



KNOWLEDGE ABSORPTION AS A RISK MITIGATION STRATEGY IN SUSTAINABLE AGRICULTURE

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Abstract

Study Objective: To understand how a company operating in the sustainable agriculture sector develops absorptive capacity as a risk mitigation strategy for promoting sustainable agriculture.

Methodology/Approach: Descriptive and qualitative study, carried out through documentary and field research, applied to representatives of the strategic summit of a company operating in the sustainable agriculture sector, located in the state of Rio Grande do Sul, with data analyzed using content analysis.

Originality/Relevance: Expansion of knowledge in the field of corporate strategy and performance, by relating the themes of absorptive capacity and risk mitigation, in the context of a company operating in the field of sustainable agriculture, with implications for the entire production chain and the local and regional economy.

Main results: The results show that the capacities of recognition assimilation, and application of external knowledge favor organizational performance, mitigating internal and external risks and collaborating in the process of transition to a new model of agriculture that proves to be alternative in terms of sustainability.

Theoretical/Methodological contributions: Contributes to the advancement of theoretical knowledge, allowing us to understand how the relationship between absorptive capacity and risk mitigation can favor the development of organizational strategies in promoting sustainable agriculture.

Keywords: absorptive capacity, risk management, uncertainties, agriculture, sustainability

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Absorção do Conhecimento como Estratégia de Mitigação do Risco na Agricultura Sustentável

Objetivo do estudo: Compreender como uma empresa que atua no ramo da agricultura sustentável desenvolve a capacidade absorptiva, como estratégia de mitigação do risco na promoção da agricultura sustentável.

Metodologia/Abordagem: Estudo de abordagem descritiva e qualitativa, realizada mediante pesquisa documental e de campo, com aplicação junto aos representantes da cúpula estratégica de uma empresa que atua no ramo da agricultura sustentável, localizada no estado do Rio Grande do Sul, sendo os dados analisados com uso da técnica de análise de conteúdo.

Originalidade/Relevância: Ampliação do conhecimento no campo da estratégia corporativa e de desempenho, ao relacionar as temáticas da capacidade absorptiva e mitigação de riscos, tendo como contexto uma empresa atuante no campo da agricultura sustentável, com reflexos em toda a cadeia produtiva e na economia local e regional.

Principais resultados: Os resultados mostram que as capacidades de reconhecimento, assimilação e aplicação do conhecimento externo favorecem o desempenho organizacional, mitigando riscos internos e externos e colaborando no processo de transição para um novo modelo de agricultura que se mostra alternativo no que tange à sustentabilidade.

Contribuições teóricas/Metodológicas: Contribui com o avanço do conhecimento teórico, permitindo compreender como a relação da capacidade absorptiva e a mitigação do risco podem favorecer o desenvolvimento de estratégias organizacionais na promoção da agricultura sustentável.

Palavras-chave: capacidade absorptiva, gestão de riscos, incertezas, agricultura, sustentabilidade

La absorción de conocimientos como estrategia de mitigación de riesgos en la agricultura sostenible

Objetivo del estudio: Comprender cómo una empresa que actúa en el ramo de la agricultura sostenible desarrolla la capacidad absorptiva, como estrategia de mitigación del riesgo en la promoción de la agricultura sostenible.

Metodología/Enfoque: Estudio de enfoque descriptivo y cualitativo, realizado mediante investigación documental y campo, con aplicación a los representantes de la cúpula estratégica de una empresa que opera en el sector de la agricultura sostenible, ubicada en el estado de Rio Grande do Sul, siendo los datos analizados mediante la técnica de análisis de contenido.

Originalidad/Relevancia: Ampliación del conocimiento en el campo de la estrategia corporativa y del desempeño, al relacionar las temáticas de la capacidad absorptiva y mitigación de riesgos, teniendo como contexto una empresa que opera en el campo de la agricultura sostenible, con repercusiones en toda la cadena de valor y en la economía local y regional.

Principales resultados: Los resultados muestran que las capacidades de reconocimiento, asimilación y aplicación del conocimientos externo favorecen el desempeño organizacional, mitigando riesgos internos y externos y contribuyendo al proceso de transición hacia un nuevo modelo de agricultura que se muestra como una alternativa en términos de sostenibilidad.

Contribuciones teóricas/Metodológicas: Contribuye al avance del conocimiento teórico, permitiendo comprender cómo la relación entre la capacidad absorptiva y mitigación del riesgo puede favorecer el desarrollo de estrategias organizacionales en la promoción de la agricultura sostenible.

Palabras clave: capacidad de absorción, gestión de riesgos, incertidumbres, agricultura, sostenibilidad

1 Introduction

The past decades have brought notable changes in the economical, social and environmental aspects, impacting several society sectors (Favareto & Empinotti, 2021). This

dynamic demands a strategic realignment from organizations, boosting the development of innovation in their processes, services and products (Schons & Costa, 2008). In the agricultural sector, these changes appear as challenges and opportunities for a more qualified management. The ability to adapt and the search for innovative solutions are essential for the success of agricultural companies nowadays (Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA, 2018; Favareto & Empinotti, 2021; Lima, 2005).

The national and international agendas, like the United Nations's (UN) 2030 Agenda, with its 17 Sustainable Development Goals (SDGs), highlight the importance of integrated actions in the social, economical and environmental dimensions to overcome global challenges (UN, 2023). Among the SDGs, agriculture takes on a fundamental role in sustainable development, since around 78% of the goals are related to the rural space (EMBRAPA, 2018; Kanter et al., 2016; Saravia-Matus & Aguirre, 2019).

The agriculture of the future, shaped by the increasing demands from the population and by climate changes, requires innovative and sustainable solutions. To guarantee a vibrant, resilient and productive sector, it is crucial to engage in actions involving the entire productive chain, from production to consumption (Kanter et al., 2016). Furthermore, the need for adaptation and exploration around risk management in the agricultural sector is highlighted (Alilla et. al., 2024).

Therefore, the north of the set of actions to be taken requires the identification, assimilation and exploration of knowledge starting from the environment, a process understood by Cohen and Levinthal (1989) as Absorptive Capacity - ACAP. The development of absorptive capacity is directly linked to the organizational innovative performance, since it affects the perception to predict and act with increased precision when it comes to ongoing changes (Cohen & Levinthal, 1989, 1990).

In a scenery that demands the transition to a more sustainable agriculture, the production of guidelines so strategies that create opportunities but also seek to mitigate the risks that may affect business productivity, profitability and sustainability are required (Darolt et al., 2016; Dias; Rodrigues; Ferreira, 2021; Dionne, 2013; Perafán; Avila, 2017). Thus, identifying, assimilating and exploring the risks that affect this activity is fundamental for the sector's success.

When it comes to agriculture and risks, the United States Department of Agriculture (USDA), created in 1862, is a global reference in research and development in agriculture. In a 2023 edition, USDA classifies the agricultural risks in five main categories: production, price or market, financial, institutional and human or personal.



In this context, according to Dionne (2013), creating a reference structure through information allows dealing with risk management, from its recognition to the control and assessment of probable risks. Besides, according to this author, knowing the market and some susceptible risks to each area or preventive activities for risk mitigation, become opportunities for future protection.

Given this scenario, the approach of this article aims to answer the questions regarding the relationship between absorptive capacities and risk mitigation in the context of sustainable agriculture. The case study is centered on a company situated in the state of Rio Grande do Sul, that works in the field of sustainable agriculture, being a reference in that region in organic production, working on the development and commercialization of biological products focused on the control of plagues and diseases, in addition to new cultivars.

This study aims to analyze how this company develops the absorptive capacity, as a cooperative strategy for the risk mitigation promoting sustainable agriculture in its field. Specifically, the goal is to identify how the business recognizes, assimilates and applies external guidelines and what is the influence of this process in its performance of risk mitigation.

Therefore, this study was done through documentary and field research, interviewing the strategic leadership of the company that acts in the field of sustainable agriculture, situated in the state of Rio Grande do Sul, with the data being analyzed through the content analysis technique.

Studies that approach ACAP or risk management in agriculture are identified separately in the literature, though they are not related as these two theoretical constructs as seen in this research. Risk management in organic agriculture was explored by Lima (2005), based on USDA classification, showing its importance in the strategic management of organic agricultural production. Besides, with the increase of visibility for organic agriculture, Rosa, Caumo, Machado & Staduto (2018) studied the elements that influenced the producers in decision taking, as well as the recognition of the main risks in this activity, concluding that agriculturists look for information subsidy with the technical institutions in their decision taking, and when it comes to risks, those of price and market were considered less worrying by the agriculturists, since it is an expanding market. Vaz (2016), however, analyzes in his study the knowledge transformation by the agriculturalists in the southern region of Rio Grande do Sul, through the lens of absorptive capacity, pointing that this knowledge provides improvement in their practices, new routines and innovation in properties.

Furthermore, the roles of absorptive capacity and risk mitigation are analyzed in the supply chain management, through empirical study of the Middle East region, observing

significant direct and indirect relationships between ACAP and risk mitigation (Alsmairat & AL-Shboul, 2023).

The approach of this study is different from the ones presented here, collaborating with the advances in the theoretical and practical fields, seeing that in this one two themes are related, analyzing how the company's absorptive capacity interferes in risk mitigation in the context of agriculture focused on sustainability. Besides, reflections on regional development are observed, since risk mitigation is reflected in the entire productive chain in society and local and regional economy (Duarte et al., 2023; Gugel, 2023).

2 Theoretical Reference

2.1 Absorptive Capacity

The theory of absorptive capacity - ACAP, defined by Cohen and Levinthal (1989, p. 569), consists of the ability a company has to “identify, assimilate and explore the external environment's knowledge”. According to Cohen and Levinthal (1990), absorptive capacity involves three dimensions: identification, i.e. the recognition of external knowledge, following to its assimilation, understood as the analysis and comprehension of this knowledge and finally, the exploration of knowledge so it can be incorporated in the organization, becoming a strategy for cooperative sustainability.

Schillaci, Romano and Nicotra (2013) offer a complete overview of absorptive capacity, defining it as a cumulative and non-linear process that emerges from the continuous interaction between heterogeneous agents. This perspective goes beyond mere absorption of knowledge, including the following abilities: learning, interpreting, articulating, assimilating and transforming.

In an individual level, the concept of absorptive capacity is related to the cognitive basis of an individual, i.e. the previous related knowledge and the diversity of experiences one has, so that the innovative performance depends on the history or the path walked and one's personal baggage, one's assimilation and transformation into new knowledges (Cohen & Levinthal, 1990).

On an organizational level it's seen that the absorptive capacity depends on cooperative knowledge, i.e. the training and experience level of human resources, its organizational structure and P&D activities are fundamental to make the absorption processes structured and continuous (Schillaci, Romano & Nicotra, 2013). When the pillars - human capital, organizational structure, P&D and organizational learning - are strengthened, the company will



be more prepared to identify, absorb and apply new guidelines, impulsing innovation and guaranteeing its competitiveness in the market.

The organizational configurations, its structure and relationship, learning and power dynamics, influence in the development of absorptive capacity, vital in the cooperative strategic process facing the risks and environmental changes (Cappellari, Sausen, Ferreira & Rossetto, 2022). Investing in a flexible structure, in a learning culture and mechanisms that mitigate risks and the sharing of information are essential measures to develop the absorptive capacity and for the long term success of a company.

2.2 Risk Mitigation in The Agricultural Sector

Agriculture as an essential activity for the human race, faces a series of challenges and uncertainties since the beginning of times. The socioeconomic and environmental changes in the contemporary world, according to Duong, Brewer, Luck & Zander (2019), intensify even more the inherent risks to agricultural production. The concept of risk in agriculture is directly related to the knowledge imperfection present in its many steps, since the planning to the harvesting and commercialization. According to Rosa et al. (2018), this lack of previsibility occurs because of factors such as climatic conditions, plagues and diseases, price volatility and changes in public politics.

When adopting the system of organic production, the agriculturist finds a new panorama of risks and opportunities. Strategic decisions in technologies, management, production scale and commercialization are crucial to navigate this environment and reach success. When taking strategic decisions in technologies, management, production scale and commercialization, the agriculturist will be more prepared to face the challenges and enjoy the opportunities of this sustainable and promising system.

Given the different sources of risk in organic agriculture, according to the USDA, the agricultural risks are classified in five main categories: production, price or market, financial, institutional and human or personal (USDA, 2023).

Risk of production is linked to natural and uncertain events that affect production, like climate, diseases, plagues (USDA, 2023). Therefore, agriculture is highly dependent on environmental, climatic and meteorological conditions that demand adequate assessments regarding the related risks, with the goal of increasing the resilience and adaptation of the agricultural explorations when it comes to the occurrence and tendencies of external environment events (Alilla, et. al, 2024).

About the production risk, Guimarães (2020) highlights in his study the development of technics like the direct straw planting, integration between crop-livestock-forest (ILPF), green fertilizer and culture rotation, as some of the examples that have been contributing to a conciliation between cultures and the environment and that reverberate in the improvement of properties in relation to the conscious use of soil, in the capacity of water absorption, in the plague and diseases control and in the increase of organic matter, reverberating in production.

The prices paid for necessary production inputs, as well as the price received by products is related to the risk of price or market, varying according to characteristics or kinds (commodity and/or product) (USDA, 2023). When it comes to that, the fluctuation of agricultural prices is a main point of discussion, since the formation of prices is strongly affected by the relationship between demand and offer, whose impact reverberates in the rentability of production, reflecting on the country's economy (Liu, Liu, Ye, Tang, & Wang, 2022).

The cost of production, in terms of resources, financing, creditors, availability, interest rates, time and assumed obligation approach the financial activity risk (USDA, 2023). The resources originated from loans and financing, as well as the conditions of these contracts such as the interest rates, are related to the financial risk, with assessments and trusted sources being important in the access of financial services (Duong et al., 2019).

The Government's regulations, laws and actions concerning the use of products linked to production, packaging disposal and waste, price levels or aids are examples of governmental decisions and are related to institutional risk involved in agricultural businesses (USDA, 2023). In this aspect, it can be highlighted that many countries adopt common agricultural politics such as insurance, funds and other financial reserves, serving as tools for the public politics of risk management (Alilla, et. al, 2024).

In Brazil, programs, politics and tools for risk mitigation are listed, such as the Rural Security Prize (PSR) for risk exposure reduction, the Guarantee of Agriculture Activity Program (PROAGRO) in case of the supported crops being affected by climatic events, and the Price Guarantee for Familiar Agriculture Program (PGPAF) that offers bonuses to the agriculturalists in terms of prices (EMBRAPA, 2018). Besides, the country has applied the climatic risk agricultural zoning (ZARC), that works as support to these instruments where the dates or time periods for the planting of each culture are defined, taking into consideration the localization in terms of regions, as well as the characteristics of that space, such as climate and soil (EMBRAPA, 2018).



Therefore, just like governmental politics might mitigate institutional risks, a change in these actions might also cause worries when it affects the sustainability of rural enterprises and its impacts in the territorial context in which they are inserted (Duong et al., 2019).

Furthermore, the agricultural activity only concretizes the cycle of the production chain when people do the different tasks on this process, i.e. the human beings are essential for the performance of the activities (Duong et al., 2019). In this scenario, personal factors, such as health and relationship issues might affect agricultural businesses, since these situations are present in the personal or human risk (USDA, 2023).

Given the different kinds of risks that are related to the agricultural activities, it isn't rare that its incidences might occur in simultaneous ways, demanding strategic actions (Siatkowsk, 2022). In this way, the risks at which the agricultural activity is exposed might lead to different loss situations, in a local level of establishment such as effects on society in the local and regional economies (Gugel, 2023). Thus, risk mitigation and sustainability in the agricultural sector, especially in this study, becomes an important variable in organizational terms, but also in effects on the economy, given the global appeal for changes in the field of sustainable development (Silva, Martins, Pacheco & Mendonça, 2020).

2.3 Sustainable Agriculture

The increasing demand for nutritive, differentiated food that is also aligned with more exigent markets imposes a challenge to the agricultural production: finding intensive and sustainable processes. To supply this complex demand, EMBRAPA (Empresa Brasileira de Pesquisa Agropecuária) proposes a series of innovative solutions, compiled in five pillars: production intensification, competitive innovation, sustainability, life quality and governance. In this aspect, the investments in development and use of different strategies and converging technologies, such as the support to scientific development, have collaborated to the increased potential of product creation and disruptive productive processes and economic and environmental impact (EMBRAPA, 2018; Silva et al., 2020).

Through the offering of innovative sustainable solutions for agriculture, with the intention of strengthening the production of organic food, the company this study is focused on targets the development of sustainable agriculture that results in quality, agricultural productivity and other benefits for agriculturists, consumers and the environment.

Being a reference in the organic production in the Northwest Border of Rio Grande do Sul, this company works with the sales of cultivars and seeds, in addition to a range of products

and processes for the biologic control of the cultures' plagues and diseases. For the organic production of crops (soy, wheat, corn and oats), the company counts with the cooperation of certified manufacturers, in an area of more than 450 hectares. These manufacturers receive the help of specialized technicians that perform follow-ups and orientations starting from the preparation of the soil to the harvest of products.

The harvesting processes happen in that specific region, but the production flow happens in the states of Paraná and Santa Catarina, places where the production is delivered and follows the process of commercialization, either for internal consumption or to be exported. In this way, investing in infrastructure, technology and sustainability is essential for the future of production in the region.

3 Methodology

This study is structured as a descriptive research with a qualitative approach. This choice is justified through the goal of understanding the phenomena in which the perception of subjects and meaning is attributed by the participants, exploring their experiences (Sampieri, Collado & Lucio, 2013). Such perspective is proved to be essential to unveil the nuances and complexities involved in risk mitigation in companies in the field of sustainable agriculture, considering the optics of the absorptive capacity theory.

This research methodology is characterized by a strategic combination of two different approaches: the documental research and the in depth field research (Marconi & Lakatos, 2021). The advantages of these combined approaches occur through the coverage that allows a more complete and holistic view of the theme.

A company that works in the field of sustainable agriculture was chosen as study object, located in the Northwest Border of Rio Grande do Sul. The choice of this company is justified by it being a reference in the field of sustainable agriculture in the region. Thus, the goal is to advance in research exploring the sustainability theme, inserted in organizational contexts referring to companies that perform an important role in the sustainable development. Furthermore, this company shows good ability in searching for information on the national and international markets, focusing on the segment of organic products, to follow tendencies and perspectives relevant to its context. That research is fundamental to how the business is conducted, since they allow for strategic decisions to be taken, risk mitigation in a proactive way, improvement of production management, strengthening of competitiveness and sustainability promotion.

For the documentary research, data was analyzed through documents created and made available by the company, such as reports of experiments performed, pictures of field work, publications in booklets, folders and other printed material. The data collected in this step made it possible to identify with greater clarity the work done by the company, such as the segment of products related to the biologic production, discussions about new varieties of seed and experiments in periods of drought, in addition to inputs and techniques related to sustainable production. In the step of field research, an interview script was used, based on the theoretical construct of absorptive capacities analyzes by Cohen and Levinthal (1990), whose question were adapted from a study made by Hermes (2020), focusing on the categories of “recognition”, “assimilation” and “application” of knowledge. Besides that, a relationship between the absorptive capacity and the risk mitigation was established, analyzed through the categories from the US Department of Agriculture, consisting of five general kinds of risks: production risk, price or market risk, financial risk, institutional risk and human or personal risk (USDA, 2023). The categories of analyses are shown on Table 1.

Table 1

Study Analysis Categories

Categories	Subcategories	Theoretical Framework
Absorptive Capacity	Recognition	Cohen e Levinthal (1990)
	Assimilation	
	Application	
Types of Risks	Production Risk	United States Department of Agriculture – USDA (2023).
	Price or Market Risk	
	Financial Risk	
	Institutional Risk	
	Human or Personal Risk	

Source: autors' own

The interview script contemplated two general blocks of questions, the first with questions about the company's characteristics and the second about the absorptive capacity related to risk mitigation in context of sustainability, divided into three categories: “recognition”, “assimilation” and “application” of knowledge in the mitigation of the five general kinds of risk and the context of sustainable agriculture.

Interviews were done in the ground of the company, limiting itself to the strategic level, being directed to two representants of the strategic leadership of the organization, understanding that the conduction of the business plan and the actions of the company depend on this level of direction. The interviews happened on March 2022 and lasted for 4 (four) total hours. Furthermore, direct observations were made by the researchers, resulting in eight hours of work inside the company. Because of the interviews, documents made available by one of the representants were gathered, in subsidy to the gathering of information.

The interview step was recorded in audio, being posteriorly transcribed by the researchers with the help of the audio transcription tool from *LibreOffice*, aiming to recover the entirety of the narratives that were compiled in documents to be analyzed, resulting in 10 pages of information.

With the basis of content analysis (Bardin, 2011), it was possible to describe and interpret the narratives transcribed by the researches, posteriorly performing the scheme of manual codification, allowing the analysis of reality experienced by the company in this conceptual relationship between absorptive capacity and risk mitigation. The data was organized following the three phases of Bardin (2011): 1) Pre-analysis, through the highlighting of the documents with relevant information for the understanding of results; followed by the performance of transcribing the interviews, reading and points from the key-information and codification of results; 2) Exploration, aiming to analyze the depositions through the thematic categories listed in this methodology, pointing the most important evidences of the relationship between absorptive capacity and risk mitigation; 3) Treatment of results, condensing and systematizing the information, supported by the theoretical reference.

4 Analysis and Discussion of Results

The analysis and discussion of results, presented in this section, evidenciate elements about the process of developing absorptive capacity in a company that works in the field of sustainable agriculture related to the risk mitigation inherent to the activities in its region. Therefore, in the following section, it is presented how the company uses the external knowledge to mitigate the risks of its activities, considering the three categories of ACAP (Recognition, Assimilation and Application).

4.1 Recognizing External Knowledge

Initially looking to know how the process of external knowledge recognition in relation to risk mitigation in sustainable agriculture works, the research done in the target company

shows that information about the national and international markets are gathered in a general way, especially about the market of organic products, aiming to follow tendencies and perspectives related to that market. Such information is essential for the conducting of business and productive processes, collaborating in the risk mitigation in a way that the information serves as basis for the decision taking and the formulation of answers related to upcoming challenges.

Regarding information about current and possible competition, it is highlighted that the market of organic products involves less risks in this aspect, either for involving a public faithful to the product and for the fact of the demand still being superior to the offering. That said, the positive aspects in this production are the lesser risk of price and market, that fall over the valorization of products and guaranteed sale, situation already noted by Rosa et al. (2018), that point in their study the risks of price and market as the less worrying for agriculturists of organic products, because this is a market in expansion.

It is worth noting that the oscillation of market prices affect the manufacturers of conventional and organic products in different proportions, to the point that there's a bigger stability when it comes to organic products, both in terms of input to be used and the terms of sales in this production, justifying the smaller risk of price and market.

Being the market of organic products a prospective one, the company requires the adoption of a proactive stance related to the market news, in a way that its monitoring is linked to planning that demands constant reviewing. This monitoring reflects in terms of risk mitigation, once it signs changes in the course of the consumer market, such as increased demands for specific products. As an example, the case of the increase of oats in human consumption in the past few years can be mentioned. Besides, questions that involve the production risk are also mentioned, such as the resistance of the crops in terms of attacks of plagues and diseases, like the Asian rust, that need to be monitored and requires efficient action that can be reflected in productivity and not only in unnecessary costs.

According to Cohen and Levinthal (1990), proactive organizations, impulsed by the constant search of knowledge, showcase increased levels of absorptive capacity. In this aspect, the posture of the company when it comes to new market exigencies in terms of reduction of pollution levels because of climate change can be highlighted, with the adoption of sustainable practices and CO² sequestration. About that, it is worthy noting an excerpt from Rodrigues (2021, p.5), present in the CEO Guide for COP 26, that says that “it is already estimated that, until 2050, climate change could be responsible for around 17% of crop losses and the reduction of 20% of agriculturable lands around the world.” The author also adds that the adoption of

sustainable practices by agriculturists might become strong environmental allies, combining productivity and carbon sequestration inside the rural productive areas.

Following these tendencies, the company is searching the recognition of these practices in the way of showcasing another favorable point to this kind of agriculture, that consists of creating carbon credits that can be commercialized, aiming for neutralization and reverberating in the mitigation of financial, price and market risks.

Aiming to contribute to the development of sustainable agriculture, the company keeps cooperation links with Universities, Federal Institutes, Centers and teams of research and other companies. Through those studies and exchanges of knowledges are developed, aiming the improvement of the people involved in the conduction of productive processes and that work for the development of cultivars, biostimulants, resistance inductors, co-inoculation technologies, biological control and other formulation that add to the innovative solutions in a sustainable agricultural production.

Such actions collaborate especially for the mitigation of production risk, as in the case of the development of corn cultivars with better resistance to drought periods and attacks of plagues or diseases that affect production.

Besides the established partnerships, the company also had internal activities and programs aiming to develop new technologies. Together with the properties, the company challenges the agriculturists to perform experiments to get better results. Furthermore, in areas belonging to the company, experiments with cultivars are done, with the goal of analyzing their tolerance to diseases and plagues. These experiments aim to improve the concerns towards planting and genetics. One of the interviewees reinforced this idea:

[...] the choice of the cultivar makes all the difference, and the biological control decreases risks, increasing the soil 's organic content. Biological treatment increases the root... it is lost when you don't follow all procedures. The more you take from the soil, the more you weaken it. With the increase in prices of fertilizers it is necessary to do the calculations, if the investment was safe... this is a big concern [...]. (Interviewee A).

In this aspect it is worth mentioning the financial risk involved in the rural activity, when the agriculturist get resources to buy inputs to plant and to perform crop maintenance. The unexpected is something present and that needs to be acknowledged in the rural production. For instance, when the estimation is to harvest a set amount but that doesn't happen due to a series of factors, specially the climatic ones, the harvest doesn't bring in the expected amount to cover costs.

In relation to that, this company acts as a guide to the agriculturists, identifying scenarios and giving recommendations around the inputs and products indicated for each case, avoiding unnecessary actions that lead to an increase in costs.

The governmental support and action, that covers the institutional risk, is also present in this discussion every time the production is done through the organic system, a productive system that is also contemplated with financing politics, rural insurance and investments, just like the conventional agricultural system.

In this case there are specific lines that cover organic agriculture, like the PRONAF Agroecology, though sometimes known and conventional credit lines are used. These cases might be linked, according to Rosa et al. (2018), to the existing gaps related to the access to the public politics of PRONAF, in a way that allows a better enlargement, structure and management of productive systems.

4.2 Assimilation of External Knowledge

Moving from recognition to assimilation of external knowledge, in the company the process of understanding and internalizing information and tendencies of the external environment is done through discussions, exchange of ideas and analyses of the managers, being formalized in the strategic planning, that is reviewed periodically. The information about market behavior, consumption trends, new technologies, development of research and experiments are interpreted and internalized through planning, and passed to the agriculturalists the assimilation of the new orientation.

[...] the use of soy by the chinese market for animal feed is an information. Heavy increase on the number of vegans, and alternatives for animal protein is an information we need to pay attention to. The increase of consumption of oats, especially by the youth that is looking for better nutrition [...]. The market signs and we need to interpret - offer these trends to the agriculturists (Interviewee A).

Given some market tendencies, it is highlighted in the literature a crescent plea in terms of the vegan movement and its convergence with the agroecology, be it as a trend or tendency, bringing change to the people's eating habits and it the making of agricultural practices, though it is still incipient the political engagement with other organizations (Niederle, Schubert, Tavares da Silva, Sandri, Dias & Gabana, 2021).

When this monitoring and internalizing of information is done through interpretation and formalization in planning, it is possible to give assertive guidance related to the risks one is exposed to. The planning gives subsidies to the decision taking, making the choices and

conduction of processes safer. As an example, the information obtained through experiments in crops and that are related to the information available to the market, aiming to verify the possibility of adaptations, with the goal of joining productivity and sustainability through the correct use of inputs and soil management, mitigating the production and financial risks. When the good use of inputs is done, there is an impact on both quantity and choice of products, in addition to strengthening the production, there is no waste of financial resources.

The incorporation of technologies and successful experiences previously implanted in the market have been collaborating in identifying advances and opportunities, since it is not enough to only have good tools available, but especially make good use and know the processes, analyzing and getting the best of each case. When a new technology reaches the market it is necessary to get to know it and try it, analyzing the cases in each it can be used or where adaptations to the reality in which it is inserted are necessary, according to the interviewee:

The company has paid attention to the development of researches and technologies that are developed, and the market experiences (...), field researchers do the prospection, and it is necessary to have good tools and make good use of them, the companies that are not interested in improving end up being left behind (Interviewee B).

Through the good use of tools, such as planning and monitoring, the company can incorporate the information acquired about the market tendencies, new technologies and/or practices, and transfer them to the manufacturer. Besides, the assimilation of the group of information allows identifying and eliminating internal practices that happen to be obsolete, renewing the competences in the key processes, stimulating the search for innovation and alternatives that help in risk mitigation, especially in the human and productive aspects, with the adoption of innovative practices.

The company adapts itself to the technologies and processes created by other organizations through guidance, i.e. it intends to be a reference in its sector, offering solutions in the correct way of using products, as well as the packaging disposal.

In this sense, the role of the board of collaborators that are instructed to guide the agriculturists and conduct the processes inside the company can also be highlighted, being in charge of the strategic group and repassing guidance to the other collaborators. When this process is done in a satisfactory way, it affects the agricultural businesses through the mitigation of human and personal risk, in a way that the instructions and guidelines received prepare the collaborators to act in daily situations, feeding back the communication and learning systems, keeping the team qualified and motivated.

4.3 Application of External Knowledge

Exploring the environment knowledge, it is expected that the incorporation in the organization happens, aiming to transform and apply it into a strategy of business innovation (Cohen & Levinthal, 1990). For this transformation and application, the company makes available an internal capacity in form of a team, with technical training in the agricultural and administrative areas, in addition to partners and collaborators. Once the team is formed, the knowledge becomes the company's biggest treasure, linking technical and practical abilities, obtained through past experiences and the continuous engagement in experiments and researches, contributing to the business in terms of final results, as well as creating objective conditions for the application of this acquired knowledge in the making of the organization.

Such finding aligns to the ones of Schillaci, Romano and Nicotra (2013), when these authors make reference to the company's knowledge, i.e. the level of training and experience of human resources as fundamental to the development of absorptive capacity, also corroborated by Malvestiti, Esteves and Dandolini (2021), when these affirm that the organizational success and its continuous transformation depend on these competences and experiences.

Therefore, in the case of this company, the technical knowledge aligned to the practical knowledge become fundamental pieces for the analysis of the factory recommendations about the use of its products. The constant recommendations on the packaging of the products are written in an universal way, i.e. standardized and, therefore, the analysis of each agricultural area unveils specificities that can be incorporated on practices such as experiment and thus transformed, applying knowledge into innovation.

Research and Development activities practiced by the company and also approached by Schillaci, Romano and Nicotra (2013) are essential to turn the processes of absorption of structured and continuous knowledge when it comes to solutions and innovations demanded by the market, collaborating in the risk mitigation where the choices become more assertive in that environment.

The application of experiences in addition to the acquired knowledge through the years qualify the productive processes, and that is only possible through planning and systematic monitoring of the knowledge evolution generated externally, as well as the ability of the organization to assimilate and apply such knowledge in its productive process. Therefore, it is necessary to pay attention to both the financial and production risks, since in many cases agriculturalists end up following market waves or even a seller when the guidance in which

products to be used end up compromising the final result of a business. When not well-analyzed, the reality and the current conditions may end up in an inappropriate use of resources and affect the results in terms of productivity, in a two-edged sword in risk mitigation for both the company and the agriculturalists.

The company constantly adds value to the products and/or services in the way of innovation, specifically aiming to overcome a model and build a new one that can contribute to the development of sustainable agriculture. Such changes involve cultivars, products and techniques, such as the system fertilizing, pulverization modes, planting systems among others, aiming to put together the productivity and quality in agricultural production combined with sustainability.

For the company the acquired knowledge has strategic impact on the performance, causing continuous improvement and favoring the mitigation of risks that involve activities, once innovation is the guide to look for improvement and evolution of systems and processes of sustainable production, collaborating with the development of a better world in terms of life quality and health, conditions that meet the ones of public politics, national and international rules and regulations, corroborating with the millennium goals, highly discussed through the 2030 Agenda.

4.4 Synthesis of Absorptive Capacity and Risk Mitigation

On Table 2 are synthesized the findings regarding the categories of absorptive capacity analysis with the crossing of obtained information, highlighting the main evidence when it comes to risk mitigation.

Table 2

Synthesis of Theoretical Findings: Absorptive Capacity and Risk Mitigation

Absorptive Capacity	Types of Risks	Risk Mitigation Actions
Recognition	Price or Market risk; Production risk; Financial risk; Intitutional risk.	Monitoring market trends and prospects, current and potential competitors; Expanding organic market with greater price stability; Proactive approach to market trends with monitoring linked to planning and continuous review; Adoption of sustainable practices, linking productivity, carbon sequestration, and profitability; Collaborative relationships or partnerships for the development of innovative solutions in agricultural production; Public policies for financing, crop insurance, and investment.
Assimilation	Production risk; Financial risk; Human or Personal risk.	Internalization and interpretation of formalized information in planning, which provide support for decision-making, providing greater security in the choices to be made and in the conduct of production processes; Information obtained through field experiments is compared with market-available data to identify potential adaptations, aiming to combine productivity and sustainability; Employees are instructed and encouraged to guide farmers and conduct the process according to company principles, seeking innovations and alternatives, providing feedback to communication and learning systems, and maintaining a motivated and qualified team.
Application	Human or Personal risk; Production risk; Financial risk; Institutional risk;	An internal capacity built upon a team with technical expertise in agronomy and administration, complemented by partners and collaborators; The combination of technical knowledge and practical experience is fundamental for analyzing factory recommendations regarding product usage; Innovation as a guiding principle in the pursuit of improvements and evolution of sustainable production systems and processes, contributing to the development of quality of life and health.

Source: autors' own.

The absorptive capacity of this company is configured as a fundamental foundation in risk mitigation and in the successful implementation of sustainable practices. This capacity, that

manifests itself in the ability of identifying, acquiring and applying external knowledge, becomes even more crucial in the context of sustainability, since it seeks for environmentally responsible solutions. The company, in developing and strengthening its absorptive capacity, is equipping itself with essential tools to potentialize better results in its business, becoming even more competitive, resilient and innovative.

Therefore, the recognition, assimilation and application of external knowledge guarantee the evolution of productive systems, and in the specific case of sustainable agriculture, collaborate in the process of transition, even if slowly, to a new model of agriculture that becomes possible in economical, environmental and social terms, in light of a new paradigm of production that can align economical gain mitigation risks as well as collaborating with the planet sustainability.

5 Final Considerations

Considering the goal of understanding how a company that acts in the sustainable agricultural field develops the absorptive capacity as a strategy of risk mitigation in the promotion of sustainable agriculture, this study initially showed that were identified the phases of recognition, assimilation and application of external knowledge by the company in favor of risk mitigation in the practice. When developing the absorptive capacity to mitigate risks, the company became more competitive, resilient and innovative, contributing to the development of a more sustainable and efficient agricultural sector.

It was verified that the recognition and capture of information and external knowledge helped the organization in terms of identifying market behavior and its tendencies, helping the risk mitigation, specifically in the ones related to production, financial, price and market. From the moment when the company invested in the search of knowledge to support its actions, mainly in terms of mitigating the risk of its business, it also benefited from a better market comprehension, developing the ability of adapting to changes, potentializing its business and in a more direct way, contributing to the construction of a more sustainable planet.

In the phase of assimilation of the external knowledge, it was noted that the process of interpretation and internalization of the external environment information and tendencies happens through a strategic planning, which is elaborated through internal and external informations and reviewed periodically, collaborating with advances in terms of mitigation of production risks, with the development of new solutions in the fields of productivity and sustainability. This posture and behavior put the organization in a highlighted position in the



market, impulsing business in a new perspective of production linked to environmental sustainability.

The team's previous knowledge, its diversity of experiences and constant practice of experimenting and researching reflect in the innovative performance of the company, in a way that knowledge is transformed into innovative solution for sustainable agriculture. This convergence of actions and practices contributes to the transformation of knowledge that creates positive impact in terms of the business's risk mitigation, as well as the construction of an agricultural production model that considers sustainability in a wider economical, social and environmental way.

In terms of knowledge acquired externally, it can be highlighted that this has created continuous cooperative improvements and favored the risk mitigation involving activities, in which the innovation of systems and processes of sustainable production are adopted by agriculturists, collaborating with the principles of sustainable development. In the context of agriculture, its relevance is intensified once it contributes to the application of new methods and productive systems where sustainability is present.

Today, the thesis of sustainability is a fundamental strategy to each and every company, as well as mandatory in the business world. The sustainable development goals - SDGs, widely promoted and demanded from all sectors of society seek the construction of a balanced and sustainable world. Therefore, the adhesion of big companies to practices and politics aligned to these goals, more than a market and competitive strategy, is presented as a condition of business survival and growth, as well as a citizen conscience in building a better world for people to live in.

The purpose of this study was to explain how the absorptive capacity is related to the risk mitigation in a company that works in the field of sustainable agriculture. Therefore, it analyzed the relationship of ACAP with risk mitigation in the business field focused on sustainable agriculture. In making the ACAP/Risk Mitigation associating in the sector of sustainable agriculture, it was possible to explore an interdisciplinary perspective, since it gets theoretical models (ACAP and Risk Management), well used and practiced in the business/organizational fields, understood as competitive strategies possibilities to potentialize gains in terms of business and associating to another approach (sustainable agriculture), that doesn't require only the economical perspective, but also the consideration of the social and ambiental perspectives as well.

In terms of study limitation it is possible to point the emphasis given to the exploration of how the ACAP development influences decision making when it comes to risk mitigation in

a company. Therefore, it was restricted to analyze the reflections of this relationship through the lenses of a specific case and, fundamentally, considering just the perception of the strategic leadership of the company under analysis. Certainly an in depth study in terms of mechanisms that favor this relationship in a bigger group of companies in a certain sector, for example, as well as the inclusion of other publics, covering clients and rural manufacturers to get the perspective of the subjects affected by those practices could provide more relevant results both in the theoretical field of ACAP and risk mitigation and in the theme of sustainable agricultural productive systems. This is our suggestion in terms of exploration in new studies in this line of investigation.

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