

Article

Sustainability through Operational Excellence: An Emerging Country Perspective

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Abstract: Operational excellence is directly related to improving performance and efficiency in every dimension of sustainability (i.e., economic, environmental and social). Consequently, companies are implementing this initiative to remain competitive in their industries. Previous works measured operational excellence in first-world companies. However, it is expected that the productivity level in many companies from developing or emerging countries is far below the average level of developed companies. In this context, the research objectives of this study are to (1) evaluate the level of implementation of operational excellence, impacting the three dimensions of sustainability simultaneously in some companies from the central-savanna region of Colombia; (2) compare their implementation status with similar studies carried out in companies of developed countries. In order to solve it, we first present an empirical assessment of operational excellence in that region using semistructured interviews in 79 different companies. Then, we compare the obtained results with the assessments available in the literature. Our results show that operational excellence performance in Colombian companies is lower than in developed companies in terms of economic performance by operations standards and continuous improvement schemes, environmental sustainability and social sustainability.

Keywords: sustainable development; sustainable manufacturing; operational excellence; semistructured interview; emerging economies



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1. Introduction

It is widely accepted that the concept of operational excellence involves economic, social and environment aspects [1,2]. From the economic point of view, operational excellence in a company can be measured by efficiency in operating costs, used in operations and continuous improvement schemes. These schemes can be traditional and well-known, such as lean manufacturing or six-sigma, among others, or simply models developed for each organization [3]. Waste reduction, pollution reductions, improving the efficiency of processes, energy efficiency, emission reductions and others, represent environmental sustainability and social sustainability provides equitable opportunities, encourages diversity, promotes occupational health and safety at work [4–6]. These are the three aspects of sustainability according to operational excellence: economic sustainability, environmental sustainability and social sustainability [7].

The term sustainability, from a company's perspective, can be defined as an operations strategy that simultaneously considers the economic, environmental, and social impact of the processes executed by the organization [5,8]. Nowadays, this operations strategy is an important requirement for companies due to established and also emerging environmental concerns, such as increasing consumer preference for environmentally friendly products, inflated energy costs and stricter legislation [6,9,10].

Many companies in developed countries have already introduced operational excellence schemes to achieve sustainability [11], as these schemes impact the three fun-

damental pillars (i.e., economic, environmental and social sustainability) [1,2,12]. Operational excellence consists of the continuous developments that companies employ to attain a competitive edge (i.e., the best practices and efforts within their industries for continuous improvement) [13].

Modern organizations in developed countries that work under operational excellence seek to maximize benefits and in turn satisfy the needs of customers and other interested parties, such as society and the environment. Many researchers have devoted considerable attention to developing models of operational excellence [7,14–16]. Additionally, there have been several studies, dating from before the 2000s [17–19].

Most studies of operational excellence initiatives have been carried out in developed countries, where satisfactory implementation results are observed today [20]. However, in developing countries, there is not much information to be found, and in current existing information, the degree of implementation is still lower than in developed countries [21].

Consequently, companies from emerging markets need guidance on measuring and evaluating the level of development for operational excellence schemes [11], thus opening an exploration gap about the status in terms of operational excellence in companies from these developing countries. The motivation of this study is to fill that gap by the research about that status in some companies from different economic sectors, within a country with an emerging economy. In the same way, make a comparison of these results with similar studies carried out in companies that belong to developed countries, to observe if the operational excellence status is coincident.

This study evaluates to what degree some companies in the central-savanna region of Colombia (which includes Bogotá) are working in terms of operational excellence, impacting the three aforementioned pillars—economic, environmental and social—simultaneously. In this context, we propose the following research questions:

- What is the degree of implementation of operational excellence in companies of emerging countries impacting simultaneously the three dimensions of sustainability?
- What is the operational excellence implementation status in emerging countries compared with similar studies carried out in companies of developed countries?

To that end, there were invited up to 125 companies of different sectors and sizes to participate in a semistructured interview for this study. These companies were selected using a nonprobability sample for convenience, taking into account its geographical proximity. Finally, 79 companies from 11 different sectors and sizes accepted to participate in this research. The results were used to compare the work done in terms of operational excellence carried out in companies in developed countries. In this way, the analysis of the survey results not only estimates the number of companies that work under complete operational excellence schemes in the Colombian region under study, but also makes it possible to compare these companies to companies in developed countries.

The organization of the paper is as follows. The literature review is presented in Section 2, while the research method is presented in Section 3. The results and the comparison with companies in developed countries are presented in Section 4. Finally, the main conclusions of this study and opportunities for further research are presented in Section 5.

2. Literature Review

In this section, the main objective is to understand the essence of what operational excellence is and its relationship with sustainability. To do so, we present and explain in depth the three fundamental concepts, namely economic sustainability, environmental sustainability and social sustainability, from the perspective of operational excellence. Additionally, as part of the study consists of comparing the results from first-world companies against the results of the companies evaluated in our research, similar studies carried out in first-world countries will be presented in this section.

2.1. Operational Excellence

In operational excellence, the word “operational” refers to the assembly and distribution of a product and to the accomplishment of a specific task, while “excellence” refers to a goal that must be met and sustained in order to remain outstanding [22]. In addition, operational excellence is directly related to improving performance and efficiency in all dimensions that the industry presents [2]. It is associated with both the operating performance (such as measures of expense, quality, and resilience) and sustainable performance (such as dealing with individuals and resources effectively to support business expansion) [23].

In order to increase customer worth, operational excellence is as concerned with manufacturing processes as it is with waste minimization, and it generates interactions between employees and customers [12]. The correct management of operational excellence increases operating profits by ensuring that it is stable in the production system, which supports customers by offering them fair value for the products and services provided. In order to attain operational excellence toward sustainable practices in industries, all three sustainability aspects—social, environmental, and economic—must be studied [24].

The social aspect of sustainable operational excellence helps to intensify business expansion and stabilize the programs within it; industries operate to obtain economic benefits and generate profits. The economic aspect of sustainable operational excellence seeks to ensure in a low way the economic profitability of the organization, in such a way that sustainable operational excellence can only be achieved if it generates an economic impact, but this should not generate negative results for the environment and the society. The environmental aspect of operational excellence decisions that lead to negative environmental outcomes must be eradicated, even if such decisions are highly profitable for the industry [1].

Figure 1 shows a sustainable operational excellence scheme according to [1], where the three aforementioned aspects are the fundamental pillars, and are going to be described better in Sections 2.1.1–2.1.3 below.



Figure 1. Sustainable model of operational excellence [1].

2.1.1. Economic Sustainability in Operational Excellence

Economic sustainability is defined as the ability of an economic process to autoreplicate itself, to preserve its ability of autoreplication and to preserve its structure [25], which means that for operational excellence, a sustainable economy is based on the correct use of the tools needed to enhance economic processes.

The steady search for profit in the economic environment of sustainability as defined in operational excellence focuses on the correct use of tools including six sigma, which is used to identify and rectify errors and eliminate defects from a process and improve the quality of a manufacturing process [26]; lean manufacturing, which supports manufacturing

companies that constantly seek to improve in different areas, reduce production cost, improve quality [27], reduce lead times [28], and increase flexibility [29]; balanced scorecard, a carefully selected set of measures derived from an organizations strategy [30]; other tools such as business process reengineering (BPR) and performance benchmarking.

2.1.2. Environmental Sustainability in Operational Excellence

Operational excellence is generally present in all business decisions that lie behind the products produced and the services provided by companies. Product and service manufacturing processes involve various tasks and activities, which have an impact on the environment. Thus, for operational excellence to be sustainable, the actions and decisions taken should consider the protection of the natural world [31].

Environmental sustainability is relevant for operational excellence because the idea is also to conserve natural resources, human's surroundings and overall ecosystems without compromising human development goals [32]. Therefore, if the decisions regarding operational excellence show very profitable results but cause negative impacts on the environment, they will be discarded. All processes should be environmentally compliant, unless they will not be sustainable in the long run. Many companies across the world have struggled to cope with these challenges. Some companies now allocate a fund to support, for instance, greenhouse gas reduction projects. The operational excellence models should take this impact into account, otherwise they will result in failure [33].

2.1.3. Social Sustainability in Operational Excellence

Operational excellence also considers factors external to the organization, such as the environment and society. Social sustainability reflects a broad set of basic human needs that should be met without harming nature and its regenerative abilities over time [27]. Social sustainability consists of identifying the positive and negative impacts of the company's operational excellence programs on society. Therefore, if operational excellence practices can assist in social improvement, this may lead to opening or attracting new businesses and sustaining the present collaborations [34].

Furthermore, social sustainability encourages diversity, provides equitable opportunities, promotes a one-sided connection within and outside the community, ensures a good quality of life, and provides democratic processes and responsible and appropriate governance structures [4]. In this way, operational excellence seeks to generate positive impacts in all sectors involved in society [22].

2.2. Previous Studies on Operational Excellence in Companies from Developed Countries

Varieties of studies have been carried out to evaluate the performance of at least two of the three aspects (economic, environmental and social) that make up operational excellence using semistructured interviews. For example, the authors of [20] conducted a study in Sweden through the Lowell Center for Sustainable Production (LCSP), that evaluated nine principles of sustainable production, which refer to practices in product design (Principle 1), reduction and elimination of waste (Principle 2), polluting factors (Principles 3 and 4), various aspects that involve workers (principles 5, 7 and 8) and economic factors (principles 6 and 9). In that study it is possible to find the three aspects of operational excellence. The study, in which interviews were conducted in 12 companies from different sectors, attempted to present empirical evidence of adherence to the LCSP sustainable production principles through practices in the manufacturing sector [20]. The study was inspired by the fact that manufacturers have become increasingly aware of the impacts of their operations on what is called the triple bottom line: people, planet and profit. Added to this is a growing pressure on companies to account for their consumption of resources and what is known as the environmental footprint [8].

Similarly, the authors of [35] conducted semistructured interviews in 56 companies from 16 different countries in the world, all considered to be industrialized and developed countries. The study evaluates the relationship between environmental practices and

their economic impact. In this case, two of the three pillars of operational excellence were specifically analyzed: economic and environmental. In this study the authors show relevant information on social practices that complement operational excellence [35]. The study turns on two main research questions: what types of environmental management practices do these companies handle, and which of these informed environmental management practices are associated with the short- and long-term financial performance of these companies? Only listed companies from developed countries and which had data and environmental reports published online were taken into account in the study [35].

Finally, a study performed in Spain, used semistructured interviews in 58 different companies to discover how manufacturing companies carry out manufacturing and environmental practices simultaneously, taking into account that manufacturers have become increasingly aware of the impacts of their operations on social, environmental and financial aspects which are the three fundamental pillars of operational excellence [36]. In that study there is a contribution to the current debate within the environmentally friendly manufacturing literature that argues that companies with advanced manufacturing practices do not proactively engage with tactical and strategic environmental management practices [36]. That paper allows us to see studies that have been carried out within the framework of at least two of the three pillars of operational excellence and their results in developed countries.

The methodology we followed to evaluate the performance of companies in the three aspects of operational excellence (economic, environmental and social) are presented in the next section. In addition, the analysis of results, including a comparison between results our study with previous ones, is presented later in Section 4.

3. Research Method

In order to answer the two research questions of this study (i.e., the degree of implementation of operational excellence in emerging countries and its comparison with companies in developed countries) we defined the methodology described below and summarized in Figure 2.

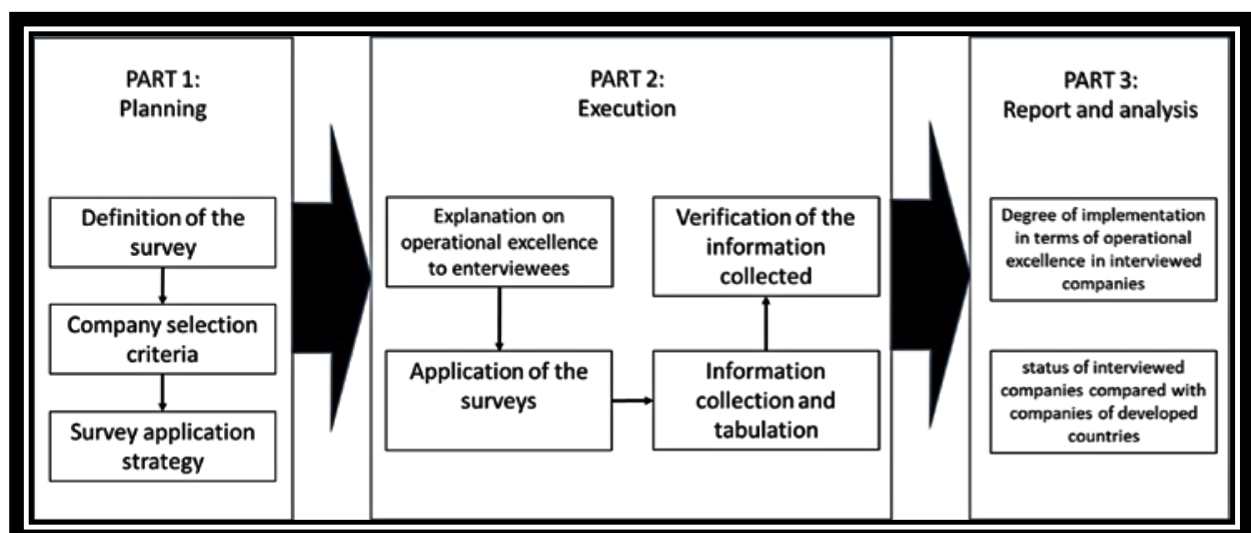


Figure 2. Steps of the research.

The primary method of data collection was to conduct semistructured interviews with operations managers and also administer to them an open-ended survey that inquired into continuous improvement, social and environmental practices as part of their company's processes of operational excellence [37]. The survey proposed in this study is included in Supplementary Materials. Before the interviewees gave their answers, they were given

explanations and some well-known examples of operational excellence, ensuring that all interviewees had the same understanding of the context of the study. Additionally, it was sometimes necessary to standardize interviewees' answers in terms of the academic literature regarding operational excellence. In the interview physical business characteristics such as company age, size (according to the income) and business sector were also noted.

Following the proposed sampling procedure for questionnaire formatting, distribution, and collection [38], a semistructured survey was created and then administered to the companies directly via a representative member of the operations area by telephone, email or face-to-face at the company's premises. The survey promised to keep the data confidential [39].

The survey has four pillar sections. First, we asked respondents if they manage any type of operations and continuous improvement scheme, one that may be based on lean manufacturing, balanced scorecard, six-sigma, another established scheme or simply the company's own. Next, if they did manage some type of environmental practice, we asked whether it was focused on complying with environmental regulations or if they go beyond these laws. After that, we asked if they had some kind of social practice with their employees in terms of industrial security or occupational health. Finally, it was asked if they had any type of certification from the point of view of standardized processes, the environment, industrial safety or an integral management certificate that includes the above three.

This study was conducted in Colombia, specifically in Bogotá and small towns around that city (central-savanna region). In the region studied, there are 295,000 companies approximately. The survey was applied to companies of four different sizes, classified as large, medium, small, and micro according to their annual incomes in millions of Colombian pesos [40]. These companies are distributed among the following 11 sectors of the Colombian economy, which include the 75% of the companies in the region [40]: agriculture, food, automotive, construction, education, entertainment, pharmaceuticals, chemicals, retail, clothing and footwear, and health and beauty. This is significant because in order to evaluate environmental performance and social practices as part of operational excellence within companies generally, more studies that focus on the unexplored areas of the globe and industry are needed [41]. Table 1 presents the number of companies interviewed per sector, while Figure 3 shows the number of companies by size.

Table 1. Number of companies interviewed per sector.

SECTOR	Number of Companies
Automotive	12
Food	11
Retail	9
Clothing & footwear	8
Construction	7
Entertainment	7
Chemicals	6
Health & beauty	6
Education	5
Agriculture	4
Pharmaceuticals	4
Total	79

The companies interviewed are summarized in Table 2 according to sector and size. The survey asked about operational excellence.

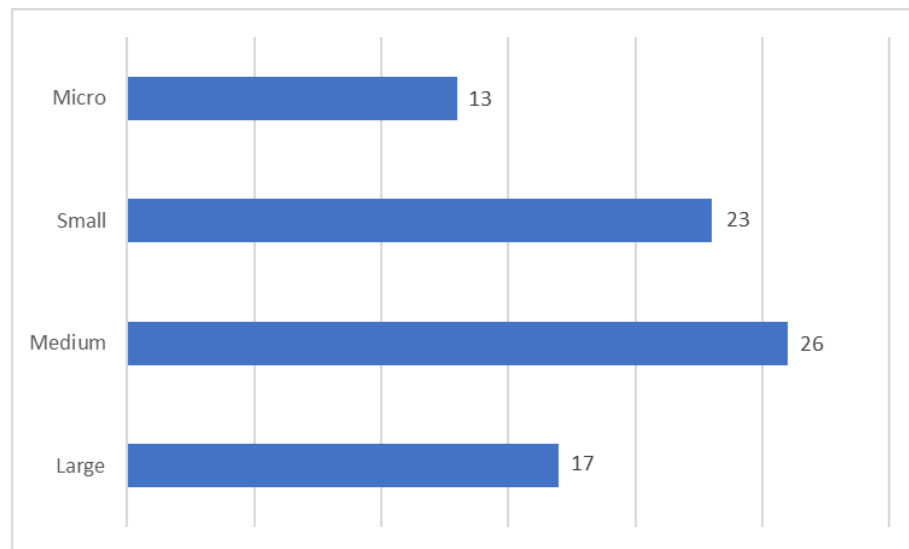


Figure 3. Number of companies interviewed per size.

Table 2. Number of companies interviewed per sector and size.

SECTOR/SIZE	Micro	Small	Medium	Large	Total
Automotive	4	2	6	0	12
Food	1	7	1	2	11
Retail	1	3	3	2	9
Clothing & footwear	1	3	3	1	8
Construction	0	1	3	3	7
Entertainment	1	2	2	2	7
Chemicals	0	2	1	3	6
Health & beauty	1	1	2	2	6
Education	1	1	2	1	5
Agriculture	1	0	3	0	4
Pharmaceuticals	2	1	0	1	4
Total	13	23	26	17	79

The data from the interviews and visits was collected and refined. Then, the information provided by the respondents was verified in three different ways: insights from factory visits, direct observation, and information from company websites [36]. Among the 79 companies surveyed, only 57% of these hold a quality, environmental, industrial safety, or integral certificate. Of these certified companies, 20% have no evidence of the certifications on their web pages and they were not shown to us during the interviews, either.

Finally, the results of this study were used to compare the state of the Colombian companies that participated in the study against the results of operational excellence found in similar studies applied to companies in developed countries. Details of what has just been mentioned and the rest of the survey results are shown in next section.

4. Results

In this study, the three aspects of operational excellence mentioned above (economic, environmental and social) were taken into account for the companies analyzed, considering for the economic case operation and continuous improvement schemes, whether they own an in house developed system or if they used the traditional proposal. For environmental sustainability companies were asked about environmental practices and whether they

complied with current environmental regulations or went beyond. Finally, for social purposes, they were asked if they handle any type of practice in matters related to equitable opportunities, diversity, industrial safety, and occupational health. At the end of the survey, they were asked if they have any certification that supports any of the aspects studied in this paper. The following sections describe the results.

4.1. Operations and Continuous Improvement Practices or Schemes

According to Figure 4, of the 79 companies interviewed, 57% (45 companies) report using some kind of operations and continuous improvement schemes. Of this 57%, 53% use a scheme developed in house and the other 47% use a traditional scheme based on lean manufacturing or six-sigma, among others.

COMPANIES SURVEYED 79	USE OF OPERATIONS AND CONTINUOUS IMPROVEMENT SCHEMES	KIND OF SCHEME
	YES 45 (57%)	developed in-house 24 (53%)
NO 34 (43%)	Traditional 21 (47%)	

Figure 4. Number of companies using operation and continuous improvement schemes.

Of these companies, 78% are medium and large sized, as shown in Figure 5, which seems to show that the largest companies are the ones that adopt this type of practice to manage their operations, control their costs and engage in continuous improvement. Similarly, in Figure 6 it can be observed that in terms of sector, the food sector and clothing and footwear predominates. In food, it happens because it is a sector with a high number of companies studied, and they may be responding to local regulations which require companies in the food and medicine sector to comply with the decree of good manufacturing practices, given that their products are for human consumption [10]. The decree of good manufacturing practices requires high standards of control for all processes in the company and it even covers suppliers of goods and services. Exploring more about the operation and continuous improvement schemes used by the 45 companies shown in Figure 4, it is found that 53% of them (24 companies) use developed in-house schemes, and the others use traditional schemes (24% based on lean principles, 13% six sigma principles and 9% other schemes).

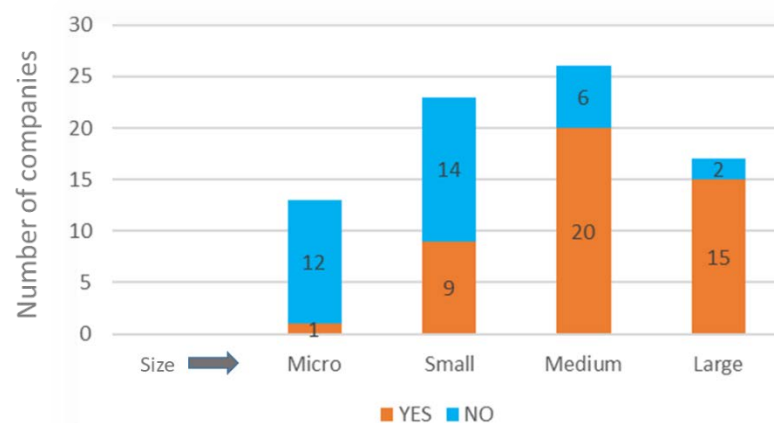


Figure 5. Number of companies per size using operation and continuous improvement schemes.

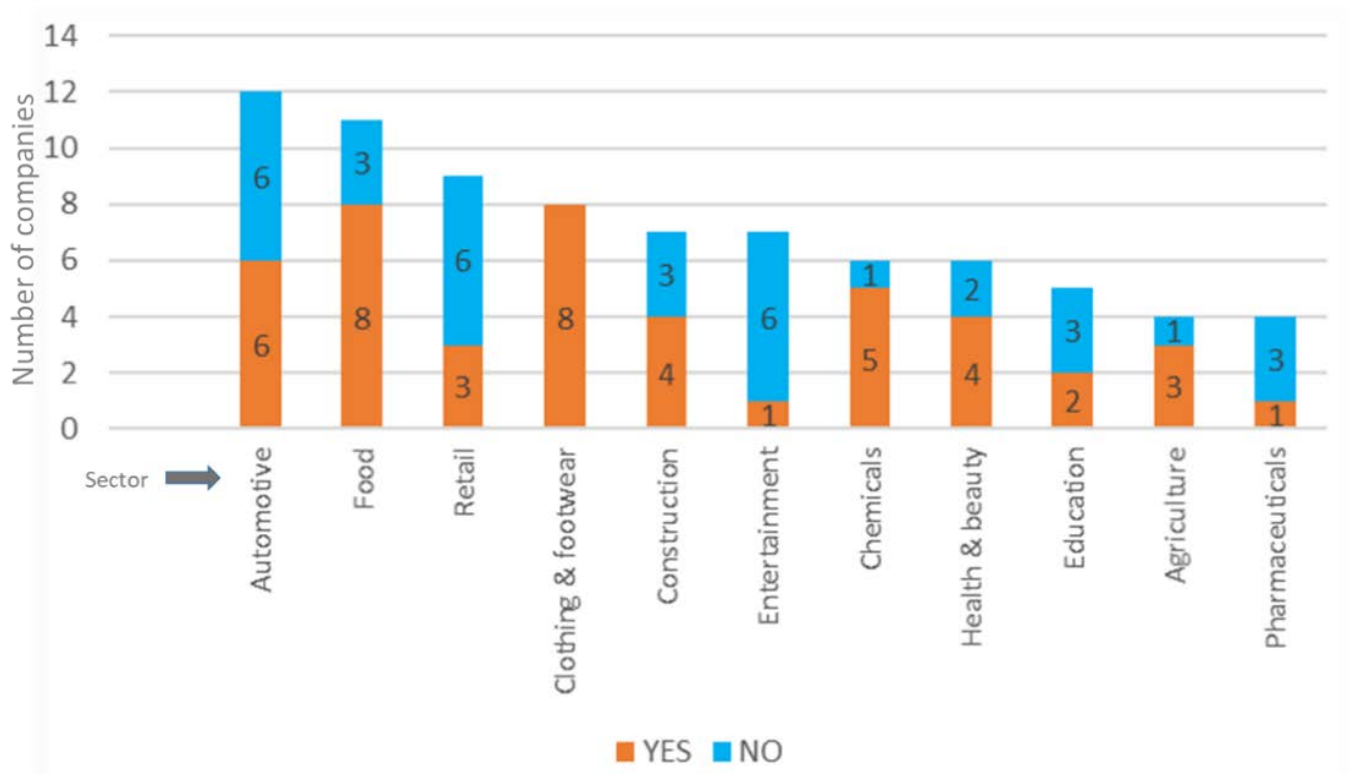


Figure 6. Number of companies per sector using operation and continuous improvement schemes.

4.2. Use of Environmental Practices

In the study carried out, results show that 54 companies (68%) claimed to have some type of environmental practice. In this case, it is important to note that, as a function of their economic activity, they are controlled by the environmental agency of the region, and thus they are forced to comply at least with the legal aspects. Figure 7 shows how many of these companies limited themselves to the minimum required by the government and how many go beyond.

COMPANIES SURVEYED 79	USE OF ENVIRONMENTAL PRACTICES	SCOPE
	YES 54 (68%)	Comply with regulations 36 (67%)
NO 32 (32%)	Go beyond regulations 18 (33%)	

Figure 7. Number of companies using environmental practices.

In this case, unlike in the operations and continuous improvement schemes, the scale is a little more balanced in terms of the size of the company. Figure 8 shows that those with the lowest environmental practices are micro companies. This could be because their low volumes of sale, production and operation makes them less susceptible to rigorous controls by legal entities, while the larger companies receive rigorous controls. Figure 9 shows the companies that have some kind of environmental practice, by sector.

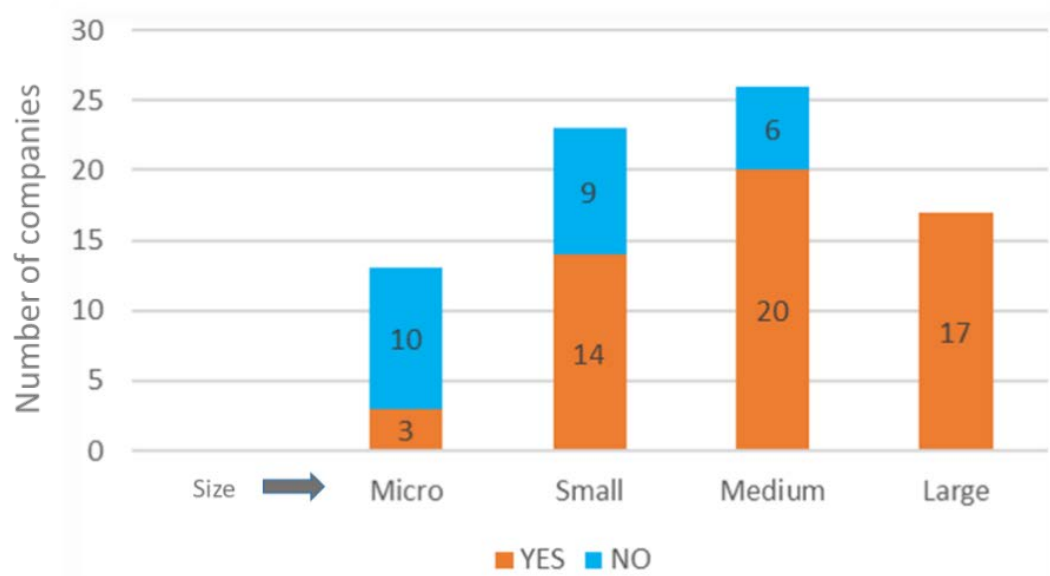


Figure 8. Number of companies per size using environmental practices.

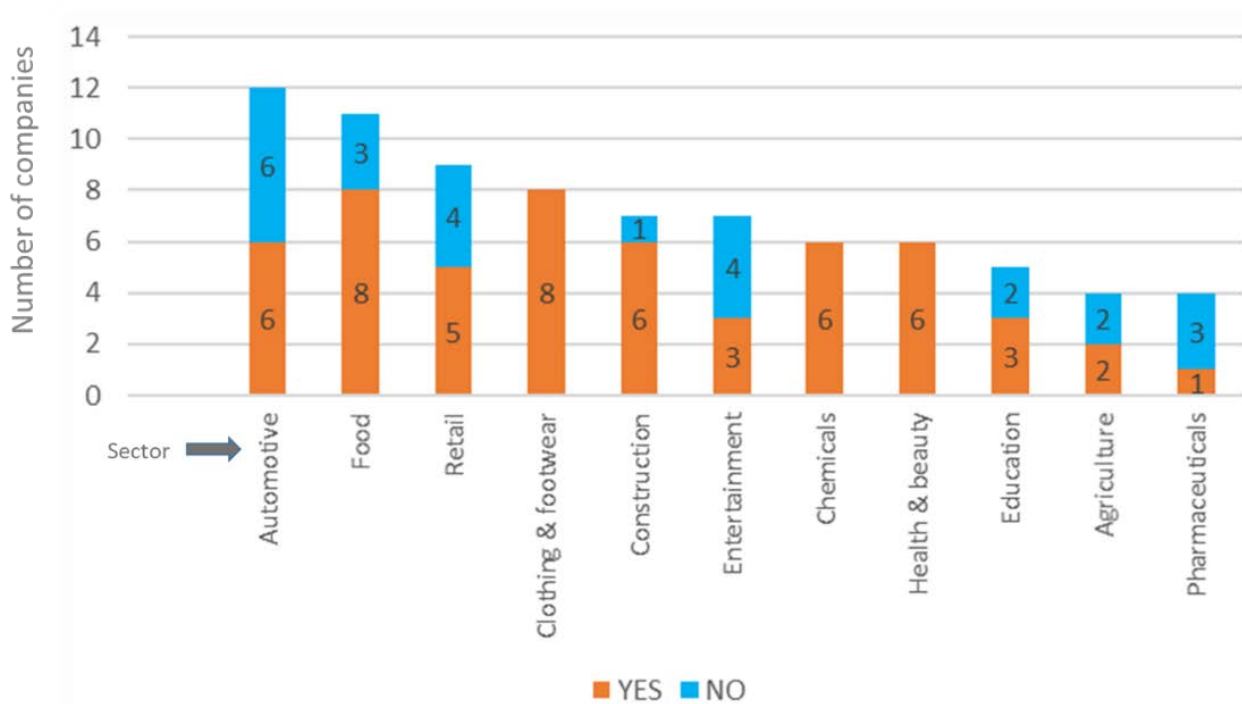


Figure 9. Companies per sector using environmental practices.

Although 68% of companies manage some environmental practice, only 33% of these, that are, 18 companies, go beyond the required environmental legislation. This shows that the environment is of utmost importance for these organizations and demonstrates their pursuit of excellence in this regard.

4.3. Use of Complete Internal Social Practices

As noted in the analysis of environmental practices, in Colombia a series of minimum conditions are required according to law. That is why from the internal social point of view, companies offer their workers adequate conditions for carrying out their work. The study found that 71% of the companies evaluated indicated that their internal social practices with their workers go beyond what is established in national legislation. Some of the

practices that they mention are family integration activities, the generation of training spaces in entrepreneurship for family members, management of family finances, time management and rewards for performance, such as jewelry. They also mention support in the form of extra salary bonuses, educational aids, career plans and a series of other benefit packages that go beyond the laws in terms of industrial safety and occupational health.

Figure 10 shows the number of companies that engage in complete social practices going beyond national laws. In addition, Figures 11 and 12 present the details in terms of size and sector, respectively. Of the 56 organizations that follow this type of social practice, nearly 62.5% correspond to medium and large size companies. In micro and small companies, on the other hand, very little is done in terms of this matter.

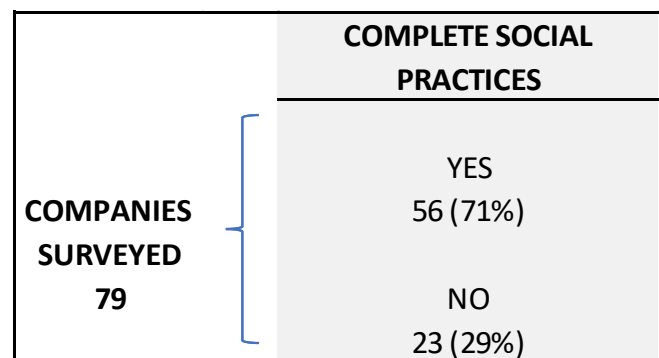


Figure 10. Number of companies using social practices.

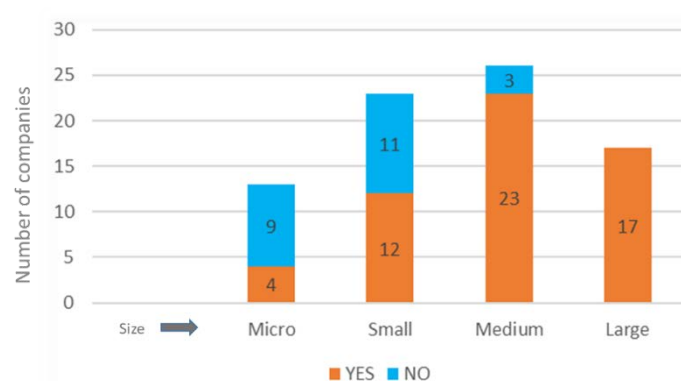


Figure 11. Number of companies per size using social practices.

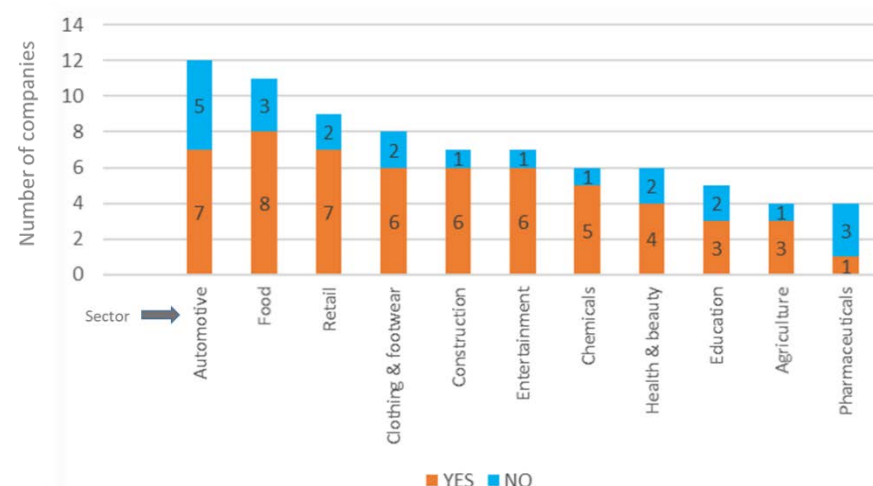


Figure 12. Number of companies per sector using social practices.

4.4. Companies with Certifications in Terms of Operational Standards, the Environment, Industrial Safety, or Integral Management

At the end of the interview, the companies were asked if they held any type of certification. First, if they handle a certification that ensures the standardization of operation and continuous improvement processes. As it is not easy to have a certification of some operation and continuous improvement practices because in many opportunities these are developed in-house, ISO 9001 can be a certification that ensures the standardization of the company's processes, and it is enough for the study. Then, some companies sought a certification that ensures the standardization of processes based on environmental practices, such as ISO 14,000 [5]. Finally, in the case of social practices, when studying the internal aspects, to be more exact with the employees, they were asked for an industrial safety certification, for example OHSAS 18,000.

Of course, an integral management certification is also valid, which brings together management by process, environmental and industrial safety standards. The results are presented in Figure 13. The results also show that the eight companies that hold an environmental certification also have one for standardized processes. There is only one company with certification in industrial safety, and that company also holds one for standardized processes. Certification in integral management is sought mostly by large companies, as they want to comply with the three pillars of operational excellence, and they prefer a single certification that includes all three of them rather than three separate certifications. Only two medium-sized and one small-sized company have an integral management certificate, but no micro companies have one.



Figure 13. Certifications results.

4.5. Companies That Engage in the Three Types of Practices and Can Be Considered as Working under Operational Excellence

In order to define the organizations that work under a complete model of operational excellence, companies that handle the three types of practices (economic, through a scheme of operation and continuous improvement, environmental, complying with legal requirements given by local government and going even further, and social, the companies that beyond the internal social practices required by laws take care about the well-being of their employees in other ways and demonstrate it) were taken. Results are shown in Figure 14.

COMPANIES SURVEYED 79	WORKING UNDER A PROGRAM OF OPERATIONAL EXCELLENCE	COMPANY SIZE
	YES 16 (20%)	Large 12 (75%) Medium 4 (25%)
NO 63 (80%)		

Figure 14. Number of companies working under a program of operational excellence.

These results show that it is difficult to find small or micro-sized companies that work under an operational excellence program. This opens a new line of research in studying where the causes of this gap lie. The large companies are mostly recognized Colombian multinationals and large international companies operating in the country. Figure 15 shows the number of companies working under a program of operational excellence by sector.

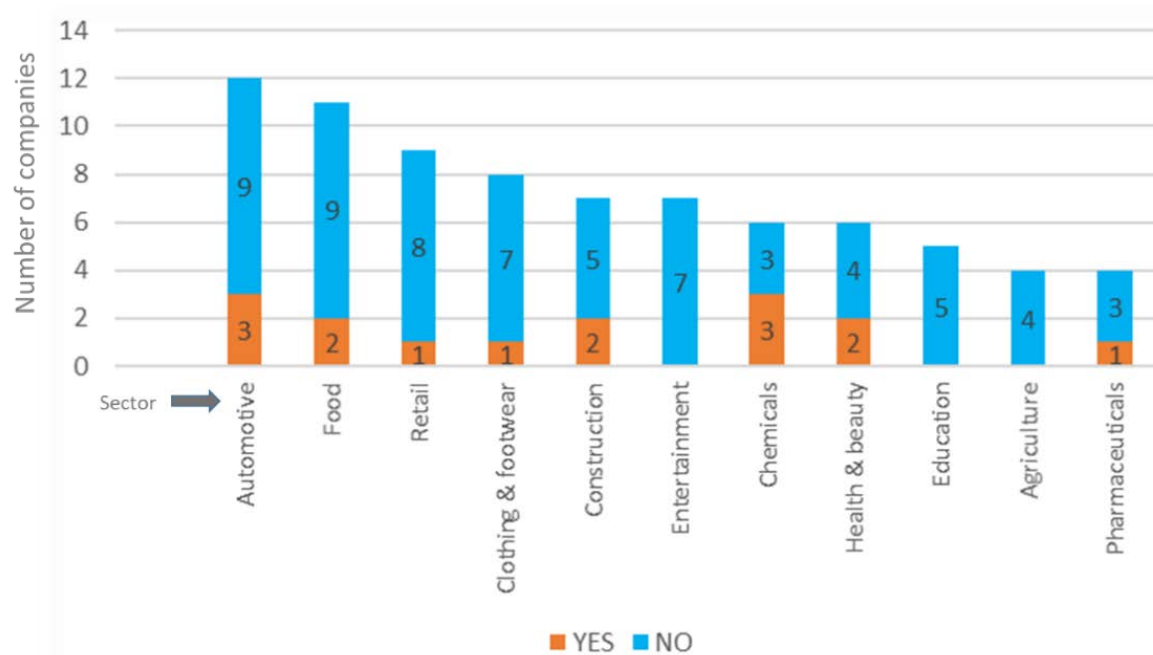


Figure 15. Number of companies per sector working under a program of operational excellence.

For the study carried out, it is also important to mention that of the 16 companies that work under an operational excellence program, almost all hold certifications that prove it. For example, 11 of these have an integral management certificate, which includes standardized process management endorsing production and continuous improvement schemes, environmental management and industrial safety management. Four companies hold at least one of the above certifications, and only one company has no certificate from any certifying body.

4.6. Comparing the Results Obtained with Other Studies in Developed Companies

Reviewing similar studies of companies in developed countries, the results found in the literature can be compared with the results found here. While no published study is 100% comparable, there are studies in which the three pillars studied here have been analyzed separately.

The authors of [20] conducted a study in Sweden, through the Lowell Center for Sustainable Production (LCSP) and presented an insight into how companies from different industries carry out manufacturing practices related to the principles of sustainable production. The study included 12 companies from the following sectors: plastics, metal machining and foundry, manufacturers of engines, hydraulic systems, and furniture. The study found empirical evidence of adherence to the LCSP's principles of sustainable production, which includes economic, environmental and social sustainability practices in the sectors studied. More specifically, this was the first study to explore adherence to LCSP's sustainable production principles in practice, involving both large companies and SMEs [20]. Table 3 compares the Swedish companies with the Colombian companies in this study.

Table 3. Comparison between the companies in Sweden in [20] and the companies in Colombia in this study.

Analysis of Companies in Sweden	Analalysis of Companies in Colombia
Most of the companies are addressing the three dimensions of operational excellence.	In the companies surveyed just 13% are addressing the three dimensions
Most companies still base their environmental practices on regulatory and market pressures, not so much tools that go beyond environmental laws. However, more proactive practices were found in some sectors such as foundry, metalworking, and engine manufacturing.	Most of the surveyed companies use environmental practices, and almost half of them go beyond regulations. The others just meet regulations
The social practices vary according to the size of the organization: while SMEs barely abided by the principles, large companies often engaged in proactive practices, anticipating or going beyond regulation. The retention of employees, for example was seen as part of their practices.	The effect is the same in the surveyed companies. All of the 11 large companies engage in these practices, while in the others there are just some of them, taking into account what by regulations they have to meet.

Another study [35] was carried out in 2016 in 56 large companies in the construction sector in developed countries such as Australia, Japan, South Korea, Austria, Denmark, France, Germany, Greece, Italy, Holland, Norway, Portugal, Spain, England, Canada, and the United States. The study evaluated the relationship between environmental practices and their economic impact. In this study, two of the three pillars that make up operational excellence were explored. The analysis showed a positive relationship between environmental and financial performance, which also depended on analysis methods, variables used, time, and countries where the samples' information are considered [35]. However, although their focus is primarily environmental, they presented relevant information on operational and social practices that complement operational excellence. A comparison between their results and the results of this study are presented in Table 4.

Table 4. Comparison between 56 companies analyzed by [35] and those in this study.

Analysis in 16 First World Countries	Analysis in this Study
80% of the companies hold a certification in environmental management, either ISO 14000, integral management or similar.	34% of the companies hold a certification in environmental management, either ISO 14000, integral management or similar. This includes 100% of large-sized companies surveyed.
87% of companies claim to have a program based on process standards and continuous improvement. (In this case their focus is on environmental practices, but with this they also seek financial sustainability)	71% of companies claim to have a program based on process standards and continuous improvement.
89% of companies handle internal social practices that go even beyond legal requirements, many of them are focused on education and training.	71% of companies handle internal social practices focused on industrial security with people.

From the above, it is evident that there is still a lot to work on with regard to operational excellence in the companies under study. If this study represented a national analysis, it would surely be far from the levels of companies in developed countries.

5. Conclusions

Operational excellence aims to improve the economic, environmental and social performance of companies. Previous works have assessed operational excellence in first-world companies. However, to the best of our knowledge, no previous work has studied this initiative in developing countries. Similarly to [20,35,36], we implemented semistructured interviews to explore and assess companies' performance. In this study, we evaluated the operational excellence of 79 companies from different sectors (e.g., food, construction, chemicals, agriculture, etc.) located in Bogotá, Colombia, and its metropolitan area (savanna region). We also compared the results with the performance of companies in first-world countries, thus contributing to the understanding of companies' level of operational excellence in developing countries. It was found that as answer for the first research question, just 20% are working under a program of operational excellence impacting the three dimensions of sustainability simultaneously and as answer for the second research question, in general, studied companies are far from companies in developed countries in terms of operational excellence.

In the case of the pillar of economic sustainability through profits in operations, we evaluated the operation and continuous improvement schemes, such as lean manufacturing, six sigma, others or an organization's own adaptation (in house) of a standard scheme, due to the fact that in operations, these schemes allow efficient management of all the resources that impact operating costs [8]. In the case of environmental sustainability, we evaluated whether companies have any defined environmental practice, either complying with legislation or going beyond [41]. Finally, regarding the social pillar, we focused only on internal practices, meaning whether the company's approach is based solely on compliance with industrial safety requirements or if they have plans that go further with their workers [27]. Our study is not without limitations. First, even if the size of this study is up to four times the size of the compared studies, the size of the sample may not be representative to generalize to all companies in Colombia, as we are evaluating one of the most developed regions in the country. Analogously, it cannot be said that this study is applicable in all emerging countries for cultural and legal reasons, among others. However, this research provides a basis to be applied in other Colombian companies and other emerging countries' companies, taking into account the corresponding legal and cultural aspects. Moreover, our study offers a starting point to carry out a diagnosis of operational excellence in companies in emerging economies.

As for opportunities for further research, it is important to identify the most critical determinants and barriers to implementing operational excellence in companies from emerging markets. Furthermore, and due to the fact that companies in emerging countries are mostly micro, small, and medium-sized, it is also necessary to provide a managerial methodology not only for large-size companies (multinationals) but for the smaller ones as well. Additionally, results of this study show only overall level of economic, environmental and social sustainability, but for future research it can be possible to analyze which of them are preferred by companies.

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