DEVELOPMENT, VALIDATION, AND USE OF A DIAGNOSIS MODEL FOR SMEs IN BOGOTÁ

Osmar Yesid Alba Cortes[1].

Gino Arevalo Acosta[2]

Luis Fernando Ortegón Pérez[3]

Abstract

This writing describes the results of two phases of a project carried out in cooperation between a public entity for job training and a higher education institution; The main findings in the understanding of the state of the art of the Colombian SME are presented, from which a diagnostic instrument is developed for small and medium-sized companies in Bogotá, a pilot test is carried out to measure the effectiveness of the diagnostic instrument , is validated and corrected based on the recommendations of consulting experts in the functional areas to be diagnosed. Finally, the findings on the understanding of SMEs in Bogotá are presented, and it is established under a statistical model, the importance of market knowledge to guarantee the profitability, sustainability and scaling of 30 SMEs in the city.

Keywords: SMEs, competitiveness, cost effectiveness, sustainability, management.

Colombian companies and the economy in context

The Colombian economy while participating in the emerging international market faces great challenges both in the economy and in other business areas that influence development, such as science, innovation, competitiveness, sustainability, and management, among others. Therefore, it

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[1] Economist and Advertising Professional, Research Professor at Fundación Universitaria del Área Andina, SME consultant. Colombia- osalba@areandina.edu.co

[2] Advertising and Marketing Professional, Research Professor at Fundación Universitaria del Área Andina. Colombia – garevalo5@areandina.edu.co

[3] Advertising and Marketing Professional, Executive MBA, Professor at the International School of Management and Marketing, Universidad Sergio Arboleda. Colombia – luis.ortegon@correo.usa.edu.co

is necessary to understand the current situation in order to recommend ideas that contribute to the long-term vision and business improvements of SME businesspeople and entrepreneurs.

Colombia's GDP represented 0.56% of the global GDP by 2018. In the international scenario, it has a higher GDP level than some Latin American countries such as Chile and Peru, which contribute 0.36% and 0.33% to global GDP, respectively; however, it has a low GDP level in comparison to countries such as Spain (1.40%) and Mexico (1.94%) and very low level compared to world players such as China (18.23%) and the United States (15.26%). What would it take for Colombian companies to produce more and reach at the same level as Mexico and Spain? Perhaps the issue is not the size of our production; the United Arab Emirates, with its impressive commodities development and production, represents only 0.54% of global GDP (World Economic Forum, 2018).

As regards business, Colombia had 1,620,000 registered companies by 2018, of which only 6,793 were large enterprises; 109,000 were SMEs; and slightly over 1,500,000 were microenterprises (Economía Aplicada, 2019). Growth is a great challenge because more than 90% are microenterprises that sell less than USD 238,500 (Bancoldex, 2019). In addition, only 69,283 (21.10%) of the 328,237 new businesses registered are companies and 258,954 (78.90%) are natural persons. (Confecámaras, 2018).

Introduction

State policies are targeting SMEs in Colombia given their critical importance to the national economy. As a consequence, higher education and vocational training institutions are putting in their efforts to be consistent with such policies and, thus, join in the development plan.

Therefore, professors belonging to an official entity whose mission is to provide Colombian industries with a labor force that is appropriately qualified contribute to young people's training and aid in their labor market insertion and strengthen entrepreneurship (Servicio nacional de aprendizaje, 2019); they associate with professors from private universities that are highly committed to social work and that have been entrusted with the task of contributing to Colombian development. Together they intend to make research proposals that, with a scientific approach

enable and expand the knowledge that will strongly support SMEs by boosting their competitiveness.

To achieve this purpose, professors undertook a research project financed by their institutions, which aims to develop, validate, and apply a diagnostic tool for SMEs that can be used by private and/or public organizations, consultants, researchers, and any party interested in proposing programs and projects to promote and support small and medium businesspeople. This work yielded information of special importance that can contribute to expanding the research on SMEs and will surely contribute to strengthening these business models. First, in the initial phase, the project reviewed documentation in order to establish the most important axes to understand SMEs. Second, by means of first-hand sources, information was validated to propose a diagnostic instrument and the methodologies that were later used to collect information to establish a relation between profitability; market knowledge; and the implementation of modern management tools, productivity, and costs. The results are communicated in various media to spread knowledge with a view to consolidate SMEs in Bogotá and across the country.

In order to achieve the goals proposed in the project, first, a document review phase was launched, which allowed for a general overview of the circumstances surrounding the SME model in Europe, Latin America, and Colombia (specifically, Bogotá). On the basis of the information analyzed so far, a diagnostic instrument was designed and validated. It comprised the most remarkable aspects as problem areas for these business models, which are consistent and very similar throughout the different territorial areas under analysis. It was, thus, possible to characterize the 30 companies linked to the research, collect each company's information and, by means of a statistical model, arrive at conclusions, and present the resulting information.

The research showed SMEs' great importance in Colombian economic development because SMEs represent 90% of all formally registered companies across the country. SMEs create 80% of formal jobs in Colombia, accounting for 35% of its GDP. However, this business model is highly informal; the data disclosed do not contemplate a large number of existing companies and entrepreneurs and are difficult to quantify because, at least as far as the scope of this study is concerned, the data concerning SMEs, beyond the scope of this study, may be broader (Sánchez, Osorio and Bahena, 2007).

Ironically, what strikes as evident in the literature is that more robust economies present the same SME importance structure. Although it is widely thought that such economies are supported by large enterprises, authors like Zevallos 2007 (p. 30) show that economies such as the United States and some leading Asian and European countries are highly dependent on SMEs; they generate around 49% of jobs in the United States, 70% in Europe, and 69% in Japan (Zevallos, 2007). The Latin American context presents a scenario in which it is clear that SMEs are essential. Documents such as "Análisis comparativo de las necesidades ambientales de las PYME en Chile, Colombia y México" (Comparative analysis of the environmental needs of SMEs in Chile, Colombia and Mexico) argue how SMEs are capable of generating between 75% and 90% of employment in the region, and between 89% and 99% of all companies are SMEs, thus showing that their capacity to contribute to regional GDP is close to 60% of the total wealth produced (Araya, 2003).

In spite of the above, the number of registered SMEs in Colombia decreased by 6.6% in 2018 in comparison to 2017. The sectors that suffered the most drastic decline are trade; construction; professional services; and scientific, technical, and manufacturing activities. In addition, the regions with the greatest number of closed companies are Bogotá and Cundinamarca, Antioquia, and Valle del Cauca (Red de Cámaras de comercio CONFECAMARAS, 2018). These facts are interpreted as a loss in SME dynamics, which also translates into business informality, caused by tax burdens and rigidity in personnel hiring models among other aspects that will not be analyzed because they are not relevant for the purposes of this study.

Another important aspect with regard to these key findings is the severe difficulties faced by SMEs in Colombia. There are five areas that prevent SMEs from growing and consolidating. First, short-term vision hinders the design of ambitious strategic plans both in terms of the market and the company's structural expansion, as well as the linking of new market resources and management based on telecommunications and information technology. This is related to the fact that small business owners spend a large amount of time performing operative activities and little time planning for value generation. The access to and use of formal and appropriate financing sources is an almost unknown concept for small and medium businesspeople who end up resorting to informal, costly, and inefficient funding. This triggers adverse effects such as illiquidity and an impossibility to modernize the company. Ignoring the importance of company modernization also leads to apathy toward expansion, business diversification, market sophistication, and process

innovation, which results in stagnation. This causes a lack of sophistication in processes; thus SMEs tend to maintain labor-intensive and generally obsolete production techniques, which stifle the company's competitiveness. Finally, the high levels of labor informality typical of the model are shown in the little or nonexistent interest in people's qualifications and in hiring or developing formal studies to understand the company's internal and external situation and impaired ability to propose innovative solutions (Asociación nacional de de instituciones financieras ANIF, 2016).

Instrument development and validation

In order to take better advantage of the results achieved so far, the instrument was required to identify first-hand key variables that allow for a detailed understanding of the main difficulties that affect Colombian SMEs. Thus, the instrument was developed to deal specifically with those areas reported in the literature review. It was then decided to propose a diagnostic instrument that contemplates market management, the inherent aspects in financial administration, human talent management, and access to technologies and innovation. Therefore, a proper instrument that allows for a company diagnosis was built. To this end, the methodology devised by the University of Texas known as SBDC is taken as reference because it is promoted by the Colombian Ministry of Industry, Commerce and Tourism as the official methodology for studying SMEs. (Turismo, 2014)

The next step consisted of applying the diagnostic instrument to a pilot sample of 15 companies located in the region of influence. The sample was randomly extracted from a company database that has been studied by the two institutions for some time and that is comprise of most of the companies in the town of Chapinero, Bogotá. In this phase, students and apprentices enrolled in the research seedbeds of the two institutions involved and were in charge of field work. At the same time, six experts contributed to validating the instrument based on their experience in SME consultancy.

The instrument considered some relevant aspects. In the area of human talent management, it was designed to inquire about personnel recruitment and the quality of such process, the approaches to leadership and company management, the existence of compensation plans, and the activities or programs for human talent qualification. In the financial area, it analyzed the strategies to build profitability and create value in businesses, the differences between personal and company assets, working capital management techniques, the use and application of financing sources and the

internal capital structure, among others. From the market viewpoint, the instrument examined aspects such as market segmentation knowledge, competitor identification and management, market expansion plans, market research, advertising, and diversification and distribution channels management, among others. In short, the instrument was structured as a checklist involving five areas: Human Talent, Finance, Accounting and Administration, ICTs, and Markets. In each area, broken down in 35 points, the status of SME functional areas was verified, and a diagnosis was produced based on such information, allowing not only to understand the current business status but also to propose improvement actions.

Diagnosis indicators

The instrument developed shows how a businessperson undertakes activities such as human talent management by gaining knowledge about the processes used to fill job vacancies, position design, professional profiles, staff turnover controls, incentives, promotions, performance evaluations, qualification plans, types of contracts, salary scales, work teams, leadership styles, decision-making paths, participation models in planning area improvement, work safety plan management, workload equity, and socialization of organization goals and objectives, among others.

Regarding the indicators associated with market knowledge and management, the instrument examines aspects such as the clarity in gauging demand, the status of customer management systems, the market focus in local, federal and international terms, market expansion plans and product design for local, federal or international clients, the acquaintance with the regulations of current and potential markets, the identification of direct and indirect competition, market research tools and goals, sales management tools, the quality and clarity of marketing plans, market segment identification and planning, the quality of distribution channel management, the development and use of digital market management tools, the proper use of pricing methods, the use of SWOT tools to identify success factors in the market, and the use of advertising and communication strategies.

Finance, accounting, planning, and financial management were approached from the perspective of the company's ability to manage information and the use of management tools based on such information. Thus, we researched aspects such as the status and availability of accounting information, IFRS implementation processes, funding sources for projects undertaken by the company, working capital management, managers' ability to identify profitability, cost and expense factors, and knowledge to implement contingent shock plans to organize financial results,

among others. In addition to these three main areas, the instrument measured the status of digital technologies adoption applied to administrative, productive, and market processes, examining aspects such as the implementation of digital techniques for client management and distribution channels, the use of data mining and big data for market research and expansion, the existence and legal use of specialized software for financial, accounting and human talent management, the existence and use of software specialized in production and quality monitoring, and the development or appropriation of specialized APS for its internal processes across the company's operating areas, among others.Another aspect contemplated by the instrument was related to the company's basic information to achieve its characterization. It was interesting to unveil aspects such as the economic sector, subsector, and company size.

Each area of diagnosis contemplated in the instrument was assessed by an expert in the field, prior to performing the pilot test. Once the pilot was completed, flaws affecting interpretation of the questions were identified, which were then validated by experts who helped to correct them.

Field work

As a result of the work carried out in phases prior to this research project, it was possible to consolidate a database made up of 30 SMEs, which have been linked to some processes adopted by the Colombian learning service (SENA in Spanish) aimed at promoting and consolidating SMEs. These companies do business in various sectors of the economy. Given the limitations and characteristics of this project, these 30 companies were taken as the universe, and their owners and/or directors were contacted in order to inquire whether they would provide strategic private information. With the entrepreneurs' approval, the group of interviewers responsible for gathering the information was trained.

The instrument was used by a group of students from the School of Administrative, Economic and Financial Sciences of Fundación Universitaria del Área Andina, belonging to the research seedbed of La Vitrina, who were extensively trained on the use of the information collection instrument, the project goals, and the characteristics of the information required. Six companies were randomly assigned to each student and three visits were made to each company linked to the test. The purpose was to ensure the quality of the information used in the diagnostic test. The first visit involved getting acquainted with the businessperson and gaining his/her trust to facilitate the application of the instrument. The second visit was made to make the initial diagnosis, and the third visit was to

confirm, correct, supplement, and purge the information collected during the previous visit. The visits were carried out every 15 calendar days, to allow for a reasonable time between each visit. After this process, the information was systematized, the variables were triangulated, and the statistical models were run to arrive at conclusions. This work was carried out between November and December 2018.

Investigation results

Size of the companies under study

The companies were characterized while taking into account the following two variables: the economic sector they belong to and their size measured by the amount of assets, annual sales volume, and equity value. Regarding the economic sector, it was found that 64.5% belong to the service sector, 19.4% are industrial companies, and 16.1% belong to the commercial sector. Regarding the size measured by the amount of assets, sales volume, and equity, the results show that the largest company among the 30 companies observed has $20 billion in assets, sales amounting to $31.7 billion, and equity of $11.6 billion. The smallest company has $3.5 billion in assets, $2.6 billion in annual sales, and equity of $2.3 billion. The geometric mean of these variables stood at 2.032 billion for assets, 2.378 billion for sales and 1.614 billion for equity. Based on these results, it is possible to notice the large difference between large and small companies, as well as the high level of dispersion of the data measured (Tables 1, 2, and 3).

Table 1 : Characterization of the 30 companies according to their asset value

Characterization of the 30 companies according to their asset value in 2017	
Mean	$ 2.032.854.040,41
Standard deviation	$ 4.274.878.322,44
Sample variance	1,82746E+19
Kurtosis	11,48123602

Asymmetry coefficient	3,288134399
Minimum	$ 3.500.000,00
Maximum	$ 20.002.358.896,00

Source: data from this research.

Table 2. Characterization of the companies according to their sales amount

Source:

Characterization of the companies based on sales amount in 2017	
Mean	$ 2.378.225.006,63
Standard deviation	$ 6.342.042.517,10
Sample variance	4,02215E+19
Kurtosis	17,49179182
Asymmetry coefficient	4,109251841
Minimum	$ 2.600.000,00
Maximum	$ 31.795.645.270,00

data from this research

Source: data from this research

Table 3. Characterization of the companies according to equity Characterization of the companies according to equity in 2017

Mean	$ 1.614.536.480,48
Standard deviation	$ 3.209.468.970,90
Sample variance	$ 1,03007E+19
Kurtosis	$ 5,419534648
Asymmetry coefficient	$ 2,565567239
Minimum	$ 2.300.000,00
Maximum	$ 11.602.346.000,00

Market knowledge

To measure this variable, the measurement instrument that was developed and validated was applied. This instrument includes 20 factors: capacity to quantify demand, availability and use of customer management systems, clarity in the market approach and coverage, models for product planning and design, activities for innovation planning, capacity for competition analysis, use of market research techniques, sales management plans and techniques, logistics management planning and techniques, use of advertising, use of marketing planning, and price approaches, among others. These aspects of the market are qualified by means of a Likert scale from 0 to 50, where zero implies absolute ignorance of the market-associated factor and 50 implies full knowledge of it. This way, a simple average is calculated, which is the market knowledge score of each of the related companies. Thus, it was possible to observe that the company with the greatest market knowledge scored 45 points, while the one with less knowledge got 24 points. It was also found that the average market knowledge score was 34 (Table 4).

Table 3. Market knowledge

Market knowledge	
Mean	34
Medium	35
Mode	33
Standard deviation	6
Sample variance	36
Kurtosis	-1.0
Asymmetry coefficient	-0,2
Minimum	24
Maximum	45

Source: data from this research

In relative terms, it may also be asserted that out of the 30 companies studied, half got a score above the mean, which means that half the companies have little market knowledge, or their market knowledge is below the mean (see Graphic 1).

Graphic 1. Market knowledge
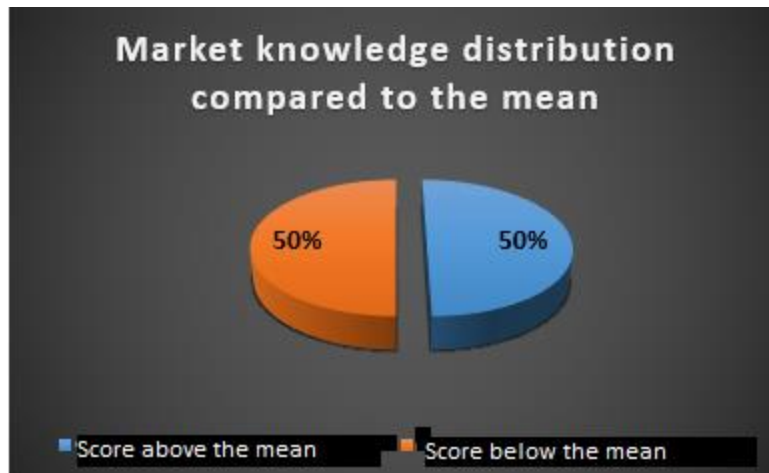
Source: data from this research

The companies' profitability, net margin, return on assets, and return on equity were analyzed based on the information reported in the financial statements of the 30 companies. Thus, the highest net margin reached 34.2% in 2017; the lowest amounted to −22.5%; the average net margin found in the sample was 10.3%; and the most recurring profitability stood at 30% (Table 5).

Table 4. Net profit margin

Net profit margin in 2017	
Mean	10.3%
Medium	12.7%
Mode	30%
Standard deviation	15.8%
Sample variance	0.025044810
Kurtosis	−0.564477842
Asymmetry coefficient	−0.453455106
Minimum	−22.5%
Maximum	34.2%

Source: Data from this research

Meanwhile, the highest value of return on assets and equity for 2017 stood at 266.7% and 78.9%, respectively. The lowest percentages were −69.7% and −167.5% for return on assets and equity, respectively. The geometric mean for these values stood at 22.9% and 22.8% for return on assets and equity, respectively (Tables 6 and 7)

Table 5. Return on assets

Retune on assets in 2017	
Mean	22.9%
Medium	16.7%
Mode	60.0%
Standard deviation	54.8%
Sample variance	0.300820778
Kurtosis	1370.6%
Asymmetry coefficient	299.5%

| Minimum | −69.3% |
| Maximum | 266.7% |

Source: data from this research

Table 6. Return on equity

Return on equity in 2017	
Mean	15.4%
Medium	22.8%
Mode	
Standard deviation	47.5%
Sample variance	0.225816091
Kurtosis	6.747847114
Asymmetry coefficient	−1.896886375
Minimum	−167.5%
Maximum	78.9%

Source: data from this research

Other results

Three fundamental questions arise from combining some of the results presented above: If the company has a deeper understanding of its market, can it achieve better profitability indicators? Does company profitability depend on its size? Does market knowledge depend on company size?

In order to answer these questions, linear regression models were built to link the variables order to show the correlation coefficients based on their statistical behavior and, thus, establish the association levels between the variables. First, when considering market knowledge as an independent variable and the companies' profitability as a dependent variable, the correlation coefficient between market knowledge and net margin (0.59) shows that there is an average correlation between these two variables. The combination of market knowledge and return on assets reveals that although there is a correlation (0.37), it is lower than in the previous case. The combination of market knowledge and return on equity remains the same as the previous one, with a correlation of 0.39. Moreover, there is a direct relationship between the three dependent variables

(net margin, return on assets, and return on equity) and the independent variable (market knowledge), so it may be inferred that the greater the market knowledge of SMEs, the greater the profitability it achieves and the stronger the impact on net profit margin, followed by return on equity and return on assets (Table 8).

Table 7. Profitability–market knowledge correlation matrix

CORRELATION MATRIX			
Related variables	Profit margin	Return on assets	Return on equity
Market knowledge	**0,55993272**	**0,37998979**	**0,39038365**

Source: date from this research

Then, by measuring the correlation between company size and profitability, taking the latter as a dependent variable, it was found that there is an inverse relationship between profitability and the size of the assets: the bigger the company, the lower the return on assets; whereas there is a direct relationship between company size, net margin, and return on equity. Bigger companies will have higher return on equity and a higher net margin (Table 9).

In addition, it was evidenced that there is a weak correlation between company size and profitability, highlighting that the highest correlation is given if the size of the company is measured by the equity value, and the net margin is taken as a reference of profitability. However, if the size of equity and the return on equity are taken as a reference, this correlation is almost nonexistent (Table 9).

Table 8. Size-profitability correlation matrix

Size – profitability correlation matrix for the 30 companies		Profitability according to		
		Net margin	Return on assets	Return on equity
Size according to	Sales	0,02938148	−0,01166025	0,07068172
	Assets	0,11701018	−0,09009064	0,01306305
	Equity	0,20470926	−0,05948024	0,00890291

Source: data from this research

Upon determining whether bigger companies have a better understanding of the market, we found that there is a direct relationship between these two variables. However the correlation is very low, arguing that size is not a determining variable for the company to know its market better. Measuring the size of the company according to its amount of assets shows a better correlation with market knowledge (Table 10).

Table 9. Market – company size correlation

Market−**company size correlation matrix**	Company size		
	Sales	Assets	Equity
Market knowledge	0,26675816	0,26559721	0,32495819

Source: data from this research

Conclusions

Even though the literature consulted refers to a large proliferation of SMEs across economic sectors, the study limitations show a limited manifestation of these sectors given the territorial limits on which it was developed and that they are greatly oriented to trade because it is an urban area. In addition, there is major disagreement regarding the classification of companies as SMEs because even though local regulations clearly establish the parameters for classifying companies as SMEs, there is heated debate in the academic community and other business circles based on solid arguments, and this causes confusion and, at times, some uncertainty. Another aspect, which perhaps can be inferred from the previous reflection, is that research in this area is complex because there are considerable differences in both company size and characteristics.

Regarding the variables that were taken as determinants for the study, although the SMEs that have a better understanding of their market get better profitability indicators, market knowledge does not offer a definite explanation about profitability and there is enough room for studying other variables mentioned in the literature consulted, such as the qualifications of company directors, their knowledge of financial management tools, the time spent in planning, the availability of technological resources and the ability to innovate, among others.

In particular, in order to carry out the study, it was assumed that companies have a minimum degree of organization and, consequently, at least an accounting system organized according to local standards, a clear internal organization system that differentiates strategic activities from operating activities, and knowledge and monitoring of their final market variables. However, we encountered great difficulties when carrying out field work because many companies chosen are very informal, do not keep historical information, and do not plan their responses to market conditions.

Subsequent studies should not establish territorial limitations and, if so, instruments that arrange measurements in sectors should be defined using more homogeneous samples; for example, companies should be grouped by economic sector and studied under this parameter, and the same method should be adopted for variables such as sales volume, administrative body complexity, size and market coverage, among others.

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