



Strengthening of industry 4.0 in small businesses: a path for local development


Fortalecimiento de la industria 4.0 en MiPymes: una vía para el desarrollo local

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Abstract

The benefits that micro, small and medium enterprises grant to local development turn out to be a key element for economic growth. With the passage of time and with the evolution that new technologies continue to bring with them, new needs have arisen to keep us updated in the face of growing demands. In this way, it is essential to analyze the development that new skills must acquire and to know the processes to which MSMEs must adapt to achieve local growth. Likewise, it is just as important to know the context in which these companies operate in order to know first-hand the facilities they have or, on the contrary, the difficulties they must face. The objective of this article is to address from the digital maturity of companies in a review of literature and technique of quantitative methodology. It was found that in the MSMEs of Magdalena there is a low level of digitization, which affects the local development of the department.

Keywords: *Capabilities 4.0; Local development; MSMEs; Fourth Industrial Revolution.*

Resumen

Los beneficios que las micro, pequeñas y medianas empresas otorgan al desarrollo local resulta ser una pieza clave para el crecimiento económico. Con el paso del tiempo y con la evolución que las nuevas tecnologías continúan trayendo consigo, han surgido nuevas necesidades para mantenernos actualizados ante las crecientes exigencias. De esta manera, resulta fundamental analizar el desarrollo que deben adquirir las nuevas capacidades y conocer los procesos a los que las MiPymes se deben adaptar para conseguir un crecimiento local. Asimismo, es igual de importante conocer el contexto bajo el cual estas empresas se desenvuelven para conocer de primera mano las facilidades con las que cuentan o, por el contrario, las dificultades a las que se deben enfrentar, el objetivo del presente artículo es abordar desde la madurez digital de las empresas en una revisión de literatura y técnica de metodología cuantitativa. Se encontró que en las MiPymes del Magdalena hay un bajo nivel de digitalización lo que incide en el desarrollo local del departamento.

Palabras Clave: *Capacidades 4.0; Desarrollo local; MiPymes; Cuarta Revolución Industrial.*



Introduction

To understand the new 4.0 capabilities, it is necessary to define the term industry 4.0, which refers to a new model of organization and control of the value chain throughout the product life cycle and throughout manufacturing systems supported and made possible by information technologies (Del Val Román, 2016).

Industry 4.0 has been one of the most innovative topics within the business sector, as it has provided the opportunity to develop new strategies that go hand in hand with technology, while saving resources such as time, capital and space, in addition, they have been able to evolve each of their processes, from production and the administrative area, to communication with customers.

In this regard, it is important to take into consideration the regulations that micro, small and medium-sized enterprises (MSMEs) focused on this industry have and the governmental support they receive, since these types of companies promote growth and, in turn, the economic development of the communities of which they are a part.

Likewise, with the passage of time and the involvement of new and diverse factors such as globalization, there has been a growing interest in new technologies, understanding them as adaptable and personalized tools capable of satisfying the needs of both business actors and customers, acquiring individualized experience and greater connectivity.

In this way, it is possible to understand the importance of the fourth industrial revolution, presenting new and more practical solutions that trigger new capabilities and enable the interaction between workers and digital media, providing different uses while seeking customer satisfaction in real time.

Finally, it is essential to take into account what are the new skills that are required in jobs and that are necessary for the incorporation of Industry 4.0 within MSMEs, since workers must face both new qualities and a constantly updated training that allows the success of companies and in turn, there is greater local development (Del Val Román, 2016).

In this sense, Magdalena has had a significant lag in the level of digital maturity that companies have, so the objective of this article is to determine the state of digitization in which the productive sector is and the impact this has on local development.

Industry 4.0 in MSMEs

The so-called Industry 4.0 is a product of industrial policy in the face of a new phase in the evolution of Information and Communication Technologies (ICT), and is emerging in the 2020s, mainly in developed countries. In this context, these emerging technologies offer a

unprecedented capacity to reorganize productive processes (Economic Commission for Latin America and the Caribbean, 2017).

Likewise, the development of Industry 4.0 can be reflected in a wide number of sectors, as the use of technological resources has helped not to be limited only to certain industries, but has helped to redefine sectoral boundaries and demonstrate greater competencies, thus helping to transform manufacturing structures and production processes at high speed. In this regard, the SME sector now has to compete with global industries by adopting new emerging technologies of Industry 4.0 and maintain sustainability in business practices (Gupta et al., 2022).

According to the Economic Commission for Latin America and the Caribbean (2019), an example of this is that ICTs have increased their use beyond commercial transactions, since their diffusion has also been present in production developments that involve digitalization and monitoring of physical, chemical and biological processes.

Likewise, ECLAC refers to some countries that have implemented this industry in some way to develop in today's globalized world, in which competition prevails and countries have had to strengthen their capacities.

Finally, it is necessary to take into account that industries are going through a disruption in the manufacturing and supply chain due to lack of raw material supplies, manufacturing resources, and unavailability of labor due to COVID-19 (Bastas and Liyange, 2019). To maintain business practices during these types of situations, industries must review and restructure their supply chain practices by implementing smart and sustainable manufacturing systems.

Strengthening 4.0 capabilities

The globalization process has caused MSMEs to require a complete digital transformation, since the incorporation of technological advances has become necessary for the operation of the businesses and the development of the internal processes they have, however, with the passage of time new capabilities and skills have been needed within this new global process.

In this sense, Suarez (2019) mentions that small companies are facing a growing talent shortage, and not only because the talents that already exist are finding new and better opportunities, but because there is a considerable backlog in educational models, and states that an industry 4.0 requires education 4.0.

In this way, various proposals have been presented for the implementation of educational plans and curricula that involve technological skills and constant training for the students.

The aim is to encourage educational institutions to foster innovative curiosity and reduce the gaps of technological illiteracy, so that this knowledge can be taken to the labor sector and companies can better establish themselves in this globalized world.

Likewise, Suárez (2019) also mentions that today's educational system is not sufficiently trained to coexist with the needs that are demanded, since the pace of technological advances has surpassed traditional education models, as certain skills are not taken into account, and subsequently, companies adopt technological trainings and cognitive capabilities that are increasingly competitive, as their business management models are based on industry- lization.

However, under this same concept, it is necessary for people to be trained not only in technological issues and digital innovation, but also for formal education to constantly encourage self-education through curiosity and the ability to learn on their own; while business leaders must focus on competent and effective leadership for the rest of the human capital.

Thus, the Fourth Industrial Revolution can be understood, not only from the implementation of technologies such as those mentioned above, but also from what companies can do with those technologies. In this way, Industry 4.0 is about novel business models and new ways of creating value (Kagermann, et al., 2013), through the implementation of technologies from the production floor to top management, and from the supplier to the customer. Therefore, one way of looking at this concept is how a company can create more value for the customer from the disposable data collected by vital underlying technologies, whether in its production or products (Amaral & Peças, 2020).

4.0 capabilities of MSMEs in the framework of local development in Santa Marta

At the outset, it is important to take into account that MSMEs play a key role in a country's economic growth by generating a large source of employment opportunities (Savlovski & Robu, 2011). MSMEs account for 99% of all enterprises and more than half of total employment in the global economy (Ferrando et al., 2017; International Monetary Fund, 2019).

Now, in the era of globalization, MSMEs strive to overcome barriers to maintain their competitive advantage and aim to improve competition to succeed (Ibrahim et al., 2016). As emerging technologies have enabled increasing capabilities and reducing the cost of information globally, taking advantage of these advances becomes a necessity for MSMEs in their manufacturing operations (Sariyer, et al., 2021).

According to Leño (2017), MSMEs are important actors because they are part of local development, because even when they require complex processes, they enable the achievement of economic growth and inclusion. In this sense, local government plays a fundamental role and development plans are valid instruments.

Peña-Hernández et al. (2020) mention that the importance of MSMEs in local development goes beyond the economic aspect, because, although they have been considered as companies, they are always in constant search of the satisfaction of local needs, so they should be considered as key organizations for the processes and phenomena of change, so that their structure and identity are fundamental for the rest of the locality.

As previously mentioned, government relations are essential for economic growth, but relations with the rest of the private actors are also important, since the way in which their governmental agenda is developed can be both helpful and detrimental to MSMEs and, in turn, to entrepreneurs.

Successful local development experiences, also called endogenous, were mostly the consequence of favorable political and social environments, expressed by a mobilization and convergence of social actors in the municipality around consensus on priorities (Leaño, 2017).

It is in this sense, the design of public policies becomes a necessity for all types of industries, since this is the way to stimulate the competitiveness of any sector, while they turn out to be instruments of great progress for local governments and tools that encourage economic development, which is beneficial for all the inhabitants of society.

It is important to mention that the demands of MSMEs are always directed towards corporate social responsibility, sustainability, competitiveness, innovation, among others, however, little is said about the skills that entrepreneurs have, which is why the demands should be directed towards the generation of public policies and support programs for entrepreneurs to generate proposals for them (Navarrete et al., 2014).

In this way, financing lines, technical assistance, local government actions, economic possibilities and other exogenous factors that intervene in the growth of MSMEs must be taken into account so that the next strategies and the most appropriate way to solve and meet the needs of the localities in which they are located can be contemplated.

However, Basco et al. (2018), mention that certain strategic elements must be taken into account to develop Industry 4.0, among which are:

- The state of glocal globalization, i.e., global + local, since distances can be reduced or increased simultaneously and the dimensions of time and space can be altered. Therefore, the opportunities offered by electronic commerce through existing platforms should be taken advantage of.
- The emergence of Artificial Intelligence may help to constitute a new factor of production.
- Re-imagining the classic comparative and competitive advantages through innovative advantages from technological knowledge.

- Disruption of traditional ways of working thanks to new technological means.
- Industry 4.0 requires an Institutional Revolution 4.0, where smart states are able to regulate new realities without stifling innovation processes.

In this way, MSMEs must take into account various factors that allow them to generate a better development and the strategies they want to implement are based on technological capabilities, however, the actors around them must also develop at the same time, because the growth of some means the growth of others.

Methodology

The present work is a mixed research of sequential character that develops qualitative and quantitative analysis, for this purpose mixed methods are used according to Creswell and Plano (2011), in mixed studies during the process, the results tend to be corrected. That is to say, the results present better limitations, and a better panorama that in turn presents a better interpretation of results. In this sense, qualitative methods will be used in one stage or phase of research and quantitative methods in another.

In the first stage, a literature review was carried out with data from 19 bibliographic sources, then a quantitative instrument was applied to companies in the department of Magdalena to determine their level of digital maturity.

Final results

According to ECLAC (2020), MSMEs represent 99.5% of the business fabric in Latin America, for Magdalena, in the convenience sample selected by the allies, the business structure, the sample size based on Law 905 of 2004 is as follows:

Table 1
MSMEs in Magdalena

Empresa	Total	% de participación
Microempresas	870	97,3%
Pequeñas empresas	21	2,3%
Medianas empresas	3	0,3%
Total	894	100,0%

Con base en el número de empleados, ley 905 de 2004.

Source: own elaboration.

Table 2
Of the 894 MSMEs, these are classified as

Formal	646
Informal	248
	894

Source: own elaboration.

To proceed with the analysis of the database of the 894 MSMEs, the global digital maturity table is constructed, in which they are categorized in the strategic areas of the digital maturity model of Colombia based on its two dimensions: level of digitization and enablers for digital transformation, determining the level of criticality by area, which is presented below:

Table 3
Digitization level

Área	MADUREZ DIGITAL GLOBAL		
	Digital	Habilidad digital	Criticidad
Producto/Servicio Inteligente	1,33	1,87	2,74
Relación con el cliente	1,45	1,87	3,72
Operaciones, producción o servicios (Smart Factory)	1,28	1,87	2,67
Cadena de suministro colaborativa	1,32	1,87	2,74
Gestión inteligente	1,42	1,87	2,86
MEDIA PONDERADA	1,36	1,87	
			2,95

Source: own elaboration with SSPS software, 2021.

This result reflects the level of digital maturity of the MSMEs in Magdalena, which denotes that they are in the beginners' stage. This means that the companies under study have a low level of digitalization represented by a weighted average of 1.36, which is reflected in the value chain of the company in the business model, the processes of digital innovation and the route to achieve business transformation.

This denotes, a low entrepreneurial capacity of industries 4.0 in the business fabric of Magdalena in the digital component, which represents the opportunity for improvement for the development of digital skills in human talent with a view to achieving the empowerment of information and communication technologies.

The purpose of this project is to promote digital culture and innovation in order to close the digital divide and visualize opportunities to generate global opportunities that will translate into greater productivity and business competitiveness.

Conclusions

Undoubtedly, the Fourth Industrial Revolution has radically changed the way products and services are produced and marketed, as well as the relationship between the company's employees, owners and customers, and it is in this way that the new roles to be played internally in each of the organizations must be taken into consideration.

In this context, it should be considered which strategies should be implemented to improve the relationships between each of the stakeholders, and to optimize the planning and new designs, thus relating the new competencies that employees should have when they become part of the MSMEs.

At the same time, the organization of MSMEs is fundamental, since these types of companies have proven to be key elements in the development of small communities, as they have a great influence on economic growth and subsequently on their development, so the productivity of these types of companies must be taken into account.

The planning of new legislation to encourage entrepreneurship and provide different types of support should be one of the priorities of local governments, so that small-scale production can be more fruitful, since the satisfaction of needs and economic growth becomes proportional to the attention given to industrialization.

Likewise, the benefits that MSMEs generate go beyond the creation of wealth, as they are capable of offering decent jobs, improving the quality of life, curbing migration, and reducing the social tensions that exist today due to the impossibility of earning the necessary income for daily subsistence, which is why the responsibility and commitment of all economic, political and social actors is necessary to generate relevant strategies for everyone and not in terms of individual benefits.

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