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Factors that impact on Brazilian rural producers' decision-making: A systematic literature review

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ABSTRACT

Agriculture is crucial for economic and social development, with rural producers playing a vital role in sustaining life. Various types of rural organizations exist, fostering diverse objectives among producers. Over the past fifty years, significant transformations have occurred in Brazil's agriculture, with farmers facing the challenge of producing more and better with less. This study aims to identify factors influencing the decision-making of rural producers. It employed a Systematic Literature Review to extract factors divided into four dimensions: technology, learning, market, and governance. These dimensions interfere with the decision-making process and are considered decisive for the success or failure of any rural producer. The primary outcome underscores the significance of understanding how to produce and all aspects encompassing the administrative and financial management of rural properties. Enhancing managerial capabilities is essential for rural producers. Faced with the implications of technological advances, rural producers must behave appropriately to manage their activities and property to remain and grow stronger in an increasingly competitive market, where efficiency and effectiveness are essential for survival.

***Keywords**: Agriculture; Management; Rural producer; Technology; Decision-making.*

1 Introduction

Rural producers are pivotal in sustaining and preserving life (Martins, 2021). Brazil, recognized as one of the world's largest food exporters, owes its success to substantial investments in science and technology over the decades (Embrapa, 2022). Given this favorable scenario, Jhajharia and Mathur (2022), rural properties need to monitor strategic factors such as resources, market changes, climate change, and population growth, to ensure ongoing competitiveness.

Regan (2019) posits that we live in a society in which current habits and customs serve as beacons for the formation of a lifestyle that, for the most part, ends up being adopted as the ideal way. In this regard, that which had previously been taken for granted in the rural sector and determined by the old traditions, now no longer adapts due to the changes that have taken place, causing many difficulties for rural producers (Munir et al., 2022).

The advance of modern technology, considered intelligent agriculture, is taking up more and more space in rural development (Yang et al., 2021). Khanna (2021) identifies that the various technologies on the market can increase crop yields, increase the productivity of resource use, reduce nutrient loss, improve environmental pollution, and, consequently, profitability. According to the United Nations, world agriculture is challenged to provide food based on food security. This challenge was proposed in 2015 through 17 Sustainable Development Goals (SDGs), which comprise a global agenda for constructing and implementing public policies to guide humanity until 2030, conceived under Agenda 2030 (United Nations, 2014).

In this context, alongside the imperative of sustainable development, Agenda 2030 champions competitiveness and the embrace of new technologies, necessitating that Brazil align itself with the global trends of the emerging economy and changing world order. However, rural producers encounter numerous challenges, including integrating farmers into the 4.0 era, securing access to education and information, adopting management software and applications, incorporating advanced machinery and equipment, cost reduction, enhanced productivity, connectivity, and improved internet access. Collectively, these challenges contribute to the evolution of a more competitive and technologically advanced producer market (Embrapa, 2020).

In response to the challenges of a competitive agricultural market, Brazilian rural producers must adapt their management approaches. The influx of foreign products, often subsidized by state support in their countries of origin, underscores the critical role of efficient productivity management in determining outcomes (Stroud and Goulding, 2022). Effective rural management necessitates robust strategies for sustaining and expanding businesses, emphasizing meticulous planning and proficient decision-making (Iba and Lilavanichakul, 2021). It is essential to underscore that such planning involves activities like cost control, the formulation of tangible objectives, and, crucially, overseeing the entire production process from cultivation to product distribution and marketing (Jhajharia and Mathur, 2022).

In agriculture, where decision-making is acknowledged as a complex process, the quest for genuinely efficient tools to aid rural producers in their decision-making is gaining increasing significance (Fahmi and Savira, 2021).According to Stroud and Goulding (2022), decision-making is a critical activity for organizations, occurring continuously and at all levels, directly impacting an organization's performance, including rural activities.The decision-making process poses a significant challenge for small and large organizations, primarily due to the substantial growth in management complexity and the pace at which activities unfold (Sagarna Garcia and Pereira Jerez, 2020). It should be noted that the operations that take place within a rural property are generally influenced by agents located outside of them, as well as in other organizations (Stroud and Goulding, 2022).

Orlova and Nikolaev (2022) affirm that many problems arise from the lack of management, which can be seen in debt renegotiations, protests, and complaints that product prices are low and resource prices are too high. For these reasons, many producers are abandoning the activity and settling in urban centers, looking for jobs because the activity in the countryside is not viable (Orlova and Nikolaev, 2022).

Therefore, this study aims to identify factors influencing the decision-making of rural producers. In these circumstances, it was essential to see how these factors affect rural producers' decision-making. The study is based on original academic and marketing research, which aims to elucidate a possible gap in literature.

Scenario and Challenges of Brazilian Agriculture

According to FAO data (2023), Brazil has been solidifying its position as one of the world's largest grain producers, ranking first in sugarcane production with 724,428,135.00 tons and second in soybean production with 120,701,031.00 tons.

The interaction of soil conditions, climate, topography, scientific and technological advancements, public policies, and the entrepreneurial spirit of farmers has transformed Brazil into a key global player in agricultural production and export and a pioneer in global food security (Embrapa, 2022).

Over the past fifty years, significant transformations have been observed in the rural landscape, driven by substantial changes in production, trade, and input supply, among other factors contributing to the increased production of recent years. Brazil ranks among the largest producers of various agricultural products. However, one of the primary challenges farmers face today is producing more and better with less. This challenge is compounded by the fact that there are now more urban dwellers than rural inhabitants, leading to fewer individuals engaged in rural activities (Eustáquio et al., 2017).

Despite technological advancements, challenges persist in data ownership, alignment between producer demands and information generated, and data security (Rotz et al., 2019). Property management faces significant obstacles in adopting an extensive production system (Barbedo, 2018). Efficient control of the variables involved in property management is crucial for optimizing gains and mitigating issues (Barbedo, 2018).

This study comprises four chapters. Chapter 2 elucidates the methodological approach, utilizing a systematic literature review, with a focus on ensuring research transparency and repeatability. Chapter 3 outlines the factors unearthed in the review and en Rural producers are pivotal in sustaining and preserving life (Martins, 2021). Brazil, recognized as one of the world's largest food exporters, owes its success to substantial investments in science and technology over the decades (Embrapa, 2022). Given this favorable scenario, Jhajharia and Mathur (2022), rural properties need to monitor strategic factors such as resources, market changes, climate change, and population growth, to ensure ongoing competitiveness.

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2 Systematic literature review method

Scientific studies must be based on methodological premises to be considered legitimate and exhibit consistent results. In this sense, this article was constructed based on combining different forms of scientific investigation. Among the modes of investigation, we used a systematic literature review (SLR) as a capable tool to conduct the present study (Marconi and Lakatos, 2017)

Systematic reviews are secondary studies that seek their source of information in primary studies. Primary studies are defined as scientific articles that directly report research results. The methodology for conducting systematic reviews consists of first formulating the research question so that it is possible to search the literature, select the articles, extract the data, and evaluate the methodological quality of this material through data synthesis, called meta-analysis, and thus assess the quality of the evidence. Finally, work is done on writing and publishing the results (Bardin, 2016).

In this sense, in the first stage, we sought through a literature review and documentary involved exploratory research to evaluate the collected material to achieve the proposed objective regarding the research context. From the exploration of the themes involved, the second stage of the study is classified as descriptive research from the point of view of its objectives, with a qualitative approach to developing the investigative process. From the point of view of its nature, it is characterized as applied (Gil, 2022).

The research aims to promote and confront data and information on a specific subject, based on a solid theoretical foundation regarding the object being researched, through the study of a problem of interest to the researcher, providing knowledge of aspects of reality and the creation of solutions to existing problems (Marconi and Lakatos, 2017).

According to Gil (2022), data analysis can take various formats, and the chosen method will depend on the research context. It is emphasized that qualitative data collection methods mainly focus on obtaining ideas, reasoning, and motivations to provide a deeper understanding of research.

Sampaio and Mancini, (2007) state that the systematic literature review (SLR) is one way of verifying the applied nature, which investigates secondary data in search of evidence on a specific topic. These are useful for integrating information from a grouping of studies conducted separately, which may present contradictory or coincident results,

as well as identifying themes that require evidence, assisting in directing future research. In addition, the SLR can answer questions that individual studies could not answer otherwise (Xiao and Watson, 2019).

The following sections detail the stages that led the systematic literature review process.

2.1 Planning the Systematic Literature Review

A literature review requires establishing objectives and research questions like another scientific research. Typically, the question of a systematic review should involve the characterization of the population, problem, or condition to be studied, the type of intervention to be analyzed, whether there will be a comparison between interventions, and the desired outcome for the study (Bardin, 2016).

Therefore, the researcher must conduct a preliminary analysis of the existing literature to determine the direction of the review. The researcher should check, for example, if other researchers have already conducted one or several reviews on the subject to optimize the time and resources used. After establishing the theme that will be addressed in the review, it is necessary to determine which databases will be used to search for articles and other bibliographic materials that can be included or excluded from the literary review intended to be carried out. Every year, new and increasingly sophisticated databases are launched (Gil, 2022).

In the planning phase (stage 1), two databases were chosen: Web of Science and Scopus. These are the most relevant research databases, covering most indexed scientific journals (Scopus, Web of Science, 2022). Following a thorough review of the chosen topic, which provided insights into the various market challenges, several attempts were made to find the best string that suited the theme. Keywords and their combination for the search were defined*: (digital* OR smart) AND (factor* OR key OR opportunities OR difficulties OR challenges) AND (management OR business) AND (farm* OR rural OR agro*)*, this combination was due to the objective proposed in this research. The second and third filters applied consisted of selecting by field of study and language. Finally, the filter was applied by type of document (article and review articles). In this planning phase, the focus was on the keywords being in the title and/or abstract of the articles.

2.2 Conducting the Literature Review

The use of bibliographic databases requires a research strategy involving a set of procedures and technical mechanisms to find information (Gil, 2022). In this second phase (stage 2), the first sample of articles was identified, resulting from the search for keywords and the filters applied, which totaled 898 articles extracted from the databases. The *Mendeley* tool was then used to exclude duplicate articles, totaling 803 potential studies.

The inclusion and exclusion criteria were then applied by reading the titles and abstracts of the articles. The exclusion criterion was "articles out of scope" and the inclusion criterion was articles whose main subject was a combination of the keywords defined for the search. Most of the topics addressed in the articles focused on plant genetic improvement, which are considered technical articles. Therefore, it was decided to exclude these articles as they were deemed outside the scope of the research, which aimed to identify how to systematize the decision-making process of rural producers. After screening the initial sample, 107 articles were considered relevant to the study, as shown in the analysis and discussion of the research results. Figures 1 and 2 detail how the systematic literature review process was conducted, considering the criteria planned in stages 1 and 2.

To analyze the results of the RSL, the research was delimited using an approach defined by criteria established in the protocol for selecting and analyzing the sources, which led to the cataloging of the texts. As shown in Figure II, an analytical inspection of the title and abstract was conducted, and the main data from the article were extracted, focusing on the research limitations and difficulties faced by the authors of the articles.

By cataloging the selected texts, explicit and systematized search methods were used to carefully gather the information needed for the research, generating critical and quality material.

To achieve the objective of the RSL, during data collection, Microsoft Excel was used to organize and classify all the research information, based on the study plan, such as *strings*, review protocol, general and critical reading, cluster selection, tying matrix, file library, data, and general notes on the subject.

The 803 articles identified in the survey were entered into an Excel spreadsheet, where the data was duly recorded, as illustrated in Figure 3.

This practice allowed for a more efficient and organized analysis, as follows in the next section. Thus, after reading the titles and abstracts and indicating whether the topic would fit the objective of identifying the factors that impact decision-making, the articles with a "yes" status were used. Subsequently, the analysis and discussion of the results of the SLR are presented, which consists of organizing and systematizing the data to respond to the objective of these studies.

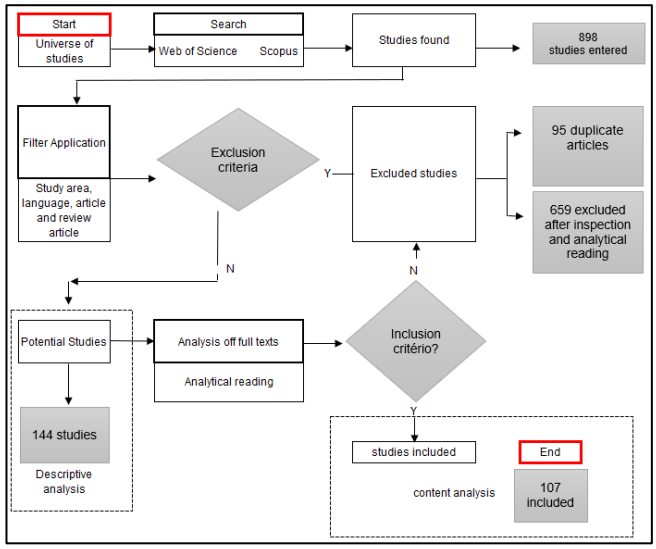

Figure 1. Demonstration of SLR conduction (Source: Authors, 2023).

I - Definition of the subject and elaboration of the research question.

II - Selection of electronic databases and consultation of the dictionary of terms to list relevant keywords.

III - Bibliographic survey by searching for keywords and cataloging the texts in the databases.

IV - Floating reading and establishment of inclusion and exclusion criteria.

V - Inspection and analytical reading of titles and abstracts.

VI - Extracting the main data from the articles.

VII - Cataloging the chosen texts.

VIII - Evaluation and summary of results.

IX - Returning to the research question.

Figure 2. Step by step of the SLR conduction (Source: Authors, 2023).

- Create an article number
- Title
- Year of publication
- Authors
- Abstract
- Keywords
- Identify whether the topic fits the subject (yes/no)

Figure 3. Initial data extracted from the articles (Source: Authors, 2023).

3 Analysis and discussion of RSL results

To arrive at the results of this research, the 107 selected articles were read in full, filling in the spreadsheet and supplementing the following data from the selected articles: theme, objective, method used, main results, research gap, driver, and observations.

Also, within this reading, the aim was to find what we call a driver, which represents a word or phrase that identifies the research gap in the article read. Based on this driver, we found the factors that have an impact on rural producers' decision-making. In addition, the selected articles identified the technologies covered and/or the objective of the research to indicate what we call the criteria that impact the rural producers' decision-making.

To organize the data extracted from the selected studies, the factors were clustered, resulting in the so-called dimensions. At the end of the organization, using the content analysis technique (Bardin, 2016), the dimensions, factors, and criteria that impact rural producers' decision-making were defined, in response to the proposed objective of this SLR.

In the subsequent subchapters of this study, the dimensions and factors that influence rural producers' decision-making are explained in detail.

3.1 Technology dimension

Agricultural practice, initially artisanal, has progressed significantly over the years. In recent times, its frontiers have expanded considerably, incorporating an extensive and advanced range of technologies, including innovative techniques. This has turned it into a concept of enormous relevance for social movements, the government, and its public policies, as well as social scientists dedicated to the study of the agrarian question in Brazil (Maraveas et al., 2022).

In recent years, according to Wolfert et al. (2017), agriculture has undergone several changes, mainly in terms of the market and technology. Globalization has presented itself to all productive segments, and agriculture could not be any different.

When it comes to agricultural operations, as well as activities arising from living in the countryside, planning, execution, and control are essential tools to achieve pre-established goals and objectives. The progress and growth of agriculture are closely linked to organized strategies, mainly using indicators of expansion and development. The use of advanced software in agriculture is a valuable tool for minimizing the use of resources, fertilizers, and pesticides (Amiri-Zarandi et al., 2022).

Broadly speaking, when we talk about technological evolution in rural areas, we have linked it to the concept of agriculture 4.0, which covers the convergence of different technologies, responsible for bringing about significant changes, in the constant search to promote increased productivity rates, cost reduction through efficiency, reduction of impacts on the environment, as well as improvements in the general conditions of quality and safety of work for rural producers in the field (Regan, 2019).

The main benefits of applying these technologies include gains in the ability to operate in real-time, traceability, and remote monitoring of all rural production processes through connected sensors, enabling decentralization for much faster decision-making. Using advanced technologies, the aim is to train operators through technical and specialized services, which makes it possible to better manage the activities of rural producers (Jhajharia and Mathur, 2022).

Digital agriculture, sometimes known as smart agriculture, is made up of tools that digitally collect, store, analyze, and share data and/or information from agricultural activities. However, digitalization is a relatively new field, and the use of machine learning has recently attracted attention, but it is a new and growing area, as explained by De Alwis et al. (2022).

Like industries, rural producers will also have to undergo a digitalization transformation, so the rural producer's role will require more data analysis skills and less physical interaction in their operational activities, and the volume of data and analysis methods will require management and integration of information from the different sources of existing technologies (Newton et al., 2020).

Many factors affect the technical and economic results obtained by rural producers, so it is difficult to determine which factors fundamentally contribute to defining a "good rural producer" (Regan, 2019). According to Lezoche et al., (2020), the current moment is one of change, in which producers need to be aware of the various factors that impact rural producers' decision-making, given that this directly influences the business.

Agricultural production, as an economic activity, is part of a complex context where a series of variables directly influence how it takes place and what the result will be. Therefore, rural producers need to consider various factors when making decisions. It is crucial to note that how the different technologies available are managed can have a significant impact on agricultural production results.

This means that effective choices in the use and integration of these technologies can be decisive for the success and efficiency of the agricultural enterprise (Munir et al., 2022).

De Alwis et al. (2022) state that technology combined with the use of a certain cultivation technique, the introduction of a new variety, as well as the combination of new products, or even new structures for hiring labor, among other factors, become essential factors for the success of a particular producer or group of rural producers.

The study conducted by Makinde et al. (2022) concludes that, despite the numerous benefits that digitalization can bring to agriculture, the adoption of these technologies is complicated by the high need for financial investment. This means that rural producers can face significant challenges in incorporating new digital technologies into their practices, even if they recognize the potential benefits these could bring to the agricultural sector.

In this context, a prior analysis with the respective definition of the areas in which resources will be invested depends exclusively on administrative training for a satisfactory decision-making process, which in theory will mean a positive differentiation in the economic results sought (Deichmann et al., 2016).

As shown in Table 1, the results of the SLR show that several factors have a direct impact on the decision-making process and the management of rural property. Among those presented are the management of information on the various existing technologies, the cost of the technologies, the training of producers and employees in the use of the technologies, the treatment of the rural producer as a rural entrepreneur, and governance risk.

According to Pivoto et al. (2019), the relevance of integrated technology management in contemporary agriculture is indisputable. Failure to update management models on a rural property can result in damaging consequences, such as losses due to inadequate investments, lack of control, and wrong decision-making. These factors, in turn, have the potential to lead to the failure of the enterprise due to inadequate management.

Table 1.
Technology dimension factors (Source: Authors, 2023).

Dimension	Factors that impact decision-making	Authors
Technology	1.1 Information management of the various existing technologies	(Alwis, et al., 2022) (Maraveas, et al., 2022) (Astill, et al., 2020) (Munthali,et al., 2018) (Sharma, et al., 2018) (McCampbell, et al., 2018) (Newton,et al., 2020) (Wolfert, et al., 2017) (Tingey-Holyoak, et al., 2021) (Hajjaji, et al., 2021) (Sinha, 2022) (Köksal, et al., 2019) (Khanna, 2021) (Connor, et al., 2021) (Munir, et al, 2022) (Glaroudis, et al., 2020) (Chanak and Banerjee, 2021) (Giua, et al, 2021) (Amiri-Zarandi, et al., 2022) (Jorge-Vazquez, et al., 2021) (Chiles, et al., 2021) (Divya, 2021) (Navulur, et al., 2017) (Katiyar and Farhana, 2021) (Habibipour, et al., 2021) (Farooq, et al., 2020) (Fracarolli, et al., 2020) (Awasthi, 2020) (Ngo, et al., 2020) (Lezoche, et al., 2020) (Pincheira et al., 2021) (Torky and Hassanein, 2020) (Idoje, et al., 2021) (Zhang, et al., 2022) (Borrero and Mariscal, 2022) (Chaterji et al., 2021) (Jhajharia and Mathur, 2022) (Daniel and Speranza, 2020) (Popescu and Popescu, 2022) (Kamilaris et al., 2017) (Regan, 2019)
	1.2 Cost of technologies	(Makinde et al., 2022) (Lioutas et al., 2019) (Filippi et al., 2020) (Fleming et al., 2018) (Deichmann et al., 2016) (Pandey et al., 2022) (Zhang et al., 2021) (Thompson et al., 2021) (Villa-Henriksen et al., 2020) (Priya and Ramesh, 2020) (Connor et al., 2021) (Gonzalez-de-Santos et al., 2020) (Braun et al., 2016) (Nedumaran et al., 2020) (Pivoto et al., 2019) (Hati et al., 2021) (Yueh et al., 2013) (Vijulie et al., 2013) (Singh et al., 2019) (Kamilaris et al., 2017) (Regan, 2019)

According to the authors cited on the use of technology in the field, it is possible to generate sufficient data to make decisions more safely and efficiently, due to the accuracy of the information obtained. This demonstrates the importance of clear indicators, which enable assertive decision-making based on the information presented. This, in a way, makes it possible to better prepare the soil or apply fertilizers for the desired production, among other benefits resulting from the use of technological advances in favor of rural producers. Items 1.1 and 1.2 of the technology themes were considered as decision-making factors.

Today, agriculture lives amidst the complexity of new technologies and is increasingly in need of studies so that it can leverage its development to the benefit of everyone involved. Investing in learning allows rural producers to strengthen themselves by building an efficient strategic plan.

3.2 Learning dimension

Young family rural producers, small rural producers who are part of the development of family farming, constantly need information, knowledge, technologies, and, above all, management skills for the competitive and sustainable development of their business to achieve integrated management of family farming, with a multidisciplinary and sustainable vision (Bentivoglio et al., 2022).

As in many other areas, there can be a mismatch between the skills needed to carry out activities on the farm and the experience of the professionals. If rural businesses evolve every year to deliver more and more productivity, professionals need to evolve too (Beres et al., 2017).

Managing a rural property involves skills and competencies that producers often don't have, making it necessary to become professional. For producers to manage their properties well, they need to have systemic thinking, organizational learning, leadership, a search for results, market knowledge, focus, and innovation. Producing with innovation guarantees farmers economic sustainability and the ability to accumulate wealth (Rundel and Salemink, 2021).

Taking the learning process into account, it should be noted that technological innovation in agriculture has led to profound changes in the sector, from stagnation to high productivity gains. In addition, it is worth noting that the use of technology helps to save money at various stages of the production process in the field, which means that less carbon dioxide is emitted into the atmosphere. According to Pivoto et al. (2019), we are looking for more effective management of information from the various existing technologies, to have more precise and optimized management, thus increasing crop yields, to enable more harvests in the same period, as well as improving the workforce in the field.

However, according to the authors Gaikwad and Kulkarni (2020), in addition to keeping up with technological developments, rural producers need to understand and be able to process the information generated by existing technologies. To do this, producers need to seek instruction, be it through technical courses, higher education, or even training and qualifications. Table 2 show the factor and the authors that contributed to this discussion.

Table 2.
Learning dimension factors (Source: Authors, 2023).

Dimension	Factors that impact decision-making	Authors
Learning	2.1 Educating producers and employees regarding the use of technology	(Sengupta et al., 2021) (Beres et al., 2017) (Orlova and Nikolaev, 2022) (Kolipaka, 2020) (Grande and Beltrán, 2020) (Saiz-Rubio and Rovira-Mas, 2020) (Ramos- Gutierrez et al., 2021) (Šipilova et al., 2017) (Agwu, 2020) (Leroux et al., 2018) (Kulikov et al., 2020) (Bentivoglio et al., 2022) (Gaikwad and Kulkarni, 2020) (Dung, 2020) (Gernego et al., 2021) (Dudin et al., 2018) (Rundel and Salemink, 2021) (Pivoto et al., 2019) (Leeuwis et al., 2018) (Fleming et al., 2021)

According to Pivoto et al. (2019), the search for knowledge and technical training provides positive transformations in activities related to the field. Changing the attitude of rural producers by investing in learning will lead to improvements in their activities, resulting in economic and financial returns. The modernization of the countryside, coupled with the learning of rural producers, provides better working conditions and improved performance in the management of rural activities. Thus, considering the production processes, machinery, and technologies applied, we move on to the market analysis of rural activities.

3.3 Market dimension

Over the years, agriculture has taken on the role of one of the main protagonists in the economic debate and on major discussion agendas in Brazil. The agricultural sector has been in the spotlight due to its capacity to expand productivity and production, generating many job opportunities in various regions, even at a time when the country's economy is in an extremely delicate situation, with recession and persistent political/institutional crises, which to some extents have been affecting its growth and development (Giua et al., 2022).

With the growth in global demands for the commercialization of rural products, in the face of existing restrictions, in a market with a high number of agents and level of negotiation, in order to make assertive decisions in the rural market, it is necessary to analyze the market and the investment itself, viewing the business as a whole, in order to create a real profit margin (Chung et al., 2021).

According to Shukla et al. (2021), market analysis contributes to the strategies for inserting products into the rural market by collecting information about the segment, which is decisive in defining the paths to a good start for the rural company. Linked to the rural producer's economic and financial factors, the lack of this analysis, when implementing a productivity culture, means that there is no efficient productive performance, leading to a loss of better economic performance.

As a result of external pressures and internal characteristics, agribusiness, especially the base of the production chain, demands a production system with a greater diversity of businesses and crops, thus resulting in production systems with more shared resources (Fahmi and Savira, 2021).

According to Reis et al. (2021), for an enterprise to become more competitive within the financial market, whether in its region or the country, it needs quality management and resources so that the results are notable. It couldn't be any different in the agricultural sector when it comes to market analysis since agriculture is of great importance to the Brazilian economy and is the main driver of income for most of the country's economy.

It's important to note that when analyzing this market, the objective is to offer alternatives based on robust indicators to enhance the value of rural businesses. This means boosting production through effective diagnosis, covering all rural producers, from small to large entrepreneurs (Tajudin et al., 2021).

According to Iba and Lilavanichakul (2021), small and medium-sized rural companies are just as important in the economy as large producers, and to leverage this sector they need to have an overview of their business and monitor it daily, attaching great importance to real indicators.

The rural market in Brazil has a high level of competition given the strength of agribusiness in the country. Therefore, investment should be made in a risk projection analysis. It is worth remembering that market risks are mainly related to significant variations in product sales prices, resource costs, and unforeseen changes in access to credit, among other issues. Factors such as the modernization of agriculture itself and the consequent reduction in the demand for labor, in parallel with the requirement for more qualified workers, have a direct influence on the performance of rural activities (Sagarna Garcia and Pereira Jerez, 2020).

It should be noted that market risks, such as price, are directly linked to production risks. Even considering that they have different causes, the interference of one on the other is real, given that prices directly affect the risks of products, and producers may be forced to save on technology due to low sales prices and thus be more exposed to the risks of nature (Giua et al., 2022).

Despite the importance of rural activities for the Brazilian economy and the strong expansion of this sector, for a long time, it was not possible to adequately monitor the evolution of its market. This has changed over the years with the implementation of market risk management analysis to provide rural producers with better financial conditions so that they can continue their production in the following years and avoid possible bankruptcies (IBA; LILAVANICHAKUL, 2021). Table 3 shows the factor and the authors that contributed to this discussion.

Table 3.
Results of the systematic literature review (Source: Authors, 2023).

Dimension	Factors that impact decision-making	Authors
Market	3.1 Treatment of rural producers as rural entrepreneurs	(Giua, et al., 2022); (Chung, et al., 2021); (Iba and Lilavanichakul, 2021); (Tajudin et al., 2021); (Fahmi and Savira, 2021); (Shukla et al., 2021); (Sagarna Garcia and Pereira Jerez, 2020); (Reis et al., 2021)

Reis et al. (2021), that in analyzing the factors that impact rural producers' decision-making, it is increasingly clear that the Brazilian countryside is undergoing significant changes in its productive structure. In this way, rural producers must continually deal with price uncertainties for their products. This is due to several variables, such as the continuous modernization of their production methods, with increasing use of machinery and industrial resources.

To make decisions on a more solid basis, rural producers need data that allows for a more in-depth analysis of their business market, which requires monitoring and controlling operational activities through good governance, as well as better risk management (Shukla et al., 2021).

3.4 Governance

According to Pivoto et al. (2019), the increase in the world's population and the need for food of sufficient quantity and quality unquestionably pose several challenges for the agricultural sector. Ensuring adequate and diversified production, diversifying consumer demand, and reducing product waste are just some of them. To overcome them, it is increasingly essential that technological development is accompanied by good governance, so that innovations can be created that can optimize production and ensure greater efficiency and sustainability.

There is a big gap between the technology or technological advances seen in the production aspects of rural units and those used to manage business activities in general. In Brazil, the production technology used in the field, especially in commercial agriculture, is high-tech, and producers know and master these innovations, discussing principles of product action, identifying defects and technical flaws in agricultural machinery, choosing alternative treatments or management of pests, diseases, and invasive plants (Cook, 2015).

However, when the focus of the investigation shifts to business management processes, a large proportion of producers are simply unaware of basic and fundamental governance tools and principles, which in a way can led the business to crises as well as financial failures. This situation occurs more frequently in places where climatic issues lead to droughts or torrential rains, which inevitably cause a total loss of agricultural production (Abioye et al., 2022)

Regan (2019) points out that Brazil is considerably one of the most important global *players* in agribusiness, and with future-oriented sciences and the consequent technological development, innovation in the agricultural sector is essential for creating new opportunities and solving challenges, given its direct impact on global food production.

Due to the abundance of productive factors, such as the existence of fertile soils, good sun exposure, as well as a favorable rainfall cycle, Brazil is a powerhouse in the agricultural sector, which gains prominence when one puts into perspective the fact that the main economic cycles have been for agricultural products (Fielke et al., 2020).

Nowadays, entrepreneurs in the sector find themselves increasingly exposed to a highly competitive and innovative market, which ends up requiring good governance and an efficient decision-making process. Motivated by this business environment and due to the need to continually seek to reduce risks to increase their profitability, rural producers in the country need to be constantly improving, so that they can professionalize their management, solidify their structures, and create governance strategies to mature internal relations (Cook, 2015).

Today a large part of rural producers in Brazil are capitalized entrepreneurs, with a good level of specialization and who invest a lot in knowledge, technology, and services, attentive to the dynamics of the sector. However, there is still a need for greater knowledge about governance and management, given that there are also family businesses, which are responsible for a large part of the country's agricultural and livestock production, and which do not have the resources to invest in the search for knowledge, which in a way can jeopardize the financial development of their activities (Abioye et al., 2022).

Pivoto et al. (2019) affirm that productive excellence in the field alone is often not enough for rural producers to thrive in the sector, as there are several challenges, such as the volatility of the exchange rate, which despite favoring exports, also makes basic resources more expensive, another factor that producers can't control the prices of agricultural *commodities*, which ends up causing some to withdraw from their activities.

This reinforces the need to adopt governance principles since they provide conditions for the performance of managers and protect the interests of investors. Through good governance practices, it is possible to survive this very challenging and adverse scenario and become more competitive. Rural producers face external obstacles within the rural property that negatively affect their costs and cash flow, thus impacting on their profit margin. Effective decision-making through good governance is reported in the literature as an alternative to overcoming these obstacles (Regan, 2019).

However, risks to good governance are constantly arising with the increase in global marketing interactions and government restrictions and regulations, as these situations can aggravate the economic aspect of rural production systems. Another factor that could become a risk is the increase in climatic fluctuations, which could have a negative impact on the profit margin of these enterprises, urging them to seek integration. The adoption of governance practices is necessary to guarantee and ensure sustainable management, in line with the interests of rural producers (Fielke et al., 2020). Table 4 show the factor and the authors that contributed to this discussion.

According to Abioye et al. (2022), market circumstances, climate fluctuations, and economic instability threaten the financial health of rural production systems. Rural enterprises compete in complex and competitive environments, and the search for improved technical management knowledge is essential. The decision-making process in the rural environment, as in any organization, directly influences the success or otherwise of the activity and must be constantly guided by correct and reliable information if it is to be truly effective. Good governance is essential for rural producers and good governance means greater financial growth, reflecting, in the long term, improvements in the country's levels of economic and social development.

Table 4.
Results of the systematic literature review (Source: Authors, 2023).

Dimension	Factors that impact decision-making	Authors
Governance	4.1 Governance risk	(Cook, 2015); (Abioye et al., 2022); (Pivoto et al., 2019); (Regan, 2019); (Fielke et al.; 2020)

4 FINAL CONSIDERATIONS

A combination of soil conditions, climate, terrain, science, technology, and the creation of public policies, along with farmers' entrepreneurship, has made Brazil one of the world leaders in agricultural production and exports. The latest projections from the Ministry of Agriculture, Livestock, and Supply (BRASIL, 2023) highlight that grain production could exceed 250 million tons.

Considering that rural producers have reasons for acting in their way implies understanding these reasons to explore sources of information and stimulate the development of their activities so that it is possible for rural producers to improve the decision-making process in the management of their properties. This article presented a systematic review to identify the factors that impact rural producers' decision-making.

Eustáquio et al. (2017) highlight several factors influencing the expansion of food production, whether due to the growth of specific regions or the increase in population and income, leading to higher per capita demand. Brazil has excellent agricultural potential, responding positively to stimuli from both the domestic and international markets.

However, changes in the economy have brought about transformations in the way production is carried out, as well as in the strategies for locating various economic activities in the country (Bueno et al., 2011). Economic theory has a rich history of contributions, indicating paths and offering suggestions for public policy action in regional development.

In this context, this article presented a systematic review aiming to identify the factors that impact the decision-making of rural producers. As seen during the research, the purpose was to identify the most suitable ways for producers to manage all the costs of their crops to achieve better results in selling their products. Achieving good results is one of the challenges of rural activities. In the search for greater competitiveness for rural facilities, management procedures that include minimum standards for recording information that will support the decision-making of rural producers need to be implemented.

Rural property should be seen as an enterprise that produces goods and services. Rural property management aims to offer producers the opportunity to minimize the risks associated with their activities by planning and controlling investments and production costs through an efficient management and decision-making process.

According to the research carried out, it was found that rural administration is a set of activities that make it easier for producers to make decisions at the level of their rural business, which aims to obtain better economic results while maintaining the productivity of the land. As explained above, it is known that the decision-making process is the factor that determines the success or failure of any company.

Consequently, for a rural business to be competitive, it must carefully analyze its decisions to improve production and maximize revenue. A general analysis found that a decision cannot be considered a simple act of pure intellect but must be guided by a series of actions and attitudes, both before and after the act of deciding. For the most part, decisions are routine and require little thought and time. However, to make a rational decision, it is essential to measure the consequences since this will influence possible future decisions.

This analyzed good governance for effective decision-making and market analysis to support investments in technology and learning. Thus, it was concluded that decisions to manufacture products in the field could not be made solely based on experience and supported by assumptions that look for successful attempts.

This research showed that the strategic formulation of any business, especially those focused on rural activity, is always based on the information available; therefore, no strategy can be better than the information from which it is derived. Therefore, it is increasingly essential for rural producers to improve their technical skills in the face of constant changes in the world scenario, which have significant consequences for the productive sectors, especially rural activity.

Given all the challenges constantly facing agriculture, particularly the need to increase agricultural production without significantly expanding the planted area, the increasingly intensive use of new technologies to allow for sustainable productivity gains becomes imperative, as evidenced by the field analysis conducted (Santos et al., 2017).

According to Eustáquio et al. (2017), although productivity gains are significant, structural challenges - economic and social - must be addressed to ensure productive sustainability. Economic challenges are associated with restructuring the national innovation system, solving logistical infrastructure problems (transportation, storage, and distribution), gaining new markets, and reducing the tax burden to stimulate entrepreneurship. Regarding social challenges, not all rural poverty is part of a structural problem, but it certainly involves a debate about welfare policy.

This current scenario of challenges creates new opportunities for applying these innovations in agriculture. As highlighted by Eustáquio et al. (2017), for Brazil to guarantee or even increase its production capacity based on sustainable development and at the same time meet the global demand for food, for example, modernization, technification, and innovation throughout the agricultural production chain become indispensable, converging towards digital agriculture, because of the sector's digital transformation.

According to (Buainain et al., 2014), there are significant concerns regarding increasing productivity sustainably. Therefore, landowners have been increasingly seeking and investing in a decision-making process based on field data, combining rural activities with techniques and tools that preserve nature and, at the same time, do not compromise productivity.

As far as the proposed objective is concerned, it is understood that was achieved, given that this study made it possible to analyze in detail the main factors that impact rural producers' decision-making, contributing to future debates on the subject. In addition, it has explicitly brought a greater understanding of this topic's importance for producers and researchers.

Through the results found, the aim was to help producers obtain greater returns on their production, reducing their dependence on the market and considerably reducing their losses because of more efficient decision-making.

In conclusion, it is essential to know how to produce, but before that, it is crucial to know all the points that encompass the administrative and financial management of rural property to improve the rural producer's managerial capacity. It was possible to analyze that there needs to be more studies on this subject, directly affecting the decision-making process of rural producers.

Based on this reality, we have seen that the changes are significant and affect everyone. In this way, rural producers need to behave appropriately to manage their activities and their property in such a way as to remain and strengthen in an increasingly competitive market, where efficiency and effectiveness are essential words for survival.

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