From Entrepreneurial Orientation to Innovation: The Mediating Role of Information System—Case of Tunisian SMEs

Samah Chemli Horchani and Mahmoud Zouaoui

Abstract The object of the entrepreneur passes necessarily through the development of an entrepreneurship shared by all. The achievement of this object supports the introduction of an information system mobilizing technology impregnate by the environment in which the business operates. The objective of this study is to present a state of the literature on entrepreneurship, innovation and information systems. Therefore, we propose a conceptual model on entrepreneurship-innovation link. To provide more information, empirical investigation covering two cases of Tunisian SMEs. The observatory study, conducted through internships in companies, allowed us to see the evolution of the model after 30 years of operation. The analysis reveals important interactions between the various components of the proposed model. Overall, the study will provide relevant knowledge about the impact of entrepreneurial orientation on innovation, in particular through the information system.

Keywords Entrepreneurial orientation · Radical innovation · Incremental innovation · Information system · Environment

1 Introduction

Radical innovation and incremental innovation have been the subject of several controversies concerning the conditions and mobilized tools leading to the implementation of an innovative business project. The importance is given to entrepreneurial guidance to help businesses to grow especially in a knowledge intensive environment (Astebro et al. 2013). Indeed, innovation and entrepreneurship are seen as connected so that the understanding of the first concept necessarily involves the understanding of the second (Schumpeter 1954). By result, entrepreneurship will enable a better understanding of the innovation dynamic's (Stolper 1994). Several researchers started to explore the significant determinants driving the degree of

S. C. Horchani (✉) · M. Zouaoui
Faculty of Economics and Management Science's of Tunis FSEGT, URISO, Department Management, University of Tunis El-Manar, Tunis, Tunisia

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innovation and intensity (Stephan 2014). Attention is then drawn to the entrepreneur as the personification of innovation (Hagedoorn 1996). Claims are increasing restoring value to the "Man entrepreneur", which is the most exciting dimension but also the most difficult to master. The variety of characters and persuasions makes difficult the existence of a portrait type of entrepreneur. However, it would be possible to say that the entrepreneur is a person who does not behave in a traditional way view. He operates in an uncertain environment (McClelland 1972) where the Information Technology and Communication (ICT) reinforce this reality. Technology has long been considered the only determinant of the organization prosperity. However, technological imperialism is long gone, and technology substitution to human intelligence is quickly fallen. The impact of information technology on organizations emerges through complex interactions between technologies and actors. The technologies have also become a component enhancing organizational capital of the company. It is no longer possible to evaluate and study the technological performance by separating the human factor. Entrepreneurial orientation (EO) would be the magic hand giving the firm's ability to innovate. The entrepreneur must seek the necessary improvements to ensure the viability of his business. His way of directing seems to be decisive.

In this study, we examine the relationship between entrepreneurial orientation and innovation through the information system. The study investigates the effect of the perception of the environment by the information system on the intensity of innovation. Our empirical part focuses on the study of two cases (E1) and (E2) of small and medium enterprises (SMEs) in Tunisia. In the first case, the company will operate a radical innovation with "the father-son recovery" in order to pursue new opportunities while the second operates in continuous incremental innovations to address the environmental turbulence. We will try to make a comparative study between the two cases at the end to identify and better understand the reasons which led the two companies to process differently to changing environmental.

Indeed, the study choice results from the fact that research on entrepreneurship and innovation deal with questions of different roles played by small and large entrepreneurial firms (Hagedoorn 1996). Our goals are first to broaden the scope of study of entrepreneurship and innovation. Consequently, we will build and validate a conceptual model on entrepreneurship-innovation link. Research will acquire available relevant knowledge to SMEs about the impact of entrepreneurial orientation on innovation, in particular through the information system.

2 Theoretical Background and Hypothesis Development

The questioning of the link between entrepreneurship and innovation through the information system is positioned by treating three essential components that are entrepreneurship, innovation and the information system. The study uses several theoretical fields such as resource-based theory (Roy 2010), the theory of organizational learning (Kim 1993; Leroy and Ramanantsoa 1997) the theory of knowledge

Table 1 The paradigms of entrepreneurship

Paradigms	Authors	Principles	Interests
The business opportunity	Shane and Venkataraman (2000)	Identify and exploit opportunities.	Detection, evaluation and exploitation of sources of opportunities and individuals who discovers these opportunities.
The creation of an organization	Gartner (1990)	Create an organization by one or many persons.	Researchers are pushing the paradigm of the organization creation to the strategic organization development and even the transformation of business (Puhakka 2010).
Value creation	Bruyat and Julien (2001)	Create individual economic or social value.	The growth.
Innovation	Druker (1985) and Julien and Marchesnay (1996)	Critical importance of innovation in the definition of entrepreneurship.	The different forms of innovation.

Source: Based on Janssen (2009)

creation (Nonaka and Konno 1998), the contingency theory (Boyer and Freyssenet 2000) the theory of evolution (Schumpeter and Perroux 2008). The tangle of several theories gives a rich mosaic of well-established concepts studied.

2.1 Entrepreneurial Orientation

The heterogeneity of the entrepreneurship field has not stopped researching classification attempts paradigms (Fayolle and Verstraete 2005). The distinction is made between four primary paradigms and which are summarized in Table 1.

Note that dominance is attributed to the search for a type or an ideal that leads to performance (Randerson and Fayolle 2010). The concept of entrepreneurial orientation was introduced by Miller (1983) defending the importance of the leader personality and his leadership in the organization. Leaders have an indispensable role on taking the organization to the achievement of performance. It is defined as strategic direction giving a specific aspect decisions and practices (Lumpkin and Dess 1996). The (EO) represents the processes, practices, and activities related to decision making that leads to organizational entrepreneurship (Covin and Slevin 1989). It is the ability of the organization to be leaders technologically, and its propensity to be proactive (Covin and Slevin 1991; Zahra and Covin 1995). It evokes the strength to pursue the opportunities and initiate innovations (Randerson and Fayolle 2010).

In the literature, five dimensions are attributed to the entrepreneurial orientation are the innovativeness, proactivity, risk taking, aggression towards the competition and autonomy (Miller 1983; Lumpkin and Dess 2001). The innovativeness

represents the tendency to engage and support a novelty (Lumpkin and Dess 1996). Risk-taking indicates the determination to use resources in strategies or uncertain projects (Zahra and Covin 1995). Proactivity is a replica of a business in attractive market opportunities (Lumpkin and Dess 1996). Competitive aggressiveness implies the willingness to retract instantly and eagerly competitors (Lumpkin and Dess 1996). Autonomy is the ability to make self-management measures in monitoring the market opportunities (Lumpkin and Dess 1996).

2.2 Innovation

The analysis of key inputs on innovation shows that research has overridden the macroeconomic towards research-oriented company (Bhupatiraju et al. 2012). Schumpeter (1936) explains innovation as economic activity that changes the production function. They are driving developments. Crozier (1970) says innovation is triggered within an organization following a crisis. It reflects the choice of actors. This requires interventions on men and on organizational structures to introduce novelty into the culture of the company to act with the system. This requires "a relational, institutional breakdown, no mutual adjustment but initiatives and human leadership, learning processes necessary to the individual players responsibility (Crozier and Friedberg 1977). It reflects a situation in which a company manages to boost its sector to influence the structure and to convert the features to its privilege; it is a strategic intent, entrepreneurial ambition, a will to build the future (Roy 2010). Innovation has a new connotation. It is obtained by reversing an established arrangement and taking financial risks, rejection or indifference. It is synonymous with originality (Barreyre 1980). Thus innovation can be through the creation of a product, service or process (Tushman and Nadler 1986). Innovation can also implies the adoption of a new idea (Damanpour 1991). In any case, innovation must be evaluated in relation to the company where innovation is adopted (Johannessen et al. 2001). Innovation can also manifest itself in the market introduction of a novelty (Hermann et al. 2007). Therefore, it is the culmination of a whole construction process of trial and error, improvement to obtain an output (Corbel 2009). Several types of innovations have been made at past research. We have chosen to make a classification of innovation introduced by changing the intensity. The distinction is made between radical or significant innovation, and incremental or progressive innovation. Radical innovation is to break with the -clefs factors of environmental success in order to try to impose its own rules which create an imbalance in the market, resulting in this way a change of reference and mounted new competitors (Dumoulin and Simon 2005). The company is located in front of the obligation to change its field of activity and sometimes its trajectory and evolution. It is a creative destruction (Schumpeter 1936). According Pin et al. (2003), three approaches are being considered to make a break. The first is reactive, in which the firm develops a disruptive strategy to have the ability to survive in its environment. The second is a proactive approach that gives the company the

Table 2 New approaches to innovation

Theories	Authors	Contributions
Evolutionary theory	Schumpeter (1936), Nelson and Winter (1982)	The cognitive process is central to innovate and it is manifested through the routines and knowledge.
The resource-based theory	Barney (1991), Le Bars Anne (2001), Warnier (2003)	Companies can be distinguished by the possession of scarce resources which are sources of benefits competitive. Innovation results from a new combination of resources while preserving the business environment balance.
The competencies theory	Durand (2000)	Need for resources associated with cognitive processes in order to ensure coordination and interaction between the tangible resources (technology, equipment) and intangible resources (routines, knowledge, knowledge information)

possibility to change the environment in which it operates. The third is the synchronic harmonization of the two approaches. The firm adapts while possessing the ability to change the environment. The risk in this type of innovation is important as radical innovation requires significant investment and time.

Incremental innovations are continuous improvements of existing products or processes (Tarondeau 1994) by organizational learning, without requiring new doing-knowledge (Broustail and Fréry 1993). The risks of incremental innovation are limited. In the new approaches (resource based approaches, evolutionary theory, the competencies approaches) innovation is a set of combined resources (knowledge, skills, abilities) but also processes (Durand 2000). The main contributions are summarized in Table 2.

Routines are a knowledge acquired through repetitive actions, coordinating knowledge and individual skills (Coriat and Weinstein 1999) and the result of collective learning (Mack 1995). Knowledge is the source of distinction as they result from the unique history of each company (Karray-Driss 2001). The existence of a cognitive process will ensure organizational coordination (Durand 2000). These processes are manifested in the form of competences which are summarized in Table 3:

The literature review brings up, technology and management systems as key competence for company. The information systems are seen as a management tool for the conduct of the organization. They have several archetypes of use (Reix 2004). The information system is a source of competitive advantage (Ross et al. 1996). These systems leverage other intangible and complementary sources such as humans and business to acquire competitive advantages (Powell and Dent-Micallef 1997).

This idea was further developed in the theory of dynamic capabilities focusing on the firm provision to integrate, build and reconfigure its powers to deal with swift changes in the environment. Capacity is the work of an entrepreneurial desire to learn and cope with the changing environment and changing it (Tarondeau 1998). What would be the location of information systems as an object to be managed and a

Table 3 The business competences

Authors	Competences
Meyer and Utterback (1992)	Research and development Production and manufacturing Market
Barton (1992)	Learning and knowledge of employees Technological system Management system Value Company's system
Fowler et al. (2000)	Technological Market orientation Integrative
Spanos and Lioukas (2001)	Organizational Sale Techniques
Daneels (2002)	Technological Consumers
Wang et al. (2004)	Marketing Technological Integrative

management tool? Will we have the opportunity to squeeze between the entrepreneurial orientation and innovation?

2.3 The Information System

The information system is defined as a set of formal processes of capturing, treatment, storage and communication, based on technological tools, which provide support to transactional and decision making, as well as communication processes driven by corporate actors, individuals or groups of individuals in one or several organization (Kalika and Kefi 2004).

Thus, an information system has several dimensions:

- First an informational dimension. Indeed, the SI provides information to users. To be employable information must be translated into signals accessible to the senses, which leads to build an image of the real world (Kalika and Kefi 2004). This image or representation are the safe keepers of information, communication and the realization of models or concepts.
- Then the technological dimension of the information system representing the used tools such as the computer or software. These tools ensures the capture, transmission, storage, processing and retrieval of data in a communicable form (Reix 2004). The last dimension is an organizational dimension by facilitating the flow of work processes and providing more flexibility in the structure.

3 Proposed Conceptual Model

After review of the literature, the question then concerns the relationship between entrepreneurial orientation and innovation through the information system? To answer this question, we developed three key assumptions:

H_1 : Entrepreneurial orientation has a positive impact on the information system.

Information systems as new technology, new daily carry endings. They thus represent sources of opportunities ensuring the development of new activities (Janssen 2009). The contractor, going in search of opportunities, must enjoy. The use of technology reveals two main aspects that are the "artifact" aspect, also said hardware/software, and the "use" aspect, showing how to use the technology in the different situations they meet (Orlikowski 2000). From this, the establishment of an information system must be accompanied by a strong involvement of the entrepreneur must be in constant contact with his staff and should explain what is expected of them on the use and behavior to have vis-à-vis these newly introduced technologies in the organization (Haines and Petit 1997). However, contractor's behavior is influenced by, first of situational factors (current environment) and secondly, by intrinsic factors personalities and individual stories (Bartoli et al. 1989). Representations, designs and developed strategies will then be influenced. Similarly, users who receive more support from their supervisors to use the system are more likely to be more satisfied and use it in a wide field (Haines and Petit 1997). The entrepreneur must have the conviction and the necessary involvement to end to encourage and supervise its business members. Therefore, the communication within an organization and information systems, as new technology, bring daily new endings. They represent sources of opportunities ensuring the development of new activities (Janssen 2009). The entrepreneur, going in search of opportunities, must enjoy it. The use of technology reveals two main aspects that are the aspect "artifact", also said hardware/software, and the "use" aspect, showing how to use the technology in different situations encountered (Orlikowski 2000). From this, the establishment of a system information must be accompanied by a strong involvement of the entrepreneur, who must be in constant contact with his staff and who have to explain what is expected of them on the use and behavior to have vis-à-vis of these newly introduced technologies in the organization (Haines and Petit 1997). However, entrepreneur's behavior is influenced by, firstly, the situational factors (current environment) and secondly, by intrinsic factors like personalities and individual stories (Bartoli et al. 1989).

Representations, conceptions of each individual as well as the strategies developed will then be influenced. Similarly, users who receive more support from their supervisors to use the system are more likely to be more satisfied and use it in a wide field (Haines and Petit 1997). The entrepreneur must have the conviction and the necessary involvement to end to encourage and supervise its business members. Therefore, the communication within an organization becomes an imperative favoring the establishment of information systems (Flynn and Foster 1984). The

implementation of the information system becomes a project require the explicit approval of the entrepreneur (Powell and Dent-Micallef 1998). Entrepreneurial orientation also means taking risks facing the uncertainty. Indeed "Decisions marking the strategic situations have, by definition, a large degree of uncertainty, to the extent that the available information is either partial or too numerous, ambiguous, biased or impossible to obtain because it key to the future and must consider other (Puthod 1998). Identifying the informational utility allows decision makers to customize the information that will be their advantage, and so have appropriate information (Ammar 2003). The entrepreneur aim to develop information systems that are compatible with their activities and that facilitate their daily lives.

H_2 : The information system has a positive impact on innovation.

Two levels can be presented. The first level is located within the company. The information system facilitates communication and vertical/horizontal coordination (Fulk and De Sanctis 1995). This encourages collaboration and information sharing between the members of the organization. Different stakeholders can work at the same time, it is concurrent engineering, with interactions continue (Davidow and Malone 1992) which support the design of new products or the absorption of new procedures. Then, the information systems undertake a high correlation among workstations, greater communication collateral, less hierarchy, and greater flexibility in the ability to respond to market changes.

The second level is outside the company. In fact, the uncertainty related to the context of innovation requires anticipating customer needs and prediction of actions and reactions of competitors. Having the sources of information at the right time, effective treatment with appropriate tools and adequate transmission in the business can reduce uncertainty and encourage the development of innovation (Janssen 2009). Information systems then offer well-developed databases, which reduces the response time to market changes and the environment (Ammar 2003).

H_3 : The information system has a mediating role between the EO and innovation.

When the entrepreneur makes the decision to innovate, each step coincides with a particular need for certain types of information (Lebraty 2002). Thus, for the initiation phase of defining the problems or opportunities, it requires information to ensure the measurement and comparison of the company performance given the environment that influences its behavior. The design phase requires information that will enable a causal analysis of the situation determinants especially those over which the company has the ability to act. The selection phase uses information forecasts and estimates for assessing the consequences of each of feasible actions. The implementation phase requires, again, indicators and measuring performance achievements.

The Link between entrepreneurial orientation and innovation through information systems ensures the involvement of the organization members in the establishment process and innovation development. Information systems can be used as differentiation tools by providing strategic and organizational opportunities that did not exist before. Learning through the use of technology may result in cognitive evolution

facilitating strategic choices often depend on dynamic capabilities inherited from the past trajectory (Teece 1998).

4 Research Methodology

In the preliminary field work, a synthesis of knowledge on entrepreneurial orientation, innovation and the information system was carried out on the basis of the available literature. This synthesis has enlightened us on the fact that entrepreneurial orientation, innovation and the information system are broad concepts and difficult to view measured they acquire their specificity in the company or they develop. For this reason, we opted for an observatory study. But reliability in qualitative research depends on the researcher's ability to soak up the field of the study and to return it.

As a result, we were among the companies studied and we observed the actants in their relationship with information technology and in everyday life. Our presence in offices and workplaces has allowed us to see the entrepreneurs in their immediate environment, to see the style of communication with their staff; this was a mine of information and gave us access context. Our observation was made in two important steps through internships in the companies studied separated in time. In the second stage, data collection was made from a trilogy in the method; we conducted interviews, made observations and conducted a literature review (De La Ville 2000).

We can qualify our discussions as semi-structured guided. We conducted semi-structured interviews using an interview guide containing open questions related to the themes of our research and questions of the interview guide were put to the respondent (Roussel and Wacheux 2005). The document used is collected on the workplace but also through the Internet. This triangulation of different resorting to various means (observation, interviews, documentation) and aimed to enhance the reliability and internal validity of the results (Miles and Huberman 2003). We made an intra-site analysis to study each case in depth, and in its particular context. Then we proceed to go back and forth between the case and theoretical frameworks offering a comparison of the explanatory power of conceptual grids, to develop a critical approach and refine the theoretical sensitivity according to the observed results.

5 Results

The Tunisian economy is based on SMEs; the study examined two cases of SMEs working in the textile sector.

In the first observation period, the environments in which companies are obliged stewardship and associated experience daily the developments at the operation level. The information and business intelligence often go together and sometimes merge in search of corporate interests. They consist of the basic elements and essential

stimulants in decision making and implementation of various business activities. Entrepreneurs, personally, make periodic visits to customers and detect their impressions on products. Then Informal information is formed by rumors or discreet and unpublished news. It can postpone the closure of a business, the extension of another, the arrival of sophisticated and more productive equipment that we want to avoid propaganda. Once the information gathered, they will be sorted in order to identify useful information. This information will provide vital support to make decisions about how much to produce the quantities to stoker, products designs, markets to exploit price changes. In other words, information lights the ways to follow in the short term and the long term. This Approach may change at any time during the get new information that requires action or rapid response. In this context, the head of (E1) states that the size of the company makes its flexibility and rapid adaptation to its environment. They ask their opinion on new market trends and new models. With the information and business intelligence, the entrepreneurs- managers have acquired valuable experience that allows them to avoid past mistakes and to see more clearly in business. Both companies have no specialized service in information, but all members of the undertaking to integrate and intervene in the search for information. They become both sources and information officers. Such behavior assists all their actions and decisions. Two types of information are detected in both cases. Firstly the formal information that comes from suppliers of equipment and raw materials, sister organizations, the media.

Then, we have the informal information under rumors or discrete and unpublished news. They can postpone the closure of a business, the extension of another, the arrival of sophisticated and more productive equipment that we want to avoid propaganda. Once the information gathered, they will be sorted in order to identify useful information. This information will provide vital support to make decisions about how much to produce the quantities to stoker, products designs, markets to exploit price changes. In other words, the path to follow in the short and long term will be described. This Approach may change at any time during the get new information that requires action or rapid response. In this context, the head of (E1) states that the size of the company makes its flexibility and rapid adaptation to its environment.

In both cases the entrepreneurial orientation is provided by the founder-director. In the first case (E1), the leader conducts work planning while setting short-term and long-term goals. However, it should be noted that the plans are not rigid and are affected by several internal and external factors. For internal factors, it should be noted that the contractor and staff cooperate to ensure the prosperity of their undertaking. In this context, it is essential to stress the importance of the entrepreneur qualities. The latter is in contact with employees who are not only sources of information, but also innovative ideas for improving work flow and product flow. For external factors, the leader tries to have a realistic view of the future of his business. This vision is reflected in the direction to be taken using available information. The activity in (E1) revolves around the leader representing the Company's core. He plays the role of father ensuring that handles these workers in their travails and directs them to the right path.

In the case (E2), entrepreneurial orientation manifests itself daily. Planning for the long term is absent, which may be related to the market and the fashion phenomenon that changes with the seasons and changes with changing consumer tastes. These changes are imposed on employees who have to adapt without the need to give their opinions. Contact with the entrepreneur remains easy but there is a strong centralization of power at the level of management. The leader retained his role as a father giving advice and orders to its employees to direct. Innovations are incremental. They manifest their self's in response to the needs of demand.

The second period of observation is made after the revolution. Note that during this period many companies have suffered from the socio-economic instability that prevailed in the country. We looked at two cases studied previously. For (E2), there has been an increase in the size of the company and a change in the local; the activity also expands and found a passage in the script set to subcontracting. However, the leader claims the conditions of work, funding problems and the risk of losing customers subcontractors. It operates continuously innovations in the production process while claiming employee resistance.

According to the leader of (E2) radical innovations are not possible at least because of their high costs but also because of the lack of a model creation unit in its company. Innovation is done continuously in response to the environment. For (E1), contact with the officer was surprising us. Indeed, following the rapid changes those have affected the Tunisian market, the manager decided to stop its activity because the market is no longer profit-bringer.

That decision coincided with the appearance of the company of his son. Indeed, after the field investigation, it has been found that in this case, the contractor has made a technological breakthrough by selling the old machine and the purchase of new equipment for the new son-activity, a legal break by changing the company name and finally a commercial break by the change of the industry and the market target.

This observation has allowed us to open the insertion path of takeover entrepreneurship in the field of entrepreneurship (Boumedjaoud 2016). The transferor- father did enjoy the son- buyer of his experience and all his cognitive, physical and financial capacity to support the new business. In this sense, the research put the emphasis on the transferor and its ability to mourn his company (Bah 2009). A new company has newly born crawling with the past and pursuing new opportunities.

6 Conclusion

We can see that The EO leads to different types of innovation and this is through different perceptions and information systems. The father's support is indispensable in the development of his son's business. More questions can then be asked about the role of the intellectual and financial capital transfer in family businesses. It would be possible to see that: When we speak about EO and Innovation, the prospects have to be open to make a choice supporting a new development. The freedom of adjustment

of means, the satisfaction of the stakeholders and the viability of the company are the key components of a rigorous management and carrying a bearer of a fruitful future. A spark spouts out at the time of the contact between the company and its environment injecting a magic of rebirth for the company: "The rupture" which is essential keep the doors open to a rich future of promises.

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