, performance and sometimes growth. The second point is to show the important role of the owner-manager in the adoption of IS by the employees. The absence of employees' implication may conduct to organizational dysfunctions. If they are not integrated in the implementation process, some employees can be hostile to change their work habits and refuse to use the implemented IS (or bypass or misuse them). In order to facilitate assimilation and adoption of the new IS by the employees, owner-managers have to formalize the utilization process. This problem is accentuated by the fact that micro-firm owner-managers have a time constraint and do not find the time to train employees. Owner-managers have to consider the importance of the staff implication in implementation and utilization of the IS.

6 Conclusion

Our study addresses the scarcity of research on IS in micro-firms by enriching theory and providing insight into the functioning of micro-firm owner-managers. Thus, based on the theoretical framework of organizational bricolage, we have specifically studied micro-firms with less than five employees to understand their behaviors in management of IS. The analysis of the 64 interviews leads us to describe the bricolage practices of micro-firms in IS management. The final use of the IS is rarely the one which was expected during the conception. The IS are modified, integrated and personalised, according the needs but also to the level of competences of the owner-manager. Tinkering with IS in micro-firm may explain the intuitive decision making of owner-managers. Being locked in a short-term vision and a selective access and use of information, they "recover", "fit", and "reclaim" IS. This research confirms the relevance of bricolage theoretical framework to analyse micro-businesses and IS. We should go deeper in future research by enlarging the sample to small and medium businesses. From a managerial perspective, this research highlights the need to take into account the owner-manager aspirations in the use of IS, especially in monitoring, forecasting and communication. Finally, bricolage can be a source of creativity and inventiveness and owner-managers should involve their employees.

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