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ECONOMIC GROWTH AND ENVIRONMENTAL DECLINE IN MATO GROSSO DO SUL STATE (BRAZIL), BETWEEN 1991 AND 2010

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ABSTRACT

This article aimed to analyze the condition of the sustainable development of 78 municipalities of Mato Grosso do Sul (MS), with aggregated variables in three dimensions: environmental, social and economic. The objective was to develop the index of municipal sustainable development in the three census years (1991, 2000 and 2010) and, with that, to analyze whether the localities grew in a sustainable way or not. Using the Data Envelopment Analysis (DEA) method, a DEA BCC model was initially calculated for each dimension and each year and, after that, the overall indicator. The results showed that, although the municipalities registered an improvement in economic and social development, the environmental dimension registered a decrease between 2000 and 2010, even though it developed positively between 1991 and 2000.

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INTRODUCTION

Since the decade of 1970, when Nicholas Georgescu-Roegen published the seminal *The Entropy Law and the Economics Process*, there have been publications of studies demonstrating that economic growth, without taking into consideration the environment, will be detrimental to the future of humanity. As an example, Kuznets (1973) described that one of the characteristics of modern economic growth is the combination of growth with negative effects on the environment and society, which may generate new problems. Therefore, several studies have been developed in an effort to measure and describe the relationship among the economy, society and the environment. At the heart of this discussion the United Nations (UN) has created institutional instruments with the purpose of subsidizing the nations about this relationship, one of them being the conference of the World Commission on Environment and Development (WCED) (MULLER, 2005).
As an outcome of this process, the concept of sustainable development was accentuated which considers "sustainable development as one that ensures the needs of the present without compromising the ability of future generations to meet their needs" (BRUNDTLAND, 1987). However, despite the efforts made since then, and of the great breakthrough implemented by this Commission, it has not been possible to notice a significant change in the development model, allowing simultaneous and synergistic actions of advancement in economy, society and the environment (UN, 2013). Directly associated with this process, the growth of world population also contributes to the environment deterioration. According to the data of the United Nations, in the year 1999, the human population of the world passed six billion. The growth of the human population, during the last 10,000 years, since the advent of agriculture, has been one of the most significant in the history of the earth (RICKELEFS, 2010). Human activity is heating the planet, and the projected growth for the next 100 years might heat the planet at approximately 5°C, in this century. This level of temperature heating has never been experienced by humanity, and the resulting physical impacts limit drastically the world development (WORLD BANK, 2010). According to the Intergovernmental Panel on Climate Change (The Intergovernmental Panel on Climate Change - IPCC), human influence on the earth's climate system is evident, and the recent anthropogenic emissions of greenhouse

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gases are the highest in the history. The climate changes in recent years have widespread impacts on terrestrial system. The concentration of CO2 in the atmosphere has already increased by more than 20% since 1958, when systematic measurements began to be made, and about 40% since 1750. According to IPCC, the increase is a result of human activity, mainly from the burning of fossil fuels and deforestation. Parallel to this fact, global emissions of greenhouse gases have reached record marks, being considered the highest in the human beings' history (CEPAL, 2016). To promote sustainable development one of the premises is the monitoring and measurement of human behavior in economic, social and environmental aspects, with a strong care with natural resources. This monitoring will allow, including the correction and improvement of instruments to subsidize the sustainable development. Thus, it becomes necessary the construction of indicators, in addition to the existing ones, which allow the understanding of the relationship between human action and the environment.

From this understanding, the pursuit of sustainable development as an adaptive process of the learning process can benefit from the use of sustainability indicators (PUPPHACHAI and ZUIDENA, 2017). In this sense, the human beings along their social advancement has used indicators to monitor and evaluate the complex terrestrial systems in which they are inserted, in order to improve understanding about the same (meadows, 1998). In the same line, according to Hardi *et al* (1997), the monitoring of the countries growth is essential for the measurement of sustainable development, which may be a commitment with the environment and the economic and social development. The sustainability indicators were initially developed in the decade of 1990 with the purpose to provide a solid basis for decision-making and contribute to the sustainability of the environment integrated with the economic and social system (PUPPHACHAI and ZUIDENA, 2017). Various institutions and projects throughout the world, especially in Europe, have been working on the development of standardised indicators in order to better evaluate the sustainable development (PIRES *et al*., 2014). In Brazil, these studies date back to the beginning of the year 2000 and, since then, four editions were published of indicators of sustainable development (2004, 2008, 2010 and 2015), from the demarcating assumptions of UN conferences (LIRA *et al*., 2008). Due to the process of environmental, social and economical changes, this article has as focus to undertake a study to measure the level of sustainable development in MS, demonstrating or not an association between quality of life and environmental quality in 78 municipalities in the State, as a way of analyzing the sustainable development in these localities in the last 20 years, considering the census years from 1991, 2000 and 2010.

Over these 20 years, the state of MS rose from 72 municipalities in 1991 to 77 in 2000 and 78 in 2010 and, with the creation of *Paraíso das Àguas* in 2013, currently has 79 municipalities. According to the statistical booklet of the State Department of Environment and Economic Development (SEMADE), the population of MS has an average growth of 17% considering 1991 as the base year. The urbanization rate increased from 79.45% in 1991 to 84.08% in 2000 and 85.64% in 2010. The relevance of this study consists of the approach to growth and economic development parallel to the conservation and maintenance of the environment, i.e., the sustainability to a State, which has had a strong environmental appeal on issues linked to its regional development, as well as the measurement of sustainable development and the improvement of the formulation of public policies for the region. Thus, the objective of this study was to analyze the conditions for sustainable development of 78 municipalities of MS.

MATERIAL AND METHODS

The target audience of the research are 78 municipalities in the state of MS, in relation to what the indicators of growth and development will be, taking as a basis the census of the Brazilian Institute of Geography and Statistics (IBGE) and other sources for the years 1991, 2000 and 2010. Mato Grosso do Sul is bordered by the states of São Paulo, Mato Grosso, Paraná, Goiás and Minas Gerais and with the countries of Bolivia and Paraguay. The State has the Pantanal biome and the west plains and to the east the highlands as main environmental characteristics. In relation to its geographical division, the State is divided into four mesoregions (center-north, east, southeast and Pantanal) and 11 microregions, which include: low pantanal Aquidauana, Alto Taquari, Campo Grande, Cassilândia, Paranaíba, Três Lagoas, Nova Andradina, Bodoquena, Dourados and Iguatemi (IBGE, 2016). Lima (2014) states that it in the ranking among the States, MS occupies the 17th position in the national GDP and the 10th position in GDP per capita.

The economy is based on the primary and tertiary sector, but it has had great performances in the industrial sector in recent years. To subsidise the research process the methods of historical research and comparative study were used. From this study, it was aimed to identify the existence of economic and social growth concomitant with the preservation and maintenance of the environment of the localities studied. Based on the understanding that the quality of life of a population, i.e., their well-being, is related to environmental quality, the Data Envelopment Analysis (DEA) applied to a base of secondary data of municipalities in the state of MS was used, in order to measurethe relative efficiency of these municipalities, with the aim of identifying whether the efficiency indices found, through indicators, are associated to the quality of life and environmental quality of these municipalities.

Due to the fact that there is much debate about how to define a multidimensional index of sustainability, allowing the combination of economic, social and environmental variables, (CRACOLICI *et al*., 2010), envelopment analysis was used as an instrument of research data , since this method allows an examination with different variables in relation to its size (economic, environmental and social). In terms of efficiency, this can be analyzed in two ways: technical and allocative. The allocative efficiency refers to the ability to combine certain inputs to obtain products in a proportional manner. When you have fixed levels of inputs, however, at different levels, we have thus the technical efficiency, i.e., the ratio between the level of product and the level of input (FARREL, 1957). In addition, the measurement of the efficiency, as well as the productivity of a given production unit, is measured by the proportional ratio of inputs and products, which may vary according to the use of production factors (LOVELL, 1994).
As the results of the index of development of each municipality will be analyzed by its efficiency, it is necessary to make a conceptualization about it. For OECD (2001) the efficiency is decomposed into technique, which is the

company's ability to generate results or outputs using the minimum input and allocative efficiency, which relates to the ability to use inputs on measures considered ideal to generate products in proportion to the measures of inputs. PEÑA (2011) describes that a process for the production is characterized as efficient when it uses the least amount of inputs in the production of a number of products, or when looking to maximize the level of production while maintaining constant inputs. Similarly, efficiency is a comparison among the inputs and the largest quantity of products generated. OECD (2001) affirms that the gains in technical efficiency are in function of the use of good manufacturing practices or the elimination of organizational-technical inefficiencies.

The use of efficiency becomes, therefore, one of the best indicators to describe the quality of a given system once the best optimization of the synergy of the variables of a certain system provides condition so that it can fulfill its objective with efficiency; on the other hand, if there is a non-conformity of the variables, we have a disorder and soon, inefficiency (Pena, 2011). DEA is an instrument of mathematics for measuring efficiency of productive units, whose fundamental assumption is that, if a given unit of decision-making (*Decision Making Units* (DMU "A"), efficient DMU_A is capable of producing Y (A) units of product using X (A) units of inputs, then other DMU's could also do the same, if they are also operating efficiently. Similarly, if an efficient DMU_B is capable and produce Y (B) units of product using X (B) units of inputs, then other efficient DMU's might be able to accomplish the same scheme of production. As the DMU's "A" and "B" are efficient, they could be combined to form a composed DMU, that is, that uses a combination of inputs to produce a combination of products.

Since that the compound DMU does not necessarily exist, it is called virtual DMU (CHARNES *et al*. 1978). DEA consists of finding the best virtual DMU for each DMU in the sample. If the virtual DMU is better than the original DMU, either by producing more with the same quantity of inputs, or produce the same quantity using fewer inputs, the original DMU will be inefficient. It is, therefore realized, that the efficient frontier of production will be the one that represents the units evaluated that can minimize the use of inputs in the production while maintaining the same quantity of products produced or, even, can produce a greater quantity of products with a fixed quantity of inputs. The DEA method was developed by CHARNES *et al*. (1978) and uses linear programming to evaluation of measures of comparative efficiency of DMU's, which use the same resources (*inputs*) and generate the same products (*outputs*). There are two classical DEA models: CCR and BCC, which can be oriented to inputs or products. Through the use of one of these models it is ossible to detect levels of efficiency of the DMU's, building, thus the frontier production with units that reach the maximum productivity (benchmarks).

The DEA-CCR version, also known by CRS or *Constant Returns to Scale*, adopts assumed constant returns to scale, while the DEA model-BCC uses the assumption of variable returns to scale. DEA with designation of guidance resources (*inputs*) comes from the fact that the efficiency should be reached with reduction of resources and when facing the products (*outputs*), maximizes the outputs while maintaining unchanged the entries (*input*) (CHARNES *et al*., 1978). All the models obtained in this study were resolved with the use of the software Decision Support System (SIAD) (ANGULO MEZA et al., 2004). In table 1 the variables relating to the municipalities of MS are presented that have conditions to reflect, in the context of each municipality, the variations in environmental, economic and social dimensions, sources and their input-output functions in DEA.

Table 1. Description of the variables, by size, power and role performed

Variable	Dimension	Source	Function
Fuel Consumption	Environmental	DENATRAN	Output
Permanent private domiciles - garbage collection - for collection service and garbage conainer		IBGE	Output
Permanent private domiciles - Water supply - General Network		IBGE	Input
Demographic density (inhab/km^2): ratio between the population and the area of the city, shows how the population is distributed across the territory.		PNUD	Input
Municipal expenditure on education per capita (R$).	Social	IPEA/STN	Input
Municipal expenditure in health and sanitation functions per capita income (in reais).		IPEA/STN	Input
Total population.		IBGE	Input
Life expectancy at birth (years).		PNUD	Output
25-Year-old people or older, Without instruction and basic education		IBGE	Output
Public investment rate	Economical	TSN	Input
Private investment rate		TSN	Input
GNI per capita		SEMAC	Output
Unemployment rate		IBGE	Output
Electric power consumption		SEMAC	Output
Intensity of electric power		ENERGISA	Input

These variables were chosen based on two criteria: the first uses the methodology of the United Nations Organization (UNO), the document "Sustainable Development Indicators: landmark and methodologies". This publication, known as the blue book, is considered by experts as a milestone in terms of reference in the selection of variables for the study of sustainable development; the second criterion was the data availability in relation to the years 1991, 2000 and 2010 of the municipalities studied. As some variables that appear in the blue book do not have available indicators for the cities of MS, it was opted for those that have a historical uniform series for all locations, the target of this research. Thus, the variables described in table 1 were chosen because they are indicators used for the calculation of the Index of Sustainable Development (IDS) by the UN, because they have impacts on the three dimensions, ability to represent important aspects of society and the environment and by the availability of historical series, allowing a holistic analysis of environmental, economic and social development of the studied municipalities.

From the results of each dimension, the index of sustainable development was extracted in each municipality (IDSM), based on the simple arithmetic average of the indices of environmental, social and economic, development $ID_{environmental}$, ID_{social} and $ID_{economic}$, respectively. Expression 1 presents the formula for the aggregation of indices that make up the IDSM.

$$IDSM = \frac{ID_{ambiental} + ID_{social} + ID_{econômico}}{3} \quad \ldots\ldots\ldots\ldots..(1)$$

The indices of development generated for each dimension and the aggregrated IDSM were classified as the result considering the parameter of the UNDP, in particular, the intervals of the Human Development Index (HDI), taken as reference for the differentiation in the level of efficiency, in terms of sustainable development. Thus, the results are classified in accordance with the illustration in Figure 1.

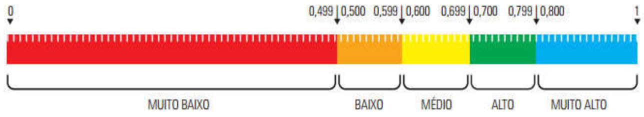

Figure 1. Illustration of the classification of the IDS results. Source: Adapted from PNDU (2013)

RESULTS AND DISCUSSION

This section the presentation of the results obtained is carried by subjecting the values of the municipal selected variables to the models DEA - CCR and BCC, for the years 1991, 2000 and 2010. After the development of the application of the models it can be observed that the best model, or the one that presented the best results was the model DEA - BCC, both directed to inputs and products, therefore, it was the one that best represented the production frontier of the DMU's, in the specific case, the municipalities. In response to the objective of the study, it was chosen to give emphasis to the products-oriented models by adopting the bias to produce more results (maximize production) keeping constant the resources, i.e., it is aimed to increase the products without changing the inputs.

The results presented here are the main concept that is not the total volume that ensures high levels of efficiency, but the relative term, i.e., the allocation of resources that are considered as the best performance. Thus, the best municipality is the one that shows more efficient allocation of resources and investments, increasing the products/services offered to the local population and not the one that holds greater absolute volume of resources. As a limitation of the study, it is important to highlight that the indicators of results of the municipalities studied do not represent the interpretation that, those with better indexes, are in full sustainable development, i.e., that there is no impact on the environment, that the local economy and society do not present difficulties, but rather, the efficient use of resources to resolve these difficulties. The results derived from the research process through the DEA, of data corresponding to the years 1991, 2000, 2010, are divided by size in the coming sessions.

Environmental dimension: In the environmental dimension, in the model DEA BCC, it is considered the highest and the lowest degrees of environmental efficiency (IDA). Thus, 7 municipalities (Caracol, Douradina, Fátima do Sul, Ladário, Rochedo, Sete Quedas e Vicentina) presented results equal 1 regarding efficiency, with great IDA and 5 municipalities with awfu IDA. In 2000, 14 municipalities presented index equal to 1, however, none of them had the best ranking nine years before, that is, in 1991. On the other way around, the worst result, only Jateí recorded result below 0.800. The other municipalities had very high levels of efficiencies, with results between 0.9446 and 0.9989. In 2010, only 8 municipalities presented the best results, efficiency 1, while 60% of other cities studied reported results in the range from low to medium degree of efficiency in the environmental dimension, in the year of 2010 (Table 1).

Table 1. MS municipalities with lower and higher IDA, in the environmental dimension in 2010

Best		Worst	
City	IDA	City	IDA
Alcinópolis	1	Porto Murtinho	0.0259
Campo Grande	1	Jaraguari	0.0247
Coronel Sapucaia	1	Jatei	0.0216
Douradina	1	Caracol	0.0185
Fátima do Sul	1	Corguinho	0.0185
Ladário	1		
Paranhos	1		
Taquarussu	1		

In this environmental dimension, the fact that draws attention is the deterioration in the result of the municipalities between the years of 1991 and 2010. While in 1991, forty-nine municipalities presented results classified as very low, in 2010 this number increased to 64, an increase of 30%.

Social dimension: In the social dimension, for the year 1991, the model DEA BCC, six municipalities recorded the best degree of efficiency, i.e., IDS equal to 1 (Aparecida do Taboado, Aral Morea, Cassilândia, Corumbá, Paranaíba and Três Lagoas). On the opposite side, i.e., those with performance regarded as very low, 5 municipalities were found (Nioaque, Pedro Gomes, Ribas do Rio Pardo, Corguinho and Dois Irmãos do Buriti). In 2000, 14 municipalities (Anastácio, Anaurilândia, Aparecida do Taboado, Aquidauana, Bodoquena, Brasilândia, Campo Grande, Caracol, Chapadão do Sul, Corumbá, Dourados, Inocência, Selvíria e Três Lagoas) recorded performances equal to 1, i.e., with a high level of efficiency in this dimension. Only Itaquirai, Novo Horizonte do Sul e Laguna Carapã had results were considered as very low in the respective year. For the year 2010, in the social dimension, 32.05% of the total number of municipalities studied had high efficiencies in the BCC-DEA version. In this dimension there was no record of municipalities with medium, low or very low degree of efficiency. However, 67.95% appear with a high level of efficiency with standard deviation of 0.017, being that the results are ranging from 0.9996 (Bandeirantes) to 0.9291 (Bodoquena). In the passage of the years between 1991 to 2010, in the social dimension, high improvement is realized in the efficiency of the resources being that, in 2010, there is no record of municipalities classified below the high level of result.

Economic Dimension: In the economic dimension, the model DEA BCC recorded results considered dispersed within the classification of degree of efficiency. In 1991, only five municipalities (Camapuã, Inocência, Jateí, Coronel Sapucaia and Mundo Novo) showed a high degree of efficiency in the use of economic inputs to generate products for the society. However, 75% of the municipalities have low efficiency being the worst Nioaque, Nova Andradina, Dourados, Campo Grande and Deodápolis (Table 5). For the year 2000, 12% (Deodapolis, Caracol, Alcinopólis, Juti, Angélica, Inocência, Santa Rita do Pardo, Nova Andradina, Corguinho e Taquarussu) of the municipalities presented high level of efficiency in this dimension, 60% reported results ranked as very high and 30% are classified as municipalities of low performance. However, in 2010, this scenario changed, and a large proportion of the municipalities evolves in this item. In the year 2010, 30.77% (24 cities) presented full efficiency, 26.92% (21 locations) very high level, 8.97% (7 cities) showed a very high degree, 16.67% (13 cities) Medium degree, 12.82% (10 cities) Low degree and 3.85% (3 cities very low degree of efficiency in the development of the model DEA - BCC).

Index of Sustainable Development of the cities of Mato Grosso do Sul: In relation to the result of the index of sustainable development of the municipalities (IDSM) of those municipalities classified as of low degree of sustainable development - from 26% to 10% - and an increase in the number of localities with medium level of sustainable development, from 18% to 26%. As to the level of high development, it changes from 4% in 1991 to 28% and 9% to 36% in the condition of development considered as too high. In the year 2010, the municipalities of MS reported a worsening of the level of sustainable development, returning to the parameters close to the year 1991.

Table 2. IDSM per city in the years 1991, 2000 and 2010

City	1991	2000	2010	City	1991	2000	2010
Água Clara	0.57	0.79	0.79	Itaporã	0.55	0.78	0.55
Alcinópolis	0.70	0.56	0.85	Itaquiraí	0.54	0.63	0.87
Amambaí	0.44	0.64	0.19	Ivinhema	0.45	0.79	0.11
Anastácio	0.46	0.93	0.53	Japorã	0.51	0.53	0.33
Anaurilândia	0.54	0.87	0.58	Jaraguari	0.65	0.77	0.66
Angélica	0.59	0.80	0.75	Jardim	0.48	0.84	0.54
Antônio João	0.65	0.82	0.49	Jatei	0.47	0.73	0.93
Aparecida do Taboado	0.46	0.99	0.74	Juti	0.67	0.68	0.97
Aquidauana	0.38	0.81	0.65	Ladário	0.99	0.77	0.74
Aral Moreira	0.58	0.85	0.77	Laguna Carapã	0.35	0.46	0.55
Bandeirantes	0.55	0.69	0.56	Maracaju	0.44	0.82	0.68
Bataguassu	0.50	0.83	0.33	Miranda	0.44	0.65	0.61
Batayporã	0.56	0.74	0.65	Mundo Novo	0.66	0.74	0.84
Bela Vista	0.44	0.67	0.60	Naviraí	0.47	0.88	0.35
Bodoquena	0.58	0.85	0.58	Nioaque	0.50	0.64	0.70
Bonito	0.44	0.69	0.57	Nova Alvorada do Sul	0.37	0.54	0.62
Brasilândia	0.47	0.87	0.54	Nova Andradina	0.44	0.80	0.59
Caarapó	0.49	0.74	0.55	Nova Alvorada do Sul	0.35	0.47	0.67
Camapuã	0.43	0.66	0.65	Paranaíba	0.42	0.97	0.65
Campo Grande	0.68	0.86	0.44	Paranhos	0.86	0.66	0.65
Caracol	0.67	0.85	1.00	Pedro Gomes	0.51	0.67	0.18
Cassilândia	0.44	0.96	0.53	Ponta Porã	0.44	0.81	0.84
Chapadão do Sul	0.59	0.90	0.44	Porto Murtinho	0.44	0.67	0.50
Corguinho	0.67	0.62	0.57	Ribas do Rio Pardo	0.46	0.59	0.33
Coronel Sapucaia	0.84	0.74	0.85	Rio Brilhante	0.45	0.78	0.65
Corumbá	0.37	0.99	0.77	Rio Negro	0.61	0.67	0.00
Costa Rica	0.45	0.73	0.77	Rio Verde de Mato Grosso	0.43	0.74	0.53
Coxim	0.42	0.86	0.71	Rochedo	0.68	0.64	0.66
Deodápolis	0.60	0.70	1.00	Santa Rita do Pardo	0.60	0.79	0.75
Dois Irmãos do Buriti	0.46	0.59	0.45	São Gabriel do Oeste	0.48	0.83	0.58
Douradina	1.00	0.68	0.66	Sete Quedas	0.69	0.63	0.51
Douradina	0.60	0.92	0.00	Selvíria	0.78	0.92	0.41
Eldorado	0.59	0.74	0.14	Sidrolândia	0.47	0.79	0.81
Fátima do Sul	1.00	0.84	0.48	Sonora	0.58	0.65	0.55
Figueirão	0.29	0.33	0.33	Tacuru	0.64	0.61	0.52
Glória de Dourados	0.73	0.72	0.52	Taquarussu	0.98	0.85	0.67
Guia Lopes da Laguna	0.59	0.65	0.48	Terenos	0.52	0.70	0.42
Iguatemi	0.50	0.71	0.56	Três Lagoas	0.42	1.00	0.65
Inocência	0.55	0.79	1.00	Vicentina	0.94	0.75	0.22

Source: Elaborated by the own authors

Table 3. Statistical summary of IDSM, per year

	1991	2000	2010
Mean	0.55	0.74	0.58
Median	0.51	0.74	0.58
Standard Deviation	0.17	0.15	0.22

respectively for each municipality of MS, in the years 1991, 2000 and 2010, there is a trend in the passage between the years of 1991 to 2000, while that between 2000 to 2010 some stabilization in the IDSM. In table 2 the results of each municipality are presented, for the years 1991, 2000 and 2010. In 1991, 9% of the municipalities were at the level of very high efficiency, 4%, high,18% , medium level, 26% being considered of low efficiency and 43% in too low efficiency rating . Therefore, it is understood that most of the cities, in the year 1991, showed a low sustainable development. However, in 2000, singular improvement was noticed. The number of localities considered of very low degree of sustainable development ceases to exist, there is a reduction in the number

In 2010, 14% were classified as having a very high level of sustainable development, 12% of high degree, 21% of medium, 27% low and 26% very low. In Table 3 it is verified that there was an increase in the medium sustainable development only in the comparison between 1991/2010, while for 2000/2010 there was a reduction. The median also recorded this result while the standard deviation increased in the passage of 20 years, indicating that there is not a common orientation to the municipalities of MS, the trend of sustainable development was very dispersed. In 1991, there was also a relative dispersion of results of the IDSM among the cities, however, with results considered as low or very low IDSM. Whereas, in 2000, it becomes clear the improvement of the cities, consolidating the results in their majority as high and very high. However, in 2010 there was a worsening of outcomes and increase in the dispersion among the cities, or an increase in the difference of the IDSM among the localities. In table 3, it is noted, from the means per year, that although there is an increase in the means in 2000, it does not mean a general improvement in the municipal sustainable development, but rather a greater homogeneity within the set of cities. This hypothesis is clear to see that, in 2000, 36% of the cities registered sustainable development considered very high, 28%, high, 26%, medium and 10% as low. Upon adding the three years of the historic series, the cities of Deodápolis, and Caracol are the best degree of sustainable development (concept 1). Only 6% reported results in the range of classification of very high, 21% high, 40% Medium degree, 16% low and 14% were classified as very low. None of the four largest cities of MS, in number of inhabitants, registered sustainable development as a very high degree. Campo Grande showed medium degree, Dourados very low, três Lagoas medium and Corumbá high. Although the cities have evolved in the social and economic dimension in the twenty years that have passed, from 1991 to 2010, the result of the IDSM in 2010 had a smaller variation when compared to 2000, returning the parameters close to those recorded in 1991. The variables of the environmental dimension can explain the reduction in the IDSM of the studied cities in 2010 compared to 2000, therefore, upon separating the IDSM by size, the ambiental was the one that showed an increase of cities present in the classification of results considered low or very low degree of efficiencies. In 2010, 85% of the studied localities were in this range of result. The increase in fuel consumption, causing greenhouse gases, like CO_2, for example, and the population increase, which in turn require inputs from the environment, are the variables that may have influenced this result.

Conclusion

The results obtained showed an inverse relationship among the cities that have evolved in the social and economic dimensions, however, decreased the result on the environmental dimension. Thus, from the data relating to the years 1991, 2000 and 2010, it was possible to observe a reversal of the cities in the direction of sustainable development as, for example, cities that recorded the best indicators of environmental efficiency in 1991, only two remained as having a high degree of environmental efficiency in 2010. The reverse also occurs, because upon analyzing the year of 2010, it is noted that the cities of low efficiency in previous years have evolved and no longer ranked as the worst in the social and economic dimensions. In the social dimension the result is more uniform, having a large part of the cities changed from low to medium or high efficiency situation in the transformation of inputs to society between 1991 to 2000 and then in 2010. The economic dimension presents the results more dispersed among the cities, however, records inverse change movement to the environmental dimension, i.e., the cities reported an improvement in the passage from 1991 to 2000 and then from 2000 to 2010. Thus, it is noted that there were improvements in the direction of economic and social development of 78 cities studied between the years of 1991 and 2000, and between 2000 and 2010. However, this increase has led to a reduction in the environmental dimension of specific mode in the comparison between 2000 and 2010.

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