

The role of entrepreneur and the internal environment of the organization on product innovation in SMEs. Case of Tunisian companies

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Abstract

Innovation is a crucial element for the company to maintain its competitiveness, but requires an enabling environment, specific resources and a particular organization to materialize. Despite the fact that innovation has attracted attention for many years among professional communities before academics, this phenomenon is experiencing some confusion in the literature causing ambiguities. We therefore tried harder to better understand innovation in Tunisian SMEs, by conducting an empirical study with a large sample. This empirical study shows that SMEs, despite having limited resources, use particular ways of doing things to stimulate product innovation. Among these ways of doing things, we will note the use of collaborations, contact with customers, the organization of management and the dissemination of information, the use of flexible equipment. Let's add to this the significant role that the entrepreneur plays. Moreover, contrary to what is found in the literature specific to large companies, the sums of money invested in R&D by SMEs are not significantly linked to their degree of innovation, while the formalization of these activities is.

Introduction

In the new global environment dominated by the acceleration of technological changes, increased customer requirements, the reduction of product life spans and a wider range of goods and services, innovation is seen as a key element in maintaining the competitiveness of companies (Chapman et al., 2001). Companies that are unable to change their ways of doing things and adjust their organization risk losing market share and their competitive position (Koufteros et al., 2002). This confirms the importance given to innovation, since it is considered a significant engine of economic growth and wealth creation.

Innovation is the equivalence of novelty, uncertainty and therefore, risk, requires a favorable environment to develop without putting at stake the survival of the company. For Schumpeter, innovation does not only lead to superior products/services, but it calls into question the competitive position of companies that refuse to progress and adapt to new ways of doing things (Vossen, 1998).

The analysis of innovation in order to know the success factors must be extended to the resources of the organization, its organizational development, its strategy, its working methods, its behavior, etc. Olson et al. (2001) abound in the same direction by suggesting that innovation is a multidisciplinary process that requires a certain coordination and intelligent management to become a success.

These studies show how the internal environment of the entity, its organizational mode and its business processes must be developed in a coherent way to stimulate innovation or ensure that it can develop effectively. We thus align with the comments of Landry and Amara (2002) which suggest that innovation no longer depends solely on the use of tangible factors such as financial resources and advanced technologies, but it increasingly depends on the way companies use intangible factors. These intangible factors concern how to mobilize knowledge associated with both internal factors and factors external to organizations. Internal factors concern the intellectual capital of firms, in particular the characteristics of the workforce, R&D activities, technological capital and various other contextual factors. As for external factors, they refer to the knowledge that comes from the network capital of companies, in particular the intensity of use of external sources of knowledge.

It is in this context that we will examine a sample of Tunisian SMEs to identify the factors specific to the entrepreneur and the internal environment of the company, stimulating their degree of innovation. Before identifying these factors, we presented the current state of the literature on this subject.

1. Innovation in SMEs:

Innovation research is currently in a state of relatively great confusion. Garcia and Calantone (2002), in an important synthesis work on innovation, criticized the researchers by paralleling the lack of rigor in the definitions used in their research and the relatively low level of knowledge until today on the study of this phenomenon which has been neglected in the last 65 years. They have identified, in the literature, 51 distinct measures of innovation on the development of new products, making it risky to compare the results of the studies and hindering the formulation of a general and global conceptual framework for continuing research in this field. They added that these different definitions can only hinder a good understanding of the phenomenon insofar as key factors that

were considered important by one author as encouraging innovation were used by another who used a different measure from this one, which led to incomparable results.

Among the most frequently used innovation measures, we find the R& D budget reserved for product development, the ownership of patents or trademarks, the rate of introduction on the market of new products for the company or new to the market, etc. The first indicators are not suitable for SMEs for the following reasons. First, the use of the budget devoted to R&D activities to measure the importance of innovation in SMEs can significantly underestimate their real rate of innovation. Indeed, SMEs do not always formally measure the amounts of money they devote to R&D. Moreover, their R&D processes are often diffuse and unorganized, while they can develop new products without these processes being structured. However, there is a more or less significant time gap between R&D activities and innovation as such, depending on its degree of novelty or radicalism. It is therefore difficult to correctly and unambiguously associate these two concepts. In addition, Audretsch (1995) suggested that not all R&D activities are aimed at the production of innovation, but they can be oriented towards the imitation of a new technology or its transfer to the company, or simply aim at increasing productivity and efficiency. Secondly, entrepreneurs often prefer not to patent their innovations for various reasons. On the one hand, deadlines or administrative requirements do not suit the reality of SMEs and, on the other hand, the obligations to request some strategic information on innovation can place the firm in a vulnerable situation against competitors with more resources. Finally, their innovations are often marginal and incremental, hence the difficulty of determining their origin and extent. In short, R&D activities, the resources allocated to them and the ownership of patents or trademarks do not make it possible to identify innovation as such, but certainly that there are elements of the process that can lead to innovation.

In this study, innovation will be considered from the point of view of the company, either from the percentage of the turnover of the last two years coming from new or modified products. As Freel (2000a,b) notes, this definition, which is more appropriate to the reality of SMEs, will allow us to focus on the process and organizational factors that can encourage the introduction of new or modified products on the market.

2. The variables stimulating innovation in SMEs: A developed conceptual framework

The internal environment of the company is identified by several authors as an important and significant catalyst for innovation activities. Innovation being considered to be the materialization of creativity, it can only emerge if the environment is stimulating and a possibility of chaotic situation does not disturb the company in a major way. We then need flexibility, motivation, participation and commitment from management and employees and an entrepreneur who is open, dedicated and who accepts the conditions of uncertainty in which his company can sometimes develop. Thus, innovation is also considered as a collective and not an individual process that will develop in a favorable environment and of which the entrepreneur is the prime contractor.

The entrepreneur

In the specific context of SMEs, the role of the entrepreneur on the development of innovation must be considered. Karlsson and Olsson (1998) announced that the entrepreneur's interest in innovation, his ability to generate new ideas and his propensity to encourage intrapreneurship are key elements to maintain a creative climate conducive to the development of innovation. Heunks (1998) has formulated similar conclusions and he has also noticed that entrepreneurs with a certain level of creativity and innovation are people who have a high level of education, extroverts, open to

challenges, oriented towards independence and risk takers. Moreover, the founding entrepreneur can be considered as a driving force for innovation because the creation of the firm was done while following an approach analogous to that of developing a new product.

In a statistical study, St-Pierre et al., (2003) affirmed the significant influence of the entrepreneur on the orientations of the organization and on the business model to which he adheres, starting from the definition of his strategic objectives, his desire for growth and his openness to the outside world. In this research, innovative organizations or organizations strongly oriented towards dynamic business models are led by entrepreneurs who are more educated, open and who show a strong interest in R&D. It is therefore essential that the study of innovation in SMEs cannot be done without taking into account the entrepreneur, his vision, his objectives, etc.

The company's resources

The size of the company

Because they benefit from significant market power and economies of scale, large entities could be more capable of innovating than smaller ones. This confirmation was inspired by the work of Schumpeter in the middle of the last century, considered resources at the level of their availability, their access and the control that their possession provided on the environment, as stimulating innovation (Vossen, 1998). The market power allows companies to minimize the uncertainty linked to the R&D process thus motivating larger investments, while the large size makes it possible to cover the fixed costs linked to R&D activities and to share the risk of the various projects throughout their portfolio, thus alleviating the pressures on the rest of the company (Vossen, 1998; Van Dijk et al., 1997).

On the contrary, unstable markets and the reduction in the lifespan of products that have been known for several years should reduce the interest in mass production dominated by large companies and give an opportunity to more specialized production, in small quantities which requires more flexibility on the part of producers, as well as greater proximity to the market, which would be the case of smaller companies (Menkveld and Thurik, 1999; Roper, 1997). Van Dijk et al. (1997) add to this that the youngest companies are more likely to present these characteristics of adaptability, efficiency and flexibility, which tend to fade as they confirm their position on the market.

Financial resources

Because of the long recovery times and the risk of activities of an intangible nature linked to uncertainty, innovation requires the availability of financial resources that are not easily accessible to small businesses. These financial needs will evolve at the rate of innovation, to cover the R&D stages where technological uncertainty is quite intense, until marketing where we will have to face greater commercial uncertainty. However, the financial needs of this last phase are estimated at 20 times the resources initially invested in R&D (Freel, 2000b), which few SMEs can afford unless their clientele consists of a few captive customers and they have no mass marketing to do, or they have developed collaborations with different organizations (cost and risk sharing).

The financial markets are not ready to finance the innovation activities of SMEs, because they do not have the skills to determine its real risk level or because they poorly understand its development process (Beaudoin and St-Pierre, 1999). Referring to this inability of the markets to provide

financing, the past profitability of organizations or their financing capacities from their internal resources could be a factor stimulating investment in R&D or innovation (Van Dijk et al., 1997). Self-financing then becomes the main source of innovation financing for SMEs and this depends on the historical performance of the firm.

Human resources

Innovation develops in a particular environment, where communication is fluid, knowledge is disseminated and skills are present (Karlsson and Olsson, 1998). The first stages of innovation development require special knowledge and skills that can be the key to subsequent developments. We have thought in particular of hiring scientific staff or engineers who are qualified to develop new products or modify the ways of doing business (Karlsson and Olsson, 1998). The limited ability of SMEs to attract qualified personnel has been announced as a hindrance to achieving a significant rate of innovation, while large companies have sufficient financial resources to attract such employees and offer them more interesting career development opportunities. On the other hand, a small company can lead to a greater appreciation of talent and a better recognition of individual achievements, unlike a large company which is often more depersonalized. An adequate remuneration policy and a better quality of life will also allow the SME to compete with the large company in terms of hiring qualified personnel. Moreover, the absence of this type of staff in the case of SMEs could be compensated for by tailor-made training activities adapted to the needs of innovation, or special collaborations with research centers (Tether, 2002).

When the product is completed and it needs to be put on the market, marketing expertise will become necessary. Contact with the market and knowledge of the specific needs of customers will be able to promote the success of the introduction of new products (LaBahn et al., 1996). The earlier these contacts are made in the innovation process, the higher the probability of success will be (Tether, 2002). Salavou (2012) confirms the positive relationship between innovation and performance for companies that are in contact with their market and can define the needs of their customers. Oakey et al. (cited in Karlsson and Olsson, 1998) recall that the sales force constitutes one of the weak points of a good number of small and medium-sized enterprises. However, this problem will be less critical for companies that work as subcontractors or in close relationships with some important customers. In this case, a small company that has developed commercial relationships with a few large customers then has a greater incentive to allocate the necessary resources to innovation in order to satisfy their quality, cost and product development requirements (St-Pierre and Raymond, 2002) or simply in order to maintain or improve its position in the supply chain (Hanna and Walsh, 2002).

The organization of the company and its mode of work

Innovation is an action that develops in an uncertain environment, depending on the degree of novelty, which involves the various expertise of the various departments of the company, and where information remains a significant essential factor. Uncertainty is characterized by the fact that the information that circulates in such a context can be interpreted in various ways by different people or may involve confusion. Reliable sources of information, efficient processing with appropriate tools and wide dissemination in the company could make it possible to reduce uncertainty, avoid equivocal interpretations and promote the development of innovation (Koufteros et al., 2002). Song et al. (cited in Koufteros et al., 2002) stressed the importance of obtaining rich, relevant, accurate and timely information, in a context of uncertainty. Monitoring activities and market studies will be important to justify developments and facilitate decision-making, while adequate technological

tools will be able to increase the efficiency of the use of this information.

Belonging to networks and the development of collaborations

As mentioned earlier, SMEs can raise the problem of limited resources by working in collaboration with other companies in order to develop or ensure the success of an innovation. Karlsson and Olsson (1998) summarize the main reasons why companies could develop such collaborations: (i) to obtain a better market knowledge, (ii) to share the risks, which is important especially in radical innovations where the degree of uncertainty is relatively high, (iii) to share the costs, (iv) to complete the necessary range of expertise, (v) to serve a relatively large international market and (vi) to develop industrial standards. Overall, these collaborations aim to reduce uncertainty and benefit from economies of scale or diversification. In the case of SMEs, the first objective is to alleviate the uncertainty factor that can affect its survival since their volume and type of activities do not allow substantial savings.

Tether (2002) emphasizes that collaborations between the organization and its customers have the advantage of minimizing commercial uncertainty, through a better knowledge of their needs and thus, a greater probability that they accept innovation. Likewise, the innovative company can obtain benefits in collaborations with its suppliers for R&D and production activities, which will thus be able to offer products that meet their needs.

In addition, the handicaps for SMEs to hire scientific or technical resources in order to develop innovative solutions may be mitigated by collaborations with research centers, universities or government agencies. On the other hand, large companies would be more likely than small ones to develop such collaborations because they have more resources to assume them financially and they are more sensitive to the benefits they can bring them (Tether, 2002).

Research and development activities

For a long time associated with a measure of innovation, formal research and development activities may not be essential for innovation in SMEs. On the other hand, R&D can be useful both for product development and for maintaining or increasing the company's skills in the processing and exploitation of external information (Karlsson and Olsson, 1998). The existence of R&D activities makes it possible to create a climate conducive to questioning, favoring the flexibility of companies, their abilities to integrate new concepts and their adaptability to any modification of market conditions (Freel, 2000b). In the same vein, Brouwer and Kleinknecht (1996) stressed that the experience and knowledge accumulated in past R&D activities, as well as the permanence of these, in contrast to their realization on a sporadic basis, should favor innovation in companies. Roper and Love (2002) confirm that the presence of personnel dedicated to R& D contributes to the creativity of the company, stimulates exchanges with the outside world and increases the use of rich information sources.

In conclusion, and based on the results found in the literature, we propose the following model that we will test from a sample of companies, where certain characteristics of the entrepreneur as well as his strategy, resources and the organization of the company should influence the degree of innovation of SMEs.

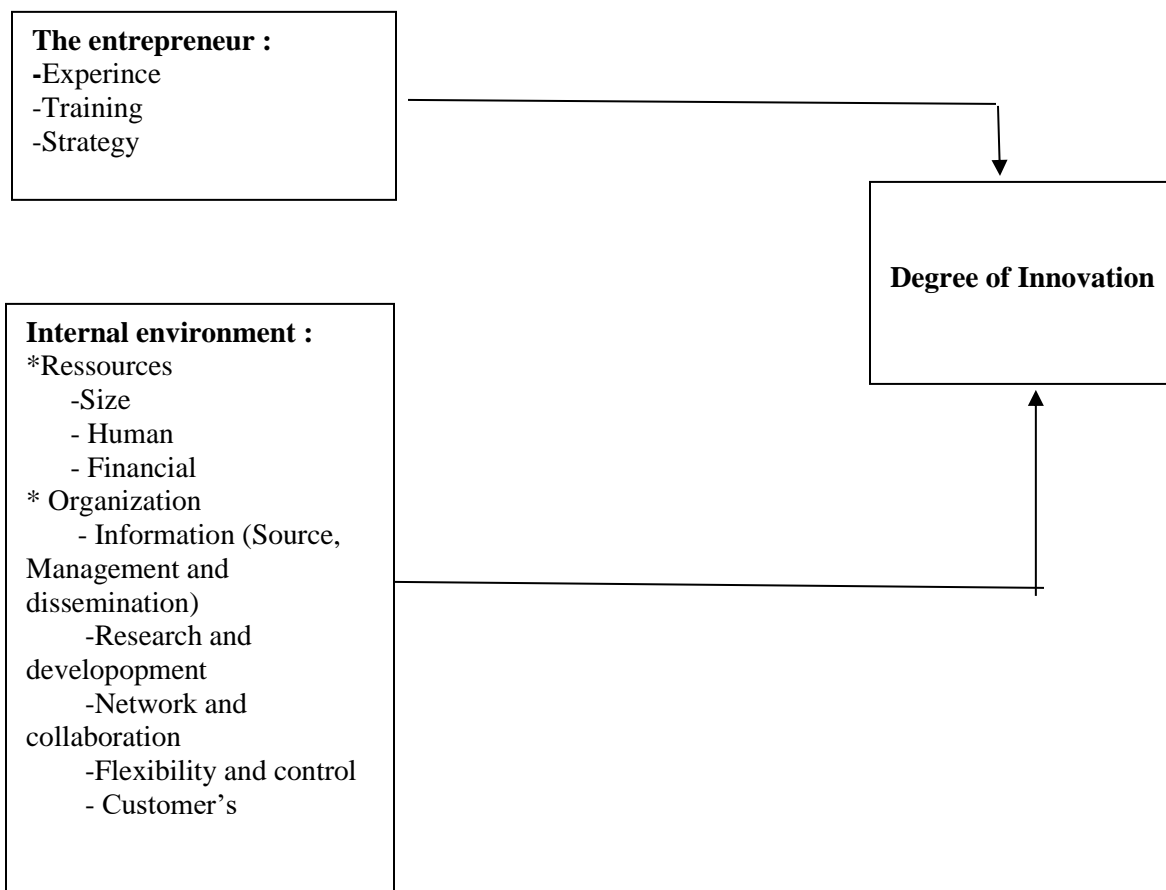


Figure 1: The Relationship between the entrepreneur, the internal environment of SMEs and their level of innovation

In this study, we will not focus on the influence of the external environment on the company or the role of the sector on innovation, as Roper and Love (2002) have suggested. These authors confirmed that the decision to embark on R& D and innovation activities is taken by the company because it will assume all the disadvantages and the benefits of such an activity on its own. Our research will therefore consist in evaluating the influence of the entrepreneur and the internal environment of the company on his degree of innovation.

1. Description of the sample and empirical results

To verify our research model, we used the API database and we chose 250 SMEs employing less than 50 employees operating throughout Tunisia. We have distributed a questionnaire containing confidential information but on the other hand we will provide a diagnosis on their general situation. We received 140 completed questionnaires, so a response rate of 56%. The SAS software will be used for statistical tests. On the unified level, median difference tests have been used for numerical variables (continuous, real or ratios) while Chi-squared tests have been used for discrete or categorical variables.

We have observed that the companies that have provided the information on their degree

of innovation have reserved a budget that varies between 0 and 11% of turnover. In Tunisian SMEs, radical innovations leading to new products are less frequent than marginal innovations leading to modified products, which is why the degree of innovation will be calculated from the combination of these two types of novelties indiscriminately. The median value of sales from new products in our sample is 5%, while this increases to 25% when modified products are added. In the latter case, the products may have been modified from the company's R&D activities, according to customer requirements or following the purchase of a new technology.

First of all, we wanted to check whether highly innovative companies differ from weakly innovative companies on a set of variables taking up one by one the concepts set out in the conceptual framework. For this, we separated the sample into three groups according to their degree of innovation. Weakly innovative companies are SMEs that have made less than 10% of their sales from new/modified products in the last two years, while this threshold has been set at 20% for highly innovative ones. Companies falling between these two groups were removed from the sample for the uni variegated tests, in order to avoid difficulties in interpreting the results of organizations with more or less stable behaviors; they will be reintroduced into the sample for the multi variegated analysis.

Characteristics of the entrepreneur and the degree of innovation of the SMEs (1)

Our conceptual framework requires that the characteristics of the entrepreneur are linked to the degree of innovation, given its influence on the internal environment of the organization. Table 1 confirms these results there we have noticed that the majority of highly innovative companies are led by their founder, who more often shows an interest in R&D activities and having higher growth objectives than others. What is remarkable is that for innovative industrial companies, the founder often has a technical background, therefore oriented towards production, so it should be noted that he is younger, more educated, less experienced and more open to the arrival of external shareholders than his colleague at the head of a less innovative company. We could therefore describe him as modern, pro-active and favoring the growth of his company.

1 - For a lack of space, we have presented only the results considered the most interesting with regard to the literature

Table1: Innovation characteristics of the entrepreneur and degree of SME

	Weakly innovative (N= 59)	Highly innovative (N= 79)	Statistical test
Age of entrepreneur	55	42	2,15
Degree of education (1 = weak... 4 = Pupil)	3,0	4,0	0,14
% of entrepreneurs with technical training	42	59	3,74***
% of entrepreneurs showing an interest in R&D	64	84	6,42****
Number of years of experience in the sector	19	11	0,33
% of entrepreneurs who participated in the foundation of the company	49	73	5,56***
% of entrepreneurs open to the arrival of external shareholders	24	73	1,12
Desired growth rate in the next two years	67%	86%	7,13****

****<0,001;***<0,01;**<0,05;*<0,10

Organizational characteristics and degree of innovation of SMEs

In Table 2 we show several notable differences between weakly and strongly innovative companies. We note that the latter, just as the literature suggests, are younger but also more indebted. This last result may suggest a certain reluctance on the part of the financial partners, as discussed above, to finance innovation in SMEs, even if it takes place in a structured and well-organized company and which uses advanced management and production practices, as the other results in the table have shown.

These companies overcome the difficulties of hiring qualified personnel through human resource management practices oriented towards selection and retention (tailor-made training and profit sharing program) and consult with their customers / suppliers and collaborate with their customers / contractors for product development and thus increase the chances of acceptance. However, we will note that the production of highly innovative companies must more often meet the standards of an important customer, thus confirming the role that this actor can play on innovation in SMEs, significantly minimizing the risk of commercial uncertainty. Finally, these companies are more engaged in more formalized R & D activities (presence of a manager and dedicated staff) and have computer-assisted design and manufacturing systems that will allow quick corrections in case of problems.

Table 2: The characteristics of the company and its degree of innovation

	Weakly innovative (N= 50)	Highly innovative (N= 79)	Statistical Test
Company age	23	18	4,01***
Number of employees	46	44	0,07
Interest bearing debt ratio	18%	31%	4,76*****
Annual training budget as a % of the payroll	0,15	0,36	3,92**
% of companies using tailor-made training	21	83	5,93***
% of companies with a recruitment policy	29	62	4,26***
% of companies with a profit-sharing program	5	32	7,82*****
% of companies with a sales/marketing manager	21	77	0,94
Number of representatives / total number of employees	5,7	6,7	0,03
% of companies that consult customers/suppliers for product/market development	31	84	5,39***
% of companies with an internal communication network	28	71	4,37***
% of companies with an external communication network	41	91	9,13*****
Frequency of conducting market research for current customers(1=Low...5 =High)	1,31	2,81	1,12
Frequency of realising market research for potential customers(1=Low...5=High)	1,53	2,74	3,48
Internal dissemination of information concerning the evolution of the clientele (1=Low ...4=High)	2,43	3,16	4,78
Internal dissemination of information concerning the evolution of competition(1=Low...4 =High)	2,63	2,71	4,44
% of sales dedicated to the R&D budget products	0,00	1,05	13,12*****
% of companies with an R&D manager	0,05	65	9,26*****
% of staff dedicated to R&D activities	0,21	5,49	5,33*****
% of companies with R&D collaborations with customers/contractors	8	37	9,74*****
% of companies with R&D collaborations with suppliers	15	24	1,62
% of companies with R&D collaborations with superior education institutions	0	18	5,85**
% of companies using computer aided design	18	65	10,18*****
% of companies using computer aided manufacturing	11	42	12,79*****
% of companies using computer aided design/manufacturing	09	38	6,39*****
% of companies whose production must meet the standards of an important customer	49	75	9,53*****

*****<0,001;***<0,01;**<0,05;*<0,10

These unified statistical tests allow us to have a better idea of the sample, but do not inform us so much about the phenomenon of innovation as a whole. To do this, we tested our model using multiple linear regressions, where certain variables had to be corrected to comply with the assumptions necessary for the use of the least squares method. For a space defect, we present only some of the results obtained and which can be analyzed and discussed according to the literature.

Influence of the entrepreneur and the organization of the company on its degree of innovation

The first model was built on the basis of the significant results obtained in the uni varied tests. It takes up all the variables of the conceptual framework, which makes it possible to explain 21.39% of the variance in the degree of innovation in Tunisian SMEs. The presence of the founder at the head of the entity is an important stimulus for innovation among SMEs, as shown by the positive sign of the regression coefficient as well as its high significance. Formal R&D activities, measured by the presence of a manager and the percentage of employees who are active in them, have played a significant role, this is in accordance with the work of Brouwer and Kleinknecht (1996). The external communication network that allows the company to be connected to customer needs, as well as the fact of being linked to a client who demands its quality standards or products or services are also significant determinants of product innovation. Finally, the design and manufacturing systems will allow the company to optimize its production; it is an agreement between flexibility and control as discussed previously. Automatic systems will make it possible to design and manufacture products efficiently by exchanging information with customers, and in parallel to quickly correct errors.

The second model was developed by the use of a regression (stepwise) which makes it possible to maintain only the most significant determinants at a tolerance threshold of 10%, confirming the role of the previous variables to which is added the presence of an internal communication network intended to share information effectively in the various departments of the organization. It should also be noted that the addition of this variable reduces the degree of significance in % of personnel dedicated to R&D activities.

Referring to the initial model, we added the option of maximizing the adjusted R², which made it possible to define the third model where we noticed minimal differences by comparing it to the first two. It should be noted that the R&D budget for products is not significantly linked to innovation, unlike the results of the various uni tests, the role of this variable having probably been vague compared to those that characterize formalized R&D (presence of a manager and involvement of staff), which are both significant.

Table 3: Relationships between the degree of innovation of SMEs, the characteristics of the entrepreneur and the organization of the company (N = 140)

	Model 1	Model 2	Model 3	Model 4
ordered at the origin	-39,965	-11,097	-34,246**	-9,717
Founding director	14,438***	14,581***	14,046***	12,860**
Executive's growth objectives	4,682			
Company age	-0,807			-6,973
Interes bearing debt ratio	0,059			
Presence of an R&D manager	10,856**	10,264***	11,523***	10,708**
% of staff dedicated to R&D activities	10,549**	6,363**	10,272**	5,484*
Profit sharing program	1,814			
Number of representatives/number of employees				5,766**
Frequency of conducting market research with current customers			2,740	
External communication network	12,840**	14,264**	14,169**	10,849
Internal communication network	6,939	8,077*	7,202	10,116**
Internal dissemination of information regarding the evolution of the customer's				4,531*
R&D budget for products			16,963	
R&D collaborations with clients/donors Of orders	1,491			
Quality standard of an important customer	10,504**	10,151**	10,260**	13,049***
Computer aided design				-8,931
Computer aided manufacturing				13,943*
Computer assisted design and manufacturing	13,164**	14,059**	14,397**	14,652*
AdjustedR ²	21,39	24,41	25,18	31,38
Fisher	3,67****	7,42****	6,23****	5,36****

**** <0,001;***<0,01;**<0,05;*<0,10

Conclusion

In this empirical study, we tried to examine the behavior of SMEs in terms of innovation, by linking their organizational and entrepreneurial characteristics to their rate of introduction of new or modified products on the market. Our results confirm that SMEs innovate and that they use different strategies to fill the alleged lack of various resources that sometimes afflict them. Internal and external communication networks, links with customers, collaborations with various partners, a flexible and efficient production system and an innovation-friendly entrepreneur have significant effects on the degree of innovation.

This research, which we consider original, is exploratory in nature, and it will need to be deepened and repeated with other samples to lead to a better understanding of the behavior of innovative SMEs. It certainly opens up interesting avenues because it highlights the importance of analyzing, beyond the resources available in the company, its mode of operation and its work organization. Moreover, Tunisian SMEs thus confirm their ability to innovate even if they do not benefit from enough resources than their large counterparts.

Conflicts of Interest

The author has disclosed no conflicts of interest.

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