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Article

Proposal for Governance in Relation to Agricultural Insurance Using the Design Thinking Methodology from an ESG Perspective

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ABSTRACT

This study proposes an approach based on *the Design Thinking* methodology to facilitate the understanding and effective implementation of agricultural insurance by farmers and insurance agents. This insurance is fundamental to environmental sustainability. Through *Design Thinking*, the needs and challenges of users are explored, allowing the creation of innovative and applicable solutions. In this context, *Design Thinking* is adopted as a strategic and innovative proposal that enables insurers to develop governance policies that meet the specific needs of farmers. This encourages more active participation and commitment to agricultural insurance, favoring the adoption of the ESG (*Environmental, Social, and Governance)* model in the context of marketing, access, and use of insurance. Thus, the methodology used comprises the application of *Design Thinking* in the generation of a model to motivate the engagement of insurance brokers in marketing and producers in the acquisition of agricultural insurance. The study also relies on a literature review on the topic and the application of agricultural insurance among rural producers. It is recommended that a virtual assistant be integrated into existing applications to guide farmers, emphasizing the importance of agricultural insurance in mitigating risks related to extreme weather events. The contributions of the article propose a governance model for agricultural insurance using *Design Thinking,* aiming at greater engagement of farmers and brokers, and the adoption of ESG practices.
Keywords: innovation; sustainability; agricultural practices; climate risks in agriculture.

ABSTRACT

This study proposes a Design Thinking-based approach to facilitate the understanding and effective implementation of agricultural insurance by farmers and insurance agents. Agricultural insurance plays a crucial role in environmental sustainability. Through Design Thinking, the needs and challenges of users are explored, enabling the creation of innovative and applicable solutions. In this context, Design Thinking is adopted as a strategic and innovative proposal, allowing insurers to develop governance policies that meet the specific needs of farmers. This encourages more active participation and commitment to agricultural insurance, promoting the adoption of ESG (Environmental, Social, and Governance) principles in the marketing, access, and use of insurance.

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The methodology involves applying Design Thinking to create a model that motivates insurance brokers to sell and farmers to purchase agricultural insurance. The study also includes a bibliographic review on the topic and the application of agricultural insurance s among rural producers. We recommend integrating a virtual assistant into existing applications to guide farmers, emphasizing the importance of agricultural insurance in mitigating risks related to extreme weather events. The study's contributions propose a governance model for agricultural insurance using Design Thinking, aiming to increase engagement among farmers and brokers while fostering ESG practices.
Keywords: amf; Cerrado; *Glomeromycota*; scientometrics.

Introduction

Rural insurance, established in Brazil in 1954 as agricultural insurance, is a form of protection for rural producers who face climatic, health, market, and other risks that may affect their activity. Since then, it has also been called agricultural or rural insurance, diversifying into various modalities, according to the Superintendence of Private Insurance (SUSEP) (Ramos, 2009, p. 5).

This protection is relevant, as illustrated by the historical example of Paraguay in the 19th century. The country stood out in South America for opposing British imperialism, monopolizing inland river navigation, and nationalizing land. This strengthened productive forces, especially in livestock and agriculture, making the country self-sufficient in various products. However, this challenging policy cost Paraguay a war against the Triple Alliance (Brazil, Argentina, and Uruguay), almost exterminating its population and economy. Effective rural insurance could have offered some protection against these risks (Alves, 2017, p. 7).

According to Höfig, Lofhagen, and Da Silva (2021), there are risk factors that are considered by rural producers, factors that need to be taken into account in decision-making, such as reducing losses due to possible power outages or shortages, farm self-sufficiency, among others.

Returning to Brazil, the origin of the issue of agricultural risk dates back to colonial times. The Commercial House was the place where regional products were received and sent to domestic and foreign markets. The tropeiros brought news about the situation of the crops in each region, reporting whether there had been crop failures due to climatic factors, pests, or other problems. Based on this information, the Casa Comercial capitalist set the price of the products. In this context, rural insurance emerged as a way to protect producers from losses caused by agricultural risks.

The trading house, which reached its peak at the turn of the 19th to the 20th century, played a role similar to that of modern rural insurance. It financed agricultural production, mainly coffee, and provided inputs and equipment to producers. In addition, it guaranteed the purchase of products and coverage for any losses. However, with the increase in production and consumption on a global scale, the 20th century also brought a serious environmental problem, which was reflected in increased agricultural risk. This reinforced the need for more efficient and comprehensive rural insurance (Alves, 2017, p. 33).

Faced with the imperative of environmental issues, capitalism has sought to reinvent itself since the early 2000s, adopting a new identity based on the acronym ESG (*Environmental, Social*, *and* Governance). This acronym represents a set of criteria that aims to make the dominant mode of production worldwide more sustainable, ethical, and responsible. However, this proposal has been criticized for its effectiveness and legitimacy. Within this context, we sought to analyze the role of rural insurance in promoting *ESG* in Brazil, considering the challenges and opportunities that this type of insurance offers for rural development (Rodrigues; Augustine, 2023).

In this sense, Bhandari; Ranta; Salo, (2022) raise a relevant question: does the company adapt to the ecosystem, social and governmental (ESG), or the other way around? Based on an analysis of 26 years of data from *the Dashgupat* Review, the authors point to a gap in companies' resource vision, which disregards the aspect of "environmental, social, and governance (ESG) compatibility," undermining their competitiveness. Given

this, managers must redefine the purpose of their companies to remain in the new ESG-oriented economy, valuing *stakeholders*.

On the other hand, rural producers face numerous challenges in dealing with the risks inherent in agricultural activity. This is a sector that is heavily dependent on climatic factors, according to Rodrigues Filho et al. (2016). According to the *World Meteorological Organization,* in 2022, concentrations of greenhouse gases that trap heat in the atmosphere once again reached a new record high, which does not indicate an end to the upward trend (WMO, 2023).

In addition, important changes associated with climate impacts, such as changes in rainfall, temperature, and humidity patterns, affect production methods and global commodity markets. These factors have an impact on the quantity and quality of some crops, such as coffee, which can suffer from drought or excessive heat, resulting in food shortages due to crop failures or diversion to foreign markets (FAO, 2012).

Studies conducted by Petit et al. (1999) are relevant because they analyze the climate history of the last 420,000 years, covering the last four glacial-interglacial cycles of the Earth's climate. The research team led by Petit indicates the range of temperature variations and the rate at which warming and cooling processes occurred.

According to the authors, between a peak glacial period, characterized by extreme cold, and a peak interglacial period, marked by maximum warming, the Earth experienced temperature variations of approximately 10 degrees *Celsius*.

Notably, the 10-degree warming process between a glacial peak and an interglacial peak takes about 10,000 years, while the 10-degree cooling process between an interglacial peak and a glacial peak of the same magnitude requires 30,000 to 50,000 years.

This significant difference in speed between the warming and cooling processes is attributed to various feedback cycles. This is because these cycles progressively intensify the rates of temperature increase during warming periods, a phenomenon commonly referred to as the 'snowball effect'.

Therefore, these climate changes have direct implications for agriculture. In a complementary approach, research addresses the study of local and regional policy implications for the vulnerability of family farming, and the process of designing and implementing public policies for rural development for the most vulnerable populations (Bursztyn, 2015).

Institutional fragility is a factor that contributes to the vulnerability of agriculture. Rodrigues Filho et al. (2015) demonstrate that episodic institutional fragilities contribute to outbreaks of deforestation in the Amazon, for example, by reducing the supply of rural credit or encouraging the expansion of the agricultural frontier.

In this scenario, agricultural insurance emerges as an important tool to mitigate these risks, ensure financial stability, and contribute to environmental sustainability (FAO, 2018). However, many farmers do not have adequate knowledge about agricultural insurance or find it difficult to adhere to and effectively use this resource (Oliveira; Souza; Mercante, 2017).

On the other hand, rural insurance is still not widely used, with low rates in Brazil compared to other countries where weather conditions are more severe, such as the United States. Market failures prevent insurance from spreading in regions with greater climate stability (Souza; Santos, 2013). The table below shows the share of rural insurance in the agricultural GDP of some countries in 2019:

Table 1. Share of rural insurance in the agricultural GDP of some countries in 2019

COUNTRY	SHARE OF RURAL INSURANCE IN AGRICULTURAL GDP (%)
USA	8.7
CHINA	6.4
INDIA	4.2
BRAZIL	1.5

Source: Adapted from Souza and Santos (2013).

Faced with this challenge, this article proposes a model to motivate insurance brokers to engage in marketing and producers to purchase agricultural insurance, opening up new market prospects for them and contributing to the regional development of agricultural areas (Oliveira, 2021). The insurance broker profession is currently limited to the repetition of well-known products, such as vehicle insurance. Therefore, it is necessary to address this problem and seek innovative solutions.

Materials and Methods

This study investigates the application of *Design Thinking* in the development of agricultural insurance, highlighting how this approach can facilitate the creation of customized solutions and improve acceptance by farmers. The objective is to assist insurers in promoting and marketing these products, in addition to contributing to expanding rural producers' access to insurance.

Design Thinking has been widely used by organizations seeking to optimize their services in an agile, efficient, and user-centered manner. According to Brown (2009), this methodology is based on the characteristic skills of a designer, such as innovation, creativity, and empathy, applying them not only to product development but to all aspects of the business. In addition, Liedtka and Ogilvie (2011) reinforce that *Design Thinking* promotes a collaborative and iterative approach, capable of generating solutions that are more aligned with the real needs of users.

The philosophy of *Design Thinking*, being collaborative and user-centered, can be a valuable strategy for developing governance policies that meet the demands of farmers and, at the same time, are sustainable. According to Stickdorn et al. (2018), applying this methodology in complex contexts, such as agribusiness, allows for the creation of solutions that are more in line with the reality of rural producers, increasing the effectiveness of initiatives.

The model proposed in this study will serve as a reference for future projects in the area, offering a *Design Thinking*-based framework for the development of more inclusive and efficient agricultural insurance . The study also draws on a literature review on the topic and the application of agricultural insurance among rural producers .

Results and discussion

The birth of the *ESG* concept is intertwined with the emergence of environmental awareness in human history. Its genesis can be identified in the United Nations Conference on the Human Environment, held in 1972 in Sweden, which resulted in the "Stockholm Declaration," which stated that man has a fundamental right to enjoy adequate living conditions in an environment of such quality that he can lead a dignified life and enjoy well-being (IPHAN, 2023). This right also corresponded to an obligation: to protect and improve the environment for present and future generations.

Brazil has taken a leading position on the issue of environmental protection, hosting important conferences on the subject, including ECO-92, held in 1992 by the UN in the city of Rio de Janeiro. The following conference was held in Johannesburg, South Africa (Rio+10, 2002), and again in Rio de Janeiro (Rio+20, 2012) (Costa, 2023).

In this sense, the Brundtland Report, entitled "*Our Common Future*," published in 1987 and coordinated by the then Prime Minister of Norway, Gro Harlem Brundtland, was fundamental in strengthening the maturation of the *ESG* concept.

For De Oliveira and Rodrigues (2020), a governance structure established within an organization is capable of solving the problems that supposedly exist in these institutions.

The abundance of natural resources in Brazil requires the adoption of a development model that takes into account the Environmental, Social, and Governance aspects inherent to ESG. This model stood out among the great challenges for Brazil. The construction of a project that allows the country to be transformed from within, through national development strategies, overcoming social and regional inequalities, is pointed out by Sachs (2001, p. 46) as an unavoidable task.

Agricultural insurance can be an important ally for farmers and ranchers on this path, as it prevents losses resulting from climate risks. According to a study by *the Swiss Re Institute Sigma*, in 2020, Brazil ranked 18th among global insurance markets by premium volume (Aizpún; Dai; Lechner, 2021). In 2022, it rose to 13th place, indicating a growing market (Aizpún; Krueger; Puttaiah, 2023). This is consistent with the fact that Brazil is the world's largest soybean producer.

However, the severe drought in the 2021/2022 agricultural year led to unexpected record crop losses, which generated a deficit for insurers and reinsurers: compensation payments exceeded the value of premiums collected (Souza; Oliveira; Stussi, 2023). As a result, the price of rural insurance premiums tends to increase and supply to decrease, which may further restrict access to insurance and leave many producers unassisted, especially those who have difficulty affording the higher costs of policies.

In this scenario, this article aims to contribute to improving farmers' and ranchers' access to agricultural insurance by presenting a strategy that considers a better understanding of the product, the main problems in access for policyholders to purchase insurance, and the governance of agricultural activity through the correct use of agricultural insurance.

As Irigay and Stocker (2022) point out, the ESG perspective raises a wide range of issues for those involved, ranging from carbon footprint to labor practices and corruption (*compliance*). This justifies the creation of criteria and practices that guide the role and responsibility of businesses in relation to environmental, social, and corporate governance factors (Irigaray; Stocker, 2022).

Agricultural insurance: a challenging product

Some types of insurance are more widely accepted in the market, such as car insurance. Most Brazilians recognize the importance of having car insurance and often pay high premiums for this coverage, but find it difficult to set aside at least 10% of this amount for life insurance, which can protect individuals and their families against unexpected events. Generally, the culture of purchasing insurance is related to people's fear of loss. According to Lewgoy (2016), Brazilians still find it difficult to plan for the long term, but it is time to see insurance as something that should be part of financial planning.

The comparison with agricultural insurance in the United States, where there has been a strong structuring trajectory (Guimarães; Nogueira, 2009), is important for understanding the challenges of insurance in Brazil, even though that country has greater climatic adversities that facilitate government action in events such as the

2012 drought. The US$ 15.75 billion in subsidies (US$ 7 billion as premium subsidies and more than US$ 8 billion due to the drought) allocated in the 2012 harvest (USA, 2013) helped producers, prevented social problems, and a serious crisis in the US agricultural economy. In the previous year, insurance coverage reached 69% of the eligible area and 89% of establishments, with $10.5 billion in compensation paid (RHIS, 2013). It is clear that government action on agricultural insurance has made and can make all the difference, reducing impacts that could be catastrophic for the population and preventing an agricultural economic crisis.

Thus, agricultural insurance is a public policy capable of creating stability in the business environment, reducing the risk of adverse events and avoiding fluctuations in productive investment (Ozaki, 2008). Producers seeking insurance look for a financial intermediary that provides minimum production guarantee parameters in the event of mishaps that could cause economic and financial losses. However, in some cases, the financial system itself adjusts by offering insurance modalities; however, given the specificities of agriculture, it is necessary to create incentives that connect producers and financial institutions (Tabosa; Vieira Filho, 2021).

Cooper; Scoot; Kelimnschimit (2002) highlight that companies with best practices have been implementing a new methodology that consists of new products to drive projects from idea to launch, improving their processes to make them faster and more effective.

For Ferreira Diniz, Schmidt, and Cielo (2021), the economic analysis of alternative modes of organizing governance structures is important and necessary in the field of economics.

In Brazil, agribusiness is a significant sector of the economy. A model that enables the improvement of the relationship between the insurance market and the agricultural market can represent an important leap forward. For this reason, this proposal inspired by *Design Thinking* was developed.

The word "design," according to Coelho (2008), corresponds to the English term "design," from the Latin root "designo." It means to designate, indicate, represent, mark, order, arrange, regulate. It can also be understood as invention, planning, project, configuration. It should not be confused with "drawing" and can indicate an interdisciplinary meaning, comprehensive and flexible in nature, open to different interpretations.

The proposal outlined here starts from a stage of discovery at the beginning of the process to generate better ideas. Activities in this new stage include: building a system for capturing and processing ideas; researching the voices of rural producers, including listening directly to them; generating scenarios; and holding large events with the potential to generate revenue.

Insurance companies, in general, already promote large periodic events with insurance brokers, at which they present the products they offer. It is up to brokers to actively seek out potential customers to offer their products. According to the Insurance Broker Qualification Center (CQCS) (2023), there are more than 58,000 brokers throughout Brazil, with the highest concentration in the Southeast region.

With regard to rural insurance specifically, however, there is little technical knowledge among professionals qualified to sell insurance contracts. It is necessary to train these professionals and work with innovative users (new *stakeholders)*, especially the beneficiaries of the insurance themselves, who can be contacted through events at rural employers' unions, non-governmental organizations that support family farming, public agencies such as the Agency for Agrarian Development and Rural Extension (AGRAER), Mato Grosso Company for Research, Assistance, and Rural Extension (EMPAER), and Brazilian Agricultural Research Corporation (Embrapa), *etc.*

Stakeholder Theory has its origins in sociology, with a focus on organizational behavior and conflict management, in which empirical studies predominantly use qualitative methods (Boaventura et a al., 2009, p. 292). This theory is based on the analysis of the relationship between external actors and organizations, that is,

the way in which relationships of interest, interference, and influence are dynamically established between the groups that make up the external environment and the company itself.

According to Donalson and Preston (1995), the term stakeholder was first used in the field of management in an internal memo from *the Stanford Research Institute* (SRI) in 1963.

In this document, the term refers to all interested or involved groups/parties, without which the company would cease to have a reason to exist. Thus, stakeholder groups include shareholders, employees, customers, suppliers, creditors, and society.

Governance

The root of the word governance comes from a Greek term meaning direction. Thus, logically, the fundamental meaning of governance is to direct the economy and society toward collective goals. The governance process involves finding ways to identify goals and means. Although it is easy to identify the logic of governance and the mechanisms for achieving these goals are well known in political science and public administration, governance is still not a simple task (Peters, 2013).

Monteiro et al. (2021) criticize what they call the "naive view" of *ESG*: there would be no difficulty in getting shareholders to agree to implement an *ESG* agenda because the potential costs of environmental and social measures would be more than offset by the economic benefits. In other words, adopting *ESG-based* policies is "good for business." The reproduction of this "mantra" implied the use of a logic that emphasizes maximizing shareholder returns as the ultimate goal of an *ESG-based* strategy.

Modeling and Proposal

Design Thinking is a mental model based on abductive logic, which consists of inferring the best possible explanation from incomplete or ambiguous observations. This logic allows us to break away from Cartesian thinking, which is based on deductive or inductive logic, which starts from clearer and more rigorous premises or evidence to reach conclusions. Thus, *Design Thinking* enables more comprehensive reflection, stimulating creativity in the interpretation and resolution of problems (Dunne; Martin, 2006; Schreiber, 2021).

Design Thinking has proven to be suitable for solving real problems, enabling the rapid construction of a solution. Among its stages are: Empathy, which consists of putting oneself in the user's place and understanding their needs, pains, and desires; Definition, which consists of synthesizing the problem and delimiting the scope of the solution; Ideation, which consists of generating several creative and innovative ideas to solve the problem; Development, which consists of transforming ideas into tangible and testable prototypes; and Testing, which consists of validating the prototypes with users and collecting feedback to improve the solution. These steps can be adapted to the context of agricultural insurance, as will be seen below (Ferreira; Conte; Barbosa, 2015).

Vianna et al. (2012) suggested three macro steps for the operationalization of the *Design Thinking* approach:

- Immersion;
- Ideation;
- Prototyping.

The Immersion stage comprises a series of activities designed to explore the context of the problem situation, with the aim of facilitating its understanding and identifying most of the variables and factors with which it is linked. This stage is similar to Empathy and Definition in the previous proposal, but with a broader and deeper focus. The Ideation stage is the same as in the previous proposal, but with a greater emphasis on the diversity and quality of ideas. The Prototyping stage encompasses the Development and Testing stages of

the previous proposal, but with a more iterative and collaborative approach. We chose to follow this proposal because we consider it more appropriate to our goal of proposing a governance model for agricultural insurance, which requires a more detailed analysis of the problem and a more participatory and adaptable solution (Dunne; Martin, 2006; Pinheiro; Alt, 2018).

Based on the *Design Thinking* stages proposed by Vianna et al. (2012), a governance model for agricultural insurance was developed, which aims to improve the relationship between insurance companies, farmers, and other agents involved. The model is based on the idea that agricultural insurance should be conceived as a user-centered service that meets their needs and expectations, and not just as a standardized and bureaucratic product. To this end, the proposed model provides for the following stages:

Figure 1. Proposed governance model for agricultural insurance. Source: Model suggested by IA Copilot (2025).

- Immersion: It is suggested that insurance companies conduct field research and interviews with farmers and insurance brokers to understand their challenges, expectations, prior knowledge, and perceptions regarding agricultural insurance. This empathy process will allow for a deeper understanding of farmers' needs and demands, as well as the factors that influence their decision to purchase insurance or not.
- Problem Definition: Based on the empathetic research, identify the main problems and gaps in agricultural insurance governance. This may include issues related to lack of knowledge, complexity of processes, lack of access, among others. This step will allow you to define the scope of the solution and set the objectives and success criteria;
- Ideation: Conduct brainstorming sessions and workshops with farmers, agricultural insurance experts, insurance company representatives, and other relevant stakeholders, such as insurance brokers. These sessions aim to generate creative ideas to improve agricultural insurance governance, taking into account

the needs and expectations of farmers. This step will allow for the exploration of various possibilities and the selection of the most promising ones;

- Prototyping: Develop prototypes of governance solutions based on the ideas generated in the previous stage. These prototypes can be in the form of flowcharts, process models, mobile applications, instruction guides, or other forms that facilitate farmers' understanding and use of agricultural insurance. This stage will allow ideas to be materialized and their feasibility and functionality to be tested;
- Testing and Iteration: Put the prototypes into practice through pilot tests involving groups of farmers. Collect feedback and perform iterations based on the experiences and suggestions of farmers, seeking to continuously improve the proposed solutions. This stage will allow the solutions to be validated and their impact and satisfaction to be verified.

The proposed governance model for agricultural insurance, based on *Design Thinking*, aims to offer a more humane, creative, and efficient alternative to deal with a complex and relevant problem for rural development. It is believed that this model can contribute to increasing the trust, transparency, and quality of the service provided by insurance companies, as well as to expanding access, information, and protection for farmers. However, this model also has limitations and challenges, such as the need for greater integration and communication between different actors, the difficulty of dealing with uncertainties and changes in the agricultural scenario, and resistance to innovation and change.

The proposal in question suggests the use of a questionnaire during the "immersion" process. This questionnaire would be administered at meetings, lectures, and seminars for producers in rural employers' and workers' unions, as well as at the headquarters of social movements, such as the Landless Workers' Movement (MST) and the Federation of Rural Workers and Family Farmers of Mato Grosso do Sul (FETAGR-MS). The goal is to identify farmers' feelings and understanding of agricultural insurance through semi-structured questions, generating a process of empathy that will allow for a deeper understanding of farmers' needs and demands. This phase is crucial to "overcome possible resistance" to the product and help clarify doubts.

Based on the questionnaires administered, the next phase seeks to define the problems that hinder rural producers' access to insurance. In this phase, which Ramos and Aguiar (2022, p. 79) call "ideation," different ideas for solving the identified problem should be considered. Prototypes to overcome these problems may involve brainstorming sessions and workshops with farmers, agricultural insurance experts, insurance company representatives, insurance brokers, and public officials.

These sessions aim to generate creative ideas to improve the governance of agricultural insurance, taking into account the needs and expectations of farmers. To this end, role-playing games can be used to understand the benefits of agricultural insurance and information on how to purchase it, including content focused on Environmental Education.

These games can include the dissemination of the Sustainable Development Goals (SDGs), as suggested by Borges; Neves (2023, p. 176). These games would include a set of rules and mechanics designed to provide immersive, reflective, and fun learning experiences, involving narrative, visual aesthetics, incentive systems, scoring, and a focus on the knowledge/skills to be taught.

Among the prototype solutions are partnerships with public agents who work in technical assistance to family farmers and small and medium-sized farmers. The goal is to motivate them to understand and purchase rural insurance. This may involve showing films at training events for this target audience and building a model with two examples: two neighboring farms that suffered crop losses due to weather conditions. One farm had rural insurance and the other did not. What are the differences in the recovery of assets, livestock, crops, *etc.*?

The idea is to propose simple actions that can contribute very positively to the creation of safety procedures for producers, thus providing them with greater security in carrying out their activities and work.

This stage involves delivering a booklet to the producer. This booklet, written in simple language and illustrated with images that make reading more enjoyable, should contain basic information about rural insurance, including:

- What rural insurance is;
- Main benefits of rural insurance;
- Types of rural insurance (agricultural, livestock, forestry, property, life);
- Why purchase rural insurance;
- Access to government subsidy programs for rural insurance;
- How to choose an insurance company for rural insurance.

As people's access to technological resources increases, this proposal suggests a new approach to applications aimed at monitoring climate changes that affect crops. These applications would be aimed at encouraging the purchase of agricultural insurance and sustainable practices in agriculture. This suggestion represents the last stage of the proposal, integrating technology as a tool to facilitate access to agricultural insurance and promote sustainability in agriculture (Rodrigues; Melo, 2017).

Currently, there are already several applications available for agriculture, such as "Doutor Milho" (Dr. Corn), developed by the Brazilian Agricultural Research Corporation (Embrapa), which provides management recommendations and allows specific offline consultations on all corn cultivars available in the harvest (FertiSystem, 2024).

One of these applications is the Risk Management Department of the Ministry of Agriculture, Livestock, and Supply, which was developed in partnership with Embrapa Informática Agropecuária. The application allows producers and interested parties to access information about rural insurance in an advisory capacity, but the application is not transactional, meaning that producers cannot purchase insurance using this tool (MAPA, 2022).

Given this scenario, the idea arose to incorporate information into existing applications that are already used by a significant number of farmers, to be passed on in a playful way by a "virtual farmer friend," who will always remind them, in the event of adverse weather forecasts, that they can use agricultural insurance to minimize the risks arising from that weather event. This information would be entered via an existing application, the "virtual friend of the farmer." Another possibility would be to develop a specific application for this purpose.

In either case, the costs could be borne by insurance companies, or by the government, or by both, in partnership, sharing responsibilities. The application can also serve as an environmental education tool, in which the "virtual friend" suggests sustainable practices that will result in gains for the crop, the farmer, the environment, and society as a whole.

Faria et al. (2023, p. 217) experimented with active learning through the application of a *Design Thinking* process supported by an online platform that motivated students to learn and engage with sustainability issues. The experiment, carried out with two groups of Portuguese students, clearly demonstrated the viability of the methodology based on the results achieved.

In the same vein, the proposal to develop a specific application, or its incorporation into other existing models for monitoring climatic events, should contribute to awareness of the importance of protecting the

environment and also of using agricultural insurance to minimize losses resulting from adverse weather conditions.

This application could help farmers develop knowledge and skills to promote sustainable development and a healthy lifestyle, respect for human rights, the promotion of a culture of peace and non-violence, global citizenship, and the appreciation of cultural diversity and the contribution of culture to sustainable development (Faria et al., 2023, p. 218).

Thus, it is possible that the adoption of the proposal will counter orthodox capitalism in such a way that the ESG concept is not just a metaphor to give this mode of production a new face.

For the application to be effective, it is necessary to increase the level of security to prevent its misuse and the creation of inconsistencies in the information generated in the database, according to the lesson of Hernández et al. (2023, p. 5522).

It is important that the application is very simple, intuitive, and self-explanatory to use, in order to convince farmers that its adoption will contribute to the proper management of planting and harvesting times, the use of agricultural supplements, and the correct use of water resources, avoiding surprises and ensuring a future harvest without losses or damage.

It is also worth mentioning an important point regarding the use of water resources. Data from the UN World Water Assessment Program show that the agricultural sector accounts for around 70% of consumption. In emerging countries with rapidly growing economies, this percentage can reach 90%. In Brazil, around 72% of water consumption goes to agriculture—especially irrigation—11% is used for livestock, 9% is distributed to cities, and 1% supplies rural areas. These figures do not take into account the quality of the water that returns to the river; the issue is not only removing water from the river, but also making it unavailable for other uses (Embrapa, 2023).

Santos et al. (2023) highlight that the incorrect use of water is an unsustainable practice, causing several problems that can be caused by the inappropriate use of the resource. The use of technologies that enable the calculation of the actual demand for water resources in irrigated agriculture is of fundamental importance for productive and environmental sustainability, which is why they proposed the development of a computer application for irrigation management based on climate information for sprinkler and localized irrigation systems (Santos et al., 2023, p. 1790).

The proposed application, by incorporating suggestions for practices for the correct use of water in agriculture, may contribute to the preservation of this scarce natural resource.

The *Design Thinking* methodology involves a testing phase to identify stakeholder satisfaction with the model and tools adopted in the previous stages of this process. To this end, we suggest the use of questionnaires, as did Faria et al. (2023, p. 223), in order to ascertain whether there has been effective progress in terms of knowledge about rural insurance and an increase in insurance uptake, based on a comparative analysis with the results obtained through the questionnaires applied in the immersion phase (beginning of the process). The difference in this final phase is that the questions can be asked not only in person, at events organized by employers' and rural workers' unions, NGOs, and federal, state, and municipal governments, but can also be included in the application that is now being proposed.

During the testing phase to assess the stages developed so far, specific events on the topic of "agricultural insurance" may be organized, since it is assumed that at this point farmers will already have basic knowledge about the product, making it possible to deepen their understanding combining it with other aspects of governance in the ESG context, such as environmental accounting, suitability for crop certification, and access

to non-conventional financing modalities, such as the generation and trading of carbon credits and access to Payments for Environmental Services provided for in federal, state, and municipal legislation.

Finally, it is appropriate to question the universal (the capitalist mode of production) and the singular, which, according to Alves (1995, p. 11), is the manifestation, in the agreed space, of how general laws of the universal operate, giving it a specific configuration.

From this perspective, it is in this perspective that the articulation between capitalism and sustainability, according to the view of Rodrigues and Augustine (2023, p. 84), produces an inaudible dialogue, because it is a dialogue disrupted by divergence (increased profit vs. decreased profit) and contradiction (capitalism does not embrace sustainability, since capitalism implies profit and sustainability implies investment/spending of dividends, so the supposed convergence conceals this contradiction).

It is a fact that an ideological orientation has gained prominence in the positioning of companies and market players. The latter, in market research, express a preference for 'sustainable investments'. These are defined as investments guided by governance models capable of mitigating social and environmental impacts, especially in the business sphere, also known as the second sector of society (Rodrigues; Augustine, 2023, p. 84).

In this scenario, ESG emerges as a criterion for investments, established by identifying the best environmental, social, and governance practices of a business. It can be said that ESG is a new metaphor for capitalism.

Conclusion

The significant drought in the 2021/2022 agricultural year resulted in significant losses for insurers and reinsurers, as compensation payments exceeded the value of premiums collected. This tends to result in an increase in the price of agricultural insurance premiums and a decrease in supply, making it difficult to purchase insurance. Those most affected are small and medium-sized rural producers, who face greater difficulties in accessing credit and purchasing insurance, in addition to having more difficulty affording the high costs of policies.

Given the current scenario, it is essential to develop a strategy that motivates the various stakeholders involved. The goal is to facilitate understanding of the problem at hand and identify viable solutions. Such a strategy can help minimize the negative impacts of crop failures on the insurance market.

The application of *the Design Thinking* methodology in agricultural insurance management provides a more farmer-focused view, considering their unique needs and expectations. By engaging farmers, insurance brokers, and public officials who provide technical assistance to small and medium-sized rural producers in the co-creation process, it is possible to devise more effective solutions that are aligned with the real demands of the sector.

This approach has the potential to increase the uptake and use of agricultural insurance, strengthening the resilience and sustainability of farmers and the sector as a whole, even in the face of the adverse scenario resulting from recent crop failures.

Collaboration and teamwork are key elements in the process of co-creating solutions. This model proposes the use of *role-playing* games and the construction of prototypes and models that illustrate the differences in loss recovery between an uninsured farm and one that has taken out rural insurance. These tools tend to favor the dissemination, access, and effective use of this type of insurance.

The inclusion of family farmers, women, and young people in agricultural insurance is also encouraged by the *Design Thinking* methodology. This is achieved by considering their particularities, preferences, and access barriers, and involving them in the co-creation of solutions that meet their needs.

With the contribution of *the Design Thinking* methodology, it is possible to reduce the operational and administrative costs of agricultural insurance. This can be achieved by simplifying processes and incorporating innovative technologies, such as the use of satellite images or smartphones to assess crop damage.

The proposal generated in the development of this research involves seeking partnerships with existing app owners to include a "virtual friend" in these apps that will alert rural producers to the need to purchase agricultural insurance in order to reduce possible future losses resulting from climatic events, and will encourage the adoption of sustainable practices in the correct use of water resources, soil correction, and appropriate planting and harvesting seasons (an indispensable condition for insurance acceptance).

After the implementation of all the planned stages, this prototype should also be tested in order to measure its effectiveness. In this final phase, it is expected that there will already have been progress in the knowledge and commercialization of agricultural insurance, with an increase in the protected area and a decrease in the price of the premium.

This will open up a new panorama for rural producers in terms of production and foreign exchange earnings through the effective management of the natural resources under their control.

In addition, farmers' confidence in agricultural insurance can be strengthened by offering more transparent, customized, and flexible products that adapt to varying climatic conditions, crops, and risks.

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