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The Report on Innovation in Manufacturing Enterprises in Eastern Central Tunisia: A Comparison between the Profiles of Female and Male Entrepreneurs

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Abstract: Through this article, we try to see if companies run by female entrepreneurs in the Central East region of Tunisia and who practice in the manufacturing sector are different from those runs by male entrepreneurs. especially in terms of behavior towards innovation. This work has allowed us to say that the companies that innovate the most are generally supported by educated entrepreneurs, who are more likely to collaborate, to decentralize decision-making power, to consult and who set themselves in addition to development objectives. more consequent (Koufteros, Vonderembse and Doll, 2002). (Karlsson and Olsson, 1998). Through this article, we try to see if companies run by female entrepreneurs in the Central East region of Tunisia and who practice in the manufacturing sector are different from those runs by male entrepreneurs. especially in terms of behavior towards innovation. A model has been put in place which states that innovation in the case of SMEs can be captured by the characteristics of the firm and the entrepreneur with significant differences in behavior between the two sexes. Women entrepreneurs in the region are younger, more educated but less experienced, and are creating smaller businesses than their male counterparts. Male entrepreneurs tend to less decentralize and collaborate, but they have more experience and financial, material, and human resources to innovate.

Keywords: innovation, entrepreneur, Eastern central Tunisia.

INTRODUCTION

The relationship to innovation is dependent on a set of factors that affect the specificities of the company and those of its leaders. This paper aims to understand the differences that can exist between the profile of male and female entrepreneurs, taking as a practical case the manufacturing companies of the Central East region of Tunisia. we notice here the lack of research carried out in Tunisia and which dealt with this subject.

THE THEORETICAL CONTEXT

Definition of innovation

Innovation is a complex and multidimensional concept (products and processes for example), which makes it difficult to give it a universal definition. Its importance is vital for businesses, as the Conference Board of Canada pointed out in 2004. Indeed, 'innovative activities have tangible and positive effects on corporate performance. They provide better goods and services, provide competitive advantages, improve profitability, maximize productivity, and thereby increase market share.

Schumpeter, (1934, cited in Julien, 2005) presents innovation as' the renewed combination of ideas or existing elements that allows the organization that makes it to stand out in the market while creating new routines at home. which will be transformed again if the innovation is renewed '. At this level, emphasis is placed on the renewal of products and processes.

The Oslo Manual, (2005) presents a broader definition and will be retained in this article. 'An innovation is the implementation of a new or substantially improved product (good or service) or process, a new method of marketing or a new organizational method in the business practices, the organization of the workplace or external relations'. In summary, broader definitions of this concept focus on improving or creating new products and processes, while recent ones emphasize value creation (O'Regan, *et al*., 2006).

In the same vein, Beaudoin and St-Pierre, (1999) present a typology of innovation: innovation of processes, equipment or products. We also speak of a radical innovation (of rupture), systemic or incremental. Radical innovation characterizes the entry into the market of a radically new product or service, while the systemic one seeks to improve the intrinsic specificities of the product or service. Finally, incremental innovation presents a minor change in the product or service. Innovation is a source of social and economic wealth since it stimulates the creation of better paid jobs with more advantageous working conditions (St-Pierre, 2004).

The specificities of innovative entrepreneurs

The entrepreneur, by virtue of his position, represents a facilitating agent in the success of a strategy oriented towards innovation. Its impact at this level is all the more important as its commitment is total, it is open to new ideas, creative and not risk averse.

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Pierre and Mathieu, (2003) argue that entrepreneurs in the manufacturing sector with a high degree of innovation often have a fairly formal level of education with long experience in the field, are founders of their own businesses and have a particular interest in research and development. Likewise, the most innovative entrepreneurs[1] set themselves a higher growth rate than others and agree to share control of their business by most often supporting a board of directors.

The characteristics of innovative companies

These companies are generally younger and more indebted, given the weight of investments in equipment and research and development at this level, than non-innovative ones. Similarly, a commercial and technological intelligence system based on consultation and the use of internal and external sources of information to the organization which facilitates innovation (Koufteros, Vonderembse and Doll, 2002).

Collaboration is also important at this level and affects all stakeholders throughout the company's value chain (suppliers, customers, research and development, and companies in the sector). It allows risk sharing, cost sharing, market alliance, skills development, and networks of expertise (Karlsson and Olsson, 1998).

Undertaking: what specificities?

The number of women entrepreneurs has been steadily increasing in recent decades according to the Women's Entrepreneurship Advisory Group (2000). However, these companies are generally small. Female entrepreneurs are younger (Carrington, 2004), with equivalent education or higher education than their male counterparts but with less experience than their male counterparts. In addition, work-life balance and professional networks are important factors in their entrepreneurial success.

The creation of a business for a woman is motivated by a need for fulfillment, recognition and independence (Minniti, *et al*., 2006). Robichaud, *et al*., (2005), argue that male entrepreneurs and women do not express the same motivations. The latter place as much importance on sociological as on economic objectives, whereas men take more into account the economic objectives.

Finally, according to Bruni, *et al*., (2004), men present a transactional management style (the reward is dependent on the success of personal goals) while women practice a more transformational and decentralized style (converging individual goals towards a common goal).

Conceptual framework and description of the sample

Entrepreneurial behaviors are diverse and multiple. This diversity can originate from cultural, socio-demographic, and personal factors. In management, it would also be useful and instructive to try to study the differences that may exist in the entrepreneurial profiles of women and men, considering their relationship with innovation.

Through this article, we try to see if companies run by female entrepreneurs in the Central East region of Tunisia and who practice in the manufacturing sector[2] are different from those runs by male entrepreneurs. especially in terms of behavior towards innovation.

A model has been put in place which states that innovation in the case of SMEs can be captured by the characteristics of the firm and the entrepreneur with significant differences in behavior between the two sexes.

The choice of the Center-Est comes from its importance as economic and demographic pole first in Tunisia. Indeed, this region has 2 546 082 inhabitants in 2014, or 23.5% of the total population of Tunisia (the first among the 7 regions) with a number of assets of 959 200, or 24.3% of total assets in Tunisia and a number of private enterprises amounting to 154,331 (24.6% of Tunisian companies)[3]. It is assumed that there are differences in the profiles of entrepreneurs in this region of Tunisia whether they are men or women at the level of the development objectives (hypothesis 1) (export); management style (decentralized or not, advisory or not) (hypothesis 2); the use of research and development and collaborative activities (hypothesis 3) and All this in relation to innovation (hypothesis 4). The research model used is based on key factors of

[1] Freel, 2005; Hausman,2005; Johne, 1999; St-Pierre, 2002; St-Pierre, 2004 ; St-Pierre et Mathieu, 2003, 2006 ; Vjas, 2005

[2] The manufacturing sector is made up of textile, clothing and leather (ITHC), mechanical and electrical industry (IME), chemical industry (ICH), agricultural and food industries (IAA), various industries (ID), Building Materials, Ceramics and Glass Industries (IMCCV)

[3] According to the results of the 2014 General Census of Population and Housing (National Institute of Statistics 2014)

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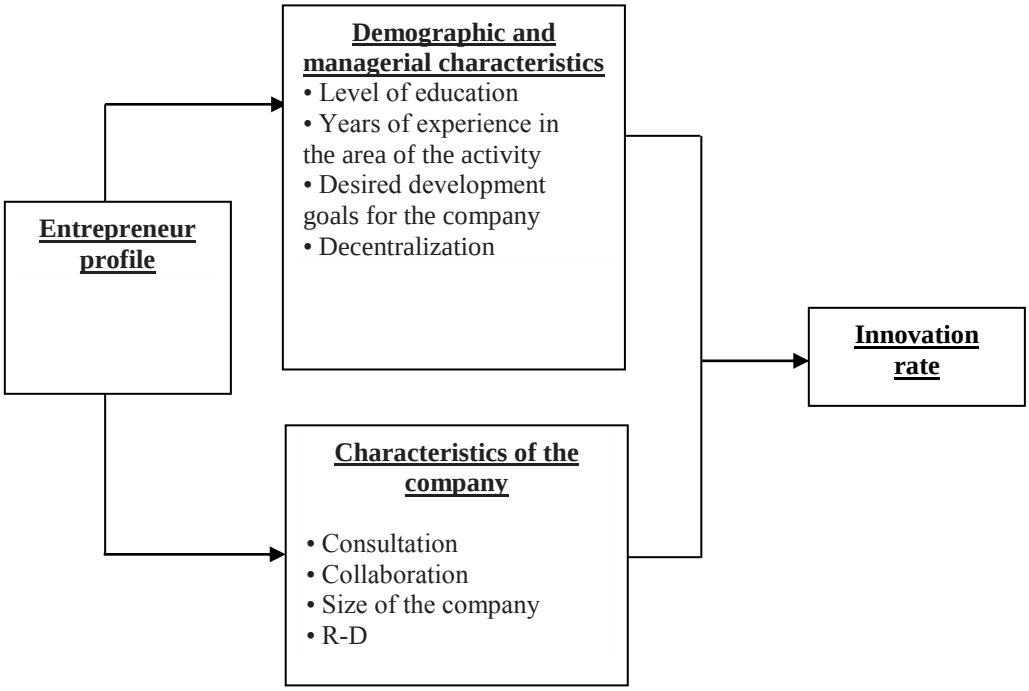
innovation, such as the characteristics of the most innovative entrepreneurs and their companies.

CONCEPTUAL FRAMEWORK



METHODOLOGY

The study population consists of 100 companies distributed proportionally between the two sexes, considering the stage of development, the size and the sector of activity.

The original industrial enterprise directory is made up of a total of 2527 companies (employing 10 or more people) of which 25% are women-led[4]. This region is home to the second largest population of industrial enterprises in Tunisia after the Greater Tunis region[5].

The sample of the survey is representative of the composition of firms working in the manufacturing sector of Central East Tunisia. Two parameters were chosen to ensure its representativeness: the percentage of companies studied by the sex of the entrepreneur and the size of the enterprises (measured by the number of employees). Among the manufacturing industrial firms in the sample, 25 are female-led and 75 are men-sized and sector-specific. Table 1 presents the characteristics of our sample.

Table 1: Characteristics of the sample

	Average	
	Man	**Woman**
Firms		
Size (number of employees	15,5	11,6
Age (number of years after creation)	17,8	14,6
Entrepreneurs		
Years of experience	20, 3	10,7
Age	50,4	42, 3

Source: personal work

First, there is a predominance of small and medium-sized enterprises in this sample. Secondly, male-owned firms are larger in size and older than women-led enterprises. Similarly, they have less experience and are generally younger (mostly in their forties).

Table 2: Education level of entrepreneurs

	Women	**Man**
Primary	11%	20%
High school	25%	30%
University	64%	50%

Source: personal work

According to Table 2, just over half of entrepreneurs have a university level with a significant advantage for women entrepreneurs. This can be explained by the fact that men prefer to take their time to gain experience before

[4] According to the data of the National Chamber of Women CEOs
[5] Industry Promotion Agency (2014): directory of Tunisian companies Between 10 and 20 as small, between 20 and 50 as medium, and more than 50 as large companies

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thinking of starting their own businesses, while women who enter the labor market later prefer to get more degrees. before starting the creation of their companies.

Definition of variables

After presenting the sample, we move on to defining the variables that make up the conceptual framework. We were interested in our questionnaire at:

Educational level: here we speak of a level of education primary, secondary, or university).

Years of experience: these are the years of experience accumulated before and after the creation of the company.

Desired development objectives: we speak of totally or partially exporting companies.

Decentralization: the more the company grows the more one needs to create new departments and thus delegate the power of decision-making. We used a yes or no question (yes = 1 and no = 0) for each department created and then a total score is calculated that can vary from 0 to 5 (centralization = 0 and decentralization = 5).

Consultation: Consulting multiple sources of information, such as staff, members of the executive committee, clients, suppliers, the internet or other external consultants to the organization at the time of strategic decision-making. We used a yes or no question (yes = 1 and no = 0) for each information source and then a total score is calculated that can vary from 0 to 5 (no consultation = 0 and consultation = 5).

Collaboration: it can be achieved with all the partners who are located along the value chain of the company or in its immediate environment (research centers, customers, suppliers, universities). We used a yes or no question (yes = 1 and no = 0) for each partner and then a total score is calculated that can vary from 0 to 5 (no collaboration = 0 and collaboration = 5).

Research and Development: This is the case where the company invests time, money and human resources in the creation or improvement of new products, services or organizational structures. We used a yes or no question (yes = 1 and no = 0) for each type of innovation and then a total score is calculated that can vary from 0 to 6 (no innovation = 0, improvement of quality = 3 and innovation = 6).

Innovation rate: the percentage of sales of new or partially changed products or services in 2016 is calculated at this level.

Analytical Methods

An attempt was made first to calculate the average score for each variable set by the contractor's gender and then a multiple linear regression was performed to see the strength of the relationships between the independent variables and the rate of innovation. considered dependent variable.

RESULTS

Through this work, we were able to confirm our hypotheses. Women entrepreneurs set development goals (export) generally lower than men. Indeed, male entrepreneurs are more export-oriented than their female counterparts who suffer from a lack of financial means and openness. This is all the truer as the company is small. This can be explained by the lack of means and a more risk averse temperament and a business climate that is still dominated by men. We prefer to move slowly but surely in an increasingly uncertain environment. We can confirm the first hypothesis.

Table 3: Company regime

Type of Entrepreneurs	Man	Women
Export rate	70% totalement exportatrices	50% totalement exportatrices

Source: personal work

In terms of decentralization, women are more likely to delegate decision-making than men. Nevertheless, all-gender entrepreneurs tend to decentralize decision-making as the size of firms increases and with it the workload and responsibilities.

This decentralization affects expertise activities such as accounting, finance, research and development and escapes sales and marketing activities considered more strategic. This trend is truer for female entrepreneurs than male except for the finance function that women entrepreneurs keep more under their control.

Indeed, and despite its strengths, the woman entrepreneur in Tunisia is still facing the financial problem. This is reflected in the low level of support for various support and funding programs

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and the lack of an adequate accounting and financial system.

In the same vein, we note that women have a stronger tendency to collaborate than their male counterparts. This state of affairs is all the more true in the case of small businesses or those whose creation is more recent because at this stage the lack of knowledge of the business environment is important and recourse to the expertise of others is vital. Also, we note that women consult more in strategic decision-making than men. They take advice from board members, associates, family members, suppliers, customers, and local communities. This confirms the second research hypothesis.

In terms of collaboration, we find that it differs according to the size of the company studied. Indeed, it concerns procurement and distribution activities for small businesses to encompass design and marketing activities for medium to large sized businesses. This is due to the growing need for financial resources and skills that characterize the transition from distribution activities to design or marketing strategies. In addition, women tend to collaborate more than men regardless of the activities cited or the size of the firms (with higher scores see Table 4).

Table 4: Decentralization and consultation

Nombre d'employés	**L'ensemble des entreprises**		**Entre 10 et 20**		**Entre 21 et 50**		**Plus que 50**	
Sexe	**H**	**F**	**H**	**F**	**H**	**F**	**H**	**F**
Décentralization (de 0 to 5)	2,8	3	2,5	2,7	3	3,2	4,1	4,3
- Finance or accounting (%)	78,5	57,4	70	49,1	75	59	89	76
- Human Resource Management (%)	46, 3	50,4	40	43	47	54	48	57
Sales and Marketing (%)	40,4	41,2	33	35	43	43,4	45	47
- Production or delivery of services (%)	88,3	90,1	76	78	89	93	87	95
- Research and development (%)	43	44	34	35	46	48	50	51
Consultation (de 0 to 10)	5,3	6	6,3	7,2	6	6,1	5,3	6,2
- Company staff (%)	80	88	92	97	87	89	76	80
- Steering committee (%)	67	70	44	43	80	88	85	89
- Customers or diggers (%)	76	77	78	80	75	74	80	87
- External consultants (%)	31	34	45	46	44	47	43	41
- Internet (%) and professional journals (%)	77	67	80	82	78	76	76	77
- Family (%)	43	44	54	55	64	56	58	59

Source: personal work

Finally, research and development and innovation remain the Achilles heel of entrepreneurship in the Central East region. Indeed, more than two thirds of the companies studied do not have a research and development department. Local companies are overwhelmingly dependent on a foreign originator as they are subcontractors for foreign firms.

This is true regardless of the sex of the entrepreneur. We only notice that companies that have a research and development department have decided to delegate non-value-added activities (such as the supply of raw material or production) to focus on design research, the quality of the product or fabric as it is the case for the textile clothing sector or there is a growing interest in innovative activities in pattern design. Emphasis has been placed on improving the quality of products or services because of the lack of financial and human resources that would enable local businesses to innovate (see Table 5).

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Table 5: Collaboration, research and development

Number of employees	All companies		Between 10 and 20		Between 21 and 50		More than 50	
Sexe	**H**	**F**	**H**	**F**	**H**	**F**	**H**	**F**
Collaboration (de 0 to 5)	2,5	3,1	2,4	2,6	3	3,1	3,1	3,3
- Activité de production ou de service (%)	59,5	65,4	66	69,1	54	59,1	56,3	58,1
- Distribution (%)	33, 3	40,4	40	43	45	53,1	43,2	57,1
- Approvisionnements (%)	42,4	43,2	43,2	45,3	42	43,4	45,2	47,3
- Conception et R-D (%)	34,3	36,1	35	37,2	38	42,1	54,2	56,2
- Marketing et ventes (%)	34,6	37,2	37, 2	38,2	46,2	48, 3	49,3	51,2
Research and development (de 0 to 6)	2,1	1,9	1,5	1,4	1,9	1,7	3,3	3,2
- Investment in new products or services (%)	33,3	30,1	20,1	21,2	30,2	30,2	38,2	35,2
- Product improvement, or services or precedents (%)	42,2	40,3	32,2	33,5	35,4	34,1	57,2	54,1
- Improved organization of work (%)	40,2	42,3	33,4	36,5	43,3	44,2	47,3	49,5

Source: personal work

In terms of work organization, we find that the more complex the organizational system, the more entrepreneurs will seek to improve the organization of work. Women entrepreneurs are more aware of the vital value of research and innovation for the sustainability of their businesses than their male counterparts since they plan to invest more during the next five years. In addition, they seek to innovate significantly more in the organizational structure of their company by incorporating the latest developments in information technology or automation of production processes which confirms the third hypothesis.

The fourth hypothesis asks us whether there are significant differences in innovation rates. At this level, we note that men entrepreneurs invested a little more than their female counterparts in innovation in 2016. In contrast, women entrepreneurs are planning to invest more in the next few years in research and development (Table 6).

Table 6: Innovation rate

	Women entrepreneures	**Men entrepreneurs**
Innovation rate in 2015 (% of sales)	3	4
Forecast average rate for the next five years (%)	6	5

Source: personal treatment

This will surely depend on the local post-revolution situation which remains very unstable. This rate remains very low, which indicates the lack of interest given by local businesses to competitiveness based on innovation. This can be explained by the lack of means available to them and a weak business environment. We have also tried to see through the multiple linear regression method the simultaneous effect of a certain number of variables on the rate of innovation of firms in the region (Table 7).

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Table 7: Multiple regression between the innovation rate and other variables

	The innovation rate	
Gender of the entrepreneur	Men	Women
Educational level	0,13	0,2
• Years of experience in the area of the activity	0,09	0,07
• Desired development objectives for the company	0,22	0,21
• Décentralization	0,03	0,02
Research and development	0,42	0,43
• Consultation	0,01	0,03
• Size of the company	0,21	0,34
• Collaboration	0,12	0,16
R2 adjusted	0,234	0,345

Source: Personal treatment

Only companies that innovated were selected at this level. Innovation seems to depend substantially on the following variables: research and development, firm size and collaboration and development objectives. This can be explained by the fact that larger firms, with more material and human resources, tend to invest in research and collaborate to counter international competition and often have more ambitious development goals. Experience in the field and the level of education appear to explain the attractiveness of entrepreneurs for innovation. However, the experience is more pronounced among male entrepreneurs whereas the level of education seems more significant for women entrepreneurs. Similarly, the variables studied explain innovation better for women than for men because they have a higher adjusted R2 index. All this allows us to assert a different relationship to innovation between men and women in the Central East region of Tunisia (hypothesis 4).

CONCLUSION

Through this article, we try to see if companies run by female entrepreneurs in the Central East region of Tunisia and who practice in the manufacturing sector[6] are different from that run by male entrepreneurs. especially in terms of behavior towards innovation This work has allowed us to say that the companies that innovate the most are generally supported by educated entrepreneurs, who are more likely to collaborate, to decentralize decision-making power, to consult and who set themselves in addition to development objectives. more consequent. Women entrepreneurs in the region are younger, more educated but less experienced, and are creating smaller businesses than their male counterparts. Male entrepreneurs tend to less decentralize and collaborate, but they have more experience and financial, material, and human resources to innovate.

[6] The manufacturing sector is made up of textile, clothing and leather (ITHC), mechanical and electrical industry (IME), chemical industry (ICH), agricultural and food industries (IAA), various industries (ID), Building Materials, Ceramics and Glass Industries (IMCCV)

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