PERFORMANCE INDICATORS: A PROPOSAL FOR FAMILY-RUN LIVESTOCK FARMING UNDER THE CONCEPTUAL FRAMEWORK OF THE SUSTAINABLE BALANCED SCORECARD

Rafael Mirailh1, Claudio Sonaglio Albano2, Vinicius do Nascimento Lampert3

1 Master of Business Administration, Federal University of Pampa — UNIPAMPA. Santana do Livramento, Rio Grande do Sul, Brazil. rafael.mirailh@hotmail.com
2 Doctor of Business Administration, Federal University of Pampa — UNIPAMPA. Bagé, Rio Grande do Sul, Brazil. claudioalbano@unipampa.edu.br
3 Doctor of Zootechnics, Brazilian Agricultural Research Corporation — EMBRAPA. Bagé, Rio Grande do Sul, Brazil vinicius.lampert@embrapa.br

Abstract
Objective: Build a matrix of indicators, according to the conceptual perspective of the BSC, adapting to the dimensions of sustainability related to family ranching. Methodology: A qualitative approach was used, carrying out bibliographic and documentary study, in addition to interviews with rural producers and specialists on the subject.
Originality: Historically, there is a lack of tools and management methodologies for the work context, especially in view of the new environmental and sustainability requirements. Thus, the work contributes to mitigate this gap in the context.
Main results: The work generated a proposal / matrix with sustainability indicators for family livestock. Matrix composed of 28 indicators distributed in the four dimensions (environmental, economic, productive and social) of sustainability.
Theoretical/methodological contributions: The main methodological contribution was to describe the process of how to propose a matrix of indicators, using planning tools such as the SWOT matrix and the BSC. Producers and specialists contributed to the construction of the SWOT matrix, later also contributed to the construction of the indicator matrix, in order to tend to the SWOT matrix.
Social contributions/to management: As a social contribution we can mention the issue of the matrix of indicators being supported by the four dimensions of sustainability. For management, the matrix itself, in addition to the specifications of each indicator, which can enable better management of family ranching properties.

Keywords: Performance indicators. Cattle farming. Family farms. Sustainability.

INDICADORES DE DESEMPENHO: UMA PROPOSTA PARA PECUÁRIA FAMILIAR SOB A ÓTICA CONCEPTUAL DO BALANCED SCORECARD SUSTENTÁVEL

Resumo
Objetivo: Construir uma matriz de indicadores, conforme a ótica conceitual do BSC, adaptando às dimensões de sustentabilidade relacionadas à pecuária familiar. Metodologia/abordagem: Utilizou-se uma abordagem qualitativa, realizando um estudo bibliográfico e documental, além de entrevistas com produtores rurais e especialistas no tema. Originalidade/Relevância: Historicamente existe uma carência de ferramentas e metodologias de gestão para o contexto do trabalho, em especial frente as novas exigências ambientais e de sustentabilidade. Assim, o trabalho contribui para mitigar esta lacuna no contexto. Principais resultados: O trabalho gerou uma proposta/matriz com indicadores de sustentabilidade para a pecuária familiar. Matriz composta por 28 indicadores distribuídos nas quatro dimensões (ambiental, econômica, produtiva e social) de sustentabilidade. Contribuições teóricas/metodológicas: A principal contribuição metodológica foi descrever o processo de como propor uma matriz de indicadores, utilizando-se ferramentas de planejamento como a matriz SWOT e o BSC. Produtores e especialistas contribuíram para a construção da matriz SWOT, posteriormente também contribuíram para a construção da matriz de indicadores, de forma a tender a matriz SWOT. Contribuições sociais / para a gestão: Como contribuição social podemos citar a questão da matriz de indicadores estar apoiada nas quatro dimensões de sustentabilidade. Para a gestão, a própria matriz, além das especificações de cada indicador que pode viabilizar uma melhor gestão nas propriedades de pecuária familiar. Palavras-chave: Indicadores de desempenho. Pecuária de corte. Produtor familiar. Sustentabilidade.
Introduction

There is a rise in the number of organizations that, confronted with a scenario of competitiveness and surrounded by uncertainties, search for methods and techniques to help in the management process (Munaretto, 2013). Relevant literature claims that it is possible to face the difficulties in this picture with the use of planning tools as a way to keep these businesses afloat. As such, to remain in the market, it is necessary that administrators make use of the best techniques to determine their organizational performance, and that the results are in accordance with the strategies employed by the organization (Martins, 2006; Ribeiro, 2009; 2013; 2018).

Planning is considered an important aspect of management for both urban and rural entrepreneurship, because it allows administrators/producers to follow and make decisions about their business activities based on concrete data obtained through organizational performance indicators (Martins, 2006). Munaretto (2013) endorses this line of thought, claiming that any performance evaluation system should incorporate a set of indicators, always with the aim of aligning those activities with the organization’s goals.

To the National Foundation for Quality (“Fundação Nacional para Qualidade”, FNQ, 2017), the existence of a system of organizational performance indicators makes it possible to carry out a careful analysis about the management’s effectiveness and, consequently, of its results. Among other tools meant to determine strategies, the Balanced Scorecard (BSC) can be used as a support for the manager in the decision-making process, in order to improve business performance. The BSC can lead to an efficient learning process, as it integrates the strategic structure of the organization in a cyclic, open manner. Thus, it is considered a flexible system, adaptable to the needs of any enterprise, regardless of its size and activities (Vigné, 2011; Montenegro & Callado, 2018).

Working with organizational management in rural, family-run livestock farms is not a simple task. Most properties lack the habit of registering, archiving and consolidating important data, which makes it harder for the producer to come to know their property thoroughly (Martins, 2006). Despite its economic relevance, the family-run livestock farm needs, by its very nature, to keep the activity only as a means of supporting themselves, their family, and to settle property expenses (Ribeiro, 2009).

Oaigen et al. (2014) argue that the importance of family-run livestock farms can be proven by the complexity behind their administration, by the diversity among these organizations and especially by the ampleness of their commodity chain. According to Silva et al. (2014), extensive cattle farming prevails in the west and south of Rio Grande do Sul, a practice historically linked to the native Pampas plains. In the north of the state, dairy farms are prevalent, as an activity dependent on grain silage, readily available in the region. However, Marques (2010) has pointed out that both kinds of farming in these regions have been presenting unsatisfactory indicators, which cannot guarantee attractive prospects for producers.
As previously stated, family-run livestock farms are a predominant form of business in Rio Grande do Sul, and for that reason extremely important to the state’s economy. Still, it is evident that many such producers lack the appropriate knowledge to properly manage rural properties; add to that a dose of misinformation about technical aspects and the market, and they might wind up with a low rate of productivity (Ribeiro, 2009; Bezerra, 2013).

Due to their relevance, producers involved in family-run livestock farming need (just like any other organization) an evaluation model for their own performance, in order to use the resulting information to enhance their control systems, to make continuous improvements, to upgrade their administration process, and to better formulate business strategies (Martins, 2006; FNQ, 2017).

Summing up the considerations above, we have, on one side, the difficulties concerning the current competitive scenario among organizations, with the use of indicators as a means to improve management, in regards to sustainability (in a general sense). On the other hand, in face of the demand to offer better managerial tools to cattle farm administrators, we present the following research question: *How can we develop a matrix of performance indicators directed to family-run cattle farms, in order to support the producers in their decision-making process, with the aim of improving the administration of their properties?*

In this essay, we intend to collaborate to the answer to this question by building a matrix of indicators, under the framework of the BSC, adapting the dimensions originally proposed by it to dimensions of sustainability, as related to family-run livestock farming.

In this way, this essay will contribute to the refinement of the decision-making process of these producers. By selecting an alternative, the administrator will be able to determine whether the organizational aims were met. With the help of an indicator system, the decision-making process can become more accurate. Caravantes, Panno and Kloeckner (2005) bring to attention the fact that the actions of an administration involve decisions such as what will be produced, how this production will take place, and the choice of consumer market.

**SWOT matrix and the BSC**

The SWOT matrix is a managerial tool used in several organizations (Oliveira & Batista, 2017; Pereira et al., 2017; Cavalcânti & Guerra, 2019; Souza, 2020) which enables the choice of an adequate strategy, through a critical evaluation of the organization’s internal and external environment. Authors such as Martins and Turrioni (2007) assert that the SWOT is important for the decision-making process, and that it is often used as an analysis model for organizational scenarios. It is also believed to be a vital foundation to establish business strategies, seeing as the union between qualifications and opportunities are what determines the position of the organization within its environment, and considering that the first step to the implementation of the BSC is clarifying and translating the organization’s strategic vision.
Thus, the SWOT can have a fundamental role, contributing to the development of a set of strategies, while also being a pillar in the implementation of the BSC, as the indicators reflect the matrix’s content (Martins & Turrioni, 2002; Castro et al., 2007; Flores et al., 2009).

Therefore, in order to define strategic objectives for the use of the BSC, it is necessary to first carry out a joint analysis of the organization’s purposes and aims, and their alignment to both its internal and external environments. To Martins and Turrioni (2002) and Flores et al. (2009), among others, it is essential to clarify the organization’s strategic vision, establishing its positive and negative aspects, and taking an intersectional approach to the data initially collected by the SWOT matrix, using it as a support for the future application of the performance indicator candidates.

The BSC methodology has the primary aim of aligning strategic planning to organizational objectives, and it can and should be adapted to the reality of each organization as indicated by its creators (Kaplan & Norton, 1997; Vigné, 2011; Montenegro & Callado, 2018). This claim is corroborated by many studies developed in recent years, such as those regarding adaptations to organizations like municipal governments and other public offices, both urban and rural enterprises or even non-profit, non-governmental organizations (Rosado; Lobato & Müller, 2011; Ahlert, 2015; Costa & Oliveira, 2015; Villela; Rezende & Domingos, 2015; Barros & Wanderley, 2016; Brum et al., 2017).

Following this trail of thought, the original framework proposed by the BSC was adapted to include social, economic, environmental and productive dimensions. Three among these new dimensions (social, environmental and economic) were developed by the Food and Agriculture Organization of the United Nations (FAO, 2018), and later supported by authors such as Sachs (2004), Elkington (2012), Barbieri and Cajazeira (2010). The fourth dimension (productivity) is linked to performance indicators used in cattle farming (Tanure et al., 2012).

Kaplan and Norton (1997) also recommend that the first step to implementing the BSC be the determination of a strategic vision. As such, SWOT analysis can play a central role in the process, contributing to the development of organization approaches, becoming a key tool to make the implementation of the BSC methodology easier.

Martins and Turrioni (2002) corroborate to this claim by asserting that, in order to establish an effective system of strategic management, it is necessary to make use of SWOT analysis to evaluate the internal and external parameters that influence the organization’s growth and survival, connecting them with those set up within the BSC’s framework. The process would show which performance indicators truly reflect the organization’s reality, being adapted to its needs.

Moreover, authors such as Sachs (2004), Elkington (2004), Barbieri and Cajazeira (2010) and Tanure (2012) state that sustainability pillars are complementary for systems as well as organizations. Considering this, it is indispensable that the producers understand the nature of their business, their position in the market, and that they are able to define their own strategies. Thus, they should come to know the impacts their organization might make on the environment and on society.
Using indicators within family-run cattle farming

In order to achieve a harmonious development — that is, sustainable —, an organization should act in such a way that the three pillars recommended by the FAO may coexist and interact among themselves. Family-run cattle farming often faces the challenge of increasing the herd’s productivity without sacrificing sustainability, all the while worrying about natural resources and the organization’s impact on the environment.

Small, family-run cattle farms still require strategies that allow for productivity gains, with an increase in fertility, average daily gain, carcass weight, stocking rates, or even gains per area. These aspects, when satisfactory, are reflective of greater productive effectiveness, with vertical expansion (Barbosa et al., 2010; Brum et al., 2017). The producer should be able to position themselves better in the market through an improved understanding of their property, while also drawing a strategy that makes it possible to achieve all the factors that serve as a measure for results, creating value for all those involved in the organization (Rabelo, 2012).

Hence, it is essential to make use of indicators that can measure factors that show the administrator the development of their property/activity in relation to productivity. Along these lines, with the support of studies carried out by Brum et al. (2017), we understand and consequently adopt productivity as the fourth dimension in our model, in order to answer the question behind this research, the building of performance indicators within the framework of the BSC (Image 1).

**Image 1** – A representation of all four proposed dimensions, integrated in action

![Image](image1.png)

**Source**: Elaborated by the authors.

The BSC is a methodology for evaluation of organizational performance, which, throughout the years, has been used constantly in urban business models. However, due to intrinsic differences in actions, structure, involved parties and objectives between urban and rural enterprises, it must be adapted to fit a rural business model.

So it can be used correctly in relation to family-run livestock farms, the methodology BSC must contemplate metrics regarding the dimension of sustainability. It follows that a rural enterprise intending
to align itself with new market tendencies must carry out its social function, respecting the environment in which it exists, while also favoring satisfactory financial results and without sacrificing the maximization of production, in order to fully endorse the property’s development.

**Methodology procedures**

We developed this research based on a qualitative approach (Yin, 2005). The framework of the ensuing investigation was built as it was applied to the research’s very nature (Marconi & Lakatos, 2011). Regarding strategies, we have carried out a bibliographic and documental review (Fonseca, 2002).

Table 1 shows all the procedures used in the process. We had to resort to scientific essays, undergraduate and master theses, dissertations, books and reports, among others, in order to collect data relevant to the study’s progression. During the process of data collection, we made use of techniques such as the previously mentioned bibliographic and documental review and in-depth interviews (Bardin, 2011).
Table 1 – Procedures used during research development

| Stage | Activity                                                                 | Period          | Participants                                                                 | Objectives/Results                                                                 |
|-------|--------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 01    | Updating SWOT matrix model developed by Moreira et al. (2015) - Interviews| Aug/2018        | Interviewee Nº 1 (E1): Professor at UNIMPAMPA. Extension Officer at the Riogrindense Association for Technical Assistance and Rural Extension Enterprises (EMATER-RS). Work experience in the area of Agronomy, with an emphasis in Rural Extension and Development. Developed several studies about the alterations in the gaucho pampas, especially about the reality of family-run livestock farms and agrarian modifications to the region. | Updating and validating the matrix developed in 2015.                                    |
| 02    | Carrying out in-depth interviews with Interviewee Nº2. Afterwards, resuming discussion about the matrix with E1. | Aug/2018 to Sep/2018 | Interviewee Nº 2 (E2): Researcher at the Brazilian Agricultural Research Corporation (EMBRAPA), working mainly in researches in the areas of Agroecology and Endogenous Development. Afterwards, another interview with E1. | Revalidating SWOT matrix. Afterwards, legitimizing possible differences in point-of-view with E1. |
| 03    | Review of relevant literature in search of references to build performance indicators related to cattle farming. Bibliographical and documental review. | Aug/2018 to Dec/2018 | Authors                                                                     | Obtaining technical support for the use of proposed indicators and their scope of action. ▪ Dissertations - Ribeiro (2009); Munaretto (2013); Moreira (2002); Müller (2003). ▪ Theses - Fernandes (2017); Favorsini (2010); Canziani (1997); Souza (2013); Ahlert (2015); Bandeira (2017). ▪ Essays and reports - Brum et al. (2017); IBGE (2014; 2017); EMBRAPA (2005; 2018); EMATER (2018); NESPRO-UFGRS (2013; 2018); ABIEC (2017; 2018); FAO (2018); FNQ (2017); IPEA (2012); |
| 04    | Defining a strategic profile, using the SWOT matrix. Bibliographical and documental research. | Dec/2018 to Jan/2019 | Authors, verifying compliance with the SWOT matrix | After consolidating the SWOT matrix, finding theoretical contributors to determine indicators and the four dimensions used in the model (social, environmental, economic and productive). Defining a strategic profile to support the proposed indicators. |
| 05    | Proposing indicators. Bibliographic and documental research.             | Jan/2019        | Authors                                                                     | Defining the proposed indicators, in a way as to answer the arms set by the research questions, while adhering to previously proposed dimensions. |
| 06    | Validating proposed indicators. Interviews.                              | Mar/2019 to Apr/2019 | Specialists. E1 and E2 along with: Interviewee Nº 3 (E3): Coordinator of the Environmental Thematic Group of Rede Leite and extension officer at EMATER-RS; Interviewee Nº4 (E4): Member of the Rede Leite program Social Thematic Group; Interviewee Nº5 (E5): Coordinator of the Rede Leite Forages and Animal Feeds Thematic Group (productive) and researcher at EMBRAPA. | Verifying and adapting the proposed indicators. Legitimizing indicators with the help of specialists. |

Source: Elaborated by the authors.

Interviews are seen as one of the main techniques for data collection, and may be defined as face-to-face conversations between the researcher and the interviewee, within a specific framework to obtain information about the desired subjects. Among many methods of interviewing, in order to properly achieve the research’s objectives, we chose to apply the in-depth interview method, using a
guide (script) as a basis (Malhotra, 2006). We sought to glean the interviewees’ individual views, while allowing ourselves the liberty of using and including new questions whenever we identified the need for such (Rosa, 2006; Ribeiro, 2008; Flick, 2013).

Gil (1999) asserts that interviews can be arranged in four classifications: informal, focalized, scripted and formalized. In accordance with the guide we used in our interviews, we preferred the scripted method, which presents a certain degree of structure, guided by a roster of topics of interest that the interviewer wants to explore. In this kind of interview, the interviewer asks few questions directly, leaving the interviewee to speak freely, as they cover the scripted subjects. We carried out eighteen interviews; fourteen of them with specialists, and four of them with producers. The interviewees were identified in our research with the capital letter ‘E’ (for “entrevistado”, interviewee in Portuguese), alongside a correspondent number, from E1 to E13. Interviewees nº 1 (E1) and nº 2 (E2) were interviewed more than once.

As a script for the interviews carried out with E1 and E2, we used the SWOT matrix developed by Moreira et al. (2015), using its elements as a way of questioning and understanding each component of said matrix, looking for its meanings and the rationalization behind those (stage 1). In the following interviews, during the stages of developing, reviewing, validating, and assigning importance to indicators, we used the aforementioned indicators as proposed, with its elements aligned by dimension.

The interviewees were chosen due to convenience and accessibility to (Appolinário, 2006; Malhotra, 2006; Gil, 2010), as we searched for specialists who had experience working with cattle farming and producers who fit the criteria for family-run livestock farms as defined by the Brazilian government (Ribeiro, 2009; Fernandes & Miguel, 2016; Andreatta; Waquil & Miguel, 2016).

As for determining how many interviewees we should procure, Appolinário (2006), Malhotra (2006) and Gil (2010) assert that the researcher does not need many interviewees, as long as they are representative of the topics of interest. The interviewees should be able to offer the information the researcher requires (Gil, 1999; Godoi & Mattos, 2006).

Data analysis

We used the content analysis method to evaluate the results of the research. It is a classic procedure used to examine texts of all kinds (Bardin, 1977; Flick, 2013). We chose this specific method considering the diversity among the interviewees’ areas of work and research, as well as the nature of the bibliographic and documental literature we used.

To Bardin (2011), content analysis can be described as an assortment of techniques stemming from communication analysis, aiming to obtain, through systematic and objective procedures of description, indicators that allow researchers to infer knowledge related to the conditions of production and reception of the studied messages. According to the same author, content analysis can be employed
in three fundamental stages: a) pre-analysis, b) material exploration, and c) treatment of results. Table 2 shows the stages we have followed to analyze the collected data:

**Table 2 – Categories used for data analysis**

| Stage 1 Counterpart | Stage objectives | Categories for analysis |
|---------------------|------------------|-------------------------|
| Stage 1             | Stage 1          | Updating the matrix developed in 2015 |
|                     |                  | Mention of elements in the SWOT matrix. |
|                     |                  | Strengths, weaknesses, opportunities and threats. |
|                     |                  | Each mention and relevant for allocation in one of these categories was registered as an update in the matrix. |
| Stage 2             | Stage 2          | Validating the SWOT matrix with another interviewee |
|                     |                  | Mentions of elements in the SWOT matrix. |
|                     |                  | Strengths, weaknesses, opportunities and threats. |
|                     |                  | Each mention relevant for allocation in one of these categories was registered as a validation of the matrix. |
| Stage 3             | Stage 3          | Obtaining theoretical support for the use and the scope of the proposed indicators |
|                     |                  | Mentions of indicators in literature. |
|                     |                  | Search for performance indicators which might be employed in family-run cattle farms models within said literature. |
| Stage 4             | Stage 4          | Developing a strategic profile |
|                     |                  | Mentions of elements in the SWOT matrix and of indicators in literature. |
|                     |                  | Analysis and interpretation of the SWOT matrix. |
|                     |                  | After stages 1, 2 and 3, seeing which themes showed up were more frequent and relevant for the development of a strategic profile. |
| Stage 5             | Stage 5          | Developing a proposal of indicators |
|                     |                  | Indicators relevant within the context of the study. |
|                     |                  | Building a proposal of indicators based on stages 3 and 4. |
| Stage 6             | Stage 6          | Validating the proposal of indicators |
|                     |                  | Trustworthiness; relevant information; adequate language. |
| Stage 7             | Stage 7          | Validating suggestions for alterations |
|                     |                  | Trustworthiness; relevant information; adequate language. |

**Source:** Elaborated by the authors.
Results and their respective analysis

In order to continue the research done by Moreira et al. (2015), it was necessary to update the SWOT matrix already developed by these authors. Thus, in 2018, we carried out an interview with the purpose of updating this matrix. We used the matrix itself as a script for the interview, discussing each of its thirty-three elements — these being nine strengths and eight weaknesses within the internal environment, and nine opportunities and seven threats within the external environment.

The second interview was carried out with the objective of legitimizing the updated SWOT matrix; we included the meanings and justifications behind the changes so E2 would be able to properly validate it, and so we would be able to identify any divergences between their point-of-view and E1’s. The matrix kept all of its thirty-three elements.

After analyzing the assertions of E1 and E2, we realized that, in general, the two of them agreed with the SWOT matrix composition, thus making it credible and allowing a deeper understanding of each element within the matrix. Table 3 shows the results of the interviews carried out with E1 and E2, after the updating and validation of the SWOT matrix elements.

Table 3 – SWOT Matrix for family-run cattle farms, updated and validated

| Positive Factors | Negative Factors |
|------------------|------------------|
| **Strengths** | **Weaknesses** |
| ✓ Land ownership; | ✓ Indirect sales; |
| ✓ The tradition behind the activity; | ✓ Standards are not regular enough; |
| ✓ Cattle ownership; | ✓ Activity working as a form of survival for the family and for traditions in general; |
| ✓ Being familiar with all activities; | ✓ Not using external inputs; |
| ✓ Cleaner producing process; | ✓ Requires the stocking of animals; |
| ✓ Types of handling; | ✓ Problems with inheritance; |
| ✓ Workforce composed of family members or neighbors; | ✓ Not using information technology; |
| ✓ Activity working as a form of survival for the family and for traditions in general; | ✓ Lack of accessible workforce. |
| ✓ The possibility of choosing when to sell the product. | |

| Opportunities | Threats |
|----------------|---------|
| ✓ Basic product stands out in relation to other regions of the country; | ✓ Inadequacy of public policies; |
| ✓ Basic product stands out due to inadherence to modern producing processes; | ✓ Producers not acting in a rationally economic way; |
| ✓ Cleaner producing process might make the producers stand out; | ✓ Little in the way of politic representation; |
| ✓ The native fields make the product unique; | ✓ Little in the way of representation within professional corporations; |
| ✓ Valorization of the region’s potential due to the use of the native fields; | ✓ Lack of access to public resources such as education and health; |
| ✓ Ability of protecting the region; | ✓ Advance of other, more profitable activities; |
| ✓ Ability to approach the productive chain without commitments; | ✓ The search for academic graduation or other kinds of opportunity might get in the way of the business’s natural inheritance process. |
| ✓ Ability to add new technologies to the productive process; | |
| ✓ Ability to use new sources of information technology. | |

Source: Elaborated by the authors.
In this way, we were able to build a strategic profile in order to define the indicators, supported by the analysis of the internal and external environments of family-run cattle farms, starting from the sorting of the elements within the matrix to the four dimensions of sustainability.

*Developing a strategic profile and map for family-run cattle farms*

Building a strategic profile is a process that begins with the definition of the general objectives of an organization, which can then be unfolded into specific or categorized objectives (Pizzinato et al., 2015; Ribeiro, 2016). Thus, with an understanding of the external and internal environments approached by the SWOT matrix, it became possible to delineate the strategic profile of the typical family-run cattle farm. Based on the analysis and interpretation of the SWOT matrix, we could ascertain the main objective to be enabling the property’s development, answering the needs of the proprietors and of society in general.

With the main objective as a starting point, we were able to list, in accordance with the dimensions of sustainability, specific objectives related to each dimension, and the unfolding of those objectives resulted in our proposed sustainability indicators.

The first dimension of sustainability is the social, and it is linked with aspects such as the wellbeing and appreciation of the parties involved in the activity. The second is the environmental, and it seeks to reestablish a commitment with the rational usage of natural resources. The third is economical, connected to production, distribution, and consumption of goods and services (FAO, 2018). The fourth dimension (Barbosa et al., 2014; Brum et al., 2017) is related to productivity and is not among the pillars proposed by the FAO; however, we understand that it works as a complementary dimension, dealing with more detailed questions, which affect the property directly.

After outlining the strategic profile, we were able to list some characteristics that we believe are essential to define performance indicators. In building a strategic map (Image 2), we were able to identify the possible indicators, and, as such, to evaluate the strategy’s execution and, consequently, the achievement of the main objectives.
Within the environmental dimension, the strategic objectives proposed are the protection of the native environment and the conscious usage of natural resources. However, in order to accomplish them, it is necessary to understand how the producer uses the natural resources within their property; how they make use of external inputs; and how they dispose of residues and packages. To measure the achievements in this area, we propose the usage of performance indicators that offer information about water use, the existence of areas dedicated to environmental protection (vegetation and water streams), the usage of native fields versus planting pastures, as well as the handling and disposal of organic residues, and recyclable and non-recyclable packages, among other aspects.

As for the economic dimension, we propose that the strategic objective be to obtain financial return befitting the objectives of the parties involved in the activity. This dimension has to do with the organization’s profitability and the quantifying of revenues and expenses. In order to meet this objective, we suggest the use of indicators that measure the organization’s profits; the average prices of buy/sale; production costs; degree of indebtedness and third-party investment; the family’s average monthly income; and expenses with infrastructure and maintenance.

Now, to accomplish the aims set by the productive dimension, that is, to maximize production and, as such, enable the property’s development and answer the demands of the other dimensions, we need specific data about the herd and the cattle’s mental welfare. We propose to measure this by collecting information about stocking rates; the cattle’s birth, death and weaning rate; the cattle’s average weight gain; the herd’s welfare; and the availability of wood and shade within the property.
Performance indicators need to be meaningful in order to be implemented, as well as practical, consistent, coherent and responsive to changes in weather and system. They also need to be easily measurable (Neely, 1998; Moreira, 2002; Deponti, 2002; Müller, 2003; Munaretto, 2013).

This set of indicators needs to offer support for administrators during the decision-making process. As previously stated, they should not become a tool for controlling the organization’s processes; they should be used as a form of identifying signs (positive or negative), as a possibility for further education and learning, and also as a form of communication, be it external or internal.

The first proposal of indicators was the by-product of the previous stages; that is, of the consolidation of the SWOT matrix, the delineation of a strategic profile, and the consideration of indicator candidates. In order to formulate the initial proposal, we have reviewed literature concerning the proposal of such indicators, like the study carried out by Brum (2017). By the end of our first meeting, in January 2019, we were able to list 48 types of indicator, categorized by dimension.

The final version of the proposal (Table 4) forwarded to specialists assembled 28 elements: nine within the social dimension, four within the environmental dimension, six within the economic dimension, and ten within the productive dimension.

| Table 4 – Performance indicators |
|----------------------------------|
| **Indicators**                   | **Indicators**                   |
| Social Dimension                 | Environmental Dimension          |
| ▪ Health;                        | ▪ Soil conservation;             |
| ▪ Satisfaction;                  | ▪ Water availability;            |
| ▪ Public policies;               | ▪ Handling of organic and inorganic residues; |
| ▪ Training;                      | ▪ Conservation of native woods.  |
| ▪ Family inheritance;            |                                          |
| ▪ Access to information;         |                                          |
| ▪ Taking part in community activities; |                                          |
| ▪ Access to education;           |                                          |
| ▪ Access to the property.        |                                          |
| Economic Dimension               | Productive Dimension             |
| ▪ Registers;                     | ▪ Adjusting stocking rates;       |
| ▪ Owning land vs renting land;    | ▪ Animal nutrition;               |
| ▪ Use of technologies;           | ▪ Improvement in zootechnic rates; |
| ▪ Degree of indebtedness;         | ▪ Motivation;                     |
| ▪ Family income.                 | ▪ Animal mental health;           |
| Source: Elaborated by the authors. | ▪ Free-range livestock;          |
|                                  | ▪ Prominent animal specimens;     |
|                                  | ▪ Animal welfare;                 |
|                                  | ▪ Standardizing herd;             |
|                                  | ▪ Undesirable vegetation.         |

Our proposal of performance indicators was categorized considering each dimension of sustainability; before they could be sent for evaluation, the indicators had to be classified within specific dimensions, with related questions and answers. Like this, we made it possible for the specialists to achieve a better understanding of the elements.
Validating the proposal of performance indicators

To validate our proposed indicators, we went to five specialists, two of which we had interviewed previously (E1 and E2) during the first two stages of this research. The other interviewees, here referred to as E3, E4 and E5, are members of Rede Leite (“Milk Network”), and specialists in research development with family-run agricultural farms in Rio Grande do Sul, within dimensions of sustainability.

Interviewees E1 and E2 received, by email, the whole matrix of indicators, with all four dimensions. Interviewees E3, E4 and E5 were sent the indicators relevant to their specialties; that is, the ones whose research falls into the social pillars received the indicators related to the social dimension, the ones whose research deals with the environmental were forwarded environmental indicators, and so on and so forth.

The specialists’ opinion allowed us to refine the indicators and to formulate a layout for presentation, considering the possibility of using it as a tool in future research, in order to collect data. At this occasion, we were also able to align each general indicator with the more specific ones, and the questions related to each of them.

By concluding this stage of our research, making our choice of indicators legitimate and adjusting them in accordance with the interviewees’ suggestions, we became able to move towards the next step: the attribution of priority to each indicator. We will assign them grades, and, as follows, list them in order of importance, while also taking into account the specialists’ opinions.

Final considerations

The main aim of this research was to build a matrix of indicators, following the BSC framework, while adapting its original proposal of dimensions to a model more related to the cattle farming business and to a new tendency of sustainability. In order to properly accomplish this, we needed theoretical support, obtained through bibliographic and documental review, so we could comprehend the relevant aspects of building an indicator — like which stages should be followed to determine an indicator successfully, which characteristics are essential in performance indicators, and which function indicators perform, among others. As we have mentioned in the essay, the building process should begin by analyzing the organization’s external and internal environment using a SWOT matrix.

Our current proposal of a matrix of indicators of sustainability for the family-run cattle farm consists of twenty-eight indicators organized in four dimensions of sustainability. These dimensions are the social, the environmental, and the economic, as recommended by the FAO (2018), and the productive, endorsed by Barbosa et al. (2010) and Brum et al. (2017).

Still regarding the proposed indicators, there are some aspects within each dimension worth pointing out.
Within the social dimension, besides indicators such as health and education, other helpful elements that stand out are the access to public policies, training programs, information and participation in community activities, and the situation of inheritance. Through these indicators, we can state an interest in a systemic perspective of the livestock farming business, and in the medium and long-term observation of an organization, vital for collecting accurate data on matters such as training and inheritance.

The indicators within the environmental dimension signal the extreme concern with natural resources, such as soil and water.

Within the economic dimension, aside from traditional indicators such as the degree of indebtedness, the property’s ownership, and the family’s income, there is also a new element referring to the use of technologies, evidence of adequacy to new parameters of administration.

The indicators related to the productive dimension confirm (as supported by bibliographic and documental review) historical concerns centered on productivity. One such indicator that stands out in that aspect is the one about “undesirable vegetation”. Less observant readers might think this indicator could (or should) be in the environmental dimension category, but the presence of undesirable vegetation affects the productive dimension.

Making a systemic comprehension of their own property possible for cattle farmers with family-run businesses might help them to position themselves more efficiently in the market. They should be able to determine strategies in ways that enable the measuring of results, and to generate revenue for all parties involved in the organization, while supported by parameters that allow for improvement of processes and of the final product, as well as the verification the presence of bottlenecks.

In answering the research question and proposing a matrix of indicators, this paper contributes to the administrator’s management, offering more support for their decision-making process. This support will facilitate the qualification of business systems, thus enabling the achievement of the organizational aims.

Another contribution of this essay was the detailing of the procedures and results during the building process of a set of indicators. We had the help of specialists, academics and producers, who engaged with the proposals and the suggested tools in several different ways. The use of the SWOT matrix and the BSC offered legitimacy to the results.

A suggestion for further research would be the relevance of the usage of these indicators while monitoring activities in rural properties, in such a way as to set up a practical demonstration of this model in action.

Acknowledgements

This research was developed within a partnership between the Brazilian Agricultural Research Corporation (EMBRAPA) and the Federal University of the Pampa (UNIPAMPA). Two of the authors...
work at UNIPAMPA’s graduate school, as a Master’s student and as a teacher advisor, respectively; the third author (and co-advisor) belongs to the EMBRAPA research team. This research contributed to the achievement of the objectives of the MyBeef project. (02.13.14.015.00.02.003 - EMBRAPA).

**References**

Ahlert, E. M. (2015), *Sistema de indicadores para avaliação da sustentabilidade de propriedades produtoras de leite*. 2015. Dissertação (Mestrado em Ambiente e Desenvolvimento – Espaço e Problemas Socioambientais). Centro Universitário UNIVATES, Lageado.

Andreatta, T., Waquil, P. D. & Miguel, L. A. (2016), A organização dos estabelecimentos de pecuária de corte de base familiar no Rio Grande do Sul. *In: Pecuária familiar no Rio Grande do Sul: história, diversidade social e dinâmicas de desenvolvimento* / organizado por Paulo Dabdb Waquil ... [et al.]. – Porto Alegre: Editora da UFRGS.

Appolinário, F. (2006), *Metodologia da ciência, filosofia e prática da pesquisa*. São Paulo: Pioneira Thomson Learning.

Barbieri, J. C., & Cajazeira, J. E. R. (2010), *Responsabilidade social e empresarial e empresa sustentável: da teoria à prática*. São Paulo: Saraiva.

Barbosa, F.A., Graça, D.S., Andrade, V.J., Cezar, I.M., Santos, G.G., & Souza, R.C. (2010), Produtividade e eficiência econômica de sistemas de produção de cria, recria e engorda de bovinos de corte na região do estado da Bahia. *Revista Arq. Bras. Med. Vet. Zootecnia.*, v. 62, n. 3, p. 677-685.

Bardin, L. (1977), *Análise de conteúdo*. São Paulo: Martins Fontes.

Bardin, L. (2011), *Análise de conteúdo*. LDA, Lisboa, Portugal.

Barros, O. J. E. de, & Wanderley, C. de A. (2016), *Adaptação do Balanced Scorecard: Estudo de caso em uma Empresa Distribuidora de Combustível*. Recuperado em junho, 2019, [http://www.scielo.br/pdf/rcf/v27n72/pt_1808-057X-rcf-201602200.pdf](http://www.scielo.br/pdf/rcf/v27n72/pt_1808-057X-rcf-201602200.pdf).

Bezerra, L. R., & Araújo, M. J. de, (2013), *Caracterização de propriedades agrícolas para pecuária de corte*. Recuperado em maio, 2019, [https://dialnet.unirioja.es/servlet/articulo?codigo=4256366](https://dialnet.unirioja.es/servlet/articulo?codigo=4256366).

Brum, L. M. da L., Lampert, V. do N., Camargo, S. da S., & Eickhoff, F. A., (2017), Matriz de Indicadores de sustentabilidade para produção de bovinos de corte no Rio Grande do Sul. *V Simpósio da Ciência do Agronegócio*.

Caravantes, G. R., Panno, C. C., & Kloeckner M. C. (2005), *Administração: teoria e processos*. São Paulo: Pearson Prentice Hall.

Castro, J. B. B. de., Santos, N. M. B. F., & Santos, R. F. dos (2007), Gestão estratégica para redes de varejo farmacêutico: um modelo fundamentado no *Balanced Scorecard*. *XXXI Enanpad 2007*. Recuperado em junho, 2019, [http://www.anpad.org.br/admin/pdf/CON-B1744.pdf](http://www.anpad.org.br/admin/pdf/CON-B1744.pdf).

Cavalcanti, L. M. R., & Guerra, M. G. G. V. (2019), Diagnóstico Institucional da universidade Federal da Paraíba a partir da Analise SWOT. *Revista Meta: Avaliação*. V.11, n. 33, p. 694-718.
Costa, A. F., & Oliveira, D. R. de, (2015). Adaptação da Ferramenta Balanced Scorecard à Gestão Pública Municipal: O caso da Prefeitura de Lavras – MG. XVIII SemeAd 2015. Recuperado em abril 2019, http://sistema.semead.com.br/18semead(resultado/trabalhosPDF/1223.pdf.

Deponti, C. M., Eckert, C., & Azambuja, J. L. B. (2002), Estratégia para construção de indicadores para avaliação da sustentabilidade e monitoramento de sistemas. Agroecologia e Desenvolvimento Rural Sustentável, Porto Alegre, v. 3, n. 4, p. 44-52.

Elkington, J. (2012), Sustentabilidade, canibais com garfo e faca. São Paulo: M. Books do Brasil Ltda.

FAO. Organização das Nações Unidas para Alimentação e Agricultura. Recuperado em junho, 2018, http://www.fao.org/home/en/.

Fernandes, V. D., & Miguel, L. de A. (2016), A presença da pecuária familiar na região da campanha do Rio Grande do Sul (Santana do Livramento, século XIX). In: Pecuária familiar no Rio Grande do Sul: história, diversidade social e dinâmicas de desenvolvimento / organizado por Paulo Dabdab Waquil ... [et al.]. – Porto Alegre: Editora da UFRGS.

Flick, U. (2013), Introdução à metodologia de pesquisa: uma guia para iniciantes / Uwe Flick; tradução: Magda Lopes; revisão técnica: Dirceu da Silva. Porto Alegre: Penso.

Flores, E. L., Fachinelli, A. C., & Giacomello, C. P. O Balanced Scorecard como condutor do processo de alinhamento do pensamento estratégico do banco Alfa. XXXIII Enanpad 2009. Recuperado em junho, 2019, http://www.anpad.org.br/admin/pdf/ESO514.pdf.

FNQ (2017), Fundação Nacional da Qualidade. Recuperado em março, 2019, http://www.fnq.org.br/.

Fonseca, J. J. S. (2002), Metodologia da pesquisa científica. Fortaleza: UEC.

Gil, A. C. (1999), Métodos e Técnicas de Pesquisa Social. 5ª ed. São Paulo: Atlas.

Gil, A. C. (2010), Como elaborar projetos de pesquisa. São Paulo: Atlas.

Godoi, C. K., & Mattos, P. L. de. (2006), Entrevista qualitativa: instrumento de pesquisa e evento dialógico. In: Godoi, C. K.; Bandeira-de-Mello, R.; Barbosa da Silva, A. (org.). Pesquisa qualitativa em estudos organizacionais. São Paulo: Saraiva.

Kaplan, R. S., & Norton, D. P. (1997), A Estratégia em ação: Balanced Scorecard. 21°. ed. Rio de Janeiro: Elsevier.

Malhotra, N. (2006), Pesquisa de marketing: uma orientação aplicada. 4. Ed. Porto Alegre: Bookman.

Marconi, M. de A., & Lakatos, E. M. (2011), Metodologia Científica. 5ª ed. São Paulo: Atlas.

Marques, P. R. (2010), Avaliação da competitividade dos sistemas de produção de bovinos de corte da Fronteira Oeste do Rio Grande do Sul. Dissertação de Mestrado, Programa de Pós-graduação em Agronegócios, Universidade Federal do Rio Grande do Sul.

Martins, R. F., & Turrioni, J. B. (2002), Análise de SWOT e Balanced Scorecard: Uma Abordagem Holística para a Formulação da Estratégia, XXII Encontro Nacional de Engenharia de Produção, Anais, Curitiba.
Martins, M. A. (2006), Avaliação do desempenho empresarial como ferramenta para agregar valor ao negócio. Revista ConTexto. Porto Alegre, v. 6, n. 10, 2º semestre 2006. Recuperado em março, 2019, http://seer.ufrgs.br/index.php/ConTexto/article/view/11231.

Montenegro, F. R. M. S., & Callado, A. L. C. (2018), Uma análise bibliométrica sobre o Balanced Scorecard no período de 2000 a 2016. Revista Custos e Agravónocio – v. 14, n. 2, Abr/Jun 2018.

Moreira, E. (2002), Proposta de uma sistemática para o alinhamento das ações operacionais aos objetivos estratégicos, em uma gestão orientada por indicadores de desempenho. Tese de Doutorado. Universidade Federal de Santa Catarina, 2002.

Moreira, M., Lampert, V. do N., Ribeiro, C. M., & Albano, C. S. (2015), A utilização da matriz SWOT como ferramenta de planejamento estratégico na pecuária de corte. Anais do VII Salão Internacional de Ensino, Pesquisa e Extensão (UNIPAMPA).

Munaretto, L. F. (2013), Avaliação do desempenho organizacional em cooperativas de eletrificação: um estudo sobre o uso de indicadores de desempenho. Tese de Doutorado. Universidade de São Paulo (USP).

Müller, C. J. (2003), Modelo de gestão integrando planejamento estratégico, sistemas de avaliação de desempenho e gerenciamento de processos (MEIO – Modelo de estratégia, Indicadores e Operações). Tese de Doutorado. Universidade Federal do Rio Grande do Sul (UFRGS).

Neely, A. (1998), Measuring Business Performance. London: The economist books ltd.

Oaigen, R. P. (2014) Gestão na bovinocultura de corte. Guaíba: Agrolivros.

Oliveira, I. B. de, & Batista, J. L. P. (2017). A utilização da análise SWOT como ferramenta de planejamento estratégico em micro e pequenas empresas: estudo de caso na empresa ourióticas do município de Ourinhos-SP. Revista Hórus, v.12, n.1, p. 1-31.

Pereira, G. L., Peres, A. A., Oliveira, B. de R., Silva, C. R., Ferreira, G. do. C., & Souza, L. W.F. (2017) A análise da matriz SWOT como ferramenta estratégica de marketing: estudo de caso na clínica de estética beleza pura em Quirinópolis. Recifacuí. V1, n.7, p. 09-36.

Pizzinato, A. K., Pizzinato, N. K., & Buzinaro, M. A. (2015), Planejamento Estratégico e de Marketing. In: Graziela Oste Graziano Cremonzei. (Org.). Administração Básica. 1ª ed. Campo Grande: Life, 2015.

Rabelo, L. (2012), Planejamento e gestão na produção pecuária. Anais V Simpósio Nacional sobre Produção e Gerenciamento da Pecuária de Corte.

Ribeiro, E. A. (2008), A perspectiva da entrevista na investigação qualitativa. Evidência: olhares e pesquisa em saberes educacionais, Araxá/MG, n. 04, p. 129-148, maio de 2008.

Ribeiro, C. M. (2003), Pecuária familiar na região da campanha do Rio Grande do Sul. Serie Realidade Rural, Porto Alegre.

Ribeiro, C. M. (2009), Estudo dos modos de vida dos pecuaristas familiares da região da Campanha do Rio Grande do Sul. 2009. Tese (Doutorado em Desenvolvimento Rural). Faculdade de Ciências Econômicas, Universidade Federal do Rio Grande do Sul, Porto Alegre.

Ribeiro, C. M. (2016), O modo de via dos pecuaristas familiares no pampa brasileiro. In: Pecuária familiar no Rio Grande do Sul: história, diversidade social e dinâmicas de desenvolvimento / organizado por Paulo Dabdab Waquil ... [et al.]. – Porto Alegre: Editora da UFRGS.
Mirailh, R., Albano, C. S., & Lampert, V. do N. (2021). Performance indicators: a proposal for family-run livestock farming under the conceptual framework of the sustainable balanced scorecard

Ribeiro, C. M. (2018), A pecuária familiar e a transição agroecológica. Revista Cangué, v. 1, p. 21-26.

Rosa, M. V. de F. P. do C., & Arnoldi, M. A. G. C. (2006), A entrevista na pesquisa qualitativa: mecanismos para a validação dos resultados. Belo Horizonte: Autêntica Editora, 2006. 112 p.

Rosado, A.G., Jr, Lobato, J. F. P., & Muller, A. (2011), Building consolidated performance indicators for an agribusiness company: a case study. Revista Brasileira de Zootecnia / Brazilian Journal of Animal Science, v. 40, p. 454-461.

Sachs, I. (2004), Desenvolvimento: Incluinte, Sustentável, Sustentado. Rio de Janeiro: Garamond.

Souza, G. P. (2020) Análise SWOT como ferramenta de avaliação pedagógica. VII Congresso Nacional de Educação – CONEDU.

Silva, G. de. S. e., Costa, E., Bernardo, F. A., Groff, F. H. S., Todeschini, B, Santos, D. V. dos, & Machado, G. (2014), Panorama da bovinocultura de corte no Rio Grande do Sul. Acta Scientiae Veterinariae. 42:1215.

Tanure, S., Souza, D. V., & Müller, C. J., (2012), Desdobramento da estratégia para avaliação de desempenho: implantação do Balanced Scorecard (BSC) no processo produtivo da pecuária de corte bovina. Revista Análise. Porto alegre, v.23, n.2.169-181, maio-ago.2012. Recuperado em março, 2018, http://revistaseletronicas.pucrs.br.

Yin, R. (2015), Estudo de caso: planejamento e métodos. 5. ed. Porto Alegre: Bookman.

Vigné, T. M. (2011), O BSC pós-crise americana: novas perspectivas – sustentabilidade e transparência. VII Congresso nacional de Excelência em Gestão. Recuperado em junho, 2019, http://www.inovarse.org/sites/default/files/T11_0385_2184_15.pdf Acesso em junho 2018.

Villela, J. N., Rezende, L. A. A. M, & Domingos, M. L. C. (2015), Adaptação do Balanced Scorecard à Sustentabilidade mediada por especialistas. ReFAE – Revista da Faculdade de Administração e Economia, 2015. Recuperado em abril, 2019, https://webcache.googleusercontent.com/search?q=cache:owOzjeiPj2IJ:https://www.metodista.br/revistas/revistas-ims/index.php/ReFAE/article/download/6705/5825+&cd=1&hl=pt-BR&ct=clnk&gl=br