The financial effects of climate change

A study regarding adaptation strategies communicated by the EU

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Abstract

Sweden's agriculture has historically been a cornerstone of Sweden's economy. By providing food security, rural employment and economic stability. Lantmännen was established in 1889. The cooperative is owned by approximately 18 000 farmers and functions as an organization encompassing sectors such as agriculture, food production, machinery and bioenergy. This organization has favorably contributed to the development of Swedish agriculture. However, in recent years, the agricultural production in Sweden has been affected by the intensified climate changes. The Swedish Meteorological and Hydrological Institute presents extreme and unpredictable weather due to Climate changes. These periods were significantly observed in agricultural production during the years 2018 and 2023. The drought in 2018 led to a lower harvest in quantity, whilst the drought followed by heavy precipitation 2023 led to a lower quality and quantity of the harvest. These trends are observed within the EU, and consequently, the Common agricultural Policy, as well as new directives are being formed to combat these new challenges. This research aims to contribute to an understanding of various sets of policy frameworks within the EU that are communicated to the Swedish agricultural production through Lantmännen. Furthermore, it is of interest to investigate the perception of climate change and how well adaptation strategies are being implemented for maintaining a financially stable production.

To comprehend factors influencing the rate of implementation and adaptation to climate change, the reader additionally needs to comprehend market circumstances and the impact of attitudes on producers' decision-making. Furthermore, it is of significance to the reader to understand how institutions such as the EU promote and support producers, and how this is received by the member states, specifically Sweden. The theoretical framework in which this research is based includes Contingency theory, Institutional theory, and SWOT analysis. This research is conducted through a qualitative research method, including a narrative literature review. The author conducted interviews with five respondents from the organization Lanmännen. The respondents were asked to answer the questions found in Annex 1. The answers are further presented in Chapter 4.

The research shows how different market conditions contribute to the attitudes of the producers. Furthermore, attitudes of producers are significantly linked to formal and informal institutions, which in turn affects various contingencies forming an organization. The created policy frameworks, in combination with Lantmännens communication to producers, constitutes how well adaptation strategies are implemented by producers.

Keywords: Climate change, climate adaptations, adaptationstratgeies, financial stability

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Abbreviations

CAP	Common Agricultural Policy
EU	European Union
SCB	Swedish statistical database
SMHI	Swedish meteorological and hydrological institute
SWOT	Strengths, Weaknesses, Opportunities, Threats

1. Introduction

The chapter aims to present a background regarding an economic perspective of Swedish agriculture, and the economical effects and challenges which have been displayed Concerning climate changes. Furthermore, policy frameworks from the EU affecting Swedish agriculture are introduced, concerning climate adaptations for financial stability. Moreover, the purpose and problem are introduced, followed by a presentation of the research questions.

1.1 Swedish agriculture- an economic perspective

Sweden's agriculture has historically been a cornerstone of Sweden's economy. By providing food security, rural employment and economic stability (Grusson et al, 2021). Swedish agriculture has played a big role in the economic resilience of Sweden (K. Johnsson,2011). However, in recent years, significant shifts in the economic landscape due to climate change have emerged. The climate changes and its effects on Swedish agriculture have become prominent in years such as 2018 and 2023 (Jordbruksverket, 2023). These shifts in climate and their corresponding economic effects are in need of a closer examination to analyze what measures of adaptation strategies are in need of implementation (ibid).

1. 1.1.1 Financial Stability in Swedish Agriculture

Swedish agricultural producers perceive a concern regarding the financial stability of agricultural production. The producers navigate through a complex set of environmental factors entailing market dynamics, policy frameworks and the emergence of unpredictable weather conditions adhering to climate change (European Union, 2023). According to recent data from the Swedish Board of Agriculture, contingencies including input costs and global trade agreements have heightened the importance of risk management for agricultural enterprises.(CAP, 2022). To further maintain economic profitability, producers need to invest in adaptations to various production strategies regarding climate change. (European Commission, 2019)

2. 1.1.3 Market Dynamics and Policy Frameworks

As previously mentioned, Swedish agriculture is significantly linked to the market dynamics and policy frameworks. As part of the EU, Sweden's agricultural production is further affected by trade regulations, global commodity prices, as well as the communicated directives and strategies from the EU (Official journal, European union, 2024). Directives and regulations from the EU entails agriculture support programs with the aim of shaping financial stability within the member states (T. Chatzopoulos et al. 2016). An overall understanding of the interplay between market dynamics and interventions from policies is essential for producers to adapt proper strategies in agricultural production to maintain financial stability (T. Chatzopoulos et al. 2016).

The overall economic perspective on Swedish agriculture is multifaceted, entailing several factors affecting the financial stability of agricultural production (T. Chatzopoulos et al. 2016). The significant emergence of variations in harvest quality and quantity observed in recent years due to climate change leads to a need for new adaptation measures. Climate change has been frequently discussed within the EU (European Commission, 2024). This discussion was the start of the Paris agreement. Additionally, CAP along with other directives from the EU have now been focusing on the initial effect climate change poses on agricultural production.

For the reader to get a broader perspective on the role of the EU and their contributions to Swedish agricultural production, an introduction to the Paris agreement, CAP and a new EU strategy for climate adaptations will be presented. However, before that. The definition of climate change will be presented.

3. 1.1.4 Climate change

SMHI, the Swedish Meteorological and Hydrological Institute, defines climate change as a change in the climate system that has lasted for decades or a longer period of time (Schimanke et al.2022). These factors can encompass changes in temperature, precipitation, drought and other similar variables (SMHI, 2023). It is also of importance to note that climate change is a term significantly connected with changes in weather patterns (Schimanke et al.2022). In this research, terms such as “ unpredictable weather” “ changes in weather patterns” and “ extreme weather” are referring to the observed effects of climate change.

4. 1.1.5 Paris Agreement and Climate Change

The legally binding international treaty, the Paris Agreement, was signed by 196 parties at the UN Climate Change Conference 2015 (United Nations, 2015). This framework of transparency aimed to address the challenges of climate change, and the presenting of the primary goal of limiting global warming to 2 degrees celsius above pre-industrial levels (United Nations, 2022).
The participating nations have been given the freedom of conducting an individual strategy including commitments and management for the purpose of reaching the constituted goal (Dupraz et al, 2019). Furthermore, the risk management and following procedures have therefore been adopted in various methods and approaches depending on the country's financial, political and social abilities (R. du Pont et al 2016).

The historical increase in temperature combined with adjusted precipitation regimes are affecting crop yields and altering growing seasons, resulting in challenges of traditional farming practices (Schimanke et al.2022).
The elevated level of frequency and intensity of extreme weather events, including heatwaves, floods and droughts, pose a significant financial risk in relation to agricultural productivity (Asbjørn et al, 2012). Moreover, these challenges encompass repercussions for markets, supply chains and food systems (J. Olesen et al. 2020).
Occurrences such as a reduction in crop yields, crop failures, and loss of quality can result in substantial income losses for farmers (Asbjørn et al.). Furthermore, these climate-related disruptions in the agricultural field may result in market instability, food price spikes and price volatility. Given these circumstances, it is essential for nations worldwide to implement a strategy with the aim of minimizing the financial effects of climate change (Jordbruksverket, 2024). The Common Agricultural Policy was thereafter reintroduced, as a means of financially supporting the member states (European Commission, 2020).

5. 1.1.6 Climate change in Sweden

Research can now clearly link many types of extreme weather to climate change. Already, the likelihood of heatwaves, both on land and in the sea, heavy rainfall, and drought has increased. The intensity of many extreme weather events has also risen due to climate change. In a future warmer climate, these types of changes will become even more extreme, both globally and in Sweden (SMHI, 2024).

Sweden's weather has varied over the course of 20 years, displaying a high correlation to the effects of climate change. SMHI, the Swedish Meteorological and Hydrological Institute presents numerous statistics and graphs showcasing these trends and addressing them as effects of climate change.

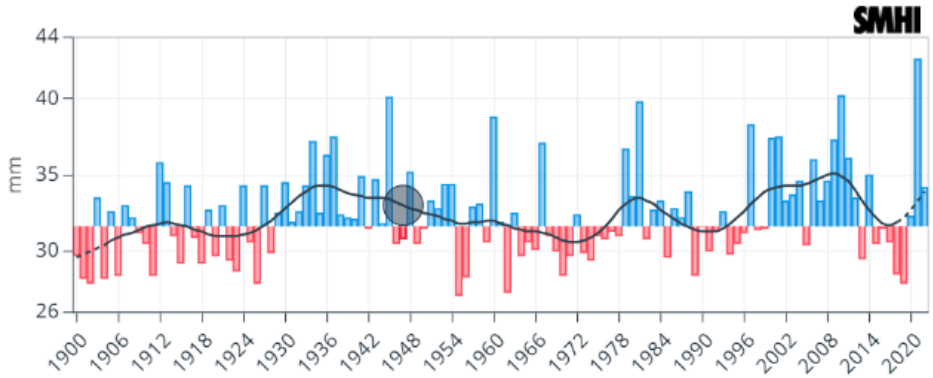

Figure 1: Showing precipitation in Sweden from 1900-2020, (SMHI, 2024)

The Swedish Meteorological and Hydrological Institute (SMHI) also explains how the heat and precipitation in 2023 represent extreme weather conditions, measuring extreme precipitation over the past century.

Furthermore, the Swedish Meteorological and Hydrological Institute (2023) presents statistics of kg per hectare in various crops. The figure below demonstrates a general downward trend in kilograms per hectare for most crops. The years 2018 and 2023, as mentioned, represent extreme values due to the impacts of climate change.

Table 1: Table Showing kg per hectare by crop and year from the Swedish Statistical database (2023).

	2016	2017	2018	2019	2020	2021	2022	2023
Winter wheat	6 680	7 360	4 790	7 730	7 450	6 600	7 220	5 750
Spring wheat	4 540	4 640	2 760	4 520	4 670	3 510	4 810	2 710
Rye	6 120	6 660	4 510	6 760	6 200	5 710	6 230	5 210
Winter barley	5 780	6 420	3 770	6 830	6 540	5 570	6 150	5 180
Spring barley	4 760	5 210	3 000	5 180	5 070	3 770	5 440	3 150
Oats	4 450	4 490	2 570	4 760	4 530	3 310	4 780	2 950
Winter triticale	5 410	5 970	4 020	6 440	6 120	5 280	5 750	4 230
Spring triticale	3 770	3 490	2 430	4 130	3 840	3 100	4 530	2 580
Mixed grain	3 730	3 450	2 280	3 440	3 800	2 760	3 810	2 660
Peas	3 680	3 450	2 260	3 380	3 330	2 540	3 610	2 050
Field beans	3 520	3 590	1 330	3 310	2 970	2 410	3 550	2 420
Corn	8 030	7 330	4 180	6 960	6 770	8 520	6 920	7 960
Table potatoes	31 810	30 840	28 080	32 980	33 260	30 620	33 520	31 750

Furthermore, increased input costs is a probable result of climate change, which may result in additional investments in agricultural inputs including fertilizers, pest management and irrigation, in order to maintain crop yields and quality (Lenaerts et al, 2022). Consequently, these investments affect farmers financial resources and profitability (A. Bowen et al. 2019). By promoting resource-efficient practices such as water-efficient irrigation systems and pest management approaches, CAP aims to support farmers to improve financial resilience regarding climate change (G. Papadopoulos, 2015).

The induced disruptions in agricultural production as a result of climate change can moreover lead to an increase in volatility in the market (Lenaerts et al, 2022). 2023, Sweden's decrease in agricultural productivity caused price fluctuations and consumer preference shifts (A. Bowen et al. 2019).

As a summary, the financial outcomes of climate change concerning agriculture emphasize the value of practice adaptation strategies executed within CAP to elevate the resilience of agricultural systems, decrease financial risks and support a long-term sustainable agriculture within EU.

6. 1.1.7 CAP

The *Common Agricultural Policy* (CAP) is as stated previously, a prominent system of agricultural support, implemented by the European Union to financially support

agricultural production and its farmers within its member states (Agrosynergi et al. 2023). The system was established in 1962 by the *European Economic Community* which has thereafter been subjected to several reforms and revisions to adapt to the evolving agricultural, economical, and political circumstances within the EU (United Nations, 2022). With the aim of an overall sustainable agriculture production, CAP promotes environmentally sustainable farming practices focused on protecting natural resources, biodiversity and animal welfare through supporting the farmers (European Commission, 2024). Since Sweden is included as one of the member states, it is evident that CAP entails a financial effect in Sweden's agricultural production (Agrosynergi et al. 2023).

7. 1.1.8 CAP:S role regarding climate related financial effects

Reduced crop yields and livestock productivity is a common result from changes in temperature, participation patterns and extreme weather events (Vögele and Rübbelke, 2011). The decline in productivity can result in lower farm incomes and increased financial vulnerability for agricultural producers (Bosello, 2022). An example of this is the decreased crop productivity in Sweden 2023(Jordbruksverket, 2023), as a result of unfavorable weather conditions such as dry weather followed by a sustainable amount of rain during late summer (Lantmännen, 2024). Compared to year 2022, the production of peas decreased to 36%, and a decrease of 18% compared to a five-year average (Statistics Sweden, 2023). The production of field beans was calculated to 38% less than prior. Additionally, yields per hectare for peas and field beans reduced by 42%, and 32 %, compared to 2022 (Statistics Sweden, 2023). As a result of decreased productivity of crops in Sweden 2023, EU and the government provided financial crisis support to Lanmännen and farmers with spring-sown cereals and oilseed crops (Jordbruksverket, 2023).

As stated, CAP plays a significant role in Swedish agriculture production through enabling support strategies and mechanisms to Swedish farmers (United Nations, 2022). The policy´s objective includes ensuring a stable income for Swedish farmers (PE'ER et al, 2019). To accomplish these aims, CAP enables various investments in both technology and infrastructure regarding Sweden´s agricultural production (Agrosynergi et al. 2023).

Moreover, CAP works as a cornerstone for Sweden´s agricultural production. By adhering to the sustainability requirements and practices, Swedish farmers can leverage CAP´s financial support alongside with reaching a sustainable food production (Agrosynergi et al. 2023). To fully grasp the actual implementation of

CAP´s mechanisms on Sweden's agricultural production, it is of significance to incorporate the Swedish organization regarding agriculture, Lantmännen. Furthermore, it is important to consider CAP's financial impact on Lantmännen concerning the financial effects of climate change on agricultural production in Sweden.

8. 1.1.9 Lantmännen

Lantmännen was established in 1889. The cooperative is owned by approximately 18 000 farmers and functions as an organization encompassing sectors such as agriculture, food production, machinery and bioenergy (Lantmännen, 2023). Moreover, Lantmännen´s main objective is to support prosperity, contributing to sustainability and financial encouragement of its member farms (R.Moraru, 2018). Lantmännen has grown into a versatile organization which exerts significant influence in shaping Sweden's agriculture and food industry (L.Yuzhou et al. 2022). The connection Lantmännen poses with regards to CAP lies in the organization's role in the Swedish agricultural sector. As part of the EU, Lantmännen is responsible for ensuring that the guidelines of the various frameworks conducted by the EU are followed (R.Moraru, 2018). This, evidently, includes the regulations and support mechanisms of CAP.
Subsequently, Lantmännen, as an organization, poses a significant financial influence regarding Swedish farmers, and additionally, the food production within the country (L.Yuzhou et al. 2022).

The organization provides essential financial support, through the support of CAP, to member farmers of the EU. The cooperative assists with various types of loans, grants and insurance to the producers, enabling a stable financial production (Lantmännen, 2023). These financial aids provide possibilities for investments in areas including technology, infrastructure and machinery regarding agricultural production (R.Moraru, 2018). These investments further enable the farmers to develop efficiency and production capabilities to ensure competitiveness in the market.

Moreover, Lantmännen conducts research and development through investments to further benefit the member farmers financially (C. Anvret et al, 2012). These investments contribute to the driving force of innovation and technological advancements in agriculture. These investments entail advancements in practices regarding sustainable farming, programs for crop improvement and various tools and consultation concerning reduction in input costs and yields optimization (C. Anvret et al, 2012).

Furthermore, the previously mentioned practices and initiatives are all different elements enhancing the objectives of CAP (R.Moraru, 2018). The framework of CAP has always, to a certain extent, been relevant for Lantmännen and their work. As a whole, the cooperative poses a strong engagement towards CAP-related policy discussions and demonstrates efforts in advocating the policies communicated by CAP to enhance the production of the farmers (L.Yuzhou et al. 2022). By participation in CAP, including negotiation and various collaborations with the stakeholders and policymakers of the industry, Lantmännen is a big contributor to shaping agricultural policy at both a national and EU level. Evidently, Lantmännen underscores a pivotal role within the landscape of Swedish agriculture through its commitment to operating in accordance with the EU policies and objectives regarding agriculture (Lantmännen, 2023).

However, practices with regards to financial adaptation to climate change are fairly new, hence, there lies an uncertainty to whereas the cooperative has yet been able to effectively review the information.

9. 1.1.10 The new EU Strategy on Adaptation to Climate Change

February 24, 2021, the European Commission approved the communication titled "Forging a Climate-Resilient Europe – the New EU Strategy on Adaptation to Climate Change" (European Union, 2024). The strategy provides a vision for the EU to be fully climate resilience by 2050. To accomplish this, the course of action presented is to effectively adapt to the inevitable effects of climate change.

The strategy is a formulation for broadening the previously mentioned Paris Agreement, and additionally the European Climate Law, whose aim is to preserve the targets of the European Green Deal into law (European Commission, 2020) . The new strategy was therefore adopted to strengthen the adaptation and capacity of the EU and the world, while still recognizing and reducing the vulnerability of the financial impacts climate change constitutes (European Commission, 2024). These institutional regulations acknowledge the significance of adaptation as an essential part of the strategy for the global response of climate change. Furthermore, Member nations and the Union are required to advance and implement suitable measures to facilitate the aim of enhancing resilience, and reducing vulnerability to climate change within agriculture (R.Moraru, 2018).

The New adaptation strategy specifies three objectives to obtain the aim (European Commission, 2024). The proposed actions regarding the aim of the strategy focuses on smarter, systematic and faster adaptation (European Commission, 2024).

Smarter adaptation emphasizes and enhances the knowledge and understanding of uncertainty. This entails advancing the margins of acknowledgment regarding adaptation and improvement of the quality of climate loss data. Systematic adaptation refers to supporting and developing strategies within the policy field (European Commission, 2024). This focus on integrating adaptation encompasses various levels and sectors, more specifically macro-fiscal policies, Nature-based solutions and local adaptation initiatives. Lastly, a faster adaptation signifies an overall acceleration of the implementation of adaptation across the member nations (European Commission, 2024).

1.2 Problem

According to the New Strategy of the European Union, a goal is set to develop climate resilience by 2050 (European Commission, 2024). As addressed, this adaptation is influenced by four objectives, including smarter, faster and a more systematic adaptation, as well as an overall investment in effectiveness and resources (European Commission, 2021).

However, the Commission Staff working document (European Commission, 2021) reveals a continuous pattern of fluctuating temperatures recorded in comparison to historical documentations. As an example of this, the culminated heatwaves in summer 2019 is disclosed. Furthermore, The Commission Staff Working document communicates numerous episodes of drought, wildfires and heatwaves throughout Europe during the recent five years (European Commission, 2024) . Moreover, the document conveys information regarding implementation of strategies for climate resilience. The evaluation of the EU adaptation strategy published in 2013 showcased a substantial advancement in methods and techniques regarding agricultural production. However, a discovery was made concerning newly accumulated problems due to climate change (R.Moraru, 2018). Bringing forth this, it is confirmed that, to adapt to the acceleration of climate change and its effects, an intensified action on adaptation is crucial. Additionally, this is reflected in the Paris Agreement (European Commission, 2024).

As revealed throughout this paper, several guidelines, frameworks and strategies have been formulated and presented within the EU, for the aim of combating the decreasing productivity in agriculture as a consequence of climate change. Nonetheless, there is a significant knowledge gap concerning the practical application of the presented adaptation strategies to Lantmännen. As a result of this unrevealed data, it is therefore of interest to also establish the financial impacts of the exceeding climate change in correlation to the yet early stage of development. Hence, there exists an overall uncertainty on the subject of these strategies and how well they are translated into actionable measures within Lantmännen.

2. 1.3 Aim and research questions

This paper aims to contribute to the understanding of how adaptation strategies regarding climate changes affecting financial aspects of agricultural production are executed in practice. By examining various market conditions influencing producer's implementation strategies and the role of EU regarding the transition for a financial stability in agriculture production, the study aims to explore the following research questions:

1. How are the adaptation strategies of the Common Agricultural Policy (CAP) along with the New EU Strategy on Adaptation to Climate Change, implemented in practice to enhance the financial stability of agriculture in response to climate change?

2. How do market conditions and attitudes impact producers' decision-making regarding the implementation of adaptation strategies for climate change in agricultural production?

3. 1.4 Delimitations

The primary focus for this research is how adaptation strategies to climate change are communicated through CAP and various EU directives to Lantmännen. Additionally, how Lantmännen perceives this communication, along with their role in agricultural production regarding climate change and adaptation strategies for a financial stability in production. The research is specifically delimited to Sweden's agricultural production, rather than including several or all member states of the

EU. This decision is made to provide a more detailed and managed analysis. By further narrowing the research to focus on Lantmännen, the research aims to provide an extensive amount of data and insights from the main cooperation in Sweden's agriculture. Lantmännen poses a broad reach and influence across the country, offering a comprehensive overview. This approach therefore allows for a thorough examination of adaptation strategies in various regions combined. Additionally, an exclusion of other important institutions such as the Federation of Swedish Farmers (LRF), the Swedish government, or individual farmers has been made. This was decided in order to maintain a clear focus and research scope, which further allows a depth in the analysis.

Moreover, the research does not focus on consumption patterns or attitudes. Incorporating these factors in this research would expand the research beyond realistic limits.

1.5 Outline

The first chapter of the research begins with an introduction of Swedish agricultural production from a financial perspective. Furthemore, the background focuses on the financial effects of climate change on Swedish agriculture. The chapter aims to provide the reader a deeper understanding regarding the objectives of the research. The chapter is concluded by the aim, research questions and delimitations of the research. Chapter 2 provides the reader with a presentation of the theoretical framework in which the research will be attributed to. Chapter 3 describes the research method. Chapter 4 provides the reader with the empirical data that has been collected by the author. Furthermore, in chapter 5, an analysis and discussion regarding the collected empirical data combined with the theoretical framework will be presented. Chapter 6 presents the conclusion of the research.

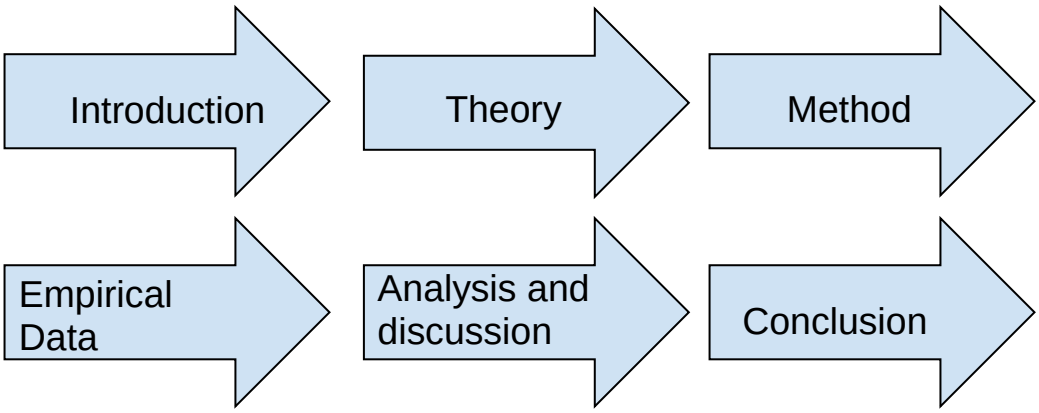

Figure 2 : The outline of the research, source: authors own illustration.

2. Theory

A comprehensive review of the Literature Review, Contingency theory, institutional theory, and SWOT is conducted in this chapter. Furthermore, the chapter concludes a theoretical synthesis containing the aforementioned theories, aiming to clarify how these theories are applied in the context of the thesis.

4. 2.1 Literature Review

The author has conducted a literature review to provide an enhanced understanding of the thesis topic to the reader. The aim of a literature review is to emphasize various theories and models from research within the subject previously conducted (Bryman & Bell 2017) . By doing so, a basis for further research problems may be identified as a result of the allowance and identification of contradictions and unanswered questions. Narrative and systematic literature review are the two main approaches (Bryman & Bell 2017). Using a narrative approach, the author adopts an interpretative manner for development of the purpose and direction of the objectives based on earlier research (Bryman & Bell 2017). This method includes the gathering of knowledge without a clearly defined goal beforehand. In doing so, the emergence of new and unexpected directions are possible. Systematic review, on the contrary, is conducted when applying a more precise examination of already existing research (Bryman & Bell 2017). This type of literature review allows a higher portability of maintaining a higher degree of objectivity during the research. However, it does not allow the same amount of freedom as a narrative literature review.

Regarding this research, a narrative literature has been conducted. This method was chosen due to the flexibility in adapting the search to the empirical data that is collected. The author has primarily used databases including Google Scholar and Primo.

The importance of using appropriate keywords when searching in databases has been considered. The keywords that have been used entails Contingency theory, along with institutional theory and SWOT. The words include the terms agricultural adaptation, attitudes, climate change, CAP and EU: climate adaptation. These keywords have provided helpful articles and journals, and consequently, allowed for the strengthening of the theoretical framework of this research.

The literature review has primarily been conducted via electronic bibliographic databases. This has made it easily accessible for the author, providing a large amount of relevant theories within the subject. Although these mentioned advantages, critical thinking when using electronic databases are needed. Such factors in need of reflective thinking are the update frequency, author and their corresponding incentive for conducting the research. These determinants should be considered before applying the article as a basis for research.

5. 2.2 SWOT Analysis

SWOT is a framework for strategic planning, serving as a tool for analyzing and developing an organization's operations. The analysis identifies four factors that affect and are included within the organization (Eriksson-Zetterquist et al. 2020). Among the internal factors are the strengths and weaknesses of the organization, which can be influenced by internal individuals. The external factors include opportunities and threats. Strengths and opportunities can be referred to as the beneficial factors as they indicate the potential for development within the organization. Similarly, weaknesses and threats belong to the detrimental factors as they encompass the restrictions and inhibiting factors affecting the organization.

The framework is utilized by categorizing various identified factors into these categories to gain an overview of the organization's internal and external environment. In this manner, the organization can further develop strategies and objectives based on the mapped situation.

Figure 3:Showing Strengths, Weaknesses, Opportunities and Threats in a SWOT analysis table (2023)

1. 2.2.1 The Advantages and Limitations of SWOT Analysis

The advantage of SWOT analysis lies in its simplicity, cost-effectiveness, and ability to provide a holistic perspective by combining internal and external factors. Consequently, the method is easily accessible and adaptable for a wide range of organizational levels and individuals, thereby stimulating discussion and idea formulation at a universal level.

However, some limitations are identified with the SWOT model. There is a significant risk of subjectivity in shaping the environmental factors. The individuals and/or organizations identifying the elements to be included in the four categories may influence what should be included, potentially resulting in an analysis that is not realistically anchored.

While SWOT analysis provides an overview of essential factors, it does not include an action plan in the model. Therefore, a concrete action plan needs to be developed separately.

Despite these drawbacks, SWOT analysis remains a highly useful tool for gaining an overview of an organization's position, development potential, and limitations. However, it may be advantageous to utilize other complementary tools and methods in the planning process to develop tools and methods for the success of the business.

6. 2.3 Contingency Theory

Contingency theory is a situational theory suggesting that organizations need to adapt their structures and systems in response to the changing environment (Rimmel, G, Jonäll, K. Accounting Theories).

1. 2.3.1 Main Characteristics of Contingency Theory

Donaldson (2001) claims several variations within contingency research, where studies focus on different organizational management and control systems within the theory. However, it is argued that there are three main characteristics within

contingency theory that are common and included in various research areas belonging to the theory (Donaldson, 2001).

2. 2.3.2 Environmental Factors

The adaptability of organizations to environmental factors relates to the design of the management and control system within the organization (Rimmel, G, Jonäll, K. Accounting Theories). The factors influencing an organization's environment are numerous, and it is therefore common to divide these factors into general environment and specific environment (Eriksson-Zetterquist et al. 2020). Research often focuses on the latter environment as specific factors have a more direct and unique impact on organizations. Environmental factors that directly influence an organization's structure include the environment's technology, market structure, the organization's competitors, financing, as well as uncertainty and complexity (Rimmel, G, Jonäll, K. Accounting Theories).

During the 1970s, interest in the theory grew further, with a focus on influencing factors related to the specific environment for organizations (Rimmel, G, Jonäll, K. Accounting Theories). This was originally carried out with a focus on accounting, which has been studied more extensively in recent times, contributing to the establishment of environmental factors as a main characteristic within all research areas of the theory (Rimmel, G, Jonäll, K. Accounting Theories).

3. 2.3.3 Management and Control Systems

An organization's management and control systems encompass the implementation of tasks and responsibilities within the organization. How the organization is managed and what type of leadership it should consist of is influenced by the aforementioned environmental factors (Rimmel, G, Jonäll, K. Accounting Theories). Research that has dealt with the relationship between an organization's structure and its environmental factors has included areas such as an organization's centralization, standardization, differentiation, and coordination (Vroom 2000).

4. 2.3.4 Consistency

The third common perspective influencing all research areas within Contingency theory is consistency. Consistency is the cornerstone of the theory and clarifies the relationship between the organization's adaptability and the resulting effectiveness (Eriksson-Zetterquist et al. 2020). Thus, organizational environmental factors affect its management and control systems, which in turn affect the organization's effectiveness. Consequently, the concept of efficiency is used as a result of the

function of environmental factors and organizational structure, becoming a measure of organizational consistency (Eriksson-Zetterquist et al. 2020).

7. 2.4 Institutional Theory

In 1970, what is now referred to as new institutionalism developed as a critique of previously established theories, which included the rational and conscious view of individuals and organizations (Eriksson-Zetterquist et al. 2020).

Sociology researchers such as Paul DiMaggio and Walter Powel, as well as economist Oliver Williamson, emphasized how formal and informal institutions shape individuals' behavior and structures, which in turn affect how organizations adapt to the institutional environmental factors prevailing. In their article "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields" from 1983, DiMaggio and Powell describe how organizations adapt in pursuit of legitimacy. In the article, concepts such as organizational fields and institutional isomorphism were introduced to describe this tendency (Eriksson-Zetterquist et al. 2020) .

1. 2.4.1 Organizational Fields

> Those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products. (D. Maggio et al, 1983)

DiMaggio and Powell included the organizational field in their research and analysis when describing the organization's complex networks that share similar structures, norms, and values within a certain industry. Organizational fields thus describe the market and environment in which organizations operate, including competitors, partners, and various interactions with the organization's stakeholders (Eriksson-Zetterquist et al. 2020).

2. 2.4.2 Isomorphism

Isomorphism is a phenomenon that describes how organizations within the same industry or sector tend to mimic each other over time (G, Rimmel et al, 2018). Organizations adapt to the institutional rules and norms prevailing in the industry, thereby contributing to this tendency (Eriksson-Zetterquist et al. 2020).

8. 2.5 Theoretical synthesis

A theoretical synthesis aims to provide a further analysis and nuanced perspectives on the applied theories regarding the research questions concerning the operationalization of adaptation strategies for climate change in agriculture.

The framework SWOT enables for a significant assessment of the internal strengths and weaknesses, as well as external opportunities and threats encompassing the organization. These factors can subsequently be utilized to analyze strategies for adapting to Climate change in the path to a financially resilient agricultural production. Moreover, SWOT aids to categorize the determinants of the strengths, weaknesses, threats and opportunities, which furthermore, provides an extensive understanding of the implementation of CAP and *"New strategy on Adaptation to Climate change"*(European Union, 2024) .

The contingency theory emphasizes the importance of adaptation, implementing the most effective management practices depending on environmental factors. Regarding agricultural policies, Contingency theory establishes the essentiality for strategies and framework including CAP and the *"New strategy on Adaptation to Climate change"* (European Union, 2024) for adapting in response to the fluctuating challenges posed by climate change.

Furthermore, the Paris Agreement displays the substantial influence climate changes possess concerning agricultural production (European Commission, 2024), including adaptive measures and the significance of aligning with the evolving conditions in the environment. From a perspective of contingency theory, this establishes the importance of adaptation in regards to the field of agriculture.

Additionally, Institutional theory displays how formal and informal norms formed by institutions influence the behavior of organizations and their structures (Eriksson-Zetterquist et al. 2020). The comforming of norms to acquire legitimacy and financial stability is essential to acknowledge when analyzing agricultural adaptation and the producers' decision-making adhering to the implementation of strategies (Eriksson-Zetterquist et al. 2020). In reference to agricultural adaptation of climate change, Institutional theory can be utilized to emphasize the influence of established policies including CAP and EU's strategy relating to financial resilience. To see to what extent these strategies have been implemented, and an enhanced comprehension of the institutional structures and mechanisms embedded within these policies will be possible.

3. Method

The aim of the chapter is to provide an overview of the justification of the chosen research method, including the process of a literature review and data collection. The chapter presents a discussion of the credibility and authenticity of the research. Moreover, ethical considerations are examined, followed by a critical reflection that concludes this chapter.

9. 3.1 Qualitative Methodology

The research will utilize a qualitative methodology. This chosen methodology is a conventional approach in the field of business economics. By employing an inductive approach, qualitative methodology entails the accumulation of empirical data to subsequently formulate theories based on the obtained information (Bryman & Bell, 2017). The methodology encompasses the collection of data, primarily through methods including interviews, enabling researchers to gain insightful perspectives and thoroughly explore the experience and perceptions of individuals. This process therefore allows for comprehensive and nuanced exploration of various aspects of human behavior and phenomena within the research context (Bryman & Bell, 2017). The choice of qualitative methodology is based on the study's objectives and research questions, which primarily focus on decision-making processes and participant perception concerning circumstances concerning climate change and the suggested strategies regarding agricultural production.

The primary empirical basis for addressing the research objectives are the conducted interviews. The research inquiries are significantly dependent on the responses gathered from participants during these interviews, and therefore, they hold a substantial influence in shaping the research outcomes. Furthermore, the research has intentionally implemented semi-structured interviews. These interviews are characterized by their incorporation of predetermined questions aimed at accumulating detailed insights and perspectives from the participants (Bryman & Bell, 2017). Moreover, it is of importance to establish that the researcher made a deliberate decision to implement predetermined questions in the semi-structured interviews. This intentional choice amplifies the researcher´s intention to assure systematic and thorough investigation of the topic researched. The research aims, through this approach, to collect nuanced observations and perspectives that contribute to a furthering comprehension of the investigated research area. Participants are offered the opportunity to adapt the questions according to their responses. This enables flexibility within the interview process (Bryman & Bell, 2017). Consequently, a semi-structured interview resembles an

informal conversation that centers around a specific field of study, creating a relaxed atmosphere that promotes comfort for both participants and researcher (Bryman & Bell, 2015).

10. 3.2 Literature review

A research conducted in 2011 (E. Olesen et al, 2011) examined how human activities would result in substantial increases in temperature, and additionally, unpredictable weather patterns in Europe. Consequently, it was concluded that these effects on weather and temperature would result in water shortages in agricultural production. The research explained how events such as drought, storms and heat would become more frequent. Furthermore, the study showed that agricultural ecosystems and the quantity of crop productions would change. This would in turn lead to an effect on the economic aspects of agricultural production. As a conclusion, the research provided examples of how future research could further investigate the impacts of climate change on the agricultural sector. These suggestions would include possibilities to take advantage of climate change effects in various ways such as development in crop species, fertilization and drainage and irrigation systems.

Another research conducted in 2013 (S, Shresta, 2013) investigated the medium term economic impact of climate changes in agriculture within the European Union. However, this research resulted in the observation of increased yields and production levels in the EU. It argued that the effects of climate change on agricultural production were minor, and if effects were observed, it was mostly favorable for the production. However, the research highlighted that regional levels within the EU observed stronger effects of climate change in agriculture. Examples within the Central and Northern part of the EU were brought to light.

A more recent research from 2023 (J, Hrsitov, 2023) examined how climate change impacts the agricultural markets in the EU. The results of the research were that the negative impacts of climate change in agriculture could be balanced by various market and trade adjustments. The research focused primarily on the market dynamics regarding these challenges, and highlighted that regions outside of the EU would experience larger economical difficulties due to climate change. The authors brought forth that an increase in exports from the EU would possibly happen due to climate change, and this was observed as a financial benefit.

11. 3.3 Assembling of empirical data

The selection of respondents was based on their competence and expertise regarding the subject of the essay. To accurately reach the aim of the essay, the author therefore selected individuals holding a position of a manager in Lantmännen. To provide an extensive assortment of various perspectives, the individuals possess expertise in different areas including Swedish crop farming, nutrition policy and strategy. Table 2 presents the designated respondents names, their position in Lantmännen and the format for their interview.

Table 2. Compilation of respondents. Source: own compilation

Respondent	Position	Date of interview
Pär Dahlström	Regionchef servicemarknad Syd, Lantmännen	17/05 kl 09:00
Mikael Jeppson	Spannmålschef, Lantmännen	17/05 kl 10:00
Patrik Myrelid	Strategichef, Lantmännen	21/05 kl 08:30
Alarik Sandrup	Näringspolitisk chef, Lantmännen	21/05 kl 10:00

Pär Dahlström is the regional manager for the service market, mainly responsible for the southern area of Sweden. This position entails an essential role in the management team through supporting and mentoring business relationships pivotal to the Company's overall development.
Mikael Jeppson, the cereal manager at Lantmännen, holds the responsibility of overseeing and optimizing aspects encompassing business and price strategies, sales and logistics to contribute to Lantmännens financial development within the grain sector. Patrik Myrelid serves as the manager of strategy at Lantmännen. His tasks include developing and implementing strategies for the company's overall financial growth.
Lastly, Alarik Sandrup, the nutrition policy manager at Lantmännen possesses the role of collaborating with stakeholders to implement development strategies and government policies to ensure an economical sustainable food production.

These individuals represent various roles in Lantmännen, each contributing with their expertise to understand the potential financial impacts climate change possesses on Sweden's agriculture. The varied roles, as stated, enables the possibility for a broader perspective on the subject.

1. 3.3.1 Nr of respondents

According to Bryman & Bell (2017), the number of respondents should be in accordance with the thesis´s purpose. The purpose of this thesis is to contribute to the knowledge of the financial impact of climate change, and how strategies to adapt to climate change are being executed. The number of respondents are four, to which the author determines is sufficient in order to reach the purpose of the thesis. A deeper understanding will be available by examining the attitudes and decisionmaking created by the market conditions. The selected respondent possesses extensive knowledge and various perspectives on the matter.

The concept of a saturation point in qualitative research refers to the number of conducted interviews the author provides for the thesis (Bryman & Bell 2013). The saturation point occurs when a sufficient amount of data has been collected in order to draw accurate conclusions. Exceeding the saturation point pertains to the idea that further interviews will not result in a deeper understanding of different insights (Bryman & Bell 2017). For the purpose of this research, a saturation point according to the author, has not been reached since the author considers more interviews to be advantageous. However, the author concludes an adequate amount of knowledge and understanding obtained to answer the thesis´s purpose and further research questions.

Furthermore, to complete a comprehensive understanding of the objectives, it is essential to utilize various sources and conduct interviews. This strategy is referred to as the Triangulation method and serves as an indication to test the validity of the research (Bryman & Bell, 2017). The Triangulation method has been used by the author during the completion of the research by using a multitude of respondents (Bryman & Bell, 2017). Supposing an author only utilizes one or two conducted interviews regarding the thesis, there is a risk of the thesis being biased (Bryman & Bell, 2013). This is due to the risk of the few respondents either contradicting each other, or additionally, conforming to the same perspective or opinion. By collecting answers and perspectives of four different respondents, a majority of similar answers will be possible, making it more manageable to conduct and analyze the conclusions.

2. 3.3.2 Snowball sampling

Snowball sampling is a method utilized when collecting data. Applying this method entails the collection of data by contacting individuals relevant to the thesis (Bryman & Bell 2017). Moreover, the contacted individuals may potentially introduce the author to additional respondents that could be of interest for the objectives of the research. Snowball Sampling is commonly used when conducting qualitative research, thus, it has also been applied in this research. A primary advantage with this method is the increased likelihood of initiating contact with desirable candidates when referring to previous contact with individuals within the organization.

There exists a pertaining limitation regarding this method (Bryman & Bell 2017). There is an increased risk of sample bias and margin of error with Snowball sampling. This is due to the fact that there is no randomized selection of respondents (Bryman & Bell, 2017). As previously mentioned, the contacted individuals provide contact information to further potential participants. As a consequence of this, there is an increased likelihood that participants refer to other individuals holding similar perspectives or thoughts on various matters. Evidently, the selected participants for the research may not fully represent the whole population. Nevertheless, the author preferred this method since the aim for this thesis is to investigate the attitudes, knowledge and communication regarding adaptation strategies within Lantmännen. Therefore, there exists an underlying interest in conducting interviews primarily from the chosen organization. Moreover, to further mitigate the risks regarding this method, managers and experts within different areas were selected from the organization. This results in a collection of different and unique perspectives and contributions.

12. 3.4 Authenticity and credibility

For assessing the quality of a qualitative essay, two fundamental criteria are used (Bryman & Bell, 2013). Authenticity is utilized to evaluate the accuracy in which the respondents statements have been portrayed regarding the objective of the study. To ensure the fulfillment of this criteria, the author conducted a respondent validation. This provides the opportunity for the respondents to observe and evaluate the collected material to more accurately reflect their responses (Z, Hoque, 2017).

Credibility encompasses the assessment of how the study's conclusions properly reflect the participant´s perspectives and experiences investigated. The intent is to

guarantee study embracing an objectively grounded conclusion based on the participant's responses. Credibility is divided into four categories: reliability, transferability, dependability and confirmability (Bryman & Bell 2017).
Reliability refers to the author's ability to follow predetermined guidelines regarding qualitative studies, and thus, confirming an accurate representation of legitimate circumstances (Z, Hoque, 2017). A respondent validation serves as a mechanism to ensure an opportunity for the participants to confirm the collected data, hence increasing the reliability (Bryman & Bell, 2013). Transferability is a criteria evaluating to which extent the study's conclusions can be implemented in alternative contexts (Bryman & Bell 2017). By providing a detailed description of the potential financial effects of climate change in Sweden's agriculture, there is an increased probability that the results can be applied in a broader context. Dependability and reliability is linked with one another and measures to what extent the research could be repeated by a randomized researcher and still provide the same conclusions. The author ensures this by providing a detailed methodology in collecting and objectively analyzing the respondents' answers. Lastly, confirmability entails producing the conclusions of the research in an objective manner. The author attains this criteria throughout the formation, collection and analysis of the data.

13. 3.5 Ethical consideration

It is paramount when conducting research to incorporate ethical considerations throughout the process. This is of importance for the purpose of ensuring the protection of the participant’s rights, integrity and privacy (Bryman & Bell, 2017). Moreover, in qualitative research, it is essential for the researcher to acknowledge and adhere to these ethical principles by encompassing critical requirements among which are information disclosure consent, confidentiality and anonymity, data usage, and avoidance of false pretenses (Bryman & Bell, 2017). The requirement pertaining to information disclosure entails a transparent communication with participants (Z, Hoque, 2017). It is necessary for the researcher to describe the procedures and the purpose of the research itself, including potential risks and benefits of the study (Bryman & Bell, 2013). Consent encompasses the criteria to which the participants are informed regarding their voluntary participation and contribution to the research. Moreover, the participant’s should be informed about their consent to their involvement, including their right to anonymity and the ability to, at any point in the research, withdraw their involvement. Defending and upholding confidentiality and anonymity throughout the research ensures the privacy of the participants, and prevents disclosure of sensitive information and their identities (Bryman & Bell, 2013). The achievement of this criteria fosters confidence in the researcher, encouraging transparent responses.

The data usage requirement emphasizes the researcher's ethical responsibility regarding the management of the research data (Z, Hoque, 2017). The collected information must exclusively be utilized for the purpose of the research specified in the research protocol. This aims for respect in regards to the participants contribution and privacy rights. Furthermore, for maintaining principles concerning honesty and transparency, it is essential for the researcher to refrain from applying deceptive information or misinterpretation to recruit participants (Bryman & Bell, 2013).

3.6 Critical reflection

When producing a qualitative research study, there is an underlying risk of the author's personal opinions influencing the collection of empirical material (Bryman & Bell, 2017). The conclusions drawn from the research may contain a biased tone, especially in a case where the study is limited to a specific area where only certain aspects and perspectives are highlighted. It is the author that produces the research, encompassing the research´s objectives, empirical collection and the interpretation of the gathered material. Evidently, this can pose an effect on the study´s transferability (Bryman & Bell, 2013). The author is well aware of these potential risks when executing a qualitative research, while also acknowledging the overall potential risks regarding all research. Research is seldom entirely objective since all researchers possess their own set of individualistic experiences, knowledge and opinions (Bryman & Bell, 2017). It is thereby essential for the author to have an overall understanding of these factors when shaping the research area, theoretical framework, theories and approach to respondents.

The interviews were conducted digitally to enhance the ability to gather valuable insights from respondents in various geographical areas. This gives the author the opportunity to collect empirical data from carefully selected respondents with the competence required for formulating accurate conclusions. However, digitally conducted interviews pose a risk of dismissing essential details that can easily be perceived when conducting an interview in practical terms. Although, the conducted interviews were conducted via Zoom which allowed the author and respondent to see each other.

2. 4. Empiri

This chapter aims to present the empirical material collected from the conducted interviews. The chapter will first address this material in text, and later on, in SWOT analysis.

4.1 Answers from respondents

1. Do you experience that Sweden's food production has been affected by climate change? If yes, in what ways?

Several respondents had perceived that a part of the unusual weather patterns observed during the last 10 years could be attributed to climate change. These variations in weather were suggested to be an interplay between long term climate shifts combined with natural weather fluctuations.

However, other respondents highlighted more difficulty in distinguishing whether the observed weather and temperature shifts were a cause of climate change. Moreover, they pointed out that there had occurred significant discussions about the increased weather variations over the past eight years. Regardless, some respondents argued that there is yet no proof of these variations being the reason for climate change.

The respondents that were more open to the idea of the impacts of climate change in Sweden's agriculture, referenced to data from the Swedish Meteorological and Hydrological Institute. The respondents explained that SMHI presents numerous observable effects of climate change, including colder and warmer periods, along with drought and an increase in precipitation. These respondents acknowledged that the harvest indeed had been affected by these larger weather variations. Practical examples of the variations in harvest as an effect of climate change were the year 2018, 2021 and 2023.

Most of the respondents recognize that weather fluctuations have become more frequent and increased in range. They declared the harvest in 2018 to have been

halved and also described the year 2023 as a both quantitatively and qualitatively challenging year, even more alarming than 2018.

Additionally, the respondents also remarked upon the overall climate change that has been presented over time. It was mentioned that crops that were previously unsuitable for cultivation in some regions, such as autumn crops, are now being successfully grown in southern Norrland. It was pointed out that this is not necessarily a negative effect of climate change. However, the respondents were all aligned with the perception that there had been an increased unpredictability that accompanies these perceived changes. One respondent believed that this unpredictability would therefore possibly result in an emergence of new pests and fungi, which would additionally pose challenges to the agricultural production.

2. Compared to the year 2022, 2023 was a significantly poorer year in terms of agricultural productivity. Do you believe this is the result of climate change?

Respondents, as stated previously, provided different perspectives to the years 2022 and 2023 regarding productivity due to climate change. Some respondents did not attribute the unusual extreme weather seen in 2023 to climate change. Other respondents, however, highlighted the effects of climate change and its connection to the year 2023 in Sweden. When asked this question regarding the comparison between year 2023, and the year prior, all respondents included references of the year 2018. All respondents explained how the year 2018 resulted in a small produced harvest, although it had a high quality. This was compared to the year 2023, which according to the respondents, not only resulted in a reduced quantity, but a deficiency in quality as well. The results in production from 2018 were connected to drought, whilst 2023 were affected by both drought in the early season, followed by heavy precipitation during the harvest. Some of these respondents emphasized that both of these years were effects of climate change, and highlighted 2023 as significantly worse, meaning that effects of climate change are possibly aggravated.

Additionally, regardless of the respondents views on the specific term “climate change”, they all directed attention to expectations regarding an increase of extreme weather patterns in Sweden. The respondents had perceived a larger variation of extreme weather during an 8 year period, and therefore, predicted longer periods of drought and excessive precipitation periods, including prolonged heat- and cold periods.

3. From a financial perspective, how do you think the agricultural production will be affected due to climate change in 5 respectively 20 years?

The respondent brought attention to their concern regarding market volatility as a result of climate change. The primary threat that is highlighted is the possible inability to sell failed harvests. The respondents moreover emphasized the previously mentioned weather patterns, and their increase in intensity. To combat these extreme weathers such as drought, investments in irrigation systems were a common opinion. The respondents clarified that the expenditures on irrigation infrastructure would evidently increase, but the necessity of this was accentuated. Additionally, some respondents noted that farmers not capable of investing in irrigation systems, were expected to experience an overall decline in crop quality over time, due to climate change. This would undoubtedly result in a further financial decline, according to some respondents.

The respondents further underscored the importance of conducting research to achieve a more detailed understanding of the observed weather variations in Sweden. One of the respondents argued that a harvest achieving only 60% of a normal harvest, or producing a normal amount but with a lower quality, would result in effects on the entire food supply chain. This would consequently, according to the respondent, affect farmers and consumers on the market, leading to market volatility that has been mentioned previously. The respondents demonstrated this argument by the example of the year 2018, when prices increased due to a significantly decreased harvest.

Aside from investing in irrigation systems, the respondents called attention to additional investments in response to these external changes. The investments that would be necessary both in 5 years and 20 years were regarding harvest and drainage systems including ditches and pipelines. This is evidently crucial to manage excess water caused from climate change.

4. Do you think that climate change will lead to unforeseen costs in agriculture? If yes, what could those be?"

The respondents discussed various possible unforeseen costs due to climate change. The challenges that were mainly discussed were, as noted earlier, extreme weather events, operational expenses and additionally, crop yields. Overall, the respondents once again, emphasized the need for investments regarding previously mentioned systems. Moreover, one respondent perceived a need for improved financial support mechanisms including insurance policies to safeguard farmers against potential productivity losses due to climate change. He argued that an improvement in this

area would result in farmers becoming more secure, increasing the motive for continuing agricultural production. However, another respondent argued that the resources would not be placed favorably in that area. He instead argued that the insurance for farmers would need an extensive amount of capital. A superior approach according to one of the respondents were investments in adapting strategies and long-term economic sustainability of agriculture.

5. Do you at Lantmännen perceive that CAP communicates new adaptation strategies for agriculture to counteract the financial impact of climate change?

It was noted that the budget for CAP includes the prior mentioned investment support, and insurance support. However, it was a common perception that the existing support is limited and highly competitive. Additionally, some respondents unpacked the various areas that had been at focus during the recent CAP periods. These included an emphasis on balancing agricultural production with biodiversity. It was agreed upon that in the upcoming CAP period, a focus on climate adaptation would be more prominent.

Agriculture is frequently discussed regarding climate change, as the sector is most affected by climate changes. Nonetheless, CAP has not yet been able to fully communicate the new adaptation strategies for agriculture to counteract the financial impact of climate change. It has accordingly been an insufficient focus on climate adaptation within CAP. A greater emphasis had been placed on climate transformation, including how agricultural production must decrease their effects on climate. Furthermore, it was highlighted that CAP essentially should connect adaptation to climate transformation, stating that neither of these areas should be neglected.

6. Do you consider the EU's directives regarding adaptation strategies for climate change in agriculture to be clear enough? If not, how can this be improved?

Furthermore, EU´s other directives regarding adaptation strategies for climate change were discussed among the respondents. Most respondents, as with CAP, expressed concerns regarding the effectiveness of current measures. The EU has not yet been successful in communicating the new strategies encompassing climate change which accentuates the discrepancy between the urgency of climate adaptation and practical implementation.

An uncertainty and confusion has been widely expressed regarding adaptation strategies. One clear example of confusion regarding EU related to sustainable strategies in agricultural production was Glyphosate. Glyphosate is a pesticide used in agricultural production that underwent discussion for stopping the use of this.

However, a recent decision communicated that allowance of usage of the pesticide would be further allowed. This example demonstrated an indication of lack of clarity in policy directives within the EU.

It is essential for the EU to further communicate and clarify the motives of the directives, along with clear implementation strategies to address the challenges posed by climate change in agriculture. There exists an overall concern regarding the effectiveness of the directives expressed by the EU. Although this uncertainty, a high interest in the EU and its directives is observed. The communication is recognized as insufficient and there is a desire for more guidance encompassing this area.

7.What do you think Lantmännen contributes to maintaining financial stability within food production?

Lantmännens efforts for maintaining financial stability within food production was highly emphasized. Actions including the negotiation of favorable deals with farmers were widely discussed. These deals ensure competitive prices and quality inputs according to the respondents. Moreover, a return on investment, primarily through CAP, was highlighted as one action crucial for investing in infrastructure including drainage systems.

Lantmännen was described as an organization focused primarily on the profitability and preparedness within Sweden's agriculture, emphasizing on the essentiality of long-term solutions and strategies to uphold economic resilience. All respondents described Lantmännens various missions, including optimizing returns for farmer members, and an overall strengthening of agricultural production through communication across the nation.

Additionally, a significant portion of Lantmännens contribution to a financially stable agriculture were efforts placed in investments in research and development. Research is conducted in various areas regarding productivity such as crop improvement, precision farming and other value-added processing. Evidently, Lantmännen regards this area as one of their biggest contributions to a financially stable Swedish agriculture.
Another essential contribution widely discussed are a general consultation in cultivation, an efficient product management, and additionally, a diverse set of selling options provided.

8. Do you experience that Lantmännen has developed initiatives or projects to address the financial effects of climate change within agriculture?

A common theme were initiatives and projects regarding sustainability and climate friendly farming practices. Lantmännen has throughout the years developed various methods regarding production with the aim of reducing the climate footprint. An initiative often brought up is the " Climate and Nature" project. This project began in 2015 and has significantly expanded since. The method involves fossil free fertilizers agricultural production. Furthermore, it includes spray-free zones, and an overall focus on biodiversity. Examples of products made via this initiative are Polarbröd, Havre AXA and the beer Spendrups.

When further asked, the respondents from Lantmännen provided various insights regarding initiatives for reducing climate footprint. However, no further insights were presented regarding adaptation strategies against the effects of climate change. CAP has, as earlier indicated, prioritized sustainable farming practices amongst the member parties. Although most connect sustainable farming practices along with climate adaptation strategies, there is evidently a broader focus on the first mentioned.

Nonetheless, Lantmännen´s efforts to create an extensive support system for their members were emphasized. This would be possible by seeking support through CAP firsthand. Lantmännens financial strategy is to maintain and multiply projects encompassing drainage systems, irrigation systems and an overall focus on further development and research regarding crop-cultivation.

Moreover, other insights further encompassing projects regarding maintaining a sustainable farming practice were presented. One respondent mentioned a collaboration with an organization called "Power to Earth" and fertilizer manufacturers. This is a project aimed to develop a large-scale fertilizer industry in Norrbotten Sweden. This fertilizer would be completely powered by fossil-free electricity. This 20 billion SEK investment aims to operate by 2028 which will furthermore create a large amount of jobs. The respondent argued that this initiative is closely aligned with an overall sustainable agriculture, and contributes to a financial stability in agricultural production.

Other projects regarding renewable diesel and the use of biodiesel on operations are further explored. The overall projects and initiatives implemented in the moment, are directly related to sustainable agricultural production. However, these projects are described as investments and support mechanisms aimed at also provisioning financial stable practices.

<u>9. What do you believe pose room for improvement within Lantmännen regarding the ability to maintain financial stability regarding climate change effects?</u>

The consistent theme in reference to improvement within Lantmännen is adaptive strategies, and the implementations of these. There is a common agreement that Lantmännen not only finds it necessary to develop a sustainable economy concerning the effects agricultural production poses on climate change. Furthermore, there is also an emphasis on the importance of implementing practices aiming for the adaptation of the perceived climate changes, and, moreover, expected climate changes in the future.

There were several suggestions to this adaptation among Lantmännen, including increase in production efficiency, fertilizer application, risk management and the importance of advocacy.

The increase in production efficiency would result in a lower carbon footprint per hectare of produce. This project would involve a diverse set of management encompassing areas such as measurement, diesel usage and data of cultivation. This project enables Lantmännen to present robust climate-friendly practices, which would contribute to the remaining competitiveness in the market. As a consequence of this, Lanmännen would have more capital to invest into further practices aimed for adaptation.

Another standpoint was the recognition for an improved risk management within Lanmännen´s portfolio. Due to the now heightened risk levels as an effect of unpredictable weather patterns, a more sophisticated approach regarding the portfolio is necessary. This would include ensuring a reasonable solvency while addressing the direct impact on agricultural production and the producers. Two of the respondents further brought to light the practical challenges in managing these risks due to climate change. Selling unsecured harvest has been observed in a downward trend, and with the absence of comprehensive crop insurance, the producers experience insecurity. The corresponding respondents therefore underscored a need for enhanced risk mitigation measures.

Initiatives for developing numerous climate-change adaptations are needed. Another highlighted subject is research in the adaptation of market needs. To quickly adapt to the market was a priority within the answers. This would evidently ensure a more stable market, and additionally a more financial stability within agricultural production regarding climate change.

The mentioned practices and propositions regarding improvement within Lantmännen can all be linked to financial resilience in agricultural production, according to the respondents. The movement beyond short-term solutions would ensure a favorable transition. Examples involved engaging and motivating producers to adapt. Lantmännen can contribute to this by shifting crop varieties in

response to climate variations. One respondent explicitly brought to light the change in areas in which specific crops could grow.

4.2 SWOT analysis

A SWOT analysis has been made to further present Lantmännens position regarding adaptation practices to climate change effects. Therefore, when conducting the interviews, the respondents were asked about the areas included in the SWOT analysis (Strengths, Weaknesses, Possibilities and threats).

Table 3: SWOT analysis presenting empirical data collection, Source: authors illustration.

Strengths	**Weaknesses**
- Negotiation of favorable for competitive prices and quality. - Investments in infrastructure, including drainage systems. - Optimizes returns for member farmers. - Strengthens agricultural production through national communication. - Invests in research and development, including precision farming.	- Uncertainty regarding the impact of climate change - Divergent views on the role of climate change - Focus on some short-term solutions
Possibilities	**Threats**
- Adaptive strategies for a sustainable economy. - Increased production efficiency. - Improved risk management. - Research and innovation. - Rapid market adaptation. - Comprehensive crop insurance. - Adjustment of crop varieties	- Increased unpredictability in weather patterns - Significant reductions in production - Increased incidence of pests and diseases - Quality issues in the harvest

Respondents were directly asked about their perception regarding the strengths, weaknesses, possibilities, and threats concerning financial effects and adaptation to climate change.

The organization appears to possess strengths in supporting farmers in various areas. Lantmännen strives to negotiate favorable prices and quality levels that are competitive. Amongst other objectives, this ensures the optimizing of returns to its farmer members. Moreover, the significant investments in research and development is an asset within Lantmännen. The research is currently focused on precision farming and other attempts to advance in the agricultural technological field.

However, there are some weaknesses discussed regarding the uncertainty concerning weather changes and to what extent these could be linked to climate change. This divided perspective on climate change has created ambivalence and disagreements on strategies and decision making. Additionally, some respondents mentioned that there is tendency in some areas to only focus on short term solutions, which could result in unfavorable consequences.

Regardless of the circumstances discussed above, Lantmännens shows a range of possible opportunities in which the respondents clarified they are highly motivated. Lantmännen takes weather changes affecting the production seriously. Therefore, there are numerous adaptive strategies being revised and reworked for the purpose of a sustainable economy within agricultural production. Respondents also signaled a higher risk management view, with further potential in investment in drainage and irrigation systems.

The most concerning threat Lantmännen is faced with are the rapid weather changes. All respondents highlighted the issue with a significant production decrease during unpredictable weather. In recent years, the weather pattern has been, as demonstrated, more unpredictable. Lantmännen has therefore already seen the economical consequences of decreased harvests, or low-quality harvest. Moreover, new pests and diseases could further complicate agricultural production.

3. 5. Analysis and discussion

The focus of this chapter is analysis and discussion regarding the collected data, combined with the theoretical framework of the research that was presented in chapter 2. The analysis and discussion is the basis for the formation of the conclusion.

5.1 Contingency theory and adaptations to climate change

1. 5.1.1 Environmental Uncertainty and Adaptation Strategies

The increasingly erratic weather patterns attributed to climate change poses a heightened uncertainty in the production. Contingencies concerning climate change have therefore increased significantly, creating new areas of discussion. When organizations address uncertainty and unexpected conditions, it is possible to formulate an effectiveness and flexible adaptation strategy. The information provided regarding recent adaptation strategies include multifaceted approaches for mitigating the risks with extreme weather events. Irrigation and drainage systems seem to be a priority after the observed increased precipitation patterns, especially after 2023. Moreover, these adaptations should be aligned with broader policies such as CAP and the New EU strategy on adaptation to climate change. However, it is evident that the new EU strategy along with CAP has not yet been fully communicated to Lantmännen. It is perceived that these strategies adhering to financial effects of climate change are fairly new. It is therefore apparent that these novel strategies require an extended timeframe and thorough implementation to observe their practical application and effectiveness.

As covered in the theory chapter, there are three main characteristics within contingency theory that, according to Donaldson, 2001, define how well an organization can adapt. These are environmental factors, management and control systems, and consistency.

2. 5.1.2 Environmental factors

when an organization has analyzed the situation, it is possible to create a vision along with strategies and risk management. For Swedish agriculture, the respondents placed an emphasis on factors including technological advancements, market structure, competitive dynamics and the uncertainties introduced by climate change. The environmental factors impacting Swedish agriculture are mainly three. The increasing frequency of extreme and unpredictable weather events, technological implementations for irrigation and drainage systems, along with inconsistent crop yields impacting market volatility.

As stated previously, there are divided perspectives within Lantmännen as to what type of unpredictable weather conditions you can connect with climate change. However, the respondents are fully aware of the various contingencies affecting Swedish agriculture and its production. And although there are divided opinions on what defines climate change, there is a common perception that Lantmännen has to evolve and adapt to these new environmental factors. This fact, along with the emergence of new EU strategies concerning this objective, signals an accelerating development.

Moreover, it is evident that Lantmännen has prioritized development regarding the consequences agricultural production poses on climate change. As respondents mentioned, Lantmännen performs various projects and initiatives to reduce their climate footprint. These projects arose due to analyzing environmental factors. Respondents highlighted these initiatives and argued that a complement to this focus would be the adaptation to the new climate.
Moreover, by embracing adaptive strategies, along with practices that maintain an overall sustainability in agricultural production, Lantmännen will be able to contribute to a financially stable production. Contingency theory is an advocate for tailored strategies. By embracing these changes in climate, Lantmännen can create and implement adaptive strategies tailored to a developing production, which in turn will achieve an effective navigation through uncertainty.

3. 5.1.3 Management and control systems

According to Donaldson (2001), management and control systems are crucial for adaptation to contingencies. It is apparent that the management and control systems within Swedish agriculture must develop further to adapt to these new environmental challenges effectively. The respondents accentuated the need for a centralized and coordinated investment. These investments would be placed in infrastructure, specifically drainage and irrigation systems. Furthermore, the

importance of financial support mechanisms were underscored. These would include insurance policies to a higher extent, to create financial stability for farmers in case of crop failures due to climate change. However, there was a divergence of opinions regarding that specific measure. Some respondents highlighted the importance of prioritizing long-term investments in the previously mentioned drainage and irrigation systems, along with similar initiatives, arguing that a broader insurance policy would be a short-term solution.

Contingency theory emphasizes the pivotal role of a united and clear direction regarding implementation of management and control systems. It is therefore of importance to agree upon the most favorable measures to ensure a developing adaptation. The emphasis on a coordinated investment and support systems reflects that individual farmers may lack resources necessary to adapt independently. By analyzing the respondents suggestions, it is evident that Lantmännen aims for a collective approach to this matter in order to support their members farmers and the production. This response aligns with the principles which advocate for adjusted adaptations to the challenges of climate change.

4. 5.1.4 Consistency

To successfully optimize organizational financial stability, it is vital to obtain a consistency regarding the chosen adaptationstratgeies. Respondents highlighted previously mentioned investments and initiatives, underscoring the importance of starting the implementation now. The consensus on the importance of a continuous adaptation to both drought and excessive precipitation was at focus. Answers from respondents regarding these long-term investments argue for their prioritization on consistency in a long-term perspective for Swedish agricultural production. CAP and emerging strategies from EU are being discussed, although, as mentioned earlier, respondents are still waiting for a clearer communication regarding most effective adaptation strategies regarding the matter.

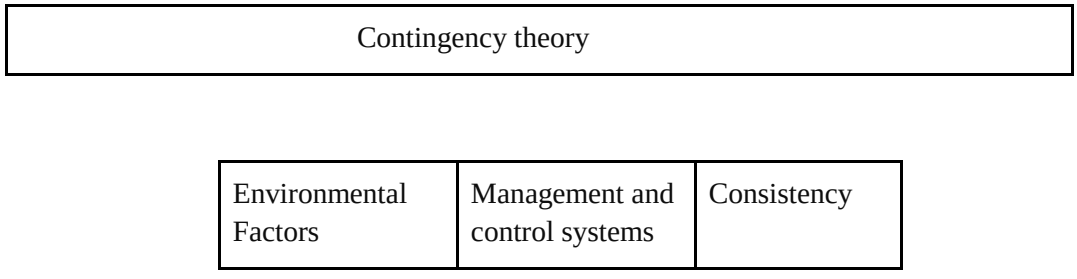

Figure 4: Showing three characteristics of Contingency theory, source: authors illustration.

2. 5.2 Institutional theory and the implementation of adaptation strategies

1. 5.2.1 Perception of CAP´s communication of adaptation strategies

The respondents foremost described that although CAP is a valuable framework, the budget including investment and insurance support has been further limited and are highly competitive. It was also explained that the communication from CAP has under recent periods mainly been focused at balancing agricultural production with biodiversity. However, a nuance of an anticipated shift towards climate adaptation in upcoming periods has been detected. Nonetheless, it is a common perception that CAP, as mentioned multiple times, has not yet successfully communicated or implemented effective climate adaptation strategies yet. The emphasis on reducing agricultural production´s impact on climate has diverted attention from the mitigation of financial impacts of climate change.

The perception of the limited and competitive support systems constitutes a challenge within institutional frameworks. Therefore, there is a possibility that the resource allocation may not align with the most favorable strategies and practices. Institutional theory suggests that organizations seek to obtain legitimacy through adherence to established norms and policies. The respondents answers regarding mixed communication of CAP are furthermore an indication of a gap between institutional directives and practical implementation. Consequently, this poses the risk of uncertainty and ineffective adaptation strategies.

2. 5.2.2 Clarity of EU Directives on Adaptation Strategies

The risk of uncertainty as a consequence of this gap has been evident as respondents expressed concerns regarding clarity and effectiveness of EU directives regarding adaptations to climate change. An established example concerning an overall uncertainty was illustrated by the example of Glyphosate. As explained before, there has been inconsistent communication regarding the use of this pesticide. This, according to respondents, exemplifies a broader issue on unclear policy directives. Regarding the implementations of adaptations to climate change, there was an even broader perceived uncertainty amongst the respondents.

DiMaggio and Powell (1983) describe the concept of isomorphism, where organizations in the same industry mimic one another in the aim of gaming legitimacy. These informal and formal norms that organizations aim to align with shapes the organizations, along with the industry. However, when directives of institutions are inconsistent or unclear, the organizational field poses the risk of fragmentation. Lantmännen, and consequently the farmers might struggle to find a direction of the norms and expectations, creating inconsistency in adaptations. Hence, a clearer communication from the mentioned frameworks are necessary to maintain a financially resilient agriculture.

3. 5.2.3 Impacts of market conditions and attitude findings

Attitudes and market conditions pose a significant impact regarding the producer´s decision making concerning adaptation strategies. The perceived competitiveness of support mechanisms provided by CAP along with the room for improvement regarding clarity of directives contribute to a cautious approach among producers. The respondents described an overall high level of interest in the EU: new strategy. However, the perceived insufficiency in communication has led to hesitation in the overall definition of climate change and the correlating adaptation measures.

In the context of Swedish agriculture, the competitive support mechanisms along with the experienced uncertainty has created an environment where producers are hesitant to fully commit to adaptation strategies. Institutional isomorphism underlines this phenomena where a lack of clear directiveness leads to a variation of approaches and practices. Therefore, in order to implement a more cohesive approach, institutional frameworks such as CAP align with the New EU strategy must provide clear communication.

3. 5.3 Implementation of Adaptation Strategies and Impact of Market Conditions in Agricultural Production

One of the most significant strengths within Lantmännen is its ability to negotiate favorable prices and quality for agricultural products. This is crucial for maintaining the financial stability of agricultural producers. Consequently, this opens possibilities such as ensuring fair returns, and the implementation of adaptation investments. The optimization of returns for the member farmers through efficient resource allocation is crucial for the financial resilience of productions. This creates

further incentives for farmers to reinvest in the production. By ensuring these favorable factors for farmers, and combining this with clear directives from CAP, necessary investments in adaptation strategies can be implemented.

However, there are various weaknesses addressed. Because of the uncertainty regarding specific impacts of climate change and communications from CAP, a delayed action among farmers is present. Additionally, the disagreements regarding the definition and views of climate change create further difficulties with the implementation of adaptation strategies. Consequently, this leads to reduced effectiveness, hindering optimization of economic stability. However, the respondents expressed an interest in long-term solutions which enable possibilities for sustainable adaptation efforts. This prioritizing of strategies can help address underlying effects of climate change that agricultural production suffers from.

Threats that Lantmännen, along with farmers are facing are the increased risk of crop failures. The financial loss derived from this event causes market volatility. The changed weather conditions can also increase the risk of new pests and diseases that pose danger for crops even further. The profitability decreasing will lead to difficulty in maintaining competitive and financial stability.

Despite the weaknesses and threats, there are various opportunities for Lantmännen to adapt to climate change. By adopting appropriate adapting strategies and implementing new technologies and methods, an increased production is possible, regardless of unpredictable changes in weather. Additionally, an enhanced risk management giving opportunities for insurance schemes and diversification of crops are factors that Lantmännen works with, and plans to develop further. These factors pose opportunities to reduce the financial impacts of climate change leading to a sustainable agriculture.

The communication and implementation of adaptation strategies under CAP and the New EU strategy are essential for the maintaining of favorable market conditions and attitudes. The SWOT analysis reveals several strengths and opportunities within Lantmännen. However, weaknesses and threats are also addressed. It is evident that effective communication, clear directives and a focus on long.term strategies are favorable for enhancing a financial stability in the Swedish agriuclutralproduction.

4. 6. Conclusion

This chapter aims to present the conclusions of the research through the research questions. The chapter ends with recommendations for further research.

1. 6.1 Conclusions of the research

The aim with this research was to examine how adaptation strategies for climate change affecting financial aspects of agricultural production are implemented.The research aims to answer the following research questions:

1. How are the adaptation strategies of the Common Agricultural Policy (CAP) along with the New EU Strategy on Adaptation to Climate Change, implemented in practice to enhance the financial stability of agriculture in response to climate change?

2. How do market conditions and attitudes impact producers' decision-making regarding the implementation of adaptation strategies for climate change in agricultural production?

The communication and implementation of adaptation strategies for climate change in agriculture by policy frameworks are critical for ensuring a financially stable Swedish agriculture However, uncertainties concerning climate impacts and communicated adaptation strategies pose challenges for financial sustainability. The institutions need clear understanding of contingencies and directives properly communicated. Furthermore, the divergence in perspectives regarding the impacts of climate change fosters a further uncertainty when receiving unclear derivatives from policy frameworks..

Additionally, market conditions and attitudes correlate significantly to the decision making of implementing adaptation strategies. The limitations of CAP´s budget

leads to competitiveness of support mechanisms which contribute to hesitation among producers. Producers have experienced financial drawbacks affecting market volatility due to climate change. As a consequence of this, Swedish farmers have implemented adaptation strategies themselves. Overall, organizations are in need of institutions to create a production encompassing trends, norms and practices well known. However, this overall uncertainty perceived from the EU is hindering the optimization of effective implementation of adaptation measures.

Lantmännen is a financially stable organization with various strengths. However, the threats climate change poses needs to be analyzed further in order to implement adaptation strategies. The risk of increased market volatility along with increased risk of factors decreasing crop quality further, are factors that need to be handled effectively.

To address these challenges, it is of importance that CAP and the EU strategy is communicated in a clear and direct way. These institutional frameworks, if communicated clearly, can enhance the approach and possibilities for Swedish agriculture. Additionally, a focus on long-term strategies along with investment in research and appropriate infrastructure, will optimize risk management and improve financial stability regardless of climate change.

6.2 Future research

Future studies could explore these areas, potentially comparing implementation of adaptation strategies across other Northern countries within the EU. It would be of interest to examine how impacts of climate change on agricultural production are perceived within Northern countries, as well as how these regions adapt to these challenges. It would also be beneficial to further investigate how CAP and the New EU strategy on adaptation to climate change are communicated in the upcoming years.

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6. Popular science summary

This research describes how climate change poses a financial impact on the agricultural production of Sweden. An example of these effects of climate changes on agricultural production are the year 2018, and 2023. The year 2018 in Sweden entailed a hot summer, which resulted in a small harvest. Additionally, in the year 2023, drought and heavy rain resulted in a small harvest, with a low quality. Consequently, farmers were obligated to sell their harvest to a lower price, which affected their economy. Lantmännen is a cooperative that aims to aid all memeberfarmer in swedish agriculture. This cooperative contributes with investments, research and development in various aspects within the agricultural sector. Lantmännen, as a part of Sweden, has a connection to the EU and their policy frameworks concerning agricultural production. One significant policy framework for agriculture within the EU is The Common Agricultural Policy. Since the emergence of financial effects of climate change, The Common Agricultural Policy has been adapted to communicate efforts in adaptation strategies. This research therefore aims to investigate whether these new reforms has been communicated properly to Lantmännen. Consequently, it is important to see how Lanmännen perceives this information and how they work to help the producers in these challenges.

The results of this research shows that Lantmännen has not fully perceived the new efforts and strategies that are favorable to implement. Furthermore, the research shows that there is a big uncertainty to the question of climate changes and how these challenges are going to be handled. However, Lanmännen as an organization itself, has analyzed the situation regarding the financial effects of climate change, and are in the process of developing strategies for the future.
The research furthermore presents how organizations and institutions are being affected by the environment, and how this, in turn, affects the attitudes of individuals.

Appendix 1

The questions sent out to the respondents are presented below:

2. Compared to the year 2022, 2023 was a significantly poorer year in terms of agricultural productivity. Do you believe this is the result of climate change?

3. From a financial perspective, how do you think the agricultural production will be affected due to climate change in 5 respectively 20 years?

4.Do you think that climate change will lead to unforeseen costs in agriculture? If yes, what could those be?"

5. Do you at Lantmännen perceive that CAP communicates new adaptation strategies for agriculture to counteract the financial impact of climate change?

6. Do you consider the EU's directives regarding adaptation strategies for climate change in agriculture to be clear enough? If not, how can this be improved?

7.What do you think Lantmännen contributes to maintaining financial stability within food production?

8. Do you experience that Lantmännen has developed initiatives or projects to address the financial effects of climate change within agriculture?

9. What do you believe pose room for improvement within Lantmännen regarding the ability to maintain financial stability regarding climate change effects?

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