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FARM LEVEL SUSTAINABILITY ASSESSMENT: CHOOSING SUITABLE TOOLS FOR LOCAL CHARACTERISTICS

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ABSTRACT

The state of Mato Grosso do Sul, in Central Brazil, is one of the main players on Brazilian agribusiness. This is clear from the value of its agricultural production, which has shown steadily growing figures in the last decade. Linked to this, there is the importance of economic growth associated with measuring parameters and monitoring sustainability in agriculture. As the use of systems that evaluate farm sustainability is already a reality, this research assessed characteristics of agribusiness in Mato Grosso do Sul using indicators present in different sustainability assessment systems to find out which of these systems could have more applicability in local agribusiness. From the systems used in this research: IDEA, APOIA-NovoRural, MESMIS, FESLM and SAFA, only the last three demonstrated to have indicators capable of measuring, in full, agribusiness characteristics of the MS selected for this study.

Key words: Sustainability Indicators; Agribusiness Management; Sustainability Assessments

INTRODUCTION

The State of Mato Grosso do Sul (MS) has an important participation in Brazilian agribusiness from the perspective of rural development. As for December 2018, it was as the fourth state with the largest cattle herd in the country, corresponding to 9.8% of national production. It also reached the fourth place in 2018 in maiz production (10.1%) and fifth in soybeans, which is equivalent to 8.2% of all national production (IBGE, 2018). With a Gross Domestic Product (GDP) of R$ 83.1 billion, MS increased from 1.2% to 1.4% the participation of the State in the national GDP in 2017. With an Agricultural Production Value of BRL 28.519 billion, it surpassed the national average in exports from agribusiness, presenting a growth of 13% in 2017 in relation to 2016, with US$ 96.01 billion traded (GOVERNO..., 2018).

The state has 71,164 agricultural establishments, which cover an area of 30.5 million ha. The distribution of land use in the State is proportionally divided into 60% with pastures, 12% crops, 24% reserved for forests and other natural vegetation and 4% for other purposes (IBGE, 2017). More specifically, according to the 2017 Agro Census, in regards to pastures, in the state, 71% are man sown and are in good condition, while 2% are sown and are in poor condition, while 27% are natural pastures. Regarding crop farming, 99% of the area has temporary and annual crops while 1% has permanent crops.

Regarding crop farming, it is important to remark not only for the quantity produced, but also agricultural practices these crops and the benefits they offer to the environment. Among the main crops and their characteristics, soybeans stands out, with a harvested area of 2.8 million hectares, a total harvest of 8.6 million metric tons and a production value of up to BRL 9,5 billion. Next is maize farming, with a harvested area close to 2 million hectares, a production of almost 10 million metric

tons and a production value of BRL 4.3 billion. Added to Sugarcane and Cassava, the production value of these crops exceeds BRL 18.1 billion (PESQUISA AGRÍCOLA MUNICIPAL, 2019).

This result is also possible thanks to a reality in the state, which is the low-carbon agriculture, favored by technologies used for production and innovation into the systems that benefit the environment, such as no-till, crop consortium and integrated crop-livestock-forestry systems. In Central Brazil, 61% of the farmed area produces two crops per year, between interseasonal maize and interseasonal cotton combined with soybeans and others (AGROEMDIA, 2020). Therefore, the use of these means of production results in gains for the environment and for farmers, after all, soybean production in MS, in the period from 1998 to 2018, grew 320%, a result attributed in large part by the use of no-till seeding that revolutionized the form of land cultivation in the State (FAMASUL, 2018). The 2017 Agro Census reported that in MS, only 17% of farms obtained some type of credit, the objective of which was mainly for cash-flow (49%) and investments on farm (42%).

Considering the importance of monitoring to improve sustainability of local production systems as well as seeking to verify and eventually quantify differences between traditional systems and integrated systems, objective of this work was to analyze different systems or tools designed for sustainability assessments applicable to farms, including integrated farms, in order to investigate which tools, through their indicators, could be more applicable to farm level sustainability assessments in the State of Mato Grosso do Sul.

MATERIAL AND METHODS

A comparative method was used, which consists of investigating and explaining facts according to their similarities and differences. In this method, two or more approaches of a similar nature are confronted in order to know what is common for both. "Comparing similarities and divergences, the importance between groups can be better explained" (FACHIN, 2011, p.41).

The procedures for this research consisted of investigating and highlighting the indicators used in five sustainability assessment systems applicable to farm level, based on the characteristics peculiar to farms in the State of Mato Grosso do Sul. The chosen assessment systems were selected through a comprehensive search for the most cited in the scientific publication bases, for instance: Web of Sciences, Science Direct, Scielo, Scopus, Redalyc, DOAJ and CAPES, using keywords related to the theme, such as: environmental and agricultural sustainability indicators, farm and environment sustainability assessment, programs, software, methods, systems or assessment tools agricultural sustainability. Thus, the systems considered for this work followed a decreasing order of number of citations:

- Marco para la Evaluación de Sistemas de Manejo de recursos naturales incorporando Indicadores de Sustentabilidad (Masera, Astier, Lopez-Ridaura, 2000);
- Sustainability Assessment of Food and Agriculture systems (FAO, 2014);
- Indicateurs de Durabilité des Exploitations Agricoles (VILAIN, 1999);
- Sistema APOIA – NovoRural (Rodrigues e Campanhola, 2003);
- Framework for the Evaluation of Sustainable Land Management (Dumanski e Smyth, 1995);

In other words, the idea was to ascertain which one or which ones of these systems would have indicators would be more suitable to assess sustainability and propose a comparative sustainability score for agricultural systems withing the context of Mato Grosso do Sul agribusiness. As these characteristics can be measured qualitatively or quantitatively and they reflect the condition of sustainability of a farm on itself and affecting its surroundings, the chosen characteristics were summarized in descriptors because, in this way, according to Pompei (2010), the descriptor is able to provide more reliability to the search carried out.

Therefore, the method chosen was to assign at least two of these descriptors to each dimension of sustainability. As the dimensions are: environmental, economic and social, it resulted in a total of six descriptors and after this assignment, a check was made against the list of indicators of the five systems selected for this research. In an objective way, similar to a mathematical set, the study had to describe whether or not the analyzed sustainability assessment system contains any indicator capable of measuring the characteristic determined within the dimensions of sustainability already mentioned according to the respective descriptors.

And in this way, to explore the possibility of stating that at least one of the systems selected in this research is suitable to be applied for assessing sustainability in typical farms of Mato Grosso do Sul.

RESULTS AND DISCUSSIONS

Assessment systems that best match the reality of agribusiness in Mato Grosso do Sul: Descriptors x Indicators

The descriptors used as reference for checking against indicators of each system are shown in Table 1, together with the sustainability dimension related to them and a code to optimize demonstration of the information in the results table (Table 2).

Table 1. Descriptors used analyze the five systems selected in this research.

Dimension	Descriptor (Indicator)	Code
Environmental	Crop rotation	A1
Environmental	Control over pesticides usage	A2
Economic	Financial planning and crisis management	E1
Economic	Maintenance of production quantity and quality	E2
Social	Social responsibility	S1
Social	Good management practices	S2

Table 2 below shows the results found from the search made in each of the five evaluated systems based on the descriptors listed in Table 1. Table 2 is subdivided with the specific dimension of sustainability: environmental, economic and social, together with the code to distinguish each descriptor. In addition to each system separated by column, whose cells are filled with the result of the search carried out in the list of indicators of each system regarding the presence or not of any indicator that represented that respective descriptor.

Table 2. Suitability of the evaluation systems evaluated with farms in Mato Grosso do Sul.

Dimension		MESMIS	SAFA	IDEA	APOIA	FESLM
Environmental	A1	Stability	Production diversity	Diversity of cultures	Productive Diversity	Production diversity
	A2	Reliability	Dangerous pesticides	Pesticide pollutant pressure	Potential impact of pesticides	Chemicals and Fertilizers
Economic	E1	Self-reliance	Risk management	Financial autonomy	Diversity of income sources	Debt planning
	E2	Productivity	Guaranteed production levels	Does not contain	Does not contain	Soil Productivity and Animal Health
Social	S1	Equity	Public health	Social involvement	Does not contain	Working with socio-cultural grains
	S2	Self-management	Effective Participation	Does not contain	Responsible profile	Farm management skills

CONCLUSIONS

As demonstrated, the tools or assessment systems IDEIA and APOIA do not have indicators that cover all the descriptors that represent the reality of the State. In this case, IDEIA does not have indicators related to the descriptors: maintenance of quality and quantity of production and good management practices. While the APOIA-NovoRural tool did not present any indicator that dealt with the levels of quality and quantity in terms of soil productivity. Nor did it present an indicator that addressed social responsibility over farm surroundings.

The tool MESMIS has no predefined indicators. What it brings in its methodology are attributes, and those were used in our verification. In this way, it was possible to adapt them in order to meet all dimensions of sustainability, confirming the flexible and adaptable format of this tool according to each local analyzed, thus being able to be used to assess farms in Mato Grosso do Sul.

Finally, the most complete, promising and possible to recommend tools in terms of presenting pre-established indicators in their structure, which, in turn, meet all the characteristics had as mandatory to study farm sustainability in Mato Grosso do Sul were FESLM and SAFA.

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