



Farmers Coping with Market Shock

A multiple case study of Agricultural SMEs

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Degree project/Independent project • 30 credits
Swedish University of Agricultural Sciences, SLU
Faculty of Natural Resources and Agricultural Sciences/Department of Economics
Agricultural Economics and Management - Master's Programme
Degree project/SLU, Department of Economics, 1525 • ISSN 1401-4084
Uppsala 2023



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Credits: 30 credits
Level: Second cycle, A2E
Course Title: Master thesis in Business Administration
Course code: EX0904
Programme/education: Agricultural Economics and Management - Master's Programme
Course coordinating dept: Department of Economics
Place of publication: Uppsala
Year of publication: 2023
Cover picture: Jesse Harder
Copyright: All featured images are used with permission from the copyright owner.
Title of series: Degree project/SLU, Department of Economics
Part number: 1525
ISSN: 1401-4084

Keywords: agriculture, market shock, crop farms, decision-making, risk management, resilience, adaptation, price volatility, coping strategies, Ukraine war, market uncertainty

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Abstract

This research explores how agricultural SMEs are coping with the agricultural market shock mainly caused by Russian-Ukraine war outbreak in February 2022. The research paper is guided by three research questions investigating 1) the impacts of the current market shock on farms, 2) the coping strategies and decisional motivation of farmers, and 3) the planned adaptations and learnings of the farmers. A qualitative research methodology was employed, wherein semi-structured interviews were conducted with conventional crop farmers within a multiple case study design framework. Of the five cases, one farmer who farms in Poland was interviewed, while the other four are located in northern Germany.

Key findings revealed that the farms are mainly affected by price volatility, scarcity and unavailability of goods, and rising machinery prices. To navigate these challenges, farmers employed strategies aimed primarily at ‘securing production’, while other strategies aimed at cushioning price volatility. They stocked up on machinery and essential input goods like plant protection chemicals, diesel, and fertilizers. Other strategies include distributed buying and selling of inputs and produce (‘salami tactics’), contractual agreements and forward pricing, and gaining market transparency through networking or contacting several agricultural traders. Farmers' planned adaptations differ among the study cases. While one of the farms plans on increasing input storage possibilities, others plan to use more ‘salami tactics’, and another case plans on constructing silos and a fermentation residue tank for future use of more organic-based fertilizer.

By investigating farmers' responses to the market shock, this study enriches the discourse on organizational resilience and crisis management. It provides policymakers, crisis management researchers, and agricultural economics researchers with unique insights into risk management and adaptation to sudden exogenous market shocks while setting the stage for future research.

Keywords: agriculture, market shock, crop farms, risk management, resilience, decision-making, adaptation, price volatility, coping strategies, market uncertainty, Ukraine war

Table of contents

List of Tables	7
List of Figures.....	8
Abbreviations	9
1. Introduction	10
1.1 Research Background	10
1.2 Research Problem	13
1.3 Aim and Research Questions	14
1.4 Academic Contribution.....	15
1.5 Scope and Delimitations	15
1.6 Outline.....	16
2. Literature Review – Theoretical Synthesis.....	17
2.1 Market Shock.....	17
2.2 Risk Management in Agriculture	20
2.2.1 Sources of Risk.....	20
2.2.2 Risk Coping Strategies	20
2.3 Decision-Making and Contingency Theory	22
2.3.1 Contingency Theory.....	24
2.4 Resilience Theory	24
2.5 Conceptual Model	27
2.6 Other Relevant Theories and Concepts	28
3. Methodology.....	29
3.1 Research Philosophy and Design.....	29
3.1.1 Case Study	30
3.2 Case-Selection.....	30
3.3 Data Collection.....	32
3.4 Data Analysis	33
3.4.1 Coding.....	34
3.5 Quality Assurance.....	34
3.6 Ethical Considerations	36
4. Empirical Background.....	37

4.1	The Crop Farm.....	37
4.2	Case Descriptions.....	37
4.2.1	Overview of Cases.....	37
4.2.2	Case 1.....	38
4.2.3	Case 2.....	39
4.2.4	Case 3.....	39
4.2.5	Case 4.....	39
4.2.6	Case 5.....	40
5.	Analysis and Discussion.....	41
5.1	Within Case Analysis.....	41
5.1.1	Case 1.....	42
5.1.2	Case 2.....	45
5.1.3	Case 3.....	48
5.1.4	Case 4.....	51
5.1.5	Case 5.....	56
5.2	Cross-Case Analysis & Discussion.....	60
5.2.1	Affected by Current Market Shock (Challenges).....	62
5.2.2	Coping Strategies and Motivational Drivers.....	64
5.2.3	Adaptation Plannings.....	67
5.2.4	Connections between Concepts.....	69
5.2.5	Discussion of Model & Theory.....	70
6.	Conclusion.....	72
6.1	Synthesis of Key Findings.....	72
6.2	Academic Contribution.....	73
6.3	Limitations & Future Research.....	73
	References.....	75
	Popular science summary.....	82
	Acknowledgements.....	83
	Appendix 1: Interview guide.....	84

List of Tables

Table 1: Five research cases	31
Table 2: Phases of thematic analysis.....	33
Table 3: General Information about the Cases	38
Table 4: Summary of themes Case 1.....	45
Table 5: Summary of themes Case 2.....	48
Table 6: Summary of themes Case 3.....	51
Table 7: Summary of themes Case 4.....	56
Table 8: Summary of themes Case 5.....	59
Table 9: Summary of themes across cases.....	60
Table 10: Cross-Case Analysis - Impacts on Farms.....	63
Table 11: Cross-Case Analysis – Coping of Farms	66
Table 12: Cross-Case Analysis – Planned Adaptations of Farms	68

List of Figures

Figure 1: Three-month change in commodity prices through end of March 2022 (in %)..	12
Figure 2: Fertilizer prices 2008 till April 2022 (in US\$/mt).....	13
Figure 3: Structure of research	16
Figure 4: A conceptual framework of SMEs and exogenous shocks.....	19
Figure 5: Steps to be followed by farmers in managing risk	23
Figure 6: A capability-based conceptualization of organizational resilience.....	26
Figure 7: Conceptual model based on Duchek's conceptualization	27
Figure 8: Interrelationships of the concepts Case 1.....	44
Figure 9: Interrelationships of the concepts Case 2.....	47
Figure 10: Interrelationships of the concepts Case 3.....	50
Figure 11: Interrelationships of the concepts Case 4.....	54
Figure 12: Interrelationships of the concepts Case 5.....	58
Figure 13: Links between Concepts.....	69

Abbreviations

DAP	Di-ammonium Phosphate
EU	European Union
LNG	Liquified Natural Gas
SME	Small- and Medium-Sized Enterprises
UAN	Urea Ammonium Nitrate (liquid fertilizer)

1. Introduction

This chapter provides an overview of the study, introducing the research topic, background, and objectives. It also presents the research problem, the aim and research questions, and the significance of the study, establishing the foundation for the subsequent chapters. The scope and delimitations of this project are outlined, while the first chapter concludes with an explanation of the research structure.

1.1 Research Background

The agricultural sector is currently experiencing an unprecedented surge in input costs, posing significant challenges for farmers (Zinke 2021). A salient example of this trend is the 182% increase in the price of urea, a commonly used fertilizer, observed between April 2021 and April 2022 (Alexander et al. 2022). With the predictability of agricultural goods' prices and costs becoming increasingly challenging, farmers must cope with strong market price fluctuations (Bayerischer Rundfunk 2023). The geopolitical event of the Russian invasion of Ukraine has led to significant supply shocks in the EU agri-food sector, and market players are once again being tested for resilience (European Commission 2022). Duchek (2020, p. 220) defines “*organizational resilience as an organization’s ability to anticipate potential threats, to cope effectively with adverse events, and to adapt to changing conditions*”, while the concept of resilience remains relatively novel in the business research field. Additionally, there is a lack of research examining the process of small firms coping during and adapting after exogenous shocks (Morgan et al. 2020).

Farmers are daily exposed to various risks and challenges, emphasizing the significance of risk management (Kahan 2013). With the onset of market liberalization and globalization, these risks have intensified, thereby making it more important for farmers to understand and implement effective risk management strategies (ibid.). While organizational risk management encompasses identifying, analyzing, assessing, and treating risks (ISO 2009), Hardaker et al. (2015) note a close connection to the decision-making process. Furthermore, Hardaker et al. (2015, p. 4) define uncertainty as “*imperfect knowledge*” and risk as “*uncertain consequences, particularly possible exposure to unfavorable consequences*”.

Long-term challenges and short-term shocks are omnipresent in any business environment and apart from that Spiegel et al. (2020) integrate risk management in the broader context of organizational resilience, which contains shock coping strategies as well as long-term influences on social, economic, and environmental aspects of businesses. Building on the insights of Spiegel et al. (2020), risk management should not solely focus on guaranteeing immediate stability. It should also strive to foster the capability for adaptation and transformation in the face of future scenarios, thereby underscoring the importance of long-term strategies in managing risks (ibid.).

Particularly agricultural enterprises are confronted with many different sources of risk, such as weather, occurrences of pests and diseases, machinery breakdowns, or market price fluctuations (Kahan 2013). Further Kahan (2013) divides the sources of risk into five areas: Production, marketing, financial, institutional, and human risk. Heyder et al. (2010) discovered that many German agribusiness managers expect increasing market volatility in the future, and Hardaker et al. (2015) expect that the analysis and management of risk will become more and more important for farms in the future.

Upon further investigation of uncertainty and commodity shock events, notable instances include the global financial crisis in 2008/2009 and the East Asian financial crisis in 1997 (Baffes & Kabundi 2020). Moreover, agricultural weather shocks, such as El Niño and La Niña episodes, have also contributed to these events, leading to significant production losses in 1995 for grains and in 1975 and 1985 for coffee (ibid.). More recently the world markets have faced high market uncertainty and risks through the Covid-19 pandemic and the Russian-Ukraine war. Due to those events, the commodity market prices are highly volatile, which particularly hit among others the primary agricultural sector (Baffes & Nagle 2022b). Baffes & Kabundi (2020) further state that there is a possibility that “*shocks can also exert a permanent impact on commodity markets*”, and Meuwissen et al. (2019) claim that shock events could lead to the implementation of novel practices or disruption and collapse of a food production system. To illustrate the dimension of the commodity market shock, Figure 1 highlights, among others, the volatility of agricultural input and output prices at the beginning of 2022. Potassium chloride and Di-ammonium Phosphate (DAP) are common agricultural fertilizers.

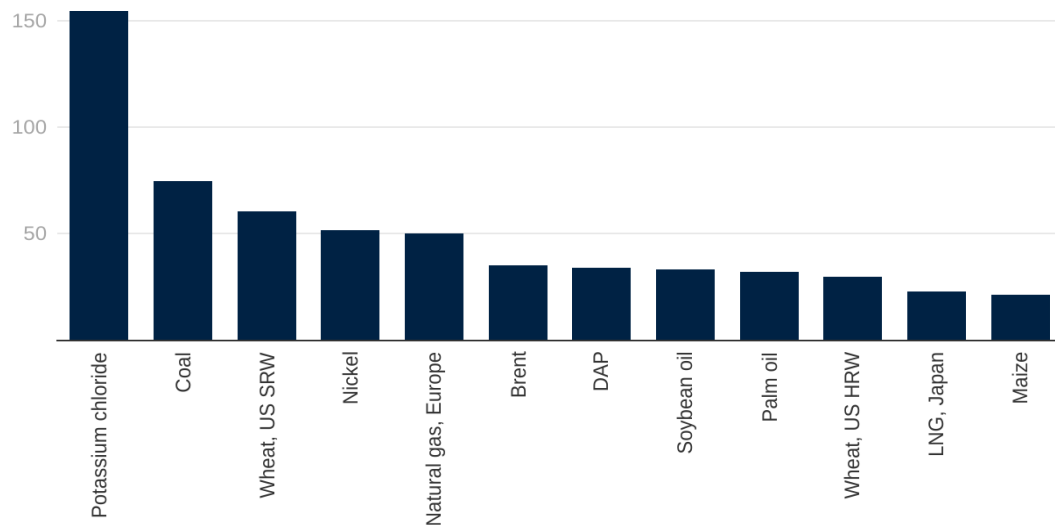
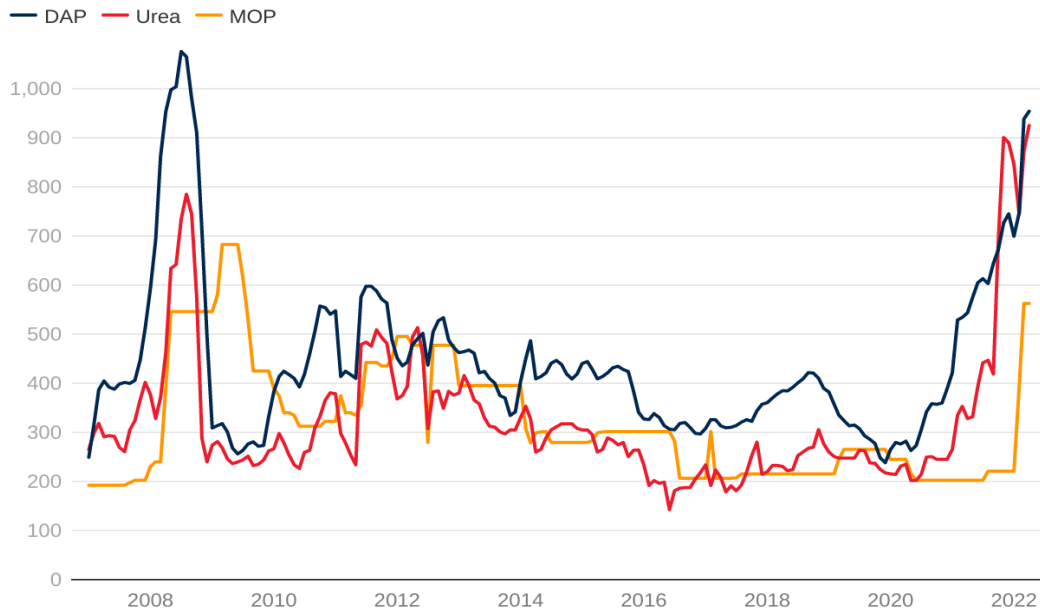


Figure 1: Three-month change in commodity prices through end of March 2022 (in %) (Baffes & Nagle 2022b; CC BY 4.0)

COVID-19

While this study is not about the cause of the agricultural market shock, it can be seen in Figure 2 that the Covid-19 pandemic also had an impact. Beginning in 2019/20 Covid had a huge impact on the global supply chains and led to shortages of farm inputs, particularly labour (Deconinck et al. 2020). The pandemic led to volatile consumer demands and transport issues, nevertheless Deconinck et al. (2020) wrote that the agricultural supply chains in the industrialized countries were surprisingly robust and resilient during the pandemic. Already in 2021, *Agarheute*, a well-known agricultural newspaper in Germany, published an article saying that a huge avalanche of costs is overtaking farmers (Zinke 2021). Zinke (2021) also highlights an all-time high in farm input costs such as diesel, fertilizer, and machinery prices, while producer prices have also risen significantly.



Note: DAP = diammonium phosphate. MOP = muriate of potash. Last observation is April 2022.

Figure 2: Fertilizer prices 2008 till April 2022 (in US\$/mt) (Baffes & Koh 2022a; CC BY 4.0))

RUSSIAN-UKRAINE WAR

The outbreak of the Russia-Ukraine conflict on February 24, 2022, caused significant disruptions to global trade and supply chains, as outlined by Garicano et al. (2022). This unexpected geopolitical upheaval had a profound impact on the agricultural sector, especially because both Russia and Ukraine are major contributors to global agricultural supplies and export significant amounts of commodities such as wheat, corn, fertilizer, and energy (ibid.). According to 2019 statistics, these two countries together accounted for an estimated 25% of global wheat exports, 14% of corn exports, and 13% of fertilizer exports (ibid.). In addition, total commodities were severely affected as Russia is the world's largest exporter of gas and oil, which in turn affected fertilizer prices as nitrogen-based fertilizers are typically produced with natural gas (Baffes & Nagle 2022b).

1.2 Research Problem

Farmers have to deal with increased market volatility and the effects of the market shock. This was highlighted in a documentary by Bayerischer Rundfunk (2023), which focused on the consequences of the Ukraine war for Bavarian farmers. The documentary illustrates the current unpredictability of prices and costs and highlights that the timing of purchasing inputs such as diesel, fertilizer and feed and selling the produce has become a critical factor for farmers (ibid.). In the interviews,

farmers compared their role to that of speculators in the face of great market uncertainty (ibid.). This scenario outlines the empirical problem of the study: farmers' confrontation with high market volatility, rising input costs, and the uncertain market environment.

From a theoretical point of view, previous articles and studies have analyzed the impacts of the Ukraine war and Covid-19 on food systems (cf. Nasir et al. 2022; cf. Meuwissen et al. 2021), agricultural trade and food security (cf. Glauben et al. 2022; cf. Ben Hassen & El Bilali 2022), European businesses and economies (cf. Prohorovs 2022), or on the global economy and its supply chains (cf. Garicano et al. 2022), while the practical points of view of how farmers are coping with the current market shock have not yet been explored. Due to the recency of the Ukraine war outbreak, the academic literature concerning this event is currently in the nascent stages of its development. Therefore, the researcher wants to contribute by investigating the affectedness and coping strategies of crop farmers. In the existing literature on risk, uncertainty, and crisis management, Herbane (2010) highlights the lack of crisis management research regarding small businesses. Further Morgan et al. (2020, p. 370) mention that “*relatively few studies examine how small firms survive during exogenous shocks or recover afterwards*”. And Duchek (2020) also points to a lack of research on organizational resilience to unexpected events. This study addresses the empirical and theoretical problem and aims to contribute to closing the existing research gap.

1.3 Aim and Research Questions

The research paper aims to explore how farmers cope with and survive market shocks and how they plan to adapt reactively, in the context of organizational resilience. Specifically, this study will examine how the market shock, primarily due to the Russian-Ukrainian war, affected agricultural SMEs (farmers) and how they respond to it. In addition, this study aims to contribute to closing the research gap on how SMEs survive and recover from market shocks and will add to the research on crisis management and organizational resilience in the small business literature (cf. Morgan et al. 2020; cf. Herbane 2010). This research paper is guided by the following three research questions:

- *How has the current market shock affected crop farms?*
- *How are farmers coping with the market shock?*
- *How do farmers plan to adapt afterwards?*

1.4 Academic Contribution

This study aims to make an important contribution to the academic literature in the field of organizational resilience, risk management and crisis response, especially regarding small and medium-sized enterprises (SMEs) in the agricultural sector. The focus of this research is to examine the impacts of the unexpected market shock triggered by the Russian-Ukrainian war on farmers and to uncover their coping mechanisms. In doing so, the study not only fills a relevant research gap but also expands the literature addressing how SMEs survive and recover from such shocks, a subject highlighted by Morgan et al. (2020).

While much research in this field relies primarily on quantitative data, this study takes a qualitative approach that provides an in-depth, hands-on perspective from the farmers themselves. This choice of methodology is consistent with the study's goal of comprehensively examining farmers' affectedness, coping strategies, and responses. In addition, the study enriches the narrative of organizational resilience by focusing on farmers' responses to market shocks. It provides valuable data and insights on risk management strategies and planned adaptation to sudden shocks that can help other farmers, policymakers, and researchers in the field. In this way, it paves the way for future research in this area.

1.5 Scope and Delimitations

The limitations and scope of this study must be clearly outlined to provide a comprehensive understanding of the boundaries within which the research was conducted. This study is limited to farms in the German and Polish agricultural sectors. It specifically addresses the problems faced by agricultural SMEs, their coping strategies, and the adaptations planned in response to the current market shock caused primarily by the war in Ukraine.

Finally, the study is bound by a specific time frame, as data collection and analysis were conducted at a specific point in time. Given the dynamic nature of markets and the agricultural sector, findings may change in response to new circumstances or events. Therefore, this study provides a snapshot in time of farmers' experiences, coping mechanisms, and planned adjustments to the market shock that coincides with the period of data collection. However, the market shock is still ongoing and therefore the adaptations might change or arise at a later point in time. Despite these delimitations, the study offers valuable insights into how agricultural SMEs navigate the price volatility and market uncertainty associated with market shocks. It lays the foundation for further research and improves our understanding of the

resilience of the agricultural sector to market shocks by shedding light on farmers' responses and coping strategies during such challenges.

1.6 Outline

This study comprises six chapters that systematically analyze farmers' affectedness, coping strategies, and planned adaptation measures in response to the market shock (see Figure 3). Chapter One introduces the research topic, provides the background and motivation for the study, outlines the research problem and questions, and identifies the scope and delimitations. Chapter Two conducts a comprehensive literature review that addresses market shocks, organizational resilience, risk management, contingency theory, and decision-making in agriculture. This chapter also presents the conceptual model used in the study. The third chapter details the research methodology employed in this study, including the research philosophy and design, case study design, case selection, data collection methods, and data analysis techniques. It also discusses the ethical considerations and steps taken to ensure the trustworthiness and credibility of the research findings.

In the following fourth chapter, the background of the five study cases is presented. Chapter five conducts an in-depth analysis of each case, while the findings are compared afterwards in a cross-case analysis. The cross-case analysis answers the research questions, while thereafter the results are discussed and linked to theory and to the conceptual model. The final chapter six summarizes the main research findings, highlights their implications for theory and practice and provides recommendations for future research within the research field.

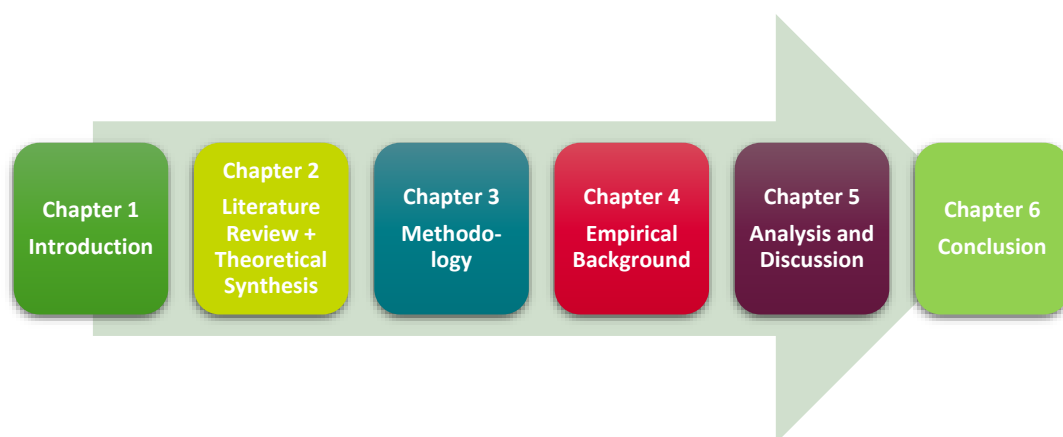


Figure 3: Structure of research (own illustration)

2. Literature Review – Theoretical Synthesis

In the second chapter, the author will present existing knowledge from previous research, especially regarding the research gap of how SMEs survive and recover from shock events. Thereby relevant literature within the research area is reviewed and key concepts and theories of risk management, decision-making, organizational resilience, and contingency theory are explained. The author further develops a conceptual model as a guide for this study. Moreover, this chapter identifies gaps in the literature and situates the current study within the larger academic context.

2.1 Market Shock

A global shock is defined by the OECD (2011) as a major event with disruptive effects that spans at least two continents. Baffes & Kabundi (2020) emphasize that energy-related shocks often amplify other shocks. According to Cashin et al. (2000), commodity price shocks tend to be long-lasting, with more than half of the effects of the initial shock lasting more than five years. This study focuses on the commodity price shock triggered by the Covid 19 pandemic and, in particular, by the Ukraine war. As discussed, and demonstrated in the introduction, this commodity market shock had a significant impact on the agricultural sector. The black swan theory should also be considered in the context of the current market shock. Taleb (2007) describes black swans as extremely rare events that are outside normal expectations, have significant impacts, and are often given explanations or predictions only after they occurred. Farmers face uncertainties caused by these exceptional events that can lead to significant changes in working conditions, climate, and the business environment, potentially requiring a shift in current production practices (Robert et al. 2016).

Existing literature, e.g., Deconinck et al. (2020), documents that the Covid-19 pandemic led to fluctuating consumer demand and transportation problems, which in turn led to shortages of agricultural inputs, particularly labour. Baffes & Nagle (2022b) point out that market shocks can lead to abrupt changes in input costs, product prices, and demand, affecting farm profitability and sustainability.

Other academic work has focused on escalating energy and fertilizer prices as a result of the war between Russia and Ukraine (Alexander et al. 2022). The WTO & FAO (2022) have reported on global fertilizer markets and policies, noting that agricultural production is energy-intensive, requiring fuels, natural gas, electricity, and indirectly, pesticides, lubricants, and fertilizers on farms. They also note that nitrogen fertilizer production requires significant amounts of natural gas, which has contributed to the FAO Food Price Index reaching a high in March 2022 not seen since 1990. The WTO & FAO (2022) also note that farmers face declining profit margins because fertilizer prices are rising faster relative to the market prices they receive for their produce. Glauben et al. (2022) discuss the impact of the Ukraine war on global agricultural trade, noting that mineral fertilizers from Russia and Ukraine were exported to 143 different countries. They add that fertilizer prices have shown an upward trend since 2020/21, exacerbated by the supply chain disruption caused by the pandemic. This increases the financial challenges for farmers as market volatility increases.

Scholars such as Herbane (2010) and Morgan et al. (2020) emphasize the need for more research on how small firms withstand and subsequently adapt to exogenous shocks. As Miklian & Hoelscher (2021) note, small and medium-sized enterprises (SMEs) are disproportionately affected by crises and shocks such as the financial crisis and the Covid-19 pandemic and are therefore particularly vulnerable. These SMEs are driven by the need to cope with crises to adopt riskier or more innovative strategies, engage more in community networks, or collaborate with other firms to pool their resources for survival (Miklian & Hoelscher 2021). Exogenous shocks, as Hudecheck et al. (2020) argue, can lead to significant economic turbulence that causes uncertainty, require quick decisions, and disrupt supply chains, labour markets, consumer demand, and government policies, which has profound implications for businesses. Based on this literature, Miklian & Hoelscher (2021) created a streamlined framework that compares SME vulnerability and resilience across different types of businesses, crises, and responses (see Figure 4).

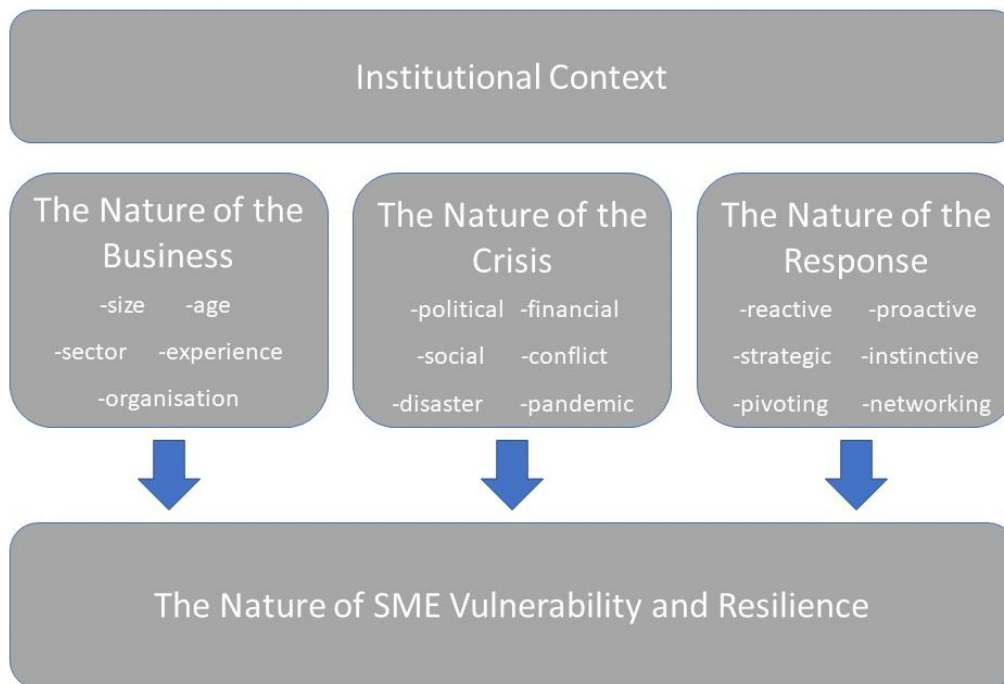


Figure 4: A conceptual framework of SMEs and exogenous shocks (Miklian & Hoelscher 2021, p.190; own processing)

Miklian & Hoelscher (2021) also emphasize that research on the impact of shocks on small firms, affecting aspects such as business cycles, innovation, market changes, and firm survival, has never been more important in today's context. The occurrence of a market shock, in essence, radically reshapes the business landscape and requires the use of innovative strategies and careful risk management to ensure business viability. The inherent unpredictability of such events underscores the need for comprehensive risk management strategies in the agricultural sector. This study, therefore, attempts to shed more light on these strategies in the following sections.

2.2 Risk Management in Agriculture

2.2.1 Sources of Risk

Risk management is of utmost importance in the agricultural sector as farmers are constantly faced with uncertainties such as weather conditions, pests, and market price fluctuations (Hardaker et al. 2015). ISO (2009) defines risk management as a process that involves the identification, analysis, evaluation, and treatment of risks. This is particularly relevant in the context of this study investigating coping strategies of farmers to market shock.

Kahan (2013), in his comprehensive work on risk management in agriculture, categorizes sources of risk into five key areas: Production, marketing, financial, institutional, and human risks. Production risk includes uncertainties such as machinery breakdowns, input resource unavailability, and weather unpredictability (ibid.). According to Kahan (2013), farmers plant their crops without knowing exactly what their harvest will be or what prices they will receive for their produce. Marketing risk involves the volatility in market prices, while financial risk involves unpredictability in interest rates, borrowed funds, and liquidity (ibid.). Institutional risk refers to unforeseen changes emanating from banks, cooperatives, marketing organizations, or government policies that affect farmers (ibid.). Finally, human, and personal risk includes unforeseen events such as disease, accidents, political riots, and labour availability. Since all these risks are interrelated, they often must be considered together (Kahan 2013). Kahan (2013) also highlights that risk arises from unexpected change.

Clearly, the concept of risk management is closely linked to decision-making and is becoming increasingly important as the business environment becomes more complex and volatile (Hardaker et al. 2015; Spiegel et al. 2020). Kahan (2013) further distinguishes between risk and uncertainty: risk involves known probabilities of outcomes, while uncertainty deals with unknown probabilities. Or as Sonkkila (2002, p. 16) states: *“Risk and uncertainty refer to the degree of knowledge in decision-making”*.

2.2.2 Risk Coping Strategies

Every decision made in farm management involves risks, and it is important to weigh each decision considering the specific conditions (Hardaker et al. 2015). Hardaker et al. (2015) further emphasize that it is rarely possible to provide precise guidelines for risk management strategies. They further emphasize that the goal of risk management is not necessarily to reduce or minimize risk but rather to optimize

the management of risk for the whole organization (ibid.). In terms of common coping strategies used by farmers to manage production, market/price, institutional, financial, and human/personal risks, Hardaker et al. (2015) outline the following: financial and debt management, flexibility, information gathering, disease and pest prevention, insurance, and cost-effective or highly productive and profitable production methods. In addition, Hardaker et al. (2015) present three guiding principles of On-farm strategies. The first, "*look before you leap principle*", encourages waiting for more complete information about potential impacts before making a change (ibid., p. 226f.). The second principle, "*better safe than sorry*", means that a current method that poses a threat with unknown impacts should be abandoned (ibid., p. 226f.). The third principle, "*slow and steady*", states that slight changes are safer than sudden, drastic ones (ibid., p. 226f.). Among these Hardaker et al. (2015) and Kahan (2013) are presenting several more risk management strategies which the researcher presents next. Because both their literature is written practice-oriented it gives valuable insights into opportunities for farmers regarding their coping strategies. In the FAO Guide to Agricultural Enterprise Management, Kahan (2013) divides these strategies into five main areas production, marketing, financial, human, and institutional. Given the focus of this study, the researcher will mainly address the tools for managing price risk and production risk. Risk management strategies that are not relevant to the market shock are not discussed in detail or at all.

Production risk strategies

Production risk mainly relates to weather uncertainty and pests, where for example irrigation can be used as a mitigation tool (Kahan 2013). However, concerning market shocks, strategies such as 'reserves of inputs and produce' are valuable (ibid.). By increasing the storage of agricultural inputs and outputs, the farm reduces its exposure to adverse events (ibid.). These reserves can be fertilizers and other chemicals, and storing can also protect the farmer from short-term price fluctuations (Kahan 2013). Another strategy is the 'diversification of production' (Hardaker et al. 2015; Kahan 2013). Diversifying decreases the "*dispersion of the overall return*" (Hardaker et al. 2015, p. 229), and can further reduce price, yield and income risk (Kahan 2013). Kahan (2013) also lists 'risk-reducing technologies', 'selecting low-risk activities', where farmers prefer reliability over potential profitability, 'risk-reducing inputs' such as organic or mineral fertilizers to reduce the risk of bad yields, and 'system flexibility'. The latter describes the ability to adapt quickly to changing conditions. Hardaker et al. (2015) further subdivide into asset, product, market, cost, and time flexibility.

Marketing risk strategies

Marketing risk strategies correspond to market volatility and price fluctuations (Kahan 2013). Kahan (2013) mentions ‘spreading sales’ as the first strategy, which is to store the harvest and sell it at various times during the year, but at the expense of storage costs. ‘Contractual agreements to sell produce and to buy inputs’ is another strategy that involves on pricing inputs and outputs in advance (Kahan 2013). This approach significantly reduces price uncertainty but requires the farmer to fulfil the expected quality (ibid.). Analogous to this strategy, ‘forward pricing’, ‘hedging on future markets’ and ‘option trading’ can serve as practical marketing tools (Kahan 2013; Hardaker et al. 2015). However, Hardaker et al. (2015) also warn of the risk of not fulfilling a contract because of too low yields or quality than expected, which can lead to penalties. The importance of ‘market price information’ is underscored by Kahan (2013), and Hardaker et al. (2015) also advocate that farmers should pay attention to market opportunities and trends, and that information gathering is a critical strategy for reducing downside risks.

Other strategies such as insurance (financial), producer groups (institutional), and labour planning (human) were excluded due to the focus of this study.

2.3 Decision-Making and Contingency Theory

Kahan (2013) argues that decision-making is the central activity of management, although the outcomes of these decisions are often unpredictable. A farmer makes decisions about what crops to grow, what amount of fertilizer to use and therefore needs all the information he can get about prices, yields, and other factors to make effective decisions (ibid.). The decision-making process in agriculture is multifaceted, unlike traditional economic theory, it is not solely driven by profit maximization or rationality, but rather is influenced by the farmers’ unique goals, perceptions, attitudes, values, beliefs, and certain individual characteristics (Kahan 2013; Darnhofer et al. 2005; Howley et al. 2015; Willock et al. 1999; Pannell et al. 2006). However, regardless of the motivating factors, any decision-making process must adequately consider the cost implications of the various options (Hardaker et al. 2015).

Farmers' attitudes toward risk are critical to their decision-making process because they determine the strategies used to mitigate the likelihood of undesirable outcomes (Kahan 2013). These attitudes can range from risk neutrality to risk aversion and are shaped by various factors such as farm conditions, market orientation, input costs, or production value (Kahan 2013). A farmer's attitude toward risk can be influenced by several factors, for example, Kahan (2013) notes

that farmers who work under subsistence conditions tend to be the most risk averse. Prior experience may also influence a farmer's decision (Kahan 2013), and Miklian & Hoelscher (2021) highlight that smaller businesses have other strategic and psychological drivers, such as small business owners' more personal experiences with bankruptcy or business failure. In addition, Öhlmér et al. (1998) argue that farmers prefer the ability to continuously evaluate and plan their decisions on a day-to-day basis.

Figure 5 shows FAO's risk management cycle for farmers, which serves as a useful guide to understanding the coping strategies farmers use. This process begins with the identification of the source of risk (e.g., price risk), followed by an examination of the potential consequences of price fluctuations (see Figure 5). In the subsequent phase, coping strategies are developed. It should be noted, however, that this study does not address the evaluation of consequences or the analysis of trade-offs (steps four and five, respectively) (see Figure 5).

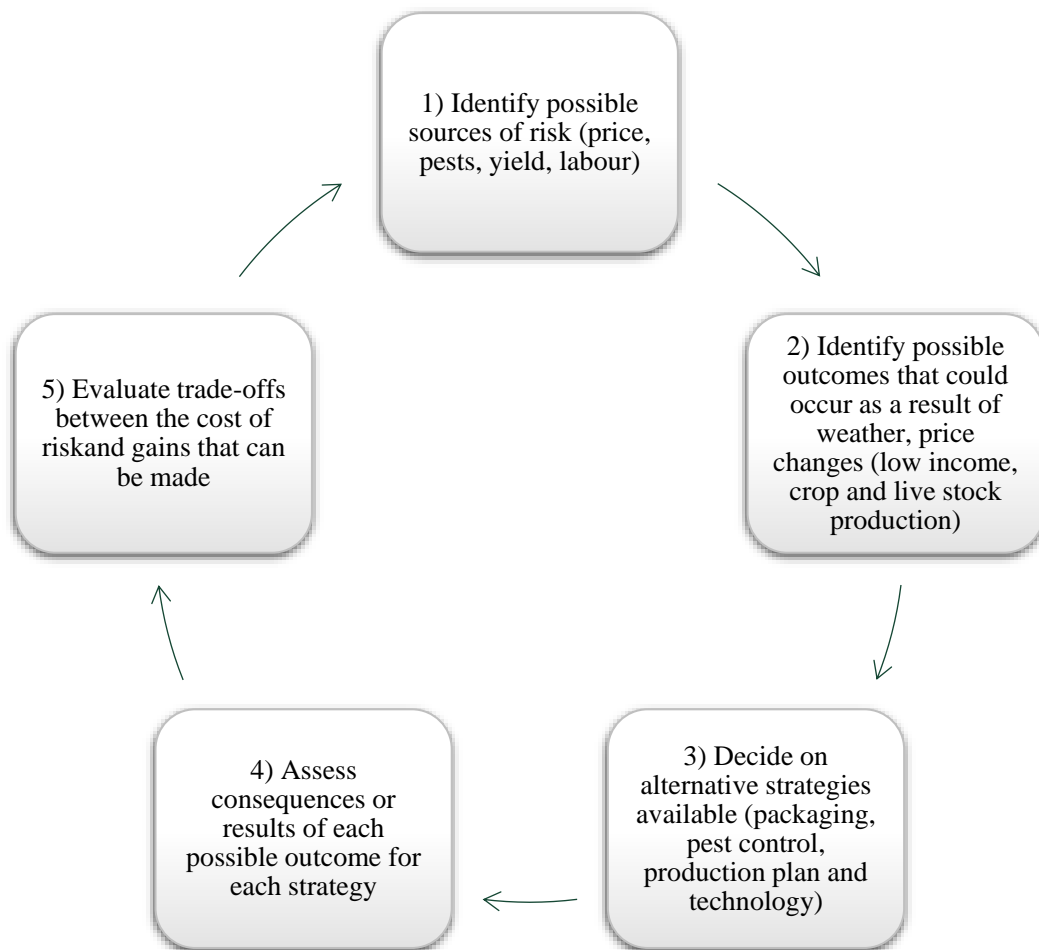


Figure 5: Steps to be followed by farmers in managing risk (Kahan 2013, p. 15; own processing)

2.3.1 Contingency Theory

Contingency theory, which is closely intertwined with the decision-making process, assumes that the effectiveness of management strategies depends on the specific circumstances (Moniz 2010). The central theory is that a manager's behaviour should be tailored to the context to choose a management style that fits the current situation (García-Vidal et al. 2017). In their recent publication, 'A Contingency Theory Approach to Understanding Small Retail Business Continuity During COVID-19', Childs et al. (2022) argue that the decisions made by contingent leaders are inherently flexible and can be adapted to current situations as they arise. Additionally, Childs et al. (2022) highlight that contingency theory assumes that managers' decisions and actions are influenced by internal factors within an organization, like resources, and external factors, like natural disasters. For Childs et al. (2022), these factors are integral to the decision-making process of contingent leaders, and they use contingency theory to understand leadership behaviour in the face of organizational change. In the context of this study, farmers' decisions are likely to depend on their individual circumstances, further emphasizing the relevance of contingency theory.

2.4 Resilience Theory

Risk management is closely related to the concept of resilience, which describes a system's ability to adapt to shocks and disruptions (Spiegel et al. 2020). Resilience encompasses both shock-coping strategies and long-term adaptations that enhance a system's ability to adapt or transform (ibid.). According to Meuwissen et al. (2019), shocks and stresses can potentially trigger the introduction of new practices (reorganization) or, conversely, the breakdown of an agricultural system (collapse). Thus, it is essential to understand how agricultural enterprises can build resilience to cope with uncertainty and shocks.

In the paper about organizational resilience, Duchek (2020) analyzes previous literature on the concept and notes that it is relatively new in the business and management research field. She notes that the literature on organizational resilience is still emerging but has recently gained in importance (ibid.). Duchek (2020) points out that there is no consensus on the definition of resilience. The terms flexibility and agility tend to refer to coping with everyday problems and challenges, while resilience focuses on coping with unexpected threats and crises (Lengnick-Hall et al. 2011). Lengnick et al. (2011) further emphasise that organizations need to develop a resilience capability that enables them to effectively respond to unforeseen circumstances and take advantage of situations that could potentially threaten their existence. Duchek (2020, p. 220) concludes that most of the research

literature defines “*resilience as defensive response (resistance and/or recovery)*” while more recent researchers also include response and anticipation. Consequently, Duchek (2020, p. 220) defines “*organizational resilience as an organization’s ability to anticipate potential threats, to cope effectively with adverse events, and to adapt to changing conditions*”. Resilience research is closely linked to crisis management literature, and Duchek (2020) adopts a similar approach to provide an organizational resilience framework. This concept comprises three stages of resilience: Anticipation, coping and adaptation (see Figure 6). Duchek (2020) assumes that resilient organizations respond to the past (reactive action), cope with current problems (concurring action) and prepare for the future (anticipatory action). The three resilience stages include organizational capabilities as sublevels (Duchek 2020). Duchek (2020) categorizes resilience capabilities into anticipation, coping and adaptation capabilities. Anticipation capabilities may include recognizing critical internal or external trends and threats and preparing for shock events as best as possible (ibid.). Coping capabilities can be divided into accepting the issue and developing and implementing solutions (ibid.) Adaptation capabilities include reflection and long-term learning, and organizational change capabilities (ibid.). In this context, Lindberg et al. (2010) point out the literature gap in practical research on how organizations learn from unexpected events. Duchek (2020) also highlights that organizations often learn from these events but fail to translate what they learn into new behaviours. Organizational change, also known as second-order learning, involves the implementation of new strategies, values, and behaviours (ibid.).

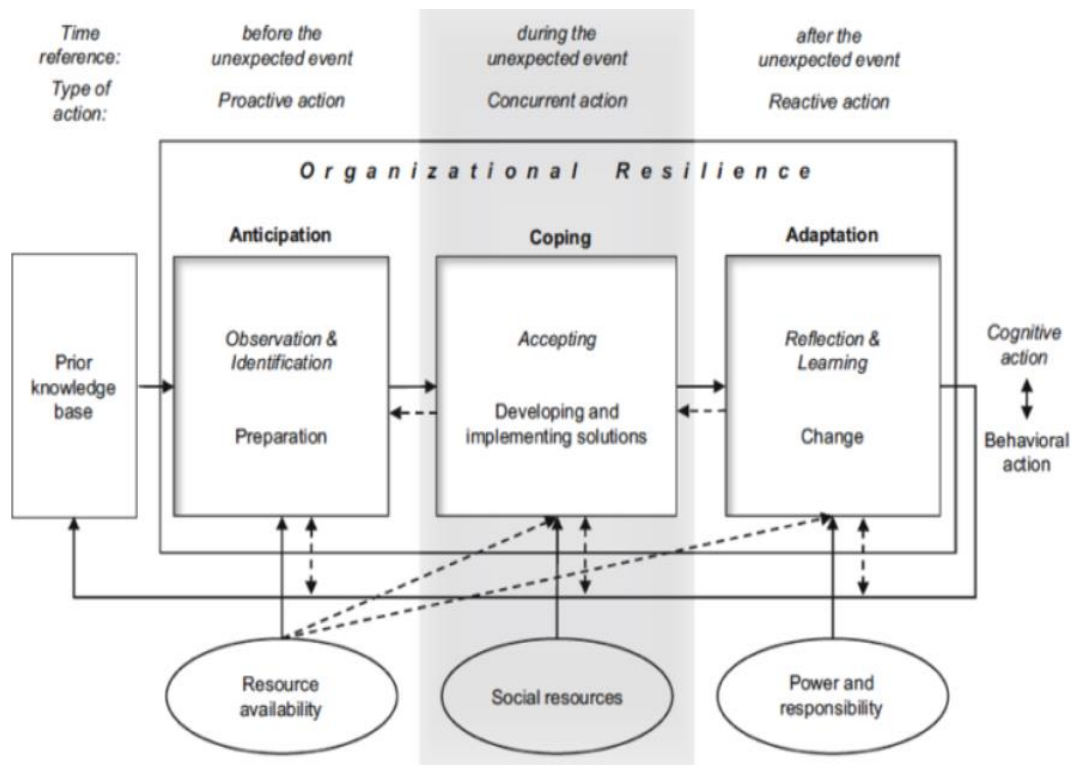


Figure 6: A capability-based conceptualization of organizational resilience (Duchek 2020, p. 224; CC BY 4.0)

In their paper, 'Processes of Adaptation in Farm Decision-Making Models', Robert et al. (2016) discuss Petit's theory of farmer adaptive behaviour, originally developed in the 1980s. According to this theory, farmers have continuous adaptive capacity (ibid.).

The purpose of this study is to examine and identify the coping strategies and adaptations that farmers use in the face of the recent market shock. To this end, resilience theory will help address the theoretical research gap identified by Morgan et al. (2020, p. 370): "Relatively few studies examine how small businesses survive or recover during exogenous shocks."

2.5 Conceptual Model

Building on Duchek’s model of organizational resilience, the researcher developed a customized conceptual model (see Figure 7). This model summarizes the previously discussed terms, concepts, and theories to better understand their interrelationships. This conceptual model will not only serve as a guide for the overall research process but will also support the analysis section. By merging these various concepts, a clearer understanding of how farmers respond to market shocks through their coping and adaptation strategies is obtained. This model links the risk management tools and strategies presented by Kahan (2013) and Hardaker et al. (2015) with the theories of decision-making and contingency. Together, these influence the stages of organizational resilience: Anticipation, Coping and Adaptation (see Figure 7). Since the focus of the research is on an unexpected event, the market shock, this was also integrated into the model, time-ordered within the stages of organizational resilience by Duchek (2020).

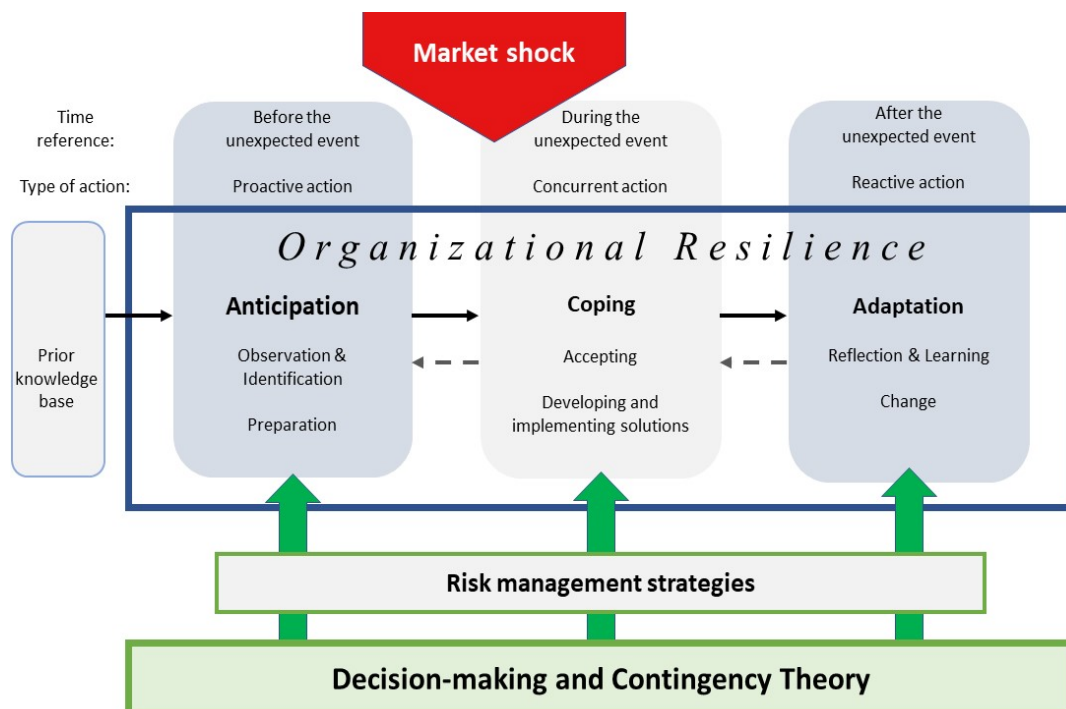


Figure 7: Conceptual model based on Duchek’s conceptualization (own illustration; Duchek 2020, p. 224 (CC BY 4.0))

The core principle of the conceptual model can be summarized as follows: In times of high volatility and uncertainty, as highlighted by Duchek (2020) and Lengnick-Hall et al. (2011), developing a resilience capacity is of paramount importance for organizations. This will not only enable them to effectively respond to unexpected

events and recover from crises, but also strengthen future success while skilfully dealing with events that could threaten the organization's survival. (Duchek 2020; Lengnick-Hall et al. 2011). The model synthesizes these insights to provide a comprehensive, multidimensional perspective on how farmers deal with market shocks, incorporating key aspects such as risk management tools, resilience stages, market shock, and decision-making processes. This linking of concepts enhances overall understanding and provides a clear visual structure for research, so the model helps illuminate the interrelated complexity of organizational resilience in the face of market shocks.

2.6 Other Relevant Theories and Concepts

The paper also acknowledges other theories and concepts that, while not used directly, may provide additional understanding of how farmers cope with market shocks. Theories not explicitly considered include Lewin's model of change management, because organizational change starts at the adaptation after the shock event, while the research was conducted during the market shock (see Channell 2021). For the same reason organizational adaptation theory was left out, this study only focuses on planned adaptations, while future studies could take up this theory. Resource dependence theory was not considered relevant to this research because it is too far from the research objective. In addition, the work of Mäder et al. (2002) is worth noting, as their research on organic farming suggests that higher soil fertility and biodiversity can reduce dependence on external inputs, potentially making these farms more resilient to market shocks.

3. Methodology

The third chapter outlines the researcher's methodological approach. First, the research philosophy and research design are clarified, while the processes of data collection and analysis are then explained. In addition, sample selection, case study design, research quality assurance, and ethical considerations are discussed.

3.1 Research Philosophy and Design

All research is guided by certain philosophical beliefs that shape the research practice and the results obtained based on the data collected and analyzed (Bell et al. 2019). Bell et al. (2019) divide the philosophical beliefs into three layers, ontology, epistemology and methodology. The ontology contains the “*understanding of what reality is*” (Bell et al. 2019, p. 25), and in this study the researcher will use social constructivism as ontological approach. Constructionism or constructivism comprises that reality and social phenomena are in a constant process of change (ibid.). In this way, reality is a product of social processes, shared meanings, and interpretations, while the researcher always presents only one version of social reality, which cannot be accepted as definitive (Bell et al. 2019; Berger & Luckmann 1967). Further, epistemology includes the “*understanding of how we can gain knowledge of that reality*” (Bell et al. 2019, p. 29) and for this study the researcher will follow an interpretivist epistemology. Interpretivists seek to understand social behaviour, including people's thinking, their actions, and their view of their environment (cf. ‘Verstehen’ approach by Max Weber) (ibid.). The third layer, the methodology, outlines what is the best way to conduct research grounded on the underlying ontology and epistemology (ibid.).

While quantitative research focuses on testing theories mostly from a deductive approach, the qualitative design often uses an inductive approach, which concludes in generating theories (Bell et al. 2019). This research suggests a qualitative research design because it allows for a deeper understanding of how farmers think and act (ibid.). Further, this research paper will use abductive reasoning, which overcomes the stringent logic of theory-testing of the deductive approach and the issues of the inductive approach (Bell et al. 2019). For abductive reasoning, the researcher needs to go back and forth between the social enquiry and the existing theories and literature (ibid.).

3.1.1 Case Study

Because multiple cases can contribute to a more robust understanding of the phenomenon under investigation, the insights gained from different empirical findings can be considered more reliable and generalizable (Eisenhardt & Graebner 2007), therefore the researcher proposes a multiple case study design. Bell et al. (2019, p. 67) state that “*multiple-case study designs have become increasingly common in business research*”, and that they are often used to compare different cases. A comparison between the cases could build a more holistic insight into the impacts on crop farms and their coping actions and strategies. This enables the researcher to observe whether a finding is rather unique or if it is transferable to several cases (Bell et al. 2019; Eisenhardt & Graebner 2007). In addition, the case study design enables the in-depth exploration of a current phenomenon in real-life (Yin 2017). Flyvbjerg (2006) argues that the strength of a case study lies in its ability to closely examine real-world scenarios, which allows for direct testing of views in relation to phenomena as they play out in real-world circumstances. The multiple case study design was chosen to understand farmers' situations and decisions using multiple data sources for evidence to investigate a phenomenon. Apart from this, Flyvbjerg (2006) also states that contextual knowledge is more valuable than the futile search for predictive theories and universals. The multiple case study design is well suited to understanding farmers' situations and strategies using multiple data sources for evidence to investigate the phenomenon.

The units of analysis and observation remain the same in this research and are individual full-time crop farmers. The reason for analyzing farms in Germany and Poland is because the agricultural sector was and still is highly affected by the price shock. Particularly Germany faces dramatic gas delivery shortages due to the high dependency on Russian gas (cf. fertilizer prices) and beyond that the country represents the largest economy in the EU, which could lead to meaningful results.

3.2 Case-Selection

In general, there are two main sampling techniques to choose from, non-probability/purposive (non-random) sampling and probability (random) sampling (Bell et al. 2019). For this research purposive sampling was chosen to find cases that are relevant (ibid.). Further, the researcher wanted to select farms and farmers that differ from each other (ibid.). On the downside the author cannot generalize to a population when doing purposive sampling (ibid.). Of the various purposive sampling methods, the researcher suggests the snowball sampling technique, in which a few people relevant to the topic are contacted in order to gain further contacts through them (ibid.). The different farm cases should fulfil the criteria of being at least 200 hectares in size for it to be considered a full-time occupation, as

people doing other work on the side might think and act differently, and in addition, the majority of the farm's turnover should be generated by crop-cultivation to precisely demarcate the livestock farms.

To start the snowball sampling, the researcher contacted an agricultural consultancy, an agricultural insurance firm, and a cereal marketing company, all located in northern Germany. These organizations subsequently identified and recommended crop farmers who could potentially be interested in participating and would be relevant to this research. They also provided their contact information for further communication. The researcher then contacted these farmers and asked them to participate in an interview. Subsequently, the snowball method was also applied to the interviewees. The sample size depended on whether the researcher re-collects similar data from new respondents, as the researcher wants to comprehensively examine farmers' coping strategies.

The sampled cases include older and middle-aged farmers, small, medium, and large farms with up to 1400 hectares, with all five farms using conventional farming methods (see Table 1). All farms grow mainly field crops, although the crops grown vary from case to case. The five cases differ in location: two are located in north-eastern Germany, Mecklenburg-West Pomerania, one farm is located in north-western Germany, in Schleswig-Holstein, one case is located in the federal state of Lower Saxony, and the researcher also had the opportunity to interview a German-speaking farmer who has his farm in northern Poland. All farms have a size of more than 200 hectares and can therefore be considered as full-time jobs.

Table 1: Five research cases (own illustration)

Case	Age of farmer	Farm age	Farm size	Location	Interview duration	Validation	Date
1	42 years	>200 years	1400 ha	Mecklenburg-West Pomerania	27 min	Interview via phone	17/03/2023
2	67 years	31 years	1250 ha	Mecklenburg-West Pomerania	18 min	The word filled out interview guide + interview via phone	05/04/2023
3	61 years	283 years	1000 ha	Schleswig-Holstein	17 min	Interview via phone	13/04/2023
4	59 years	200 years	300 ha	Lower Saxony	35 min	Interview via phone	05/04/2023
5	55 years	22 years	560 ha	Poland	16 min	Interview via phone	29/03/2023

3.3 Data Collection

For collecting qualitative data on the farmer's actions, the researcher used semi-structured interviews, to gain a practical in-depth understanding of the situation and the farmers' perspectives (Bell et al. 2019). This enabled the researcher to remain unbiased, allowing concepts and theories to build up from the data (ibid.). Semi-structured interviews are in between fully structured and unstructured interviews (ibid.). The primary data collection began with the development of the interview guide based on secondary data sources of the literature review and theoretical synthesis. This guide was used to ensure that all relevant topics are covered, while it also allowed flexibility to follow up on relevant questions that arose during the interviews (Bell et al. 2019). The interview guide for this research was structured into four parts: introduction & general questions, impacts of the market shock on the farm, coping strategies & reactions of the farmers, and outlook & planning including long-term adaptation signs. To develop and test the interview guide, but also to train interviewing, interviews were conducted with a farmer from the researcher's family. In this way, the researcher ensured that the guide is clear and effective in generating rich data. While semi-structured interviews enable the interviewer to ask open-ended questions, cross-case comparability needs to be ensured (Bell et al. 2019). In addressing this matter, the author utilized the interview guide to solicit further information when necessary, during the interview. In addition, previous research has found that the more structured an interview, the lower the risk of bias, although this statement remains controversial (Bergelson et al. 2022).

All interviews with the farm owners or the managers of the farms were conducted by telephone for time efficiency and to save transportation costs. Each interview was conducted in German, recorded and then transcribed into a Word document to facilitate data analysis. The original language of both the interview and the transcription was German, which required precise translation into English later. This translation was done using the website www.deepl.com, and the researcher ensured that the original meaning was preserved after translation. The interview process varied; some farmers were very expressive, so not all pre-planned questions needed to be asked. Conversely, in cases where the interviewee was less forthcoming, additional questions were asked to obtain enough information.

3.4 Data Analysis

For qualitative research, there are no explicit rules about how to conduct the analysis of data (Bell et al. 2019). In qualitative research, a broad range of data is collected that needs to be structured for being able to analyze it (ibid.). The two most common strategies for qualitative data analysis are thematic analysis and grounded theory, while this study followed the thematic analysis (ibid.). “*Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data*” (Braun & Clarke 2006, p. 6). It requires more interpretation on the part of the researcher and focuses on the process of recognizing and defining both implied and expressed concepts in the information called themes (Guest et al. 2012). Often codes are used to describe the determined themes and help summarise data for the analysis (ibid.). For this study, the researcher followed the six phases guideline of thematic analysis developed by Braun & Clarke (2006) (see Table 2). First, the researcher transcribed all interviews and familiarized himself with the data, while afterwards began the coding process (ibid.)

Table 2: Phases of thematic analysis (Braun & Clarke 2006, p. 35; own processing)

<i>Phase</i>	<i>Description of the process</i>
1. Familiarizing yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, and noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking in the themes work in relation to the coded extracts (Level 1) and entire data set (Level 2), generating a thematic ‘map’ of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, the final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

3.4.1 Coding

All data analyses involve to some extent data coding (Bell et al. 2019). The main process of coding is to tag a part of the empirical data, a word, or a paragraph, with a word or a short sentence that summarizes this content (Linneberg & Korsgaard 2019). By using coding techniques, a large amount of qualitative data can be condensed, making it easier to access the data for analysis while increasing the quality of the analysis and the resulting findings (ibid.). Coding has the advantage of finding new data that the researcher did not notice during data collection, structuring of the data for an easier comparison between cases, and increasing the trustworthiness and credibility of the study (Linneberg & Korsgaard 2019).

Regarding the process of coding for this exploratory study and to better grasp the real-life data, the researcher first took up an inductive coding approach, also named open coding, with the possibility of incorporating theories further down the line (ibid.). Thus, the coding approach can generally be described as abductive, allowing the researcher to move back and forth between data and theory (ibid.). The abductive approach is open to surprises in the data and therefore remains highly flexible (Linneberg & Korsgaard 2019). As part of the inductive coding process, the author began with line-by-line coding and colour-coding, while these codes were later grouped into broader categories and themes (axial coding), considering concepts and theories from the literature (Grad Coach 2022). The risk management strategies highlighted in the second chapter serve as support for the researcher to develop themes and patterns from the empirical data.

3.5 Quality Assurance

While reliability and validity are treated separately in quantitative research, qualitative researchers integrate both by using the terms trustworthiness and authenticity (Bell et al. 2019; Golafshani 2003). Stenbacka (2001) even wrote that a qualitative study cannot be considered good if the concept of reliability is discussed. The concept of trustworthiness was proposed by Guba & Lincoln (1994) for the assessment of qualitative studies and includes the four criteria the researcher will also follow within this study:

- Credibility - *“How believable are the findings?”*,
- Transferability/Applicability - *“Do the findings apply to other contexts?”*,
- Dependability/Consistency - *“Are the findings likely to apply at other times?”*, and
- Confirmability/Neutrality - *“Has the investigator allowed his or her values to intrude to a high degree?”* (Bell et al. 2019, p. 48).

Each of these four criteria has an equivalent in quantitative research (ibid.). Further qualitative interviews are always influenced to some degree by the interviewee's interpretation, so the researcher should have the interviewee reread the written text to see if the researcher has understood his or her assertions correctly (Bell et al. 2019.). Underlying methods also include that it is at the discretion of the researcher what to include or exclude and what weight to give to certain statements (ibid.). In conclusion, the research should be trustworthy and authentic. Therefore, the researcher took care to minimize bias and ensured objectivity throughout the research process and ensured that the conclusions drawn from the data are based on empirical evidence and valid arguments.

In terms of credibility, the researcher took a transparent approach to detailing the research process. This included a clear explanation of the snowballing method for case selection, the telephone interviews conducted, including their exact duration and dates (see Table 1), and the careful transcription, coding, and thematic analysis of the empirical data generated. Interviews were properly recorded and securely stored on the researcher's laptop. The interview guide, which was based on the scientific literature, was reviewed by the supervisor and tested before data collection began. Transferability is ensured by providing extensive background data and in-depth descriptions of the five cases. The multiple-case study design allowed for a comprehensive understanding of the different cases experiencing the same market shock. Although generalizability is limited, trends and similarities were uncovered through comparative analysis among the cases. Bell et al. (2019) acknowledge the challenges associated with transferability in qualitative research.

Regarding dependability, the researcher added the interview guide in Appendix 1 and provided a comprehensive description of the research process. The categories and themes that emerged from the data were also aligned with risk management strategies suggested by Kahan (2013) and Hardaker et al. (2015). It should be noted, however, that the market shock cannot be considered fixed, but changes over time. Future research replications are possible, for example if the conceptual model developed by the researcher is followed. In terms of confirmability, the researcher emphasizes remaining objective and not including own beliefs, values, and opinions (Bell et al. 2019). The fact that the researcher's father is a farmer required an unbiased approach to data analysis. The researcher meticulously analyzed the empirical data line by line to ensure that personal beliefs were separated from the research process.

Finally, it is important to acknowledge that the research was conducted within a specific time frame, which may limit the understanding of the long-term effects, coping, and adaptations of and to the market shock. The market shock and war in Ukraine are ongoing, and future research may address this limitation.

3.6 Ethical Considerations

Ethical considerations play a crucial role in qualitative research, as the researcher must ensure that participants are not harmed, their privacy is maintained, and their wishes for anonymity are respected (Bell et al. 2019). Therefore, this study adheres to the four key ethical principles articulated by Diener & Crandall (1978):

- avoiding harm to participants,
- informed consent,
- ensure privacy, and
- preventing deception.

To adhere to these principles, the researcher obtained prior consent from the participants and explicitly informed them of the purpose of the interview, the recording and transcription of their responses, and the assurance of their anonymity in this research. The researcher also committed to respecting participants' privacy, avoiding any harm, and preventing any form of deception (Bell et al. 2019). Deception, as defined by Bell et al. (2019), occurs when researchers misrepresent their research findings. Therefore, the researcher presented this study with the utmost transparency and honesty (*ibid.*). In addition, all empirical data collected is securely stored and accessible only to the researcher (*ibid.*).

4. Empirical Background

In this chapter, the picture of a typical farm is first drawn to provide the reader with a contextual basis for the following case studies. Subsequently, the five individual cases are described in detail to deepen the understanding of the empirical data collected in the study.

4.1 The Crop Farm

Conventional farming practices are typical for an average farm in Europe. The production process requires various inputs such as fertilizers, chemicals, seeds, planting materials, and machinery and equipment, which account for most of the farm's costs and are critical to the study of farmers' responses to market shocks (Smith 2001). Among the most important products of a German or Polish farm are crops such as wheat or rapeseed. In the agricultural value chain, farmers purchase inputs from seed, fertilizer, or plant protection chemical manufacturers or agricultural distributors (Moore 2016). They then sell their products to agricultural traders or directly to food companies, retailers, or consumers (ibid.)

4.2 Case Descriptions

In this section, the different farming cases are described. The researcher obtained the specific case information through the general information part at the beginning of the interviews with the farmers.

4.2.1 Overview of Cases

This investigation includes five cases in the northern region of Germany and Poland. Two of the cases are located in Mecklenburg-West Pomerania, an agricultural state on the Baltic coast in northeastern Germany. One case each is located in Schleswig-Holstein and Lower Saxony, while case five is a crop farm in Poland. In this study, the term 'case' describes a farm and its interviewed farmer. While four interviews were conducted with farmers in Germany, the researcher also

took the opportunity to interview a German farmer who operates in Poland. The size of the five farms ranges from 300 to 1400 hectares and all of them have arable farming as their main occupation (see Table 3).

Table 3: General Information about the Cases (own illustration)

Case	Location	Age of farmer	Farm age	Farm size	Farming practice	Main crops
1	Mecklenburg-West Pomerania	42 years	>200 years	1400 ha	conventional	wheat, barley, rapeseed, rye, corn and sugar beets
2	Mecklenburg-West Pomerania	67 years	31 years	1250 ha	conventional	winter wheat, silage maize, rapeseed, barley, peas and sugar beet
3	Schleswig-Holstein	61 years	283 years	1000 ha	conventional	wheat, rapeseed, and silage maize
4	Lower Saxony	59 years	200 years	300 ha	conventional	Wheat, sugar beets, rapeseed, peas for sowing, soybeans and potatoes
5	Poland	55 years	22 years	560 ha	conventional	wheat, rapeseed, rye or barley and potatoes

The researcher also interviewed an organic farmer, who stated that organic farms may not be affected much by the price shock: “*So it wasn't a shock situation or anything like that, for us*”. Therefore, the author decided to not include his case in the research paper and did not reach out to other organic farmers. Future studies could investigate if the organic market is, due to being less dependent on resources from other countries such as fertilizer and pesticides, a more resilient farming concept towards commodity market shocks than conventional farming (see Mäder et al. 2002). For this reason, all five research cases in this study remain conventional farms.

4.2.2 Case 1

The first farm has been in existence for more than 200 years, and cultivates on 1400 hectares of arable land, reflecting the largest farm size among the five study cases. The farm is located in the federal state of Germany, Mecklenburg-West Pomerania. The farmer is 42 years old, and the case describes a conventional farm growing

wheat, barley, rapeseed, rye, corn and 50 hectares of sugar beets. Storage facilities are high, so an entire harvest can be stored. The owner describes his risk tolerance as being *“too low”*. The researcher contacted the farmer through an agricultural consulting company.

4.2.3 Case 2

Farm number 2 has a size of 1250 hectares, and mainly grows winter wheat, silage maize, rapeseed, barley, peas and sugar beet. The owner is 67 years old and started the farm 31 years ago. The owner describes the storage possibilities as *“good”* and his willingness to take risk as *“medium”*. He further states that there is a need for prefinancing every harvest. The second largest farm of the five study cases is located in West Pomerania, which is the eastern part of the federal state Mecklenburg-West Pomerania.

Contact was made through an agricultural consultancy as well, and due to lack of time from the farmer’s side, the researcher used the following data collection method: First, the farmer filled out the interview questions in a Word document and sent it back via mail. Then the researcher and the farmer talked for another 18 minutes via telephone about the previously given answers.

4.2.4 Case 3

This farm is the oldest among the five cases, with 283 years. On approximately 1000 hectares the farm grows wheat, rapeseed, and silage maize. The agricultural firm is in the north-western part of Germany, Schleswig-Holstein. What makes this farm special is that it is managed by a property manager, who is not the owner. The researcher received the contact via a cereal marketing company. The 61-year-old manager mentioned that the storage possibility remains 6000 tons, which is approximately one full harvest. He further described his willingness to take risk as *“medium”*. The farm manager states that the business includes a biogas plant and therefore they have a *“second mainstay”*.

4.2.5 Case 4

Located in the federal state of Lower Saxony, the fourth farm cultivates crops on 300 hectares. While half of the area wheat is grown, 50 hectares are planted with sugar beets, 40 hectares with rapeseed, 35 hectares with peas for sowing, and a few hectares are planted with soybeans and, in other years, potatoes as well. According to the farmer, the soils in his region are very good and the storage possibilities are

high as well, so one full harvest could be stored. The agricultural enterprise has already existed for roughly 200 years, with 150 hectares in year 1990, and 300 hectares since 2007. The owner is 59 years old, and contact was made through a cereal marketing company. He described his willingness to take risk as "*risk averse*".

4.2.6 Case 5

The last case is characterized by the peculiarity of being in Poland, which makes it the only case outside of Germany. The contact with the German-born farmer was established through the agricultural consulting company the researcher approached. The farmer is 55 years old, and the farm has been in operation for 22 years now. All 560 hectares are leased, as the law only allows Poles to own land. 50 hectares of the whole farm are grassland. The farm grows about 200 hectares of wheat, 150 hectares of rapeseed, and 50 hectares of rye or barley and potatoes each year. The storage capacity is quite high, ranging from 2500 to 3000 tons and the farmer stated his willingness to take risk as "*too high*".

5. Analysis and Discussion

In this chapter, the empirical findings from the five farm cases are analysed and discussed. The data is organized and structured according to the research questions, highlighting key patterns and themes across the cases. While first presenting the within-case analysis, the cases are compared in the cross-case analysis afterwards. The findings are then also connected to the expanded conceptual model and theory. The chapter discusses the results of the study in the context of the existing literature and concepts, highlighting the implications for both theory and practice in the field.

5.1 Within Case Analysis

This section presents the analysis and themes of the empirical interview of each farm case. The researcher divides each case-analysis by the research questions, and thereby tries to clearly structure the data for the following cross-case analysis.

To gain a better understanding of the situation crop farms are currently facing, the first research question investigates the effects of the market shock on each study case. The affectedness of a farms goes hand in hand with the cause of the decision to cope. This subsection aims to answer the first research question: *How has the current market shock affected crop farms?*

Following the impact of the market shock on farmers, the researcher presents the coping strategies used by each farm case addressing the challenges and problems they face. For the analysis it is important to understand the close connection between affectedness and copings to the decision-making. All coping strategies built on the farmer's decision, or motivational driver. The researcher thereby aims to answer the second research question: *How are farmers coping with the market shock?*

For the thematic analysis and theme development of the farmers coping strategies, the researcher went back and forward between themes that derived from the empirical data and price and production risk management tools (themes) presented by Kahan (2013) and by Hardaker et al. (2015). In the event of market shocks, farmers want to minimize risks to survive. As mentioned in chapter two, Kahan (2013) divides the sources of risks into production-, marketing-, financial-,

institutional- and human risk. *“Risk occurs because of unexpected changes”* (Kahan 2013, p. 9). Risk management tools regarding human, institutional and financial risk were left out, because the farms were mainly affected by price and production risks.

Regarding the third segment, the researcher will present the findings related to the farmers' adaptation planning statements which goes in line with the third research question: *How do farmers plan to adapt afterwards?*

However, it must be stated that the Ukraine war and market shock is ongoing and therefore the researcher only presents the start of the farm's adaptation process. While in this section also the Learnings will be demonstrated.

5.1.1 Case 1

Affected by current Market Shock

The first farmer interviewed for this study expressed the current market situation as *“worse than before”*. The farmer mentioned the flooding of the Polish market with Ukrainian grain, which has led to market uncertainty and difficulties in positioning lower quality grain on the world market for himself. He further mentions that Hamburg harbour is exporting significantly lower amounts of grain than in previous years. Case 1 bought fertilizer for twice the price of what it costs now (mid-March 2023), and later adds *“Actually, I bought everything expensive”*. He also expressed that he already pre-contracted the harvest 2022 and therefore could only sell 10% of it at decent prices. In this way, he could not profit from the increase in farms output prices.

The owner of farm 1 also points out that some pesticides have become scarce or were unavailable. In addition, the farmer also notes a high increase of interest rates and points out increasing prices of machinery.

Out of the empirical data of case 1 the researcher derived the following themes:

- Price volatility of inputs and outputs
- Scarcity & unavailability of inputs
- Machinery price increase
- Increasing interest rates

Coping Strategies & Motivational drivers

From the interview with Farmer 1 the researcher derived the following coping strategies:

Market price information/ transparency

To avoid the machinery price increase and to obtain a low interest rate for a bank loan, case 1 bought three tractors in winter 2022/2023, which the researcher adds to the coping theme of achieving market information due to the farmers observation of the price increase. Thereby farmer 1 hopes to have no need to make major purchases for the next years. Also, regarding the topic of market price transparency, farmer 1 turned to three agricultural traders instead of the usual only one, to get the most favorable input prices.

Contractual agreements & Forward Pricing

Although case 1 used the tool of forward pricing, the farmer expressed that he should have used more forward pricing regarding selling the produce for the upcoming harvest 2023.

The dilemma of weather & forward pricing:

Regarding this strategy, Farmer 1 states that he “*could have pre-contracted more for harvest 2023*”, but because of not knowing how the weather will be regarding El Nino, or drought he decided not to. In addition, he calculated the pre-sold amount of wheat to be half the amount of a poor harvest.

Reserves of inputs and produce

Farmer 1 mentions that he purchased the common herbicides for 2023 in the fall 2022 and increased the storage of fertilizer, pesticides, and maize seeds.

Production diversification

Case 1 also claims a slight cultivation change. Due to high sugar beet prices, the farmer decided to increase his sugar beet plantation from 50 to 75 hectares only for the current year.

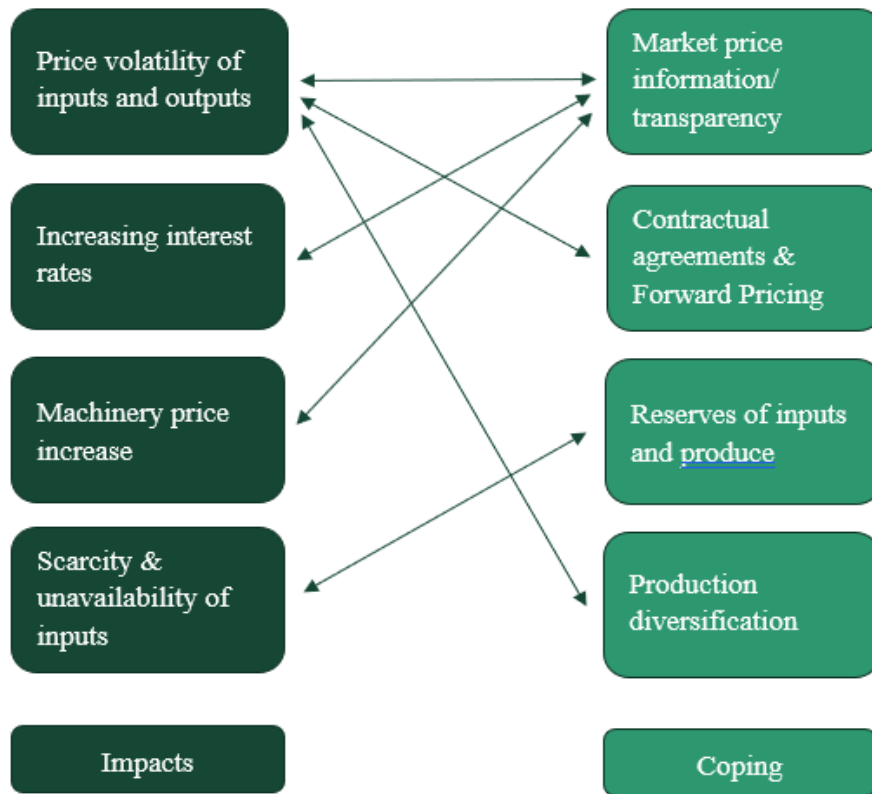


Figure 8: Interrelationships of the concepts Case 1

Planned Adaptations & Learnings

Regarding the adaptation plans of farmer 1, he considers building a small plant protection product storage for storing over winter. He further adds that these goods “don't go bad when they are stored”. As main reason for the adaptation, he points out the issue of unavailability and price volatility of these input goods. However, the farmer excludes extending the grain and diesel storage, because the storage possibilities of these goods remain already good: “So, grain storage not, but some crop protection” products.

Also, in relation to fertilizers, Farmer 1 mentions plans to expand storage facilities. He states that in the future he would like to be able to store 3 times more urea ammonium nitrate (UAN). In addition, the farmer attaches importance to storing more of the common production goods.

Connected to the learnings, Farmer 1 mentions that buying fertilizer after the war outbreak was “too expensive” in retrospective. He further expressed that he should have used more forward pricing regarding harvest 2023: “For the harvest 23, I was not brave enough to conclude even more”. His decision was influenced by the ‘dilemma of weather and forward pricing’ (see previous page).

As main theme, the author highlights:

- Expansion of storage facilities (fertilizers and pesticides)

Table 4: Summary of themes Case 1

Affected by market shock	<ul style="list-style-type: none"> • Price volatility of inputs and outputs • Scarcity & unavailability of inputs • Machinery price increase • Increasing interest rates
Coping Strategies & Motivational Drivers	<ul style="list-style-type: none"> • Market price information/ transparency • Contractual agreements & Forward Pricing • Reserves of inputs and produce • Production diversification
Planned Adaptations & Learnings	<ul style="list-style-type: none"> • Expansion of storage facilities (fertilizers and pesticides)

5.1.2 Case 2

Affected by current Market Shock

Case 2 conveys that his farm is “*quite decently affected by the shock*”. He highlights that the actual situation is completely different than in all the years he has experienced. The applied rule is that towards the new harvest goods get scarcer and due to that the prices increase, and the storage pays off. However, this time, the rule did not hold. Farmer 2 stored 1000 tons of grains and rapeseed from harvest 2022, while prices dropped sharply towards February 2023.

He further notes, that “*the whole marketing and market situation has changed fundamentally*”. One illustration of this change was the emerging fear of the possible unavailability of urea fertilizer. The farmer mentions that the concern was widespread, and people said, that “*you might not get anything next year*”.

Out of the empirical data of case 2, the researcher derived the following themes:

- Price volatility of inputs and outputs
- Scarcity & unavailability of inputs (urea)

Coping Strategies & Motivational Drivers

From the interview with Farmer 2, the researcher derived the following themes:

Market price information/ transparency

Farmer 2 highlights that achieving market information is extremely important to be a successful farmer nowadays: *“If you want to be a successful farmer these days, you are forced to keep your eyes and ears open in all directions”*. Moreover, he states that *“you must have many different portals in the present time to find out about prices”*, while pointing out that he is not selling to agricultural traders anymore, but inserts the farms produce in an online portal and only conclude a contract if he is satisfied with the price offer. Regarding his decision-making, he points out, that *“You have to have an eye on the big economic situation and then you can plan at least short to medium term [...] Otherwise you can forget it”*.

System flexibility

Under system flexibility, the author classified the conversion to more organic fertilizer in case 2. The farmer points out that in 2022 and 2023 he has *“partly not taken mineral fertilizer but [...] taken organic fertilizer”*. He used fermentation residues from a biogas plant nearby and thereby *“managed to keep nitrogen prices somewhere within a tolerable range”*. The motivation behind this strategy can thus be presented as ‘cost reduction’ or ***‘price risk mitigation’***.

Reserves of inputs and produce

Farmer 2 also mentions that he stored 1000 tons of grain and rapeseed even though prices were good in the summer of 2022. To his disadvantage, prices fell towards February 2023. The researcher will also count this as one of the farmer's coping strategies, as he made the decision to hold stocks despite the circumstances.

Contractual Agreements & Forward Pricing

Farmer 2 mentions that he pre-contracted urea after the outbreak of Ukraine war for the new harvest 2023. Thereby he also uses the price risk management tool of forward pricing for input goods.

Secure production

As mentioned above, Interviewee 2 mentions pre-contracting urea after the outbreak of Ukraine war, while the motivation behind purchasing the fertilizer in 2022 was to secure the production. He adds that people were saying: *“It's possible that next year you won't get anything at all”*. The farmer further adds that he paid 2.80€ per kilogram, while it is now at 0,98€ per kilogram.

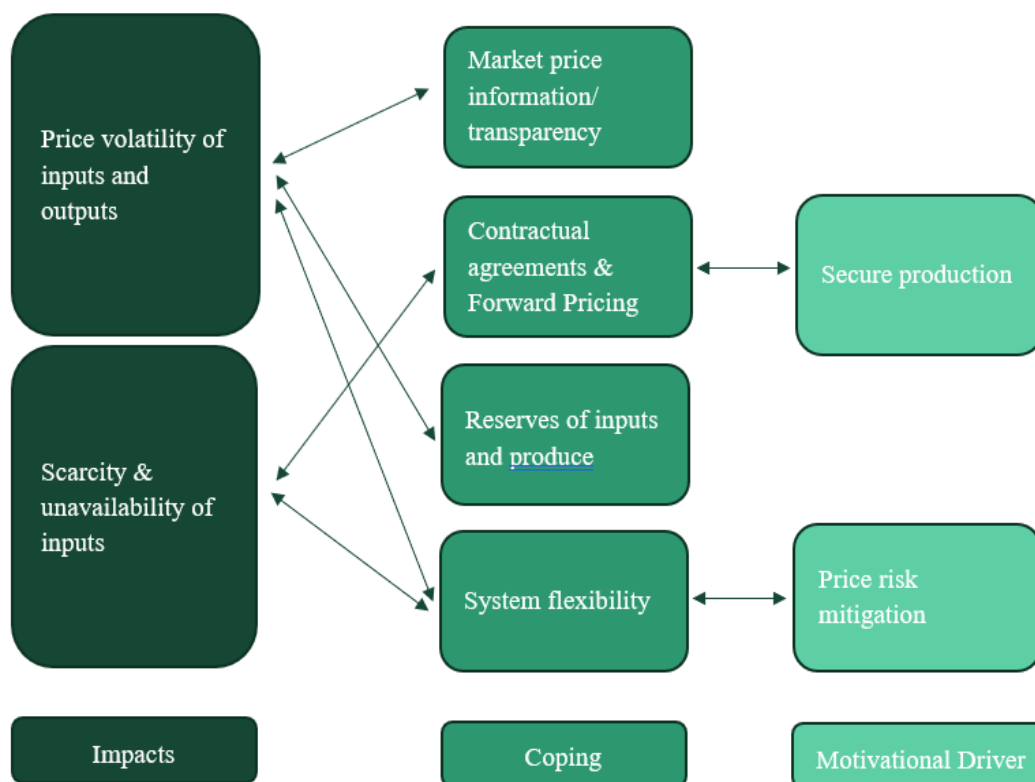


Figure 9: Interrelationships of the concepts Case 2

Planned Adaptations & Learnings

Regarding the adaptation plans of Case 2, the farmer states: *“The next thing on the plan now, I build two silos and a fermentation residue tank. And have a contract with the biogas plant that they are filling up the digestate tank [...] in winter”*. As a result, the farmer adopts the coping strategy ‘system flexibility’ towards using more organic fertilizer in the future and being less dependent on fluctuating prices or shortages of fertilizer.

The contract is managed under the circular economy by linking his farm, the biogas plant and another chicken farm. He delivers his silage maize to the biogas plant, drives to the chicken farm and collects the chicken manure from there. He then takes the manure to the biogas plant and picks up dried digestate, which he then stores in his silos and can later use as organic fertilizer.

As already stated in the coping strategies farmer 2 was also pre-buying urea after the outbreak of Ukraine war for the new harvest 2023, while he mentioned that this can be seen as a mistake in retrospect. Case 2 stored 1000 tons of grain and rapeseed, although prices were good in summer 2022, and now the prices dropped

in January/ February 2023. In retrospect, the farmer also regrets storing the wheat and rapeseed for too long.

As main theme, the researcher highlights:

- More organic fertilizer (building 2 silos and fermentation residue tank)

Table 5: Summary of themes Case 2

Affected by market shock	<ul style="list-style-type: none"> • Price volatility of inputs and outputs • Scarcity & unavailability of inputs (urea)
Coping Strategies & Motivational Drivers	<ul style="list-style-type: none"> • Market price information/ transparency • Contractual agreements & Forward Pricing • Reserves of inputs and produce • System flexibility (more organic fertilizer) <p>➤ Secure production</p> <p>➤ Price risk mitigation</p>
Planned Adaptations & Learnings	<ul style="list-style-type: none"> • More organic fertilizer (building 2 silos and fermentation residue tank)

5.1.3 Case 3

Affected by current Market Shock

Case 3 states that the current situation “*got more difficult*”. Farm manager 3 further claims that “*the current situation is not bad in agriculture*”. He emphasizes that the market was “*overheated*”, while now it is “*back down to earth*” and “*agriculture can still make money*”. While at the same time, he also admits that marketing has become a bit of a “*lottery game*”. The property manager of Farm 3 also expressed satisfaction with the falling prices of fertilizers and pesticides, noting that the prices of the latter might also fall further. However, he mentions that machinery “*will probably not come down in price again*”. The traders are now charging 20-30% more, and respondent 3 further states that *labour costs and wages are the biggest headache for us*”.

Out of the empirical data of case 3 the researcher derived the following themes:

- Price volatility of inputs and outputs
- Machinery price increase
- Labour costs and wage increases

Coping Strategies & Motivational Drivers

Based on the empirical data received by interviewing Farmer 3, the researcher derived the following themes:

Market price information/ transparency

Farmer 3 mentions, that he observed the market situation and decided to buy a few things in advance due to the observation of the increasing machinery price trend. Therefore, the researcher links this to market price information. Case 3 is continuously investing a certain amount into machinery, even in bad years. Regarding market price transparency the manager states that although they did not change the number of trading partners, he always reaches out to 3-4 traders, stating “*Competition stimulates business*”.

‘Salami tactics’ or Spreading Sales

Regarding the theme of partially selling and buying farmer 3 brings up the term ‘Salami tactics’: “*We followed Salami tactics, always if the price is good, then selling a part [...]*”. Additionally, the manager mentions that other farmers did not follow the continuous strategy but speculated.

Counter-hedging

Case 3 also follows a counter-hedging strategy to cope the price volatility of inputs and outputs at the same time: “*At the time when fertilizer was expensive, we also sold wheat at expensive prices, so we counter-financed*”. However, this strategy is only possible if the wheat and fertilizer market prices are on an equal level.

Contractual agreements & Forward pricing

The farm manager 3 uses pre-contracts, while he additionally employing price hedging strategies on the stock exchange or a price hedging system of an agricultural trader. In this context, case 3 has already pre-contracted the entire harvest produce for 2023 at very good prices in the end of 2022, while directly counter-hedged through buying fertilizer expensive at the same time. The farm manager indicates that he does not use pre-contracts more than before and that the volume always depends on the year.

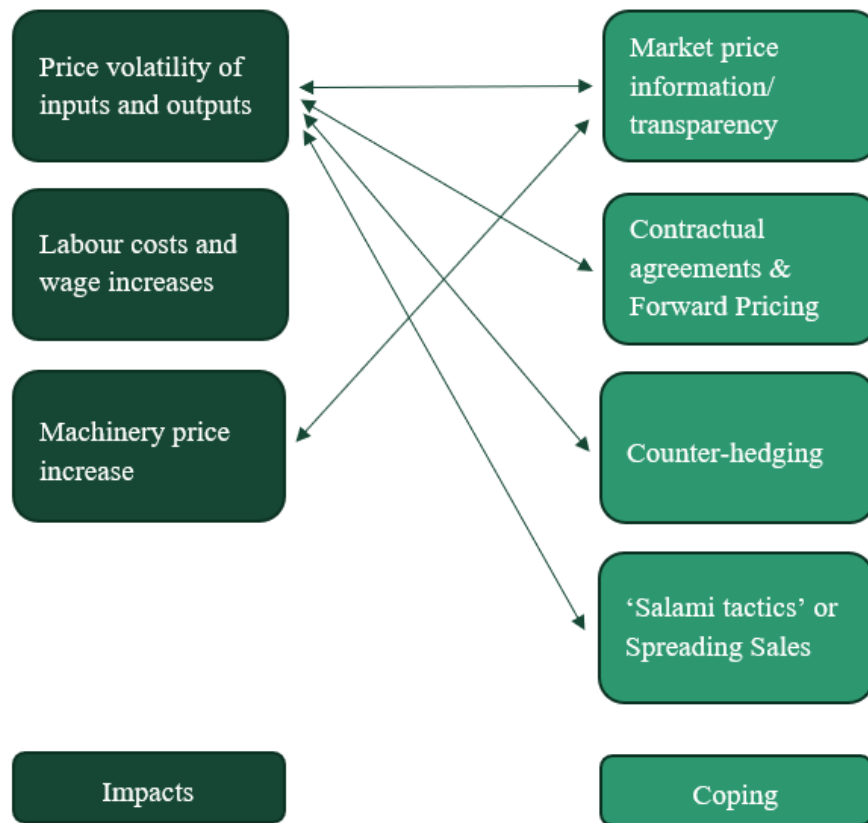


Figure 10: Interrelationships of the concepts Case 3

Planned Adaptations & Learnings

The farm manager is currently not planning on changing anything and highlights that he will stick to the strategy of ‘Salami tactics’. Due to good management decisions, there is currently no need for his organization to adapt: *“Due to the fact that we were not so wrong the last few years, I’m not at all at the moment, [...] that we are fundamentally changing our marketing story here”*.

However, the farm manager mentions that listening to the analysts was wrong, who said that the *“golden times”* will last with 500 €/ton of wheat. In this context, he stresses that it is a *“highly speculative”* lottery game. In conclusion, farm manager 3 emphasizes that *“Nothing is more constant than change and transformations”*.

As main theme, the researcher highlights:

- No planned adaptations (stick to ‘salami tactics’)

Table 6: Summary of themes Case 3

Affected by market shock	<ul style="list-style-type: none"> • Price volatility of inputs and outputs • Machinery price increase • Labour costs and wage increases
Coping Strategies & Motivational Drivers	<ul style="list-style-type: none"> • Market price information/ transparency • Contractual agreements & Forward Pricing • Counter-hedging • ‘Salami tactics’ or Spreading Sales
Planned Adaptations & Learnings	<ul style="list-style-type: none"> • No planned adaptations (stick to ‘salami tactics’)

5.1.4 Case 4

Affected by current Market Shock

Farmer 4 points out that till autumn 2022 the market situation was good. While also admitting that *“marketing has already become a bit of a lottery”*. He mentions that fertilizer scarcity was foreseeable and *“that the supply will be quite tight”*. Case 4 complains about the drop of grain and rapeseed prices, and highlights that the *“current stock market is very nervous”*. On some days the price *“rises or falls by €1.50 per quintal [100 kg] per day, i.e. for cereals or rapeseed”*. The interviewee further adds that currently it is very difficult to calculate and predict. He ordered UAN fertilizer for 65€, while it is now (April 2023) at 38€. Farmer 4 also highlights the machinery price increase: *“We also have the problem that the prices for agricultural machinery have gone up exorbitantly.”* In addition, the farmer brings up the scarcity of spare parts and goods in general and adds that rental tractors are all sold now and unavailable for renting. Moreover, the farm owner mentions the risk of buyers for insolvency before payment deadline and complains about landlords requesting a higher rent level due to the price increase in 2022.

Out of the empirical data of case 4 the researcher derived the following themes:

- Price volatility of inputs and outputs
- Scarcity & unavailability of inputs (fertilizer, spare parts)
- Machinery price increase
- Unavailability of rental tractors
- Higher risk of insolvency of the buyer/ trader

- Landlords demanding higher rent level

Among market shock-related challenges, he states that “*politics is the biggest risk we have at the moment*”, and that due to new regulations his farm is in the ‘red area’. Therefore, the reduced fertilizer quantity of Case 4 cannot be related to shock coping strategies but to political regulations and laws, which are not part of this research.

Coping Strategies & Motivational Drivers

From the empirical interview data, the researcher derived the following coping themes from case 4:

‘Salami tactics’ or Spreading Sales

Farmer 4 comments on spreading the risk and to “*trade every now and then*”, while further stating: “*Putting all eggs in a basket does not make sense at the moment*”. This statement resonates with the theme of implementing 'Salami Tactics' as identified in this research.

Contractual agreements & Forward pricing

Farmer 4 pre-sold wheat for the 2022 harvest one week after the outbreak of the Ukraine war. He also used pre-contracts to buy fertilizer (see Reserves of inputs and outputs). The farmer further states that the “*leverage is not as high at fertilizer as it is when selling grain*”, meaning that it is more important to sell at the right time than to buy at the right time. However, the farmer points out the dilemma of pre-contracts in terms of weather uncertainty.

The dilemma of weather & forward pricing

Regarding his decision-making, Farmer 4 states: “*I am very reluctant to take the risk, or that I sell my canola before I have drilled it*”, because of the weather risk that the rape seed will not come up after winter. He adds that it is impossible to know how much you will harvest, and therefore it is impossible to sell 100% of the harvest through forward contracts. Farmer 4 elaborates that a farmer “*can only continuously monitor his field crop stands and on the basis of this continuously estimate the yield per hectare*”. Thus, the farmer can estimate the crop yield relatively well just before harvest and pre-contract then. However, the farmer can estimate the crop yield poorly in winter, with farmer 4 noting that for rapeseed it is very difficult to predict yield even right before harvesting. The researcher observes that the yields are hard to predict in advance and thereby the forward pricing and pre-contracting is limited.

Market price information/ transparency

Farmer 4 has made strategic purchases and acquired a tractor at the end of 2022 to ensure the operation and to respond to the expected increase in machinery prices. However, he stresses the limitations of expert advice and market media recommendations in the current situation, saying, *"Experts can't help in this case."* He underscores the risk of buyer insolvency before payment deadline and reiterates the importance of market diversification and transparency. Farmer 4 repeatedly draws attention to "market transparency" as a vital goal. He identifies digital media as a valuable tool for identifying regional price differences or price differentials between the Agri-traders, and advocates farmer networking as a means to enhance market transparency. He acknowledges that information sharing within his network has increased since the onset of the market shock and emphasizes, *"Networking among farmers is very important."* Farmer 4 affirms, *"You have to try to create market transparency for yourself somewhere."*

Reserves of inputs and produce

Farmer 4 mentions that he purchased all fertilizer due to foreseeable supply chain shortages while stating that in 2021 it was right and in 2022 it was wrong in retrospect. He also did not presell a lot for harvest 2023 but could store the rapeseed and wheat produce completely. The farm owner further points out that he made the decision of pre-buying UAN due to the *"main problem [...] to have the security that the commodity is then also available"*.

Machinery reliability

At the end of 2022, farmer 4 took a decisive step by purchasing a tractor to ensure the continuity of his business amidst a rising price trend. This was also a precautionary measure against possible disruptions due to machine breakdowns and the unavailability of spare parts. He summarizes his management approach by saying, ***"Production security comes before price, and so you have to invest at some point."*** This view is also supported by the current unavailability of rental tractors, which underscores the importance of reliable farm equipment.

Production diversification

Farmer 4 states that resilience is also built by cultivating several crops, like grain, beets, potatoes, and peas. This serves as a practical risk management strategy regarding crop price and weather risk. Farmer 4 mentions a minor adjustment in crop selection *"because the advantageousness of the individual crops were very different"*, in the previous year.

Secure production

The major motivational driver that is observed by the researcher for the farmers coping decisions is ‘securing the production’. Farmer 4 notes that “*Production security comes before price*” when it comes to buying expensive nitrogen or purchasing machinery. In addition, the farmer indicated that “*it is useless if prices go down and then there are no goods*”. He therefore decided to pre-buy UAN in advance, mainly for the reason “*to have the security that the commodity is then also available*”.

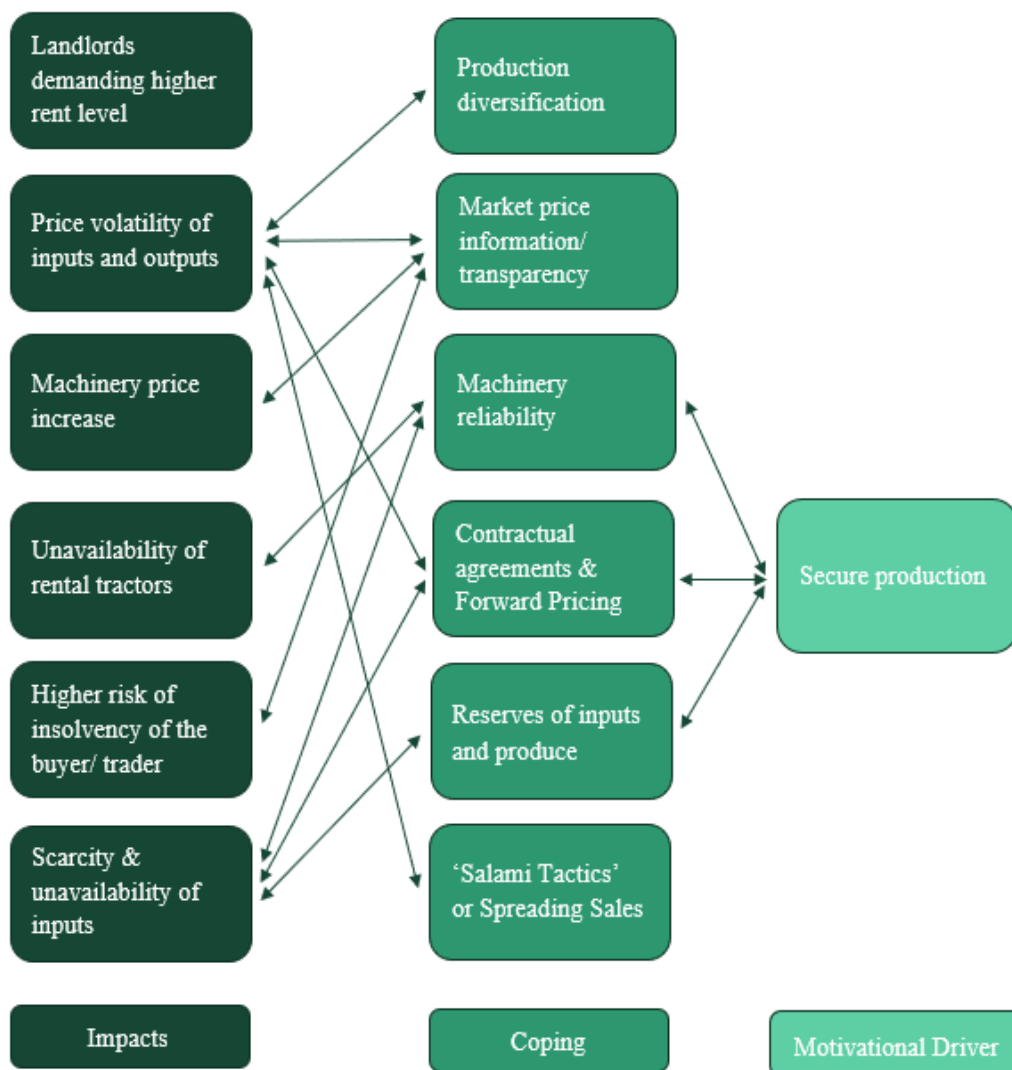


Figure 11: Interrelationships of the concepts Case 4

Planned Adaptations & Learnings

Regarding the adaptation plans of Case 4, the farmer considers selling more equally in the future: *"I [...] have to pay more attention to the fact of always selling something in equal tranches throughout the year."* The researcher classifies this statement to the theme of 'Salami tactics' or Spreading sales. Under Salami tactics the farmers understand the continuous process of buying or selling partial amounts of their inputs and output and by that mitigating the market price risk. Farmer 4 adds, *"When prices are good, then sell a part of the harvest,"* while it *"does not make sense [...] putting all your eggs in one basket; [...] you have to accept that there can be no price spikes."*

In retrospect, farmer 4 realizes that he waited too long to sell most of the grain, and now prices have fallen. He also emphasizes that he did not pre-sell much for the 2023 harvest, especially for rapeseed. He points out that selling grain too late *"can be made up with nothing"*, leading him to conclude that the *"leverage is not as high at fertilizer as it is when selling grain"*, meaning that selling at the right time is more important than buying at the right time.

The farm owner notes that regarding fertilizer, it was a *"good decision to prebuy early"* in 2022. He additionally reflects in retrospect that he should have increased sales *"in the falling market"*.

As main themes, the researcher derived:

- 'Salami tactics' or Spreading Sales (Selling more equally throughout the year)
- Selling at the right time has greater leverage than buying at the right time

Table 7: Summary of themes Case 4

Affected by market shock	<ul style="list-style-type: none"> • Price volatility of inputs and outputs • Scarcity & unavailability of inputs (fertilizer, spare parts) • Machinery price increase • Unavailability of rental tractors • Higher risk of insolvency of the buyer/ trader • Landlords demanding higher rent level
Coping Strategies & Motivational Drivers	<ul style="list-style-type: none"> • ‘Salami Tactics’ or Spreading Sales • Reserves of inputs and produce • Contractual agreements & Forward Pricing • Machinery reliability • Market price information/ transparency • Production diversification <p>➤ Secure production</p>
Planned Adaptations & Learnings	<ul style="list-style-type: none"> • ‘Salami tactics’ or Spreading Sales (Selling more equally throughout the year) • Selling at the right time has greater leverage than buying at the right time

5.1.5 Case 5

Affected by current Market Shock

Farmer 5 states that *“the current situation is very bad, because the Polish market was flooded by Ukrainian grain [...] and domestic farmers cannot sell their goods”*. Although he initially benefited from this unexpected event that led to the market shock, because Case 5 pre-contracted fertilizer in 2021 and still had wheat in stock. This allowed Farmer 5 to benefit from higher producer prices in March and April 2022. However, interviewee 5 notes that he cannot sell his grains at the moment, because Polish traders are buying cheaper grain from Ukraine: *“Polish traders have bought in Ukraine for 16-17 € [per 100kg] and wheat at commercial traders they are practically not at all taking it from domestic farmers here.”* This leaves him with 800 tons of wheat in stock, which affects the farm’s liquidity: *“So we are already starting the year with €100,000 minus”*. Farmer 5 wants the current European market price of 240-280€ [per ton] but would only get 210€ per ton for wheat. He further explains that the Polish government is negotiating with the EU to

subsidize Polish farmers with 40-50€ per ton so that they are willing to sell their grain. Farmer 5 further comments that agricultural traders in Poland have not been willing to sign pre-contracts with him lately: *"So, the traders themselves here in Poland were reluctant to make advance contracts."* He also points out that he feared that the machines would become extraordinarily expensive.

Out of the empirical data of case 5 the researcher derived the following themes:

- Price volatility of inputs and outputs
- Traders not willing to sign pre-contracts
- Machinery price increase
- (Scarcity & unavailability of inputs)

Coping Strategies & Motivational Drivers

From the interview with Farmer 5, the researcher derived the following coping themes:

Market price information/ transparency

Farmer 5 made the decision to buy a machine, a telescopic handler, in advance on the grounds that *"we were afraid that machines would become so expensive"*. The farmer mentioned that they observed what would be needed for the farm the next years: *"Our telescopic handler [...] is already relatively old, so we knew that we would have to replace it in the next two or three years [...]."*

Contractual agreements & Forward pricing

Case 5 also makes use of pre-contracts. The farmer mentions that he bought fertilizer in November 2022 for 2023. However, the farmer states that agricultural traders in Poland are not willing to sign pre-contracts with him, which currently limits this coping strategy: *"So, the traders themselves here in Poland were reluctant to make advance contracts."*

Reserves of inputs and produce

Farmer 5 responded to the outbreak of war by purchasing as much fertilizer and diesel as he could. He increased his diesel storage capacity from 5,000 to 10,000 litres and procured other operational resources and pesticides. Although he had pre-contracted this year's fertilizer in November 2022, he noticed a subsequent decrease in its price. Due to the high increase in storage capacity and input resources, the researcher relates the farmer's motivational drivers to the themes of **'securing production'** and **'price risk mitigation'**.

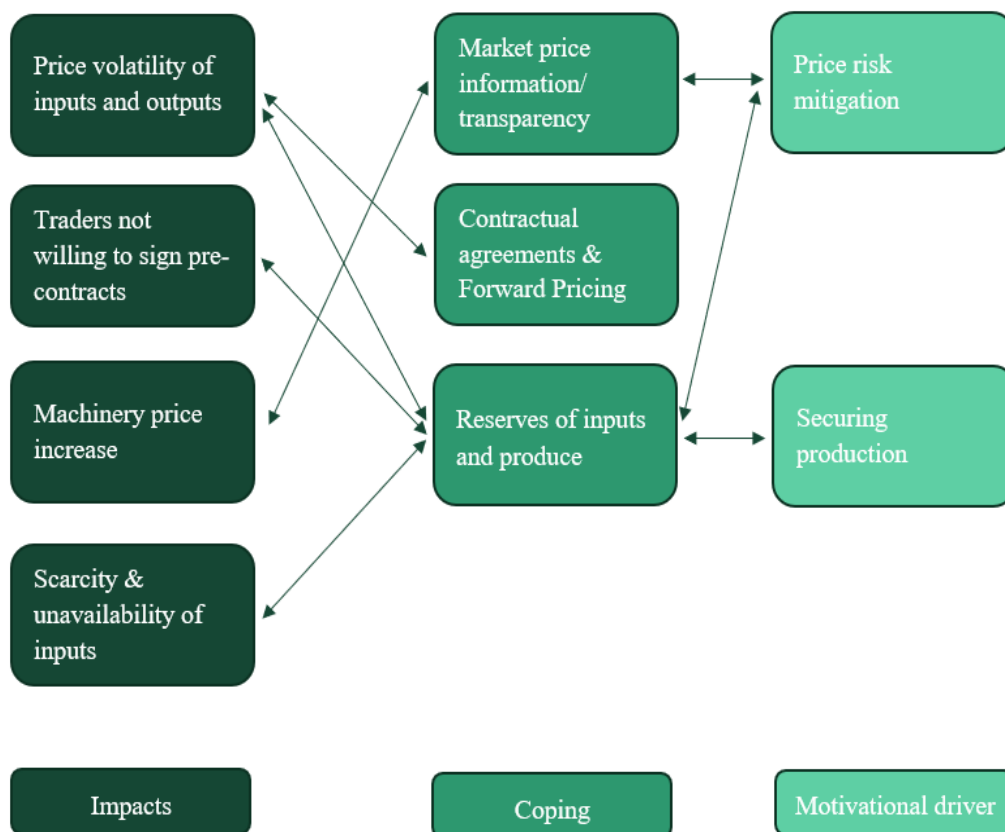


Figure 12: Interrelationships of the concepts Case 5

Current Polish saying

“So, in Poland, they say: The farmers who are financially poor, they have great advantages this year, because they had to sell the harvest last year, but have not pre-contracted fertilizer, because they have no money.” Farmer 5 states that these farmers are now buying fertilizer cheap and profited from the good wheat prices in summer 2022. *“And the farmers who are wealthier, they have gambled on higher wheat prices and because they had money, they have pre-contracted the fertilizer already last year, what was wrong, and have kept the wheat, was also wrong. So, [...] the financially strong farmers have practically a disadvantage now. And the financially weak farmers would have the advantage, inevitably.”*

To sum this up the financially strong farmers had the opportunity to secure their production, due to scarcity, while poorer farmers had to sell their harvest to get liquidity, but the market fluctuations were on their side for buying inputs cheap again.

Planned Adaptations & Learnings

In terms of planned adaptations, Farmer 5 attempts “to rely more on the salami tactic. In other words, not to play so much poker, but to really sell continuously from the harvest, and also to buy in partial quantities continuously. In other words, not taking such a big risk because the market is so unpredictable.” With this statement, another farmer mentions the ‘Salami tactic’ as a strategy known among farmers. By using the ‘Salami tactics’ strategy, the farmer mitigates market price risk. In retrospectively evaluating his decisions, farmer 5 notes that keeping half of the 2022 harvest produce was a mistake. He adds that pre-buying fertilizer in November 2022 was also wrong, because of the drop in fertilizer prices towards spring 2023.

As a prominent theme that emerges from Farmer 5’s approach, the researcher cites:

- ‘Salami tactics’ or Spreading Sales (selling & buying in partial quantities)

Table 8: Summary of themes Case 5

Affected by market shock	<ul style="list-style-type: none"> • Price volatility of inputs and outputs • Traders not willing to sign pre-contracts • Machinery price increase
Coping Strategies & Motivational Drivers	<ul style="list-style-type: none"> • Market price information/ transparency • Contractual agreements & Forward Pricing • Reserves of inputs and produce
Planned Adaptations & Learnings	<ul style="list-style-type: none"> • ‘Salami tactics’ or Spreading Sales (selling & buying in partial quantities)

5.2 Cross-Case Analysis & Discussion

In this section, the researcher conducts a comparative analysis of the five farm cases to explore commonalities and differences. The cross-case analysis will provide a comprehensive understanding of how these farmers cope with market shocks and identify overarching patterns and trends in their strategies and approaches. The analysis will be divided into the three major sections similar to the research questions. Table 9 structurally presents the themes, which the researcher has worked out of the transcribed interview data (cf. Within case analysis). By presenting similarities and differences, this section also gives answers to the three research questions:

- *How has the current market shock affected crop farms?*
- *How are farmers coping with the market shock?*
- *How do farmers plan to adapt afterwards?*

Table 9: Summary of themes across cases (own illustration)

Farm Case	Affected by market shock	Copings	Motivational drivers	Planned Adaptations
Case 1	Price volatility of inputs and outputs Scarcity & unavailability of inputs Machinery price increase Increasing interest rates	Market price information/transparency Contractual Agreements & Forward Pricing Reserves of inputs and produce Production diversification		Expansion of storage facilities (fertilizers and pesticides)
Case 2	Price volatility of inputs and outputs Scarcity & unavailability of inputs (urea)	Market price information/transparency Contractual Agreements & Forward Pricing Reserves of inputs and produce System flexibility (more organic fertilizer)	Secure production Price risk mitigation	More organic fertilizer (building 2 silos and fermentation residue tank)

Case 3	<p>Price volatility of inputs and outputs</p> <p>Machinery price increase</p> <p>Labour costs and wage increases</p>	<p>Market price information/transparency</p> <p>Contractual Agreements & Forward Pricing</p> <p>Counter-hedging</p> <p>‘Salami tactics’ or Spreading Sales</p>		<p>No planned adaptations (stick to ‘salami tactics’)</p>
Case 4	<p>Price volatility of inputs and outputs</p> <p>Scarcity & unavailability of inputs (fertilizer, spare parts)</p> <p>Machinery price increase</p> <p>Unavailability of rental tractors</p> <p>Higher risk of insolvency of the buyer</p> <p>Landlords demanding higher rent level</p>	<p>‘Salami Tactics’ or Spreading Sales</p> <p>Reserves of inputs and produce</p> <p>Contractual Agreements & Forward Pricing</p> <p>Machinery reliability</p> <p>Market price information/transparency</p> <p>Production diversification</p>	<p>Secure production</p>	<p>‘Salami tactics’ or Spreading Sales (Selling more equally throughout the year)</p> <p>Selling at the right time has greater leverage than buying at the right time</p>
Case 5	<p>Price volatility of inputs and outputs</p> <p>Traders not willing to sign pre-contracts</p> <p>Machinery price increase (Scarcity & unavailability of inputs)</p>	<p>Market price information/transparency</p> <p>Contractual Agreements & Forward Pricing</p> <p>Reserves of inputs and produce</p>	<p>Secure production</p> <p>Price risk mitigation</p>	<p>‘Salami tactics’ or Spreading Sales (selling & buying in partial quantities)</p>

5.2.1 Affected by Current Market Shock (Challenges)

The market shock mainly caused by the Russian-Ukrainian war had a significant impact on all five farm cases. By investigating these impacts, the researcher presents valuable insights into the practical farmers situation. The findings contribute to understanding the complexity of the market shock situation farmers face. While the farm cases face three similar challenges, some of the impacts were brought up by only one of the interviewees. Among these similarities, price volatility of inputs and outputs is the theme that was mentioned by all farmers.

The most common themes among the cases are significant price volatility of inputs and outputs, scarcity, and unavailability of inputs, and increasing machinery prices, as illustrated in Table 10. Although facing the same market shock, some farmers state impacts and challenges, the other farmers did not mention. Farmer 5 is the only one impacted by an extraordinary price drop and unwillingness of agricultural traders to buy his grain for the European market price. This is due to his farm being in Poland, which is importing large quantities of cheap grain from Ukraine. Other farmers note challenges regarding increasing interest rates, increasing labour costs and wages, unavailability of rental tractors, higher risk of insolvency of the buyer, or landlords demanding a higher rent level. All these themes were only stated by one of the five farmers, which underpins that farmers are having different views on the market shock, due to their specific business environment and risk consciousness.

Concerning the themes in common, the researcher takes up on these three main impacts:

- Price volatility of inputs and outputs
- Scarcity & unavailability of inputs (fertilizer, plant protection chemicals, spare parts)
- Machinery price increase

These results of the first research question, help understand farmers' reasons for making coping decisions, which will be answered in the following research question.

Table 10: Cross-Case Analysis - Impacts on Farms

Case	Price volatility of inputs and outputs	Scarcity & unavailability of inputs	Machinery price increase	Increase in interest rates	Labour costs and wage increases	Unavailability of rental tractors	Higher risk of insolvency of the buyer	Landlords demanding higher rent level	Traders not willing to sign pre-contracts
1	✓	✓	✓	✓					
2	✓	✓							
3	✓		✓		✓				
4	✓	✓	✓			✓	✓	✓	
5	✓	(✓)	✓						✓

5.2.2 Coping Strategies and Motivational Drivers

One common theme that emerged in all cases is the importance of **market price information and transparency** (see Table 11). Farmers recognize the need to closely monitor and analyse market trends, using various sources of information such as digital media, contacting several agricultural traders, or using farmer networks. Due to the upward machinery price trend, farmers decided to purchase machinery. By staying informed, they were able to make more informed decisions about buying and selling their products and inputs. This enabled them to adapt their strategies to prevailing market conditions.

Another coping strategy used by two of the farmers was the practice of spreading sales or implementing "**salami tactics**." The term "salami tactics" was derived as an in vivo code, a strategy known among farmers in practice. By distributing their sales and purchases over the year, farmers mitigate the risk of sudden price fluctuations. In this way, they can reduce vulnerability to market shocks. In addition, the cases demonstrated the importance of **contractual agreements and forward pricing** as coping tools. All of the farmers mentioned using them for both input procurement and sales. In this way, they are able to secure favourable terms and prices, which provided them with a degree of predictability in their operations. However, farmers said that due to the unpredictability of weather conditions, it is difficult to predict yields and therefore pre-contracting or forward pricing harvest outputs are limited or could lead to an increased risk of not being able to deliver the contracted amount.

Another similarity among the four out of five farmers regarding the theme **reserves of inputs and outputs** is the increase of input reserves. Farmers invested in building up reserves of key inputs such as fertilizers, or plant protection products, to mitigate scarcity and unavailability. This enabled them to maintain continuity of production and reduce dependence on external suppliers. Additionally, two cases highlight slight changes in their cultivation (**production diversification**) and one farmer switched to using more organic fertilizer (**system flexibility**) to reduce the input costs. One farmer also implemented **counter-hedging** as a coping strategy, including selling and buying for high/low prices at the same time. Another farmer cited **machinery reliability** as very important in the context of ensuring operational viability.

It is important to recognize that despite commonalities, each case faces unique circumstances and challenges. Geographic context, farm size, and specific farm environment influenced farmers' coping strategies and outcomes. For example, the farmer in Poland faced the challenge of agricultural traders being unwilling to buy

grain due to cheap Ukraine grain exports. Due to that, he cannot use contractual agreements and forward pricing, or ‘salami tactics’ at the moment.

Concerning the motivational drivers behind the farmers coping strategies, the researcher noted **securing the production** and **mitigating price risk** were most important.

Overall, the cross-case analysis provides valuable insights into the coping mechanisms of small and medium-sized agricultural enterprises in the face of the market shock, mainly caused by Ukraine-Russian war. It highlights the importance of market price information and transparency, marketing tools such as forward pricing and reliable inputs and machinery in coping with market shocks and building resilience.

Table 11: Cross-Case Analysis – Coping of Farms

Case	Market price information/transparency	Contractual Agreements & Forward Pricing	Reserves of inputs and produce	Production diversification	System flexibility (more organic fertilizer)	Counter-hedging	‘Salami tactics’ or Spreading Sales	Machinery reliability
1	✓	✓	✓	✓				
2	✓	✓	✓		✓			
3	✓	✓				✓	✓	
4	✓	✓	✓	✓			✓	✓
5	✓	✓	✓					

5.2.3 Adaptation Plannings

The third research question examined farmers' planned adaptations in response to the market shock and the learnings on their coping strategies. As visible in Table 12 the planned adaptations of the cases differ greatly. Except for the theme of using more Spreading sales or 'Salami tactics' the farmers plan to adapt in very different ways. While farmers 1 and 2 are adapting towards input storage facilities, farmers 4 and 5 are planning to adapt regarding their marketing behaviour. Farmer 3 is not planning any adaptations yet.

However, it must be said, that the Ukraine war is still ongoing and adaptations regarding the market shock may arise later in time. Adaptation is happening after the unexpected event (cf. conceptual model), and the researcher only investigated how agricultural SMEs are planning to adapt within the market shock.

Table 12: Cross-Case Analysis – Planned Adaptations of Farms

Case	Expansion of storage facilities (fertilizers and pesticides)	More organic fertilizer (building 2 silos and fermentation residue tank)	No planned adaptations (stick to ‘salami tactics’)	‘Salami tactics’ or Spreading Sales	Selling at the right time has greater leverage than buying at the right time
1	✓				
2		✓			
3			✓		
4				✓	✓
5				✓	

5.2.4 Connections between Concepts

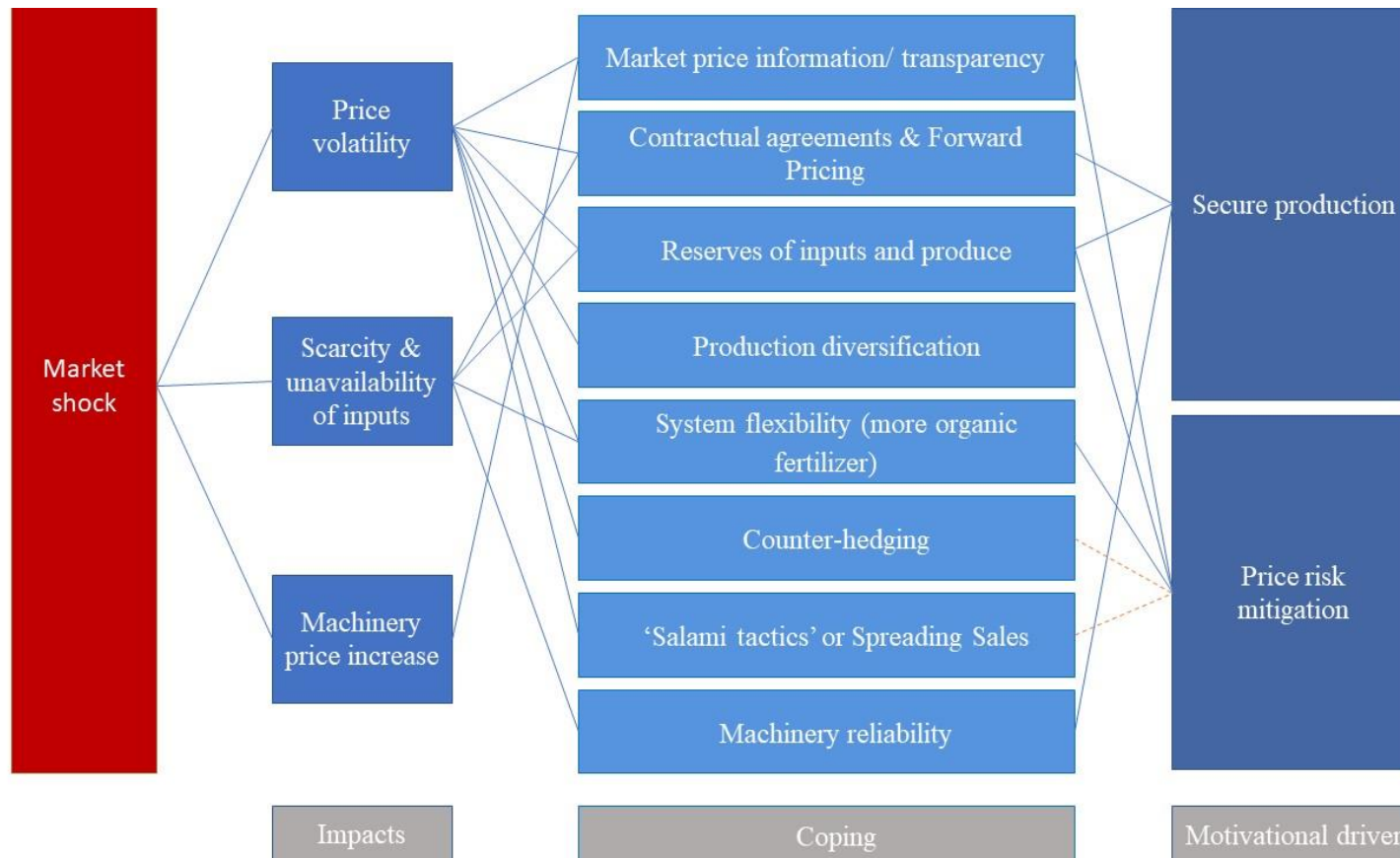


Figure 13: Links between Concepts (own illustration)

In Figure 13 the most common (similarities) impacts among the farm cases are interconnected with the coping strategies used by the five crop farms. The figure shows the complexity of understanding the market shock survival of the farms.

The researcher added two dotted lines, which did not derive from the empirical data directly. However, it would make sense to add these connections as the motivational driver behind using ‘Salami tactics’ and Counter-hedging most probably is price risk mitigation. It must also be said that the researcher did not study the motivational factors of the farmers in depth but discovered these themes during the interviews and thematic analysis.

5.2.5 Discussion of Model & Theory

In this section, the results from the analysis are discussed regarding the expanded conceptual model and existing concepts and literature. The results highlight the complexity of market shocks and the need for tailored and context-specific strategies. Furthermore, the researcher noticed that coping strategies and adaptations depend on the specific circumstances and challenges of individual farms. The cross-case analysis shows similarities and differences between the research cases and Figure 13 shows how themes are connected to each other.

The expanded conceptual model, which includes organizational resilience, risk management strategies, market shock, decision-making, and contingency theory, provides a comprehensive framework for understanding the complexity of agricultural SMEs navigating market shocks. The model helped the researcher as a guide to understanding the complexity of this research. The empirical data underpin the developed model, with the interrelations of the various concepts. This model can serve as a guide for future research and practical applications in coping with unexpected events and building resilience in agricultural enterprises.

The researcher found that the most common impacts of the market shock on the farms are price volatility of inputs and outputs, scarcity and unavailability of inputs, and increasing machinery prices. These impacts can be linked to coping strategies that derived from the interview data as well as aligned to the risk management strategies (cf. Hardaker et al. 2015; Kahan 2013). The most common strategies are Market price information/ transparency, Contractual agreements & Forward Pricing, as well as Reserves of inputs and outputs. However, the farmers also used individual strategies, such as counter-hedging or increasing the usage of organic fertilizers. In addition, the strategies used were justified by the farmers with the following themes: Mitigating price fluctuations and securing production.

The specific circumstances and contexts of individual farmers and their farms influenced the choice of coping strategies and planned adaptations. Therefore, the findings can be linked to the Contingency theory, which assumes that management decisions depend on the specific circumstances and situation (Moniz 2010; García-Vidal et al. 2017; Childs et al. 2022). Although the researcher found that there are similarities between strategies the cases used, decisions are often based on the current environment and internal factors. Though it can be said that business leaders in agriculture always need to decide regarding the specific situation they are in. The farmer in Poland, e.g., is highly affected by the agricultural traders buying Ukrainian grain and needs to cope differently in comparison to the other farmers. Also, Case 2 was able to switch to using more organic fertilizer from a biogas plant, while other farms may not have had this opportunity in their regional environment and therefore used other coping strategies and adaptations. A decision is always based on the specific context, while this changes from farm to farm and from time to time.

Managers examine their potential greatest weakness or challenge and therefore apply specific coping strategies and adapt if needed.

The findings provide valuable insights into the coping strategies and adaptations farmers use to respond to a market shock. Thereby, this study adds organizational resilience research to the literature. While this study mainly focuses on coping as concurrent action, it also gives an outlook of planned adaptations of the small and medium-sized agricultural enterprises.

6. Conclusion

The final chapter synthesizes the main findings in relation to the research aims and questions, discusses the contributions of the study to the existing body of knowledge, and reiterates the implications and delimitations. It also avenues for future research in the area.

6.1 Synthesis of Key Findings

This research aimed to explore how agricultural SMEs cope with and survive market shocks and how they plan to adapt reactively. In this regard, three research questions were formulated and investigated throughout the study. In this conclusion chapter the researcher will provide a summary of the research findings.

Research Question 1: How has the current market shock affected crop farms?

The results of the study show that the current market shock, caused primarily by the Russian-Ukrainian war, had a significant impact on agricultural SMEs. Farmers experienced price fluctuations in inputs and outputs, shortages and unavailability of inputs such as fertilizers and spare parts, and a dramatic increase in machinery prices. The market shock also led to significant problems selling grain for one farmer in Poland, because of cheaper imports from Ukraine flooded the market. These findings highlight the disruptive nature of market shocks and their profound impact on agricultural SMEs. However, the first research question was asked primarily to understand the following coping strategies and adaptations.

Research Question 2: How are farmers coping with the market shock?

The coping strategies used by farmers varied from case to case but had some themes in common. Market price information and transparency played a critical role to cope the market shock. Contractual agreements and forward contracts were used to mitigate risk, and stocks of inputs and (produce) were built up to secure production. The strategy of "Salami tactics" or Spreading sales derived from the empirical data, which two of the cases state to use for coping price volatility. However, some strategies were only implemented by one of the farm cases, for example counter-hedging, or machinery reliability.

Research Question 3: How do farmers plan to adapt afterwards?

Farmers' planned adaptations reflect their commitment to resilience and learning from the market shock experience. While some farmers intend to use 'salami tactics' more consistently and sell and buy more evenly throughout the year, others plan to expand their input storage facilities, shift to greater use of organic fertilizer, or focus more on selling produce than on buying inputs due to greater leverage. These planned adaptations in each case illustrate the different internal and external factors of each farm and provide a link to the contingency theory of situational decision-making in management.

6.2 Academic Contribution

This study contributes to the scientific literature in several ways. First, it provides insights into the coping strategies and adaptations used by agricultural SMEs in response to market shocks. By examining real-world experiences and practices, the study improves our understanding of crisis management, organizational resilience, and risk management in the agricultural sector. The results shed light on the complexity of market shocks and the interplay of various concepts. Second, the study extends the Ducheck (2020) model of organizational resilience by incorporating risk management strategies, market shock, decision-making, and contingency theory. The expanded model provides a comprehensive framework for analysing the dynamics of coping and adaptation in agricultural enterprises. Even though this study did not investigate all of the concepts deeply, the researcher clearly shows the relationships between them. Furthermore, the researcher presents practical farmers insights and strategies navigating the market shock situation. In this way, this study adds crisis management and organizational resilience research to the existing literature and contributes to closing the existing research gap on how SMEs survive and recover from market shocks (cf. Morgan et al. 2020; cf. Herbane 2010).

6.3 Limitations & Future Research

Although the results provide valuable insights, it is important to acknowledge the limitations of this study. The study focused on one agricultural SME in Poland and on four in Germany, and by that on a limited number of cases, which limits the generalizability of the findings. Furthermore, this research investigated only planned adaptations and therefore future research regarding adaptations at a later point of time is needed. In addition, the analysis focused primarily on coping strategies and adaptations, and further research is needed to examine other

dimensions of organizational resilience, such as anticipation. Future research could also dive into the risk management field of farmers and use the Hardaker et al.'s book (2015) to investigate quantitatively the decision-making of the farm managers. Another study could focus on conducting a SWOT-analysis of each farm to also investigate the decision-making process of the farmers further.

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Popular science summary

The agricultural sector has been significantly affected by the market shock resulting from the Russian-Ukrainian war, which began in February 2022. This study examines how small and medium-sized enterprises (SMEs) in agriculture are coping with this unprecedented market shock. The study is guided by three research questions that focus on the impact of the market shock on farms, farmers' coping strategies and decision motivations, and farmers' planned adaptations and learnings in response to the shock.

A qualitative research methodology was used in which semi-structured interviews were conducted with farmers growing conventional crops as part of a multiple case study. The sample included five cases, with one farmer from Poland and four from northern Germany. The main findings of the study show that farmers face challenges such as price volatility, shortages and unavailability of inputs, and rising machinery prices. To overcome these challenges, farmers have developed various coping strategies. Their main focus is on "securing production" by stocking up on essential inputs such as fertilizer, crop protection products and diesel. In addition, farmers have adopted strategies such as 'Salami tactics', which include distributed buying and selling of inputs and produce, contractual arrangements and forward pricing, and improving market transparency by networking and contacting multiple agricultural traders. In terms of planned adaptations, the study found that different farms have different approaches. Some farms plan to increase storage capacity for inputs, while others plan to use more 'Salami tactics' in their operations. Another farm plans to build silos and digestate tanks to facilitate the use of organic fertilizers.

By examining farmers' responses to market shock, this research contributes to the understanding of organizational resilience, crisis management, and risk management in the agricultural sector. The results provide valuable insights for policy makers, crisis management researchers, and agricultural economists in addressing the challenges posed by sudden exogenous market shocks. This study also provides the basis for further research in this area aimed at improving the resilience of agricultural SMEs in the face of market uncertainties.

In addition, it should be noted that the study was conducted within a specific time frame. Future research may examine the long-term implications and adaptations to the ongoing market shock and war. Overall, this study sheds light on how agricultural SMEs cope and adapt to the market shock and contributes to the broader discourse on organizational resilience and risk management.

Acknowledgements

I would like to express my sincere gratitude to the farmers who agreed to participate in the interviews for this study. Your insights were invaluable. I would also like to thank Mr. Grothusen and Mr. Zachert for putting me in touch with the farmers. Many thanks to my parents and friends for the unwavering support, even from afar. Your encouragement has strengthened my resolve. I am especially grateful to my thesis supervisor, Richard Ferguson, whose guidance, and motivation were crucial throughout my work on this study. Thank you for steering me in the right direction.

Appendix 1: Interview guide

I. General questions

- a. How old are you?
- b. How long has your farm already existed?
- c. How many hectares (ha) do you currently farm on?
- d. What are your main crops in descending order, starting with the largest crop by area?
- e. What are your storage options?
- f. How would you describe your willingness to take risks?

II. Impacts on farm

- a. How do you see the current market situation in agriculture?
- b. To what extent was/is your business affected by the current market shock?
- c. What are you most concerned about/anxious about/ challenges by in this regard?

III. Reactions and coping strategies

- a. What was your immediate reaction to the outbreak of the Ukraine war?
- b. What strategies did you pursue in order to operate profitably and minimize risks during this period?
- c. Have you changed/expanded your purchasing behaviour, including storage, purchasing timing, or purchasing instruments, or are you planning to do so soon?
- d. Have you changed your selling behaviour, including storage, selling timing or selling instruments, or do you plan to do so soon?
- e. Have you used price hedging more than before?
- f. How have the price shock and market uncertainty affected crop selection?
- g. Have you changed/adjusted the production inputs due to market shock?
- h. Have you cooperated more with other farmers?
- i. Has price shock and market uncertainty affected your investment behaviour?
- j. Have you changed agricultural traders for buying and selling due to the price shock?

- k. Would you like to mention any other strategies or decision or go into more detail?
- l. How would you evaluate your decisions in retrospect? And how did you make decisions?

IV. Outlook and future planning

- a. How do you plan to deal with the market uncertainty in the near future; to what extent do you plan to adjust your risk management?
- b. Where do you see risks for the coming months?
- c. To what extent do you see your business as resilient?

Interview guide – German

I. Allgemeine Fragen

- a. Wie alt sind Sie?
- b. Wie lange existiert Ihr Betrieb bereits?
- c. Wie viele Hektar (ha) bewirtschaften Sie derzeit?
- d. Welches sind Ihre Hauptkulturen in absteigender Reihenfolge, beginnend mit der flächenmäßig größten Kultur?
- e. Welche Lagermöglichkeiten haben Sie?
- f. Wie würden Sie Ihre Risikobereitschaft beschreiben?

II. Auswirkungen auf den Betrieb

- a. Wie sehen Sie die aktuelle Marktsituation in der Landwirtschaft?
- b. Inwieweit war/ist Ihr Betrieb von dem aktuellen Marktschock betroffen?
- c. Was bereitet Ihnen in diesem Zusammenhang die größten Sorgen, Ängste und Herausforderungen?

III. Reaktionen und Bewältigungsstrategien

- a. Was war Ihre unmittelbare Reaktion auf den Ausbruch des Ukraine-Krieges?
- b. Welche Strategien haben Sie verfolgt, um in dieser Zeit gewinnbringend zu wirtschaften und Risiken zu minimieren?
- c. Haben Sie Ihr Einkaufsverhalten geändert, einschließlich der Lagerhaltung, des Einkaufszeitpunkts oder der Einkaufsinstrumente, oder planen Sie dies in nächster Zeit?
- d. Haben Sie Ihr Verkaufsverhalten, einschließlich Lagerhaltung, Verkaufszeitpunkt oder Verkaufsinstrumente, geändert oder planen Sie dies in nächster Zeit?
- e. Haben Sie Preisabsicherungen mehr als zuvor genutzt?
- f. Wie haben sich der Preisschock und die Marktunsicherheit auf die Auswahl der Kulturen ausgewirkt?
- g. Haben Sie die Produktionsmittel (Inputs) aufgrund des Marktschocks verändert/angepasst?
- h. Haben Sie mehr mit anderen Landwirten kooperiert?
- i. Haben sich Preisschock und Marktunsicherheit auf Ihr Investitionsverhalten ausgewirkt?
- j. Haben Sie aufgrund des Preisschocks den Agrarhändler für den Ein- und Verkauf gewechselt?

- k. Möchten Sie weitere Strategien oder Entscheidungen erwähnen oder näher erläutern?
- l. Wie würden Sie Ihre Entscheidungen im Nachhinein bewerten? Und wie haben Sie Ihre Entscheidungen getroffen?

IV. Ausblick und Zukunftsplanung

- a. Wie planen Sie in nächster Zeit mit der Marktunsicherheit umgehen; inwieweit planen Sie eine Anpassung Ihres Risikomanagements?
- b. Wo sehen Sie Risiken für die kommenden Monate?
- c. Inwieweit sehen Sie Ihren Betrieb als resilient an?

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