Management context of entrepreneurship in engineers and architects in Tachira, Venezuela

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Abstract. This article arises from the research in which one of its objectives was to characterize the entrepreneurs of the small and medium industries of Tachira, Venezuela in terms of their managerial competencies, developed under the qualitative approach, having these entrepreneurs as key informants. The interview and field notes were used as techniques for data collection. Today the entrepreneurs of the construction sector are mostly engineers and architects, graduates of universities in the region, who have the technical skills related to the core of the business, but have shortcomings in other managerial and entrepreneurial skills, so we propose a change in the curriculum study that includes as a longitudinal axis of engineering careers, subjects that allow the internalization of various managerial skills that increase the likelihood of success in future companies.

1. Introduction

Human beings have always needed to transform the elements of nature in order to take advantage of them, establishing what it says [1], where the use of the human brain and its interaction with its environment has led it to evolve in all aspects, having resources at hand to improve its processes, but this use intensifies towards the end of the eighteenth century, when the process of transformation of natural resources undergoes a radical change, which is known as the industrial revolution. Since then, industry has been one of the main engines of the world economy, by promoting structural change, improving income levels and overcoming large differences in social sectors [2].

Within the business world, the industrial sector reflects a relevant importance, since there are significant technological advances, it is there where there are notable incubations of ideas, which being in the era of knowledge, is essential to strengthen national development [3]. It is important to highlight the changes that countries have generated through knowledge management, in recent decades organizations have sought ways to evolve by modifying their processes, as has happened within the construction sub-sector, which represents an important element for the development of national infrastructure and the improvement of the quality of life of citizens.

Also, within the industrial sector, “pequeñas y medianas empresas (Pymes)” form a fundamental sub-sector to enhance the development of any country, for [3], establish that these can reach a process of maturity, also is observed when comparing the pymis with large companies, a fundamental socioeconomic factor relevant to the distribution of national wealth: in large companies there are 100 for each owner or more employees, while in small and medium there is 5 for each 100 employees or some other owners. In small and medium-sized enterprises (SMEs) there are many more owners, so this
promotes social balance, equality of opportunities and ultimately, the emergence of all, and are considered economic bases of some countries, and micro, small and medium enterprises are considered the basis of the Mexican economy [4].

Because these organizations are medium or small in size, much of what happens there depends to a great extent on their leaders, which is why when a positive leadership demands a high degree of stimulation for the command of managerial methods, then in SMEs is transcendental the work that their manager does [5]. This is focused on what they point out [6], where the environment demands of managers a new style of behavior added to a fundamental change in the traditional practices of the administration. Also in large industries, the responsibilities of business management are distributed among a considerable number of people, but in SMEs, these fall directly on the entrepreneur or business owner, who is also the general manager; he is the one who must make most of the day-to-day decisions and strategic management, supported by the approach that describes where the leader within his strategic actions is perceived with the ability to add value to the products of the company [7].

Faced with this situation, one of the main factors that must converge in the development process of a nation is, without a doubt, the productive apparatus with a degree of strength that allows the creation of virtuous circles or spirals of growth in different dimensions: social, cultural, economic and political, and even more in organizations such as SMEs, in which they refer to themselves as a fundamental pillar of sustainable economic development [8].

This requires excellent professional training. In the field of construction companies specifically, engineers are needed with a high academic training that allows not only their work as an employee in a large company, but is able to start their own business, make it grow and sustain over time, since the scenarios have changed, since the social, political and economic conditions of this contemporary stage show that the profile of the current engineer is very different from that of the engineer of several decades ago, which is why the skills that must be taken into account in engineers and architects within the new orders as entrepreneurs [9]. Within this context, the objective of the present article is to characterize the entrepreneurs of the small and medium industries (Pymes) of Táchira, Venezuela in terms of their managerial competencies, with the purpose of proposing some improvements in their professional training, with the understanding that the better the training, the greater the probability of success in their future ventures. The main objective of this research was to identify the entrepreneurship competencies of the civil engineering and architecture professionals of the universities of Táchira that offer these university degrees.

2. Method
The present article arises after carrying out an investigation approached from the interpretative perspective, adding some elements typical of quantitative investigations, in order to include a mixed methodology, defined as the approximation by means of the ideas towards an objective reality, and towards the subjective one that will give the description of the phenomenon to study, and the theoretical referents were characterized by the construction SMEs and the management [10]. In order to carry out the research, we proceeded by means of the position based on documentary review, [11], in this way we analyzed the curriculum of different universities to see and describe the competencies that these careers could have within the context of the research.

3. Results
The following are the results of the research related to three main elements: the profiling of the entrepreneur in the construction sector, a comparison between the entrepreneurial engineer and the employee, and a comparative analysis of the curricula of regional universities and others from different latitudes in terms of subjects related to management and entrepreneurship. These discoveries are triangulated with other theories and empirical results of other researches, this to strengthen and make more interpretative the contributions of the research.
3.1. Engineers and architects as entrepreneurs

According to the research findings, several decades ago, the profile of the construction entrepreneur in the region was given by a person of medium or low educational level, foreigner from countries such as Colombia, Italy or Spain, who had obtained his knowledge through years of experience as a specialized worker, as a machine operator or as an advanced technician who at some point took the initiative to form his own business. Today, the profile of the entrepreneur in the construction sector has changed significantly: he is a Venezuelan person, a professional in the area of engineering or architecture, with solid knowledge in his area of expertise, but with deficiencies in other managerial competencies. Once they have started their entrepreneurship there is no appreciation for formal education, they prefer short refresher courses or being self-taught, rather than getting involved in longer studies such as an undergraduate or graduate degree. Normally they are people who have the technical skills of the core area and decide to start their own business.

It is observed that the engineers and architects of Táchira, Venezuela have excellent technical skills and abilities in the area of their university degree, but they also have insolvencies in terms of their human and conceptual skills and in terms of their technical skills outside their university degree. In terms of human skills, the professional construction entrepreneur in Táchira, Venezuela lacks tools for conflict analysis, either with his subordinates or with his partners. That is why he prefers to start the business on his own so as not to have to negotiate or resign his position before a partner. In this regard [12]. It suggests that associations are necessary for entrepreneurship, both the union of two or more partners to form a company, and the association of several companies to form a conglomerate or producer association. As for teamwork, the engineers or commercial architects of Táchira, Venezuela may have some subordinates with whom to work and whom to consult in different areas and in different situations, but the final decision is always proposed by him, even taking it as something personal and Almost always the decision maker is the manager, but neither does it allow subordinates to present alternative solutions to the problems raised [13].

The above is related to the management of human resources, as the key resource of the company, being crucial the full development of their capabilities and their participation and integration in the business project, teamwork and the use of tools and techniques appropriate to each level of the organization. To confirm this. The complexity and mutability of the environments of small and medium enterprises make it increasingly imperative for the decision-maker to have these new charts and navigation instruments.

4. Discussion

The above makes suppose that inside the curriculum of the careers of engineering and architecture must exist a longitudinal axis, a branch of the career in where the student acquires and internalizes the necessary elements to create and to develop a company, the enterprising component must be present in its formation of undergraduate. This longitudinal axis is present in careers such as bachelor's degrees in business administration, bachelor's degrees in management, marketing, finance, etc. According to data collected and analyzed by the Global Entrepreneurship Monitor (GEM), it is engineers and architects who today lead the way in industrial entrepreneurship, specifically in the construction sector.

This tendency to include a component of entrepreneurship within the training of engineers has already been taken into consideration by several Latin American universities. A comparison of the curricula of two universities present in Táchira, Venezuela such as “Universidad Nacional Experimental del Táchira (UNET)” and “Politécnico Santiago Mariño”, with other higher educational institutions such as “Instituto Tecnológico de Monterrey (ITM)” in Mexico, “Universidad de Investigación y Desarrollo (UDI)” of Colombia and the “Universidad de Palermo” in Argentina, all with a semester regime, can be found in Table 1.

A smaller number of subjects related to management and entrepreneurship are observed in national universities. Institutions such as ITM and UDI de Bucaramanga have assimilated the idea that engineering professionals are the future entrepreneurs of the industrial sector, and based on this idea try to print this knowledge in their graduates.
The industrial engineering career has historically had an important component related to management and entrepreneurship, both in Venezuelan and foreign universities, as shown in Table 1. But the careers of civil engineering and architecture do not have this component. It is probable that this is due to the orientation towards large companies that universities have normally had, but it is certainly necessary for engineers to graduate with the basic training that will allow them to face a process of business creation. Engineering curriculum have been organized according to the demands and needs of large companies, where more specialists than generalists are needed; there are enough specialized personnel according to the requirements of each area within the organization; the opposite occurs in the small and medium industries of the construction sector, where the engineer or enterprising architect must be multifaceted, multifunctional, with broad technical, human and conceptual competencies.

This addition of the longitudinal axis must be thought of and adapted to the Venezuelan reality and the reality of Tachira, Venezuela. This reality, for example, is related to aspects such as the creation of a company in Venezuela, the particularities of bureaucratic processes in Venezuela, as well as cultural and social aspects. So, the future engineer or enterprising architect needs to know what reality he is going to face when he decides to start his own business, he must have the ability or competence to carry out these procedures as efficiently and effectively as possible. He or she must know the socioeconomic conditions in which he or she will have to work as an industrial entrepreneur. In this way, the trial and error processes will be less and the learning curve will have a steeper slope.

| Table 1. Management and entrepreneurship subjects. |
|-----------------------------------------------|
| University                  | Academic program                  | No. of subjects related to management and entrepreneurship |
| UNET                        | Civil engineering                  | 2 |
|                             | Architecture                       | 2 |
|                             | Industrial engineering             | 10 |
| Politécnico Santiago Mariño | Civil engineering                  | 1 |
|                             | Architecture                       | 1 |
|                             | Industrial engineering             | 7 |
| ITM                         | Civil engineering                  | 9 |
|                             | Architecture                       | 5 |
|                             | Industrial and systems engineering | 11 |
| UDI                         | Civil engineering                  | 4 |
|                             | Industrial engineering             | 11 |
| Universidad de Palermo      | Industrial engineering             | 10 |

5. Conclusions
The future engineer or enterprising architect needs to know what reality he is going to face when he decides to start his own business, he must have the ability or competence to carry out these procedures as efficiently and effectively as possible. He or she must know the socioeconomic conditions in which he or she will have to work as an industrial entrepreneur. In this way, the trial and error processes will be less and the learning curve will have a steeper slope.

It is important to study the feasibility of adding groups of optional subjects that allow the graduate to obtain specific competencies in the area of entrepreneurship and management; the achievement of this group of optional subjects would earn a diploma or certificate additional to the engineering degree being studied.

This concentration of subjects in the managerial area must be broad, adapted to contemporary times and the Venezuelan reality. The management skills needed by a Venezuelan entrepreneur are not the same as those needed by an entrepreneur from other latitudes. Venezuela is a country with unique elements that oblige entrepreneurs to know and overcome obstacles that other entrepreneurs in other parts of the world will not have.
In this order of ideas, universities should also make their proposal for workshops, courses, specializations and master's degrees more flexible and adaptable so that it is truly taken advantage of by these engineers and architects who have decided to be businessmen and who believe they have little time for their continuing education. This will allow them to strengthen their managerial competencies and minimize the probability of mistakes at the moment of decision making in their organizations, because in short, the manager is mainly that: a decision maker.

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