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SUSTAINABILITY INDICATORS FAVOR THE CREATION OF COMPANIES?

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Abstract

Objective: To analyze the relationship between sustainability indicators and the creation of companies.

Method: This study is characterized as quantitative and explanatory. Both relationship modeling and hypothesis testing were performed by regression analysis from secondary data. Two models were tested using five variables. Secondary data regarding Sustainability indicators were collected from the Santa Catarina Federation of Municipalities (FECAM) databases, from the Municipal Sustainable Development Indicator System (MSDIS). Data regarding the creation of companies in each municipality were obtained from the Federation of Industries of the State of Santa Catarina - FIESC.

Originality / Relevance: This study provides evidence that, besides the influence of aspects associated with the national environment, the local environment, represented by the municipality, positively influences the creation of companies.

Results: It was found that the Sustainable Municipal Development Index (SMDI) influenced the number of companies created in Santa Catarina municipalities. Percentage changes in the sustainable development index cause more than proportional percentage changes in the number of companies created. The dimensions that had the greatest impact on the relationship studied were sociocultural and environmental.

Theoretical / Methodological Contributions - This research contributes to the fields of study in Entrepreneurship and Sustainability by demonstrating that municipalities with higher sustainability indicators tend to create more companies. This demonstrates the importance of municipal public policies aimed at sustainable development.

Keywords: Entrepreneurship. Sustainable Local Development. Creation of companies.

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Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

158

1 INTRODUCTION

Starting new businesses contributes to value creation and economic growth (Schumpeter, 1934). Recent studies show that new ventures may also favor sustainable local development (Dean, & Mcmullen, 2007; Kuckertz, & Wagner, 2010). The creation of new ventures is influenced by individuals and context. Context or environment, with its institutions, norms, beliefs, and values, influences the creation of new business (Bruin, Brush, & Welter, 2007). An environment that favors the exchange of information, interactions, and knowledge centers, universities and social capital, contributes to the creation of companies (Fischer & Nijkamp, 2018). In this sense, entrepreneurship is above all a regional and local phenomenon, and there are entrepreneurial municipalities, regions or countries with more entrepreneurs than others. The municipalities are the nearest environment of entrepreneurs. Therefore, it is understood that municipal policies can encourage and contribute to the dynamization of a sustainable territory.

Understanding development requires a vision that goes beyond the economic dimension and integrates the social, environmental and institutional political dimensions. This integration challenges large and small economies to manage and apply locally a sustained development in which the social and environmental dimensions are compatible with economic growth (Sachs, 2008).

In order to measure sustainability indicators, the State of Santa Catarina created, through the Santa Catarina Federation of Municipalities (FECAM), the Collaborative Network of the Sustainable Municipal Development Indicators System (SMDIS Network). The network comprises institutions representing society and is composed of forty-one government institutions (federal, state and municipal authorities), eleven non-governmental institutions (councils, sectoral entities, and third sector organizations) and eight higher education institutions. The initiative made it possible to monitor the level of sustainable development of the municipalities of Santa Catarina, which is now measured by the Municipal Sustainable Development Index (SMDI), instituted by FECAM. This index derived from a series of indicators aimed at diagnosing the degree of development of a territory (FECAM, 2017) and is based on four dimensions: sociocultural, economy and income, institutional and environmental policy. The objective of SMDI is to evaluate municipalities according to their level of sustainable development.

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

159

Considering the relevance of entrepreneurship to the development of municipalities, this study aimed to analyze the relationship between sustainability indicators and business creation. This study contributes to the fields of study in Entrepreneurship and Sustainability by demonstrating that municipalities with higher sustainability indicators have more companies created, which demonstrates the importance of municipal policies aimed at sustainable development. The results of this study indicate that SMDI has a positive impact on business creation. The dimensions that had the biggest impact on the relationship were sociocultural and environmental.

2 THEORETICAL DEVELOPMENT AND RESEARCH HYPOTHESES

Business creation can result from the exploitation of opportunities by some individuals who gather information and are alert to opportunities (Kirzner, 1973; Shane & Venkataraman, 2000). They evaluate the opportunities and decide whether or not to exploit them. In addition to this, the creation of companies can result from pooling resources and relationships or from the development of opportunities (Binder, & Belz, 2015; Fisher, 2012; Sarasvathy, 2008; Sarason, Dean, & Dillard, 2006). These conditions are influenced by the environment or context (Bruin, Brush & Welter, 2007). The environment not only influences entrepreneurship, but it also is influenced by it (Julien, 2010). In this sense, the environment can contribute to local and sustainable development.

2.1 Entrepreneurship, Economic Development and Sustainability

The local development approach considers those territories are not static and that space and economy are integrated perspectives. The change in the profile of a locality results from entrepreneurial activity, which in turn implies product or process innovations, product improvement, as well as new management modes (Fischer, & Nijkamp, 2018).

Entrepreneurship can be understood as the act of combining existing resources in a new way, promoting market imbalance and creative destruction (Schumpeter, 1934). The entrepreneur is an agent responsible for ensuring market stability, acting as a promoter of adjustments and balance. He is alert, observing market behavior, and may be able to perceive a profit opportunity first and foremost (Kirzner, 1973). In this sense, entrepreneurs contribute to the economic development of localities (Fisher, 2012). They define and are defined by the environment in which they operate (Morris,

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

160

Neumeyer & Kuratko, 2015) and can streamline it, for example through networks, disseminating information (Julien, 2010) or as actors in change, acting to accelerate creation, diffusion, and application of new ideas (Morris et al., 2015).

As a regional event, entrepreneurship influences the characteristics of a region, "not only in the level of new business formation but also in the type of new business" (Fritsch, 2013, p.1). It is characterized as a dynamic process, influenced by the environment, through its values, its institutions and its dynamics (Gartner, 1985; Hirsich, Peters & Shepherd, 2009). This contributes to reducing the unemployment level of a region (Barros & Pereira, 2008). However, it is not only an economic activity but involves knowledge, research, and development (Morris et al. 2015).

In this sense, environment variables influence the creation of companies in the following dimensions: economic (Schumpeter, 1934), environmental (Dean, & Mcmullen, 2007), sociocultural (Elkington, 1997) and politics (Sachs, 2008). A sustainable development approach covers all these variables.

2.2 Sustainability and Sustainable Development Indicators

The population is growing rapidly and is promoting an increase in consumption. This situation exposes to, imminent social and environmental risks to the society. This concern, for Keeler and Burke (2010, p. 29), results from "cumulative effects". Discussions about sustainable development became more frequent from the 1970s, beginning at the 1972 United Nations Conference on Development and Environment. The last decades have seen the manifest of the sustainability discourse as the dominant embodiment in the debate involving development issues at the local or global level (Sachs, 2008).

The first approach to sustainability was proposed by Elkington (1997). In his perception, in order to be sustainable, there was a need to balance the socio-cultural, environmental and economic dimensions, named the traditional Triple Bottom Line. From this conception, other aspects emerged with diversified directions, including new dimensions, suggested by Sachs (2008), which highlights five pillars: social, environmental, territorial, economic and political. Although not understood at that time as a sustainability dimension, the political approach had already been mentioned when two policy plans were created, the Agenda 21 (Barbieri, 2008), a document that established the merit of each country in committing to express how governments, companies, non-governmental organizations could cooperate in the study of solutions

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

161

to social and environmental problems, and the Millennium Development Goals (Onubr, 2015), searching new foundations for global sustainability. Both plans highlighted the need to move forward in terms of sustainable development, introducing sustainability assessment from local indicators.

The intention of developing sustainability indicators arose at Rio-92, World Conference on the Environment. The proposal to define sustainable development standards that take into account the different dimensions of sustainability as set out in the conference's final document, Agenda 21. The development of sustainability indicators would enable countries to create and monitor relevant information on sustainable development decisions at different levels, regional, national and global. In response to the Agenda 21 proposal, the Commission for Sustainable Development approved in 1995 the Work on Indicators of Sustainable Development program, which consolidated the creation of sustainable development indicators accessible to decision-makers at the national level (ONU, 2001).

Given the complex interaction between environment, economy, and society suggested in Chapter 40 of Agenda 21, indicators are listed that related four primary dimensions of sustainable development: social, economic, environmental, and institutional. However, this preliminary suggestion should not be understood as the only or best way to quantify the level of sustainable development of a given locality (Nourry, 2008). The proposed indicators were actually the starting point for countries to set up their national indicator programs.

Subsequently, several countries began to measure sustainable development, each adjusting the indicators according to the proposed methodology. In this context, the construction of sustainable development indicators in Brazil followed the principles formulated in Rio-92. The disclosure of the Sustainable Municipal Development Index (SMDI) at the national level is the responsibility of the Brazilian Institute of Geography and Statistics (IBGE). There is a discussion focused on the use of local or regional indicators (Rezende & Sinay, 2016; Silva, Rebouças, Abril & Ribeiro, 2018). Some Brazilian states have defined cuttings at the state and even municipal level, such as the state of Santa Catarina (FECAM, 2017).

2.3 Sustainable Municipal Development Index – SMDI

In Santa Catarina state, in 2009, the system of indicators of sustainable municipal development (SISMD) was created, which has among its tools the SMDI,

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

162

which measures the sustainability of the municipalities of Santa Catarina. Data are published every two years, and the first version was published in 2012. The index is applied to all municipalities of the state and can be considered a planning tool at the state level. The municipality's SMDI classification ranges from zero (0) to one (1), and the closer to one (1) the greater the degree of sustainability and the closer to zero (0) the lower the degree of sustainability of the municipality. There are five levels of SMDI classification according to I) "High" - greater than or equal to 0.875, II) "Medium High" - greater than or equal to 0.750 and less than 0.875, III) "Medium" - greater than or equal to 0.625 and less than 0.750; IV) "Low Medium" - greater than or equal to 0.500 and less than 0.625 and V) "Low" less than 0.500 (FECAM, 2018).

The index corresponds to the arithmetic mean of four dimensions, institutional, sociocultural, environmental and economic politics, aggregated into nine subdivisions, thirty indicators and sixty-two variables (FECAM, 2018). Figure 1 lists the dimensions, sub-dimensions and their respective weights, as well as the variables that make up each sub-dimension.

Dimension / Weight	Subdimensions / Weight	Analysis Variables
Sociocultural (25%)	Education (45%)	School Access and Stay; School performance; School infrastructure; Teaching quality.
	Health (35%)	Basic Care Coverage; Risk and Protection Factors; Morbidity; Mortality.
	Culture (10%)	Promotion of Culture; Cultural infrastructure; Cultural initiatives; Resources in Culture.
	Housing (10%)	Housing Management Structure; Housing quality.
Economy and Income (25%)	Economy (100%)	Economic Value Added; Economic dynamism; Income level.
Environmental (25%)	Environment (100%)	Sanitation; Environmental management; Environmental Preservation.
Institutional politician (25%)	Public finances (40%)	Revenue Capacity; Investment stimulus; Financial health.
	Public administration (30%)	Articulation with the Exterior; Planning capacity; Financial management; E-government; Quality Functional Framework.
	Social Participation (30%)	Electoral participation; Representativeness of Genres.

Figure 1 – Composition of SMDI
Source: Elaborated by authors (2018).

To measure the relationship between Entrepreneurship and Sustainability, the model proposed by FECAM was chosen, which measures sustainability from the dimensions of institutional, social, cultural and environmental policy and economy.

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

163

2.4 Research Hypotheses

Cohen, Smith, and Mitchell (2006) state that the creation of new companies originates in entrepreneurial motivations, which envisions in entrepreneurial activity the possibility of making profits and creating economic value, but also creating social and environmental value. The motivation to undertake is composed of a complex series of factors, including the social condition of the territory (Sachs, 2008) and environment characteristics (Julien, 2010; Segura, & Kantis, 2009). Based on these assumptions, it is assumed that:

H1 - The Municipal Sustainable Development Index – SMDI of municipalities influences the creation of new companies, so the higher the SMDI, the greater the number of companies created.

The socio-cultural dimension of the SMDI encompasses education, culture, health, and housing sub-dimensions. Fischer and Nijkamp (2018) point to the presence of knowledge centers, universities, research and development facilities and a skilled workforce as an important condition for fostering an entrepreneurial environment. According to Getz (2000), in western countries, entrepreneurs are motivated by benefits related to social issues. Elkington (1997) mentioned that the social dimension can impact the availability of resources, such as capital, structure, and labor, which in turn implies the start, continuity, and growth of a company. Based on these considerations, it is suggested that:

H2 - The social aspects of the municipalities influence the creation of new companies, so the higher the socio-cultural sustainability index, the greater the number of companies created.

Entrepreneurship promotes economic growth, job creation and innovation (Carree, & Thurik, 2006; Morris et al. 2015). Elkington (1997) states that economically stable environments are more likely to attract productive investments and therefore more attractive to new companies. Corroborate Rosenthal and Strange (2003) in mentioning that the most efficient method of building an attractive urban environment for new business investments would be through initiatives aimed at building a solid economic environment. Thus, it is assumed that:

H3 - The economic aspects of municipalities influence the creation of new companies, ie, the higher the economic sustainability index, the greater the number of companies created.

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

164

Global conjuncture imposes challenges that can foster entrepreneurial activity while simultaneously solving environmental problems (Dean, & Mcmullen, 2007). Companies have found that developing environmentally sound processes leads to reduced operating costs and promotes corporate image (Sachs, 2008). Zeal for environmental issues can not only reduce environmentally degrading effects but can also represent profitable opportunities for new ventures (Ferreira, 1998). With this, it is indicated that:

H4 - The environmental aspects of municipalities influence the creation of companies, that is, the higher the environmental sustainability index, the greater the number of companies created.

Finally, political and institutional issues have effects on entrepreneurship (Elkington, 1997; Sachs, 2008). Elkington (1997) points out that the political-institutional environment can influence the creation of new companies. The importance of institutional support for business creation was highlighted by Sachs (2008). Thus, it is assumed that:

H5 - The political-institutional aspects of the municipalities influence the creation of companies, that is, the higher the political-institutional sustainability index, the greater the number of companies created.

3 METHODOLOGY

This study is characterized as quantitative and explanatory. It uses the quantitative method to provide a safety margin for inferences (Richardson, 1999). Both relationship modeling and hypothesis tests were performed using regression analysis. The applied techniques followed the guidelines of the works of Fox and Fox (2016), Weisberg (2014) and Fox, Weisberg, and Fox (2011) and were operationalized using the software R (R CORE TEAM, 2016) and Rstudio (RSTUDIO TEAM, 2015).

Two models were tested using five variables, SMDI and its sociocultural (SMDI.S), environmental (SMDI.E), economy and income (SMDI.EI), and institutional policy (SMDI.IP). The first model is a simple regression that regresseses COM.POP over SMDI in order to test hypothesis H1. The second model regresseses COM.POP over SMDI.E, SMDI.EI, SMDI.S and SMDI.IP (multiple regressions) to test hypotheses H2 through H5. Both models follow the logarithmic functional form, allowing evaluating the elasticity of the dependent variable in relation to the independent variable, that is,

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

165

the percentage change in the dependent variable caused by the percentage change in the independent variable (s).

The sample of this study is represented by 295 municipalities that represent the state of Santa Catarina, Brazil (Santa Catarina, 2017). Secondary data, regarding sustainability indicators, were collected in FECAM databases from MSDIS. The system consolidates municipal information from several databases in an indicator database that allows the monitoring of various sustainability variables linked to public management (FECAM, 2018).

In a previous analysis, nine municipalities (Warehouse, Atalanta, Balneário Piçarras, Balneário Rincão, Barra Bonita, Islet, Major Vieira, Pescaria Brava, and Ponte Alta) presented missing data and were eliminated from the analysis. Thus, the final sample consists of 286 municipalities.

The data collection criterion was limited to 2016, which characterizes the research as cross-sectional and, according to Richardson (1999, p. 145), "data are collected at a point in time, based on a sample selected to describe a population at that particular time ". Information regarding the creation of companies in each municipality was obtained from the Federation of Industries of the State of Santa Catarina - FIESC, concerning companies created in 2016.

4 RESULTS AND ANALYSIS

According to the FECAM indicator classification scale, of the 286 municipalities surveyed, none has a "high" SMDI. Most municipalities (58%) are classified as "medium-low". Considering the partial SMDI, 67% of the municipalities are classified as "medium" in the socio-cultural area (SMDI.S), 57% as "low" in the environmental area (SMDI.E), 53% as "medium-low" in the economy and income (SMDI.EI) and 71% are classified as "low medium" in institutional policy (SMDI.IP). Table 1 shows the number of municipalities classified in each category of the FECAM classification scale for the SMDI and its components, considering all regions of the state.

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

166

Table 1. Number of municipalities of Santa Catarina according to FECAM indicator classification

	SMDI"L"	SMDI"ML"	SMDI"M"	SMDI"MH"	SMDI"H"	Totais (%)
	10 (3%)	**165 (58%)**	**103 (36%)**	**8 (3%)**	**0 (0%)**	**286 (100%)**
SMDI.S "L"	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**
SMDI.S "ML"	4 (1%)	4 (1%)	1 (0%)	0 (0%)	0 (0%)	**9 (3%)**
SMDI.S"M"	6 (2%)	137 (48%)	47 (16%)	2 (1%)	0 (0%)	**192 (67%)**
SMDI.S "MH"	0 (0%)	24 (8%)	55 (19%)	6 (2%)	0 (0%)	**85 (30%)**
SMDI.S "H"	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**
SMDI.E "L"	10 (3%)	131 (46%)	21 (7%)	0 (0%)	0 (0%)	**162 (57%)**
SMDI.E "ML"	0 (0%)	32 (11%)	35 (12%)	0 (0%)	0 (0%)	**7 (2%)**
SMDI.E"M"	0 (0%)	2 (1%)	30 (10%)	1 (0%)	0 (0%)	**33 (12%)**
SMDI.E "MH"	0 (0%)	0 (0%)	16 (6%)	6 (2%)	0 (0%)	**22 (8%)**
SMDI.E "H"	0 (0%)	0 (0%)	1 (0%)	1 (0%)	0 (0%)	**2 (1%)**
SMDI.EI "L"	10 (3%)	55 (19%)	2 (1%)	0 (0%)	0 (0%)	**67 (23%)**
SMDI.EI "ML"	0 (0%)	91 (32%)	61 (21%)	0 (0%)	0 (0%)	**152 (53%)**
SMDI.EI"M"	0 (0%)	19 (7%)	39 (14%)	6 (2%)	0 (0%)	**64 (22%)**
SMDI.EI "MH"	0 (0%)	0 (0%)	1 (0%)	2 (1%)	0 (0%)	**3 (1%)**
SMDI.EI "H"	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**
SMDI.IP "L"	0 (0%)	1 (0%)	0 (0%)	0 (0%)	0 (0%)	**1 (0%)**
SMDI.IP "ML"	7 (2%)	41 (14%)	14 (5%)	0 (0%)	0 (0%)	**62 (22%)**
SMDI.IP"M"	3 (1%)	112 (39%)	82 (29%)	5 (2%)	0 (0%)	**202 (71%)**
SMDI.IP "MH"	0 (0%)	11 (4%)	7 (2%)	3 (1%)	0 (0%)	**21 (7%)**
SMDI.IP "H"	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**

Source: Elaborated by authors (2018).
NOTE: "L" = "low" rating in the respective index; "MB" = "medium- low" rating in its index; "M" = "average" rating in the respective index; "MH" = "medium-high" rating in the respective index; "H" = "high" rating in its index. (%) = percentage of respective intersection in relation to the total of municipalities analyzed.

The distribution of SMDI values and their sub-dimensions do not present great disparity when comparing the SC regions. All regions have average SMDI between 0.58 and 0.65, which classifies them as "medium-low" or "medium". In SMDI partials this balance persists: The average SMDI.E fits the regions between "low" and "medium-low"; for the average SMDI value. The regions are classified as "medium-low"; considering SMDI.IP the regions are classified as "medium"; and taking into account the SMDI.S all regions are classified equally as "medium".

Table 2 shows the distribution around the average of the indexes in the SC regions.

The lowest values for SMDI and their sub-dimensions were recorded for five different municipalities, demonstrating that no municipality concentrates the worst

ratings in the indexes. On the other hand, three of the five municipalities that present the lowest values in the analyzed indicators are in the region called "Oeste". The highest values for SMDI and its sub-dimensions were recorded in four different municipalities. The municipality of Jaraguá do Sul has the highest values for the SMDI and also for the socio-cultural sub-dimension (SMDI.S).

Table 2- Distribution of SMDI values and their components for each SC region

General (n = 286)	SMDI	SMDI.E	SMDI.EI	SMDI.IP	SMDI.S	COM.POP
average (SD)	0.61 (0.06)	0.48 (0.17)	0.56 (0.08)	0.67 (0.06)	0.72 (0.05)	8.81 (3.23)
min. - max.	0.47 - 0.79	0.11 - 0.88	0.32 - 0.79	0.48 - 0.82	0.57 - 0.84	2.72 - 21.07
Extrem South (n = 43)	**SMDI**	**SMDI.E**	**SMDI.EI**	**SMDI.IP**	**SMDI.S**	**COM.POP**
average (SD)	0.61 (0.06)	0.48 (0.16)	0.55 (0.08)	0.67 (0.05)	0.73 (0.04)	9.27 (2.79)
min. - max.	0.5 - 0.76	0.16 - 0.81	0.39 - 0.76	0.57 - 0.8	0.61 - 0.8	3.46 - 17.38
Florianópolis (n= 21)	**SMDI**	**SMDI.E**	**SMDI.EI**	**SMDI.IP**	**SMDI.S**	**COM.POP**
average (SD)	0.62 (0.06)	0.55 (0.14)	0.56 (0.09)	0.65 (0.06)	0.72 (0.04)	9.7 (4)
min. - max.	0.51 - 0.72	0.33 - 0.82	0.41 - 0.73	0.55 - 0.77	0.62 - 0.8	3.77 - 19.63
North (n = 25)	**SMDI**	**SMDI.E**	**SMDI.EI**	**SMDI.IP**	**SMDI.S**	**COM.POP**
average (SD)	0.63 (0.07)	0.6 (0.16)	0.54 (0.11)	0.63 (0.05)	0.74 (0.05)	9.15 (3.31)
min. - max.	0.5 - 0.79	0.31 - 0.87	0.32 - 0.77	0.54 - 0.71	0.66 - 0.84	3.19 - 16.91
Oeste (n = 117)	**SMDI**	**SMDI.E**	**SMDI.EI**	**SMDI.IP**	**SMDI.S**	**COM.POP**
average (SD)	0.59 (0.06)	0.39 (0.14)	0.57 (0.08)	0.69 (0.05)	0.73 (0.05)	8.29 (2.75)
min. - max.	0.47 - 0.76	0.11 - 0.78	0.34 - 0.74	0.53 - 0.82	0.57 - 0.83	2.72 - 18.06
Serrana (n = 29)	**SMDI**	**SMDI.E**	**SMDI.EI**	**SMDI.IP**	**SMDI.S**	**COM.POP**
average (SD)	0.58 (0.06)	0.49 (0.14)	0.54 (0.1)	0.65 (0.07)	0.66 (0.04)	6.83 (1.98)
min. - max.	0.47 - 0.72	0.23 - 0.75	0.38 - 0.73	0.48 - 0.8	0.58 - 0.78	3.2 - 10.61
Vale Itajaí (n = 51)	**SMDI**	**SMDI.E**	**SMDI.EI**	**SMDI.IP**	**SMDI.S**	**COM.POP**
average (SD)	0.65 (0.06)	0.6 (0.16)	0.57 (0.07)	0.68 (0.05)	0.74 (0.04)	10.19 (4.02)
min. - max.	0.55 - 0.77	0.31 - 0.88	0.42 - 0.79	0.57 - 0.81	0.65 - 0.82	3.49 - 21.07

Source: Elaborated by authors (2018).
NOTE: n = number of cases for the respective group; SD = standard deviation; min = minimum value in the respective group; max = maximum value in the respective group.

Two details deserve to be highlighted: first, no municipality that presented lower values in the indexes had the lowest COM.POP; second, the municipality of Itapema, the largest COM.POP is not listed as the highest value in any of the indexes. Table 3 shows the municipalities with the lowest and highest values in the analyzed indexes.

Table 3- Municipalities classified with lowest and highest values in the analyzed indexes

Municipality	Region	SMDI	SMDI.S	SMDI.EI	SMDI.E	SMDI.IP	COM.POP
Calmon	Oeste	0.489	0.571 [a]	0.42	0.371	0.593	10.6
Ipuaçu	Oeste	0.467 [a]	0.666	0.456	0.158	0.587	6
Itajaí	Vale Itajaí	0.766	0.783	0.793 [b]	0.674	0.812	14.2
Jaraguá do Sul	Norte	0.79 [b]	0.841 [b]	0.739	0.873	0.706	10.3
Navegantes	Vale Itajaí	0.753	0.75	0.646	0.879 [b]	0.738	11
Novo Horizonte	Oeste	0.581	0.194	0.687	0.703	0.74	2.72 [a]
Ouro Verde	Oeste	0.527	0.715	0.527	0.108 [a]	0.757	3.55
Piratuba	Oeste	0.697	0.766	0.734	0.463	0.824 [b]	18.1
Santa Terezinha	Norte	0.51	0.762	0.317	0.342	0.619	4.74
Urubici	Serrana	0.533	0.657	0.451	0.549	0.477	9.33
Itapema	Vale Itajaí	0.706	0.795	0.583	0.795	0.651	21.07 [b]

Source: Elaborated by authors (2018).
Remarks: [a] = lowest value in the respective index; [b] = highest value in its index

The overall data COM.POP has an average of 8.81, with a standard deviation of 3.23, a minimum of 2.72 and a maximum of 21.07 (Table 3). When analyzing the regions separately, it is noted that two of them ("Serrana" and "Oeste") present an average of COM.POP lower than the general average. The COM.POP cash diagram for the general data and for the stratified data by SC region (Figure 2) reveals that the municipalities of the "Serrana" region have the highest homogeneity of COM.POP, as this region has the smallest standard deviation (1.98), besides not presenting extreme cases.

The "Florianópolis" region does not present extreme cases, but presents the second largest PD (4). The "Extreme South" region has one of the smallest standard deviations, but presents extreme cases.
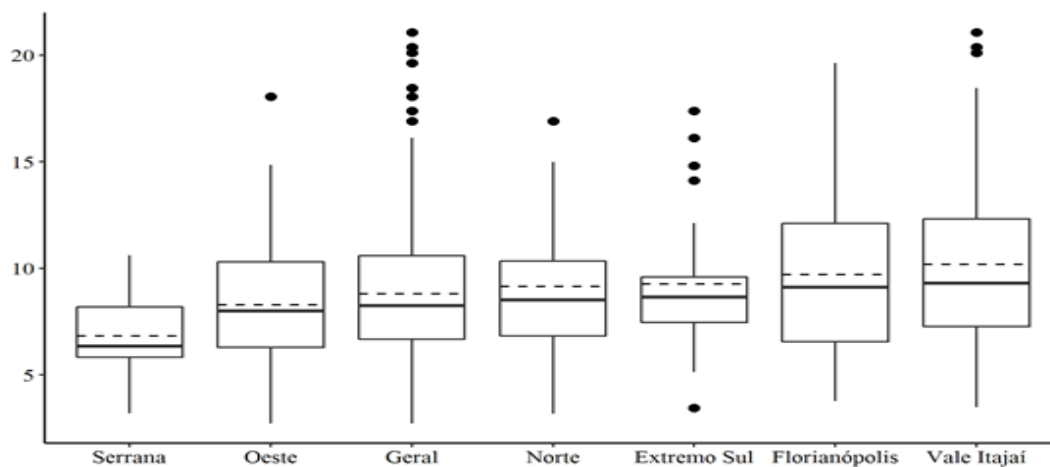

Figure 2: COM.POP box diagram for data in general and stratified by SC region
Source: Elaborated by authors (2018).
NOTE: The dotted line represents the average of COM.POP for the respective region.

In the sequence, was performed the regression analysis, shows the degree of influence that independent variables exert on the dependent variable. In this study, was considered that the SMDI and its four dimensions (independent variables) influence the creation of companies (dependent variable). The first regression tests the relationship between COM.POP and SMDI, while the second evaluates the impact of the four dimensions of SMDI on COM.POP. Table 4 presents the results of both models.

Table 4 - Model 1 and 2 Results

	Dependent variable: log(COM.POP)	
	Model 1	Model 2
log(SMDI)	1.494^{***} (0.194)	
log(SMDI.E)		0.270^{***} (0.054)
log(SMDI.S)		0.913^{***} (0.313)
log(SMDI.EI)		0.193 (0.151)
log(SMDI.IP)		0.035 (0.256)
Intercept	2.859^{***} (0.099)	2.754^{***} (0.121)
Regression lines:		
Model 1: log(COM.POP) = 2.859 + 1.494*log(SMDI)		
Model 2: log(COM.POP) = 2.754 + 0.270*log(SMDI.E) + 0.913*(SMDI.S)a		
Comments	286	286
R^2	0.173	0.182
$R^2_{ajusted}$	0.170	0.171
Standard Error Waste	0.333 (df = 284)	0.333 (df = 281)
Statistical F	59.408^{***} (df = 1; 284)	15.650^{***} (df = 4; 281)

Source: Own elaboration (2018).

Note: * = $p <0.10$; ** = $p <0.05$; *** = $p <0.01$; df = degrees of freedom. a Only statistically significant independent variables were included in the regression line of model 2.

The results of the first regression show that the percentage changes in SMDI explain about 17% of the percentage changes in COM.POP ($r^2 = 0.173$, F (1,284) = 61.25 and p-value = 0.00000). A 1% change in SMDI predicts a 1,493% change in COM.POP ($\beta= 1.4938$, t = 7.708, p-value = 0.000). The second model decomposes the effect of SMDI on COM.POP. According to the results, the percentage changes in the SMDI dimensions explain about 18% of the COM.POP percentage changes. However, this adjusted value for increasing independent variables (adjusted R^2) maintains the model power at about 17% ($R^2 = 0.1822$, adjusted $R^2 = 0.1705$, F (4.281) = 15.65, p-value = 0.000).

The second model suggests that a 1% change in SMDI.E predicts a 0.27% change in COM.POP ($\beta = 0.27004$, t = 4,978, p-value = 0.000) and a 1% change in SMDI.S predicts 0.92% change in COM.POP ($\beta = 0.91290$, t = 2.915, p-value =

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

170

0.00384). Estimated parameters for the effects of SMDI.EI POP (β = 0.19344, t = 1.279, p-value = 0.20183) and SMDI.IP POP (β = 0.03504, t = 0.137, p-value = 0.89111) statistically different from zero.

5 DISCUSSION OF RESULTS

The first model was used to test whether SMDI influences the creation of new companies (H1). The results of the tests performed do not indicate statistical support to reject hypothesis H1. According to the functional specification of the model and the results obtained, the creation of new companies is elastic in relation to the SMDI, so that a variation of 1 percentage point in SMDI causes a 1,494% variation in the creation of new companies. That is, sustainable environments positively influence the creation of companies, corroborating the influence of the environment on entrepreneurship (Gartner, 1985).

The environment, in this case, the municipalities, with their local powers promote the political organization of the space, stimulate local interactions and contribute to the creation of companies, corroborating the results of other studies, which mentioned that the environment, with its institutions, norms, beliefs, and values, influences the creation of new businesses (Bruin, Brush, & Welter, 2007; Julien, 2010). In turn, the companies created can influence the development and sustainability of the municipality (Silva, Silva, & Andreali, 2011), forming a recursive relationship that can promote a spiral of local and sustainable development.

Examples of how entrepreneurship can help make the place more dynamic and promote the development of territories can be seen in Willers, Lima, and Staduto (2008), who demonstrated how a small business arrangement contributed to the development of a locality, and in Silva, Silva and Andreali (2011), who demonstrated how a company promoted the development of the municipality, stimulating other activities, promoting culture and sustainability. Despite the positive result, it should be noted that the variation seems small when considering that SMDI encompasses several aspects. Either way, SMDI changes result in more than proportional changes in new business creation.

The second model is designed to test hypotheses H2 through H5, which states that each SMDI dimension has a positive impact on the creation of new businesses. According to the tests performed, there is no statistical support to reject hypotheses H2 and H4. Again, the functional specification of the model and results suggest that a variation of 1 percentage point in SMDI.S and SMDI.E causes, respectively, variations of 0.913% and 0.27% in the creation of new companies. The same results are pointed by Elkington (1997),

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

171

who states that social and environmental factors influence the creation, and growth of companies. The results of this study showed that municipalities with the highest levels of education, health, culture and housing were the ones that created the most companies. On the other hand, it should be noted that the results of H2 and H4 indicate that the creation of companies is inelastic to SMDI.S and SMDI.E since the effect has lower percentage variation than the percentage variation of the cause.

Finally, hypotheses H3 and H5, which stated (respectively) that SMDI.EI and SMDI.IP positively impact business generation, was rejected. Statistical results did not support these hypotheses. Some authors mention that economic conditions influence business creation (Roshenthal, & Strange, 2003). However, the economy and income sub-dimension were not supported by the model of this research. Two explanations may justify these results. One is that people prefer not to risk and maintain income from their wages, or another, which may be associated with reduced unemployment in the municipality influencing individuals to remain in their jobs and consequently not create a business. Unemployment can be a stimulating factor for business creation (Barros & Pereira, 2008). A possible explanation for the lack of positive impact of SMDI.IP on business creation is the measurement of this dimension, measured mainly by aspects related to municipal public management, public finances and social participation in government decisions (including electoral participation and gender representation). Figure 3 summarizes the hypothesis test information and its results.

Hypothesis	Dimension / Variables	Position
H1: The Municipal Sustainable Development Index (SMDI) of municipalities influences the creation of new companies, so the higher the SMDI, the greater the number of companies created.	General x Companies created	Accept
H2 - The sociocultural aspects of the municipalities influence the creation of companies, so the higher the socio-cultural sustainability indexes, the higher the index of new business creation.	Sociocultural x Companies created	Accept
H3 - The economic aspects of municipalities influence the creation of companies, so the better the rates of economic sustainability, the higher the rate of creation of new companies.	Economy and income x Companies created	Reject
H4 - The environmental aspects of municipalities influence the creation of companies, so the higher the environmental sustainability indexes, the higher the rate of creation of new companies.	Environmental x Companies created	Accept
H5 - The political-institutional aspects of the municipalities influence the creation of companies, so the higher the political-institutional sustainability indexes, the higher the rate of new business creation.	Institutional politician x Companies created	Reject

Figure 3 – Hypothesis Test Results
Source: Own elaboration (2018).

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

172

6 CONCLUSIONS

In summary, in this research, it was founded that SMDI influences the number of companies created in Santa Catarina municipalities. The data showed that percentage changes in the sustainable development index imply more than proportional percentage changes in the number of companies created. However, by deepening the analysis, investigating which of the dimensions of the SMDI actually influences the creation of companies, only the socio-cultural and environmental dimensions exerted influence. These results make an important contribution, as most studies analyzing the relationship between the environments focused on national and non-local levels (Sternberg, 2011). These research findings show that, in addition to the influence of aspects associated with the national environment, such as fees and taxes (Sternberg, 2011), the local environment, represented by the municipality, positively influences the creation of companies.

Entrepreneurship is a regional or local phenomenon because people, in general, create businesses where they were born, where they work or where they live (Sternberg, 2011). In this sense, and considering the relationship between sustainability indicators and the creation of companies in municipalities, identified in this research, has as practical implications for municipal managers the importance of promoting sustainability, which will result in a larger number of companies created and consequently on economic, social and environmental benefits (Morris et al. 2015).

Fischer & Nijkamp (2018) indicate that regional or local level development is intertwined with two processes: structural change and productivity improvement. For the authors, structural change is due to entrepreneurial activity, which implies innovations, new management modes and the creation of an entrepreneurial culture, including knowledge-intensive skills (Llamas-Sánchez, Muñoz Fernández, Maraver-Tarifa, & Senés- García, 2010; Saz-Gil, & Gómez-Quintero, 2015).

One of the limitations of this study refers to the fact that data are representative only in 2016. Future studies may explore longitudinal analyzes, minimizing the possible effects of events associated with the year of analysis. It is also suggested that future studies explore the relationships between variables, considering the different regions of the state, which may reveal differences also associated with territorial dispersion.

Although the institutional political dimensions and economy and income have

Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

173

not had a direct effect on business creation, this does not mean that they should be neglected in municipal management, as they can indirectly influence local development. It is noteworthy that the generalization of the results is restricted to the state of Santa Catarina.

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174

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175

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Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

177

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Iberoamerican Journal of Entrepreneurship and Small Business | v.9 | n.2 | p. 158-178 | Jan./Apr. 2020.

178