MASTER

MANAGEMENT AND INDUSTRIAL STRATEGY

MASTER´S FINAL WORK

DISSERTATION

BLOCKCHAIN TECHNOLOGY IN CROP-INSURANCE: A CASE STUDY

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SUPERVISION:
PROF. DRA. GRAÇA MARIA DE OLIVEIRA DA SILVA

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I want to thank the school, these past two years at ISEG have been a unforgettable experience where I got to grow professionally and personally. And most of all have been able to make new friendships, impressions and memories with people from all around the world.

ABSTRACT

This research project extensively explores the use of blockchain technology in the agricultural sector for crop-insurance targeted at smallholder farmers in Sub-Saharan Africa. This is done through a case study of Etherisc and their partnership with Acre Africa. It delves into the adaption of blockchain technology and the associated challenges and barriers. While, also identifying the key drivers and benefits of using blockchain technology for crop-insurance.

The research project follows a qualitative research design with an exploratory approach. A case study was chosen as the research method. Primary data was collected through a semi-structured interview with Susanne Austin from Etherisc. While, secondary data was collected through document analysis from the company's website, blogs, videos and white papers. This allowed data triangulation to enhance credibility.

The findings show how blockchain-based crop-insurance enhances efficiency, transparency, traceability and reduces operational costs. While proven barriers include lack of trust, government regulations and affordability.

Furthermore, this study contributes theoretically by addressing the academic literature on blockchain applications in the agricultural insurance, and practically by showing providers how they could benefit from adopting blockchain-based crop-insurance to improve trust, increase take up and reduce payout times.

Keywords: Blockchain technology, Crop-insurance, Smart Contracts

RESUME

Este projeto de pesquisa explora de forma abrangente o uso da tecnologia blockchain no setor agrícola para seguros de safra direcionados a pequenos produtores rurais na África Subsaariana. A investigação é conduzida através de um estudo de caso da empresa Etherisc e sua parceria com a Acre Africa. O trabalho examina detalhadamente a adoção da tecnologia blockchain, bem como os desafios e obstáculos associados a ela, identificando também os principais fatores impulsionadores e benefícios do uso dessa tecnologia para seguros de safra.

O projeto de pesquisa adota um delineamento qualitativo com abordagem exploratória. O estudo de caso foi selecionado como método de pesquisa. Os dados primários foram obtidos através de uma entrevista semiestruturada com Susanne Austin, representante da Etherisc. Os dados secundários foram coletados mediante análise documental do site da empresa, blogs, vídeos e documentos técnicos (white papers). Esta triangulação de dados permitiu aumentar a credibilidade da pesquisa.

Os resultados demonstram como os seguros de safra baseados em blockchain aprimoram a eficiência, transparência e rastreabilidade, além de reduzirem os custos operacionais. Entre as barreiras identificadas estão a falta de confiança, regulamentações governamentais e questões de acessibilidade financeira.

Ademais, este estudo contribui teoricamente ao preencher lacunas na literatura acadêmica sobre aplicações da blockchain em seguros agrícolas e, do ponto de vista prático, ao demonstrar aos provedores como podem se beneficiar da adoção de seguros de safra baseados em blockchain para fortalecer a confiança, aumentar a adesão e reduzir os prazos de pagamento de indenizações.

Palavras-chave: Tecnologia blockchain, Seguro agrícola, Contratos inteligentes

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1. INTRODUCTION

Smallholder farmers play a crucial role in global food production. Their food production supports around two billion people worldwide. Which is equal to 50% of global annual food production. At the same time, they are among the most vulnerable to the impacts of climate change (Etherisc, Etherisc's Journey with Acre Africa, 2021; Etherisc, 2025; Global Alliance for a Sustainable Planet, sd).

Climate change has a significant effect on agricultural productivity. Leading up to a potential drop of 30%. This will have a direct impact on food availability and place financial strains on farmers. Crop failures will lead to reduced incomes and financial instability (Etherisc, 2025; Mathai, 2023; Gregrowski, 2024).

Given the region's vulnerability to climate change, economic instability and limited infrastructure, the study on crop-insurance and blockchain technology in Sub-Saharan Africa is highly relevant. Many smallholder farmers lack reliable insurance coverage, with only 3% of farmers covered in Sub-Saharan Africa, leaving them vulnerable for crop losses caused by droughts, floods or pests (Etherisc, Etherisc's Journey with Acre Africa, 2021).

The relevance of this topic is connected to the significant potential blockchain holds. In the insurance industry, blockchain presents the opportunity to make insurance more accessible and affordable. In many other sectors, we already see a big interest in blockchain technology (Thangarasu & Alla, 2025). The use of blockchain technology into agricultural insurance systems provides a transparent, secure and efficient method of managing policies, claims and payouts, thereby fostering trust and reducing fraud. This trust can increase the adoption of insurance for smallholder farmers, offering them protection against financial vulnerability. Additionally, blockchain technology enables the development of mobile-based microinsurance platforms that are tailored to the needs of smallholder farmers, thereby improving accessibility and affordability.

Upadhyay (2020) notes that, despite growing enthusiasm, there remain doubts about blockchain's practical value due to the absence of real-world applications. Furthermore, while several studies have examined the issues of weather index insurance, the potential of blockchain technology remains unexplored (Ntukamazina, et al., 2017). This is particularly important in sub-Saharan Africa, where increasing climate vulnerability intersects with growing digital innovation.

The growing number of studies related to blockchain technology in the agricultural sector highlights the central relevance of this topic (Demestichas et al., 2020).

Thus, this research project therefore focuses on the role of blockchain technology in the parametric agricultural insurance industry, specifically crop-insurance. The study examines the key drivers behind the adoption of blockchain, as well as well as barriers and benefits associated with it.

The **research question** of this research project is as following:

"How do insurance companies make use of blockchain-based crop-insurance in Sub-Saharan Africa?"

To answer this research question, a case study was performed about Etherisc, focusing on their collaboration with Acre Africa. Where Etherisc is a decentralized insurance platform, while Acre Africa makes use of this platform to connect farmers to innovative insurance products.

In order to address the research question, the study has set the following **objectives**:
- To explore the collaborative roles of Etherisc and Acre Africa in blockchain-based crop-insurance.
- To identify the motivations behind Etherisc's adoption of blockchain technology for crop-insurance in Sub-Saharan Africa.
- To analyse how blockchain technology is applied in practice to insure farmers, specifically in terms of the implementation process, data flows and interactions.
- To identify the key challenges and barriers faced by Etherisc during the implementation of blockchain-based crop-insurance.
- To identify the expected benefits of blockchain technology adoption, for example in terms of transparency, trust and cost efficiency.

This study will contribute to a better understanding of how blockchain technology can be used in the agricultural sector for crop-insurance. This is relevant since the amount of research done on this topic is very limited (Omar, et al., 2023).

This research project will be structured as following. The first chapter will present the literature review. The second chapter will present the methods used for this research project and the rationale behind these methods. This is followed by an analysis and discussion of the case study. Finally, the conclusion, the literature cited and the appendix.

2. LITERATURE REVIEW

2.1. Agricultural Supply Chain Management

Nowadays, companies are often part of complex supply networks rather than functioning as isolated entities. A supply chain comprises all the companies and processes that contribute to adding value to the final product. Supply chain management refers to the strategic coordination and integration of relationships with suppliers and customers throughout the supply chain, with the aim of creating value in the final market while minimizing overall costs (Svensson, 2002). Figure 1 shows the different information flows of the supply chain. Supply chain management is all about managing these flows (Dubey, et al., 2020; Lambert & Cooper, 2000).

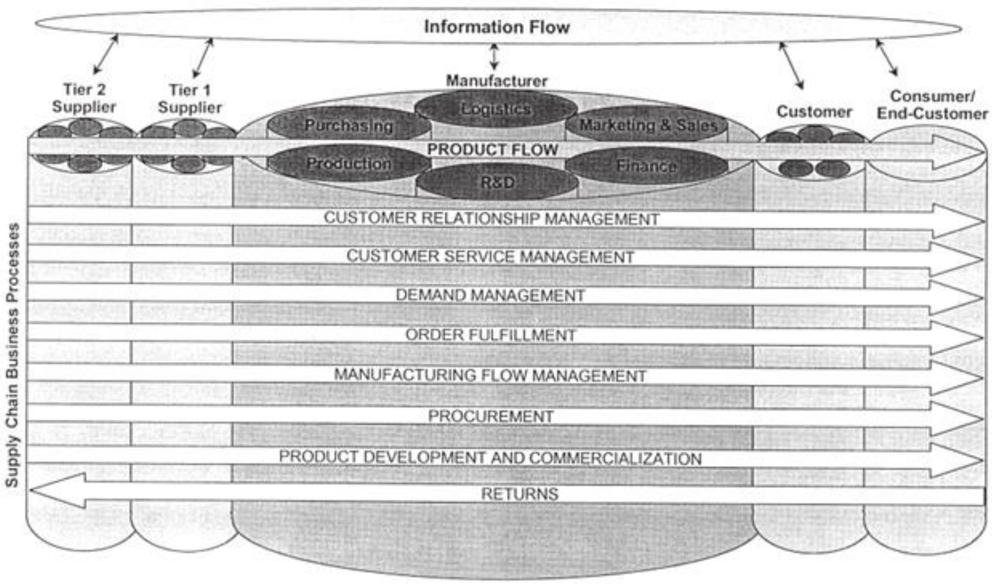

Figure 1: *Information flow supply chain*
Adapted from (Lambert & Cooper, 2000).

Agricultural supply chain management can be seen as one of the most complex and difficult tasks due to the large number of stakeholders that play a role in the process. The agricultural supply chain comprises all activities, resources and actors involved in the process of products from farmers to end consumers. This includes farmers, suppliers, distributors, and retailers. This complexity results in the lack of solutions for traceability and transparency (Bekolli, et al., 2024; Demestichas, et al., 2020; Gorman, et al., 2023; Khandelwal, et al., 2021).

Traditional supply chains, based on centralized systems, face different challenges and limitations. One challenge these centralized systems face is the vulnerability to system failures. If the server used by the company fails, the whole system will fail, which can lead to a loss of important information. Also, the centralized systems are often victims of data manipulation. This makes fraud a big concern and especially since it is difficult to trace back these manipulations (Duhadway & Carnovale, 2019; Ehsen, et al., 2022).

Concluding, we could say, “Traditional supply chains based on centralized systems lack traceability, transparency, resulting in data loss, data tampering, and security threats” (Ehsen, et al., 2022, p. 3)

One possible option to make supply chains more efficient and trustworthy is the use of blockchain technology. Blockchain technology has potential to improve processes and business models for supply chain management (Hackius & Petersen, 2017; Hackius & Petersen, 2017; Wang, et al., 2019).

2.2. Blockchain Technology

In recent years, a variety of emerging technologies have become integral to agricultural supply chains (Wolfert, et al., 2017). These include the Internet of Things (IoT), cloud computing (CC), big data analytics (BDA), wireless sensor networks (WSNs), radio frequency identification (RFID), cyber-physical systems (CPS) and various other information and communication technologies (ICTs). Among these, blockchain technology has emerged as a particularly promising innovation with the potential to drive technological advancements within the agricultural domain (Zhao, et al., 2019; Yadav, et al., 2019).

Blockchain technology is a distributed database in which data is stored in units called ‘blocks'. This works as following: an event happens, and all information is stored on a “block”. This “block” will get a specific code, also referred to as hash code. When something changes a new “block” will be created. Every “block” gets a specific hash code and a new block will carry both the new hash as well as the old hash and therefore the “blocks” are connected (Jena & Dash, 2021; Nakamoto, 2008).

Some key characteristics of blockchain technology are that it stores verified information in a decentralized and immutable way. Figure 2 shows these main characteristics and how these are met. Decentralized because it is completely run by the users of the chain. The data is verified since all information that is put into a block needs to be signed by the author. Lastly, it is immutable since when data is changed, a new block will be created, so data can never be deleted (Guo & Yu, 2022; Hackius & Petersen, 2017; Rajasekaran, et al., 2022).

Figure 2: *Characteristics of blockchain*
Adapted from (Hackius & Petersen, 2017).

Another important concept within blockchain is smart contracts. Smart contracts are digital agreements between two parties. These contracts can automatically be executed without the need for third parties with the use of blockchain technology. Smart contracts will run once specific conditions are met and then will trigger the following action or agreement to be executed. In other words, when event A happens, event B will be executed (Christidis & Devetsikiotis, 2016; Guo & Yu, 2022; IBM, 2021).

In recent years, the interest in innovation and digital technologies has risen. Blockchain technology is one of these digital technologies. Blockchain technology in agricultural supply chain has been applied to increase transparency, traceability and efficiency in the supply chain (Bhawna, et al., 2024; Wang, et al, 2019).

According to Raikwar, et al. (2019, p.2) blockchain technology is “a distributed ledger maintaining a continuously growing list of data records that are confirmed by all of the participating nodes”. Where Yadaw & Singh (2019, p. 973) describes: “Technically, it is a back-end database which maintains a distributed ledger and has the facility of being inspected openly.”

Blockchain technology creates decentralized data, which is safe and can be trusted. Also, since the use of blockchain technology, the data streams between customers and businesses or internally have increased (Thangarasu & Alla, 2025). Importantly, blockchain technology also offers robust data security features. Consequently, researchers have advocated its use in providing real-time, secure information within agricultural supply chains (Lin, et al., 2017; Yadav, et al., 2020; Zhao, et al., 2019).

There are two types of blockchains which are public and private. Public blockchain is open for everyone to change or participate in. While private only gives access to authorized participants and validators (Raikwar, et al., 2019; Strehle, 2020). This research project focuses on private blockchains.

2.3. Benefits of Blockchain Technology

Blockchain technology is being adopted to improve food safety and transaction times, particularly within food supply chains (Bermeo-Almeida, et al., 2018). In South Africa, for example, blockchain technology has the potential to transform the agricultural sector by helping to solve food crises and providing new tools to improve production and distribution processes (Mavilia & Pisani, 2021). However, challenges such as high costs, inadequate infrastructure and limited technical expertise are hindering its widespread adoption in Sub-Saharan Africa (Mwewa, et al., 2024). Overcoming these obstacles requires collaborative efforts from stakeholders and supportive policy frameworks to encourage adoption and promote economic growth.

Blockchain technology offers several advantages. These include transparency and traceability, which, when combined with long-term cost reductions, can increase profitability. By eliminating the need for intermediaries and third-party validators for transactions, blockchain technology can potentially reduce transactional costs (Demestichas, et al., 2020; Hackius & Petersen, 2017; Sunny, et al., 2020; Yadaw & Singh, 2019).

Data within the blockchain cannot be changed or updated once entered. This feature makes blockchain technology valuable for preventing fraud and improving auditability. Fewer people will be involved in the auditing, therefore audits become faster and more cost-efficient (Demestichas, et al., 2020; Ehsen, et al., 2022; Hackius & Petersen, 2017; Zheng, et al., 2017). Blockchain technology improves the overall supply chain integrity.

Moreover, for blockchain technology to reach its full potential it should have reduced cost, risk, time and increase trust and transparency (Demestichas, et al., 2020; Hackius & Petersen, 2017; Wang, et al., 2019).

Transparency is a key concept when discussing the impact of blockchain technology on supply chains. Traceability refers to having all the information about the origin of the product. Blockchain technology offers all participants to have access to the same data of the whole process, allowing stakeholders to view and verify product information. It enables product transactions to show honest and reliable information. Transparency with stakeholders promotes trust and has a positive effect on the client-customer relationship (Bhawna, et al., 2024; Demestichas, et al., 2020; Saberi, et al., 2018; Thangarasu & Alla, 2025; Tian, 2016).

Another important benefit of blockchain technology is traceability. Applying blockchain technology is mostly done by companies to improve their traceability (Saberi, et al., 2018; Tian, 2016; Yadaw & Singh, 2019). Traceability refers to the ability to trace the whole product journey and see what happens in every step. This enables a company to easily trace back mistakes and identify improvement areas (Sunny, et al., 2020; Thangarasu & Alla, 2025). Some information that makes a product traceable is knowing the origin of a product, producer data, harvesting data and production dates (Ehsen, et al., 2022). Also, a traceable supply chain results in reliability (Demestichas, et al., 2020).

There are two different kinds of traceability, which are mandatory and voluntary. Mandatory traceability is used for financial purposes and voluntary traceability is open for any information the supply chain participants want to collect and share (Demestichas, et al., 2020). In this research project, the main focus is on voluntary information, but mandatory traceability will also be taken into consideration.

Other ways to improve traceability, such as digitization and RFID tagging, are shown not to be foolproof (Tian, 2016; Yadaw & Singh, 2019).

2.4. Challenges and barriers of blockchain implementation

The implementation of blockchain technology in agricultural food supply chains comes with several challenges and can be complicated. One of the major issues is that all stakeholders should be involved, which can be difficult since it heavily relies on the knowledge and understanding of blockchain technology of these stakeholders (Kamble, et al., 2020).

In the agricultural sector, products undergo many changes when moving through the process. Data integration across all these steps can be complicated. Additionally, agricultural products are often distributed globally, which adds another layer of complexity (Bosona & Gebresenbet, 2023; Cuellar & Johnson, 2022; Demestichas, et al., Adamopoulou, 2020; Tian, 2016).

The financial cost related to the implementation of blockchain management is another barrier. The setup of blockchain technology requires money to purchase the right hardware and software. This can be a challenge for companies not having enough resources to make this initial investment to start with blockchain technology. A lot of time and energy will also have to be dedicated to ensuring employees are well-trained. This all leads to high setup costs (Cuellar & Johnson, 2022; Ehsen, et al., 2022; Wilson, et al., 2024; Saberi, et al., 2018).

One of the features of blockchain technology earlier mentioned, is how information is recorded on the ledger, which can then not be altered anymore. While this is a strength in terms of fraud prevention, it also means that when a mistake is made, this data will remain incorrect. This can potentially lead to long-term problems. Therefore, it is essential that all information entering the blockchain technology is correct (Yadaw & Singh, 2019; Ehsen, et al., 2022).

Regulations, stakeholder relationships, ownership of data and the ability to scale are also challenges companies consider when implementing blockchain technology (Demestichas, et al., 2020; Zhuk, 2023).

2.5. Enablers of Blockchain Technology

While we have gone into the benefits and challenges of blockchain technology, successful implementation is dependent on multiple enablers. These enablers are helpful or necessary to reach the full potential of blockchain technology.

Management commitment and support is one important enabler of blockchain technology adoption. Adoption is highly influenced by their commitment and their willingness to provide assistance and support. There are different internal and external conditions for gaining management commitment. One of them is that the expected benefits and costs should be better than other available technologies (Agi, 2022; Kamble, et al., 2020; Kouhizadeh, et al., 2021; Queiroz & Wamba, 2019).

Another enabler is the existence of industry-wide initiatives that promote blockchain technology adoption and usage (Agi, 2022; Casey & Wong, 2017; Kouhizadeh, et al., 2021). The adoption of blockchain is increasing, which is a driver for other businesses in general (Jardim, et al., 2021). Another important factor is the existence of governance rules that are clear for the blockchain technology (Agi, 2022; Mendling, et al., 2018). A company must have the technological capabilities for adopting blockchain technology and as a basic condition that interoperability between systems (Agi, 2022;Behnke & Janssen, 2020; Kamble, et al., 2020).

Blockchain technology deals with complex processes, knowledge gaps and inconsistent information between parties, leading to issues of trust and reliability (Zhang, 2020; Awan, et al., 2021). Therefore, it is important to have a reliable and trustworthy environment between intermediaries of the supply chain to achieve sustainability. Since the acceptance of blockchain technology is highly correlated with the level of trust. The trust should be in blockchain technology itself, but also in the provider of blockchain (Jardim, et al., 2021). Trust can be fostered through education and training, to help stakeholders understand the technology.

2.6. Agricultural Insurance

Insurance can be defined as "a contract, represented by a policy, in which a policyholder receives financial protection or reimbursement against losses from an insurance company" (Kagan, 2024) or can be defined as "an arrangement which a person or company undertakes to provide a guarantee of specific compensation for specified loss, damage, illness or death in return for payments of a specified premium" (Oxford Univeristy Press, n.o.). The insurance industry is essential for risk management and offering financial security against unanticipated circumstances. Some issues seen in the current insurance industry are complicated claims processing, fraud and ineffective risk management, leading to a lack of efficiency and effectiveness (Mishra, et al., 2025)**.**

Figure 3 presents the stages of claim management in the context of insurance suggested by (Mahlow & Wagner, 2025). Which consists of the following:

1. Notification: The client informs the insurance company about a loss
2. Registration: the insurer registers the claim in the system
3. Audit: determination is made whether a claim is covered by insurance
4. Settlement: insurer determined for what amount a settlement will be made
5. Closing: customer receives payout

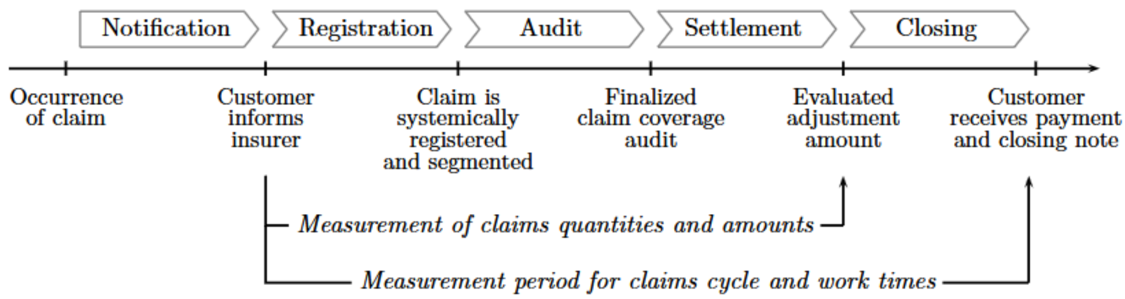

Figure 3: *Stages of claims management*
Adapted from (Mahlow & Wagner, 2025).

Improvements in processing speed are a key success factor in insurance processes (Mahlow & Wagner, 2025). Mahlow and Wagner (2025, p. 10) identify two measures related to processing speed: claims cycle times, which they describe as "the time elapsing from when the customer informs the insurer of the occurrence of the loss until the claim is closed and settled", and claims work times, which they describe as "a measure of the actual time that the insurer needs to perform the process steps from registration until the closing of the claim".

Insurnace take-up has been low, which is caused by product quality, product design, affordability, information and education, behaviroural and social factors and governement role in enabling markets. While, insurance is a reliable risk mitigation instrument to help farmers protect against climate-related effects (Nshakira-Rukundo, et al. , 2021; Wodaju, et al., 2023; Ankrah, et al., 2021). Which is especially important since climate vulnerability is only expected to worsen for future perspectives, which makes agricultural risk management a contemporary issue (Anton, et al., 2013). The take-up rate is also related to the premium rate, the higher the premium rate the lower is the willingness of farmers to pay for insurance (Ntukamazina N. , et al., 2017).

Conventional agricultural insurance has often been considered too expensive in the past for smallholder farmers in developing countries. Conventional agricultural insurance is based on payouts for verifiable losses. This way of insurance comes with two problems. Firstly, it requires high administrative costs to collect evidence of the losses, assess the damage for each individual farmer and specific contracts needed for each case. Secondly, it often struggles with structural problems, since it relies on individual assessments, think of moral hazard, adverse selection and systematic risk (Elabed & Carter, 2015; Miranda & Glauber, 1997; Miranda & Farrin, 2012; Skees & Barnett, 2006; Valdes, et al, 1986).

Previous studies have mostly focused on weather index insurance as a means of mitigating the financial impact of climate changes on smallholder farmers (Hazell et al., 2010). This index is the earliest and most widely implemented form of parametric insurance, which was developed to compensate smallholder farmers for yield losses triggered by bad weather such as droughts or excessive rainfall (Barnett & Mahul, 2007).Parametric insurance is an insurance that gives payouts immediately when a predefined event occurs. Key features of parametric insurance is that the parameters are predefines, claims can be handled fast and with certainty, transparency of terms and a reduced risk of disagreements between parties (America, 2024; Etherisc, Etherisc White Paper, 2025).

Index insurance is a financial product that is linked to an index, which is a measurable random variable. Payouts occur when a threshold is met. Index insurance decreases risk related to problems like moral hazard and adverse selection (Hazell, et al., 2010; Miranda & Gonzalez-Vega, 2011) This allows to transfer risks related to climate change from the farmer to the insurance company. Index insurance is always a parametric insurance, but parametric does not always have to be index-based.

Parametric and index insurance focuses on insuring the farmers based on a set index, such as the amount of rainfall, instead of verified losses as done in conventional insurance (Barnett & Mahul, 2007; World Bank, 2011; Miranda & Farrin, 2012). Some advantages of index-based insurance are that there is no risk of moral hazard anymore since the index cannot be influenced. Information is retrieved from publicly available information, so there is no reason for trust issues between insurer and policyholder, so smaller changes of adverse selection. And lastly, there is no one-sided assessment needed anymore, leading to a decrease in costs. This all makes it possible to offer insurance at a lower cost, which is a big benefit for farmers (Alderman & Haque, 2007; Barnett & Mahul, 2007; Barnett, et al., 2008; Bryla & Syroka, 2007; Clement, et al., 2018; Hazell, et al., 2010; Skees, 2008).

Crop agriculture is very reliant on the weather, since the effects of droughts and floods have a big effect on the farmers' outputs (Ahktar, et al., 2019). Which makes farmers vulnerable and affects their livelihood (Hellmuth, et al., 2007; Hongo, 2010).

2.7. Blockchain in agricultural insurance industry

Blockchain technology has a number of applications in the agricultural sector, including ensuring food safety, facilitating agri-trade, managing finance, certifying crops and providing insurance (Yadaw & Singh, 2019). Blockchain technology can be the solution to those current issues seen in the insurance industry. The main characteristics of blockchain technology are a good fit for insurance industry since data integrity and trust are very important.

Some advantages for applying blockchain technology in insurance are decreasing expenses, claims processing time and enhancing customer experience. There is often disagreements regarding claims which lead to delays in claims settlement. Which then results in unhappy customers and higher operating costs. The use of blockchain technology and smart contracts will reduce processing times and conflicts. Besides that, blockchain technology will offer transparent audit trails and real- time monitoring, enhanced collaboration, and immutable audit trials (Mishra, et al., 2025).

Agricultural practices are complex since the production relies on many pre- and post-harvesting factors, which are hard to predict or control. Blockchain technology in agricultural can achieve smart and sustainable agricultural practices (Omar, et al., 2023).

Smallholder farmers are often hesitant to adopt new technologies such as blockchain due to unfamiliarity and a fear of disrupting traditional farming practices (Haessner, et al., 2024). The technical complexity of blockchain and the lack of expertise among users can contribute to confusion about its potential benefits, ultimately resulting in low adoption rates (Treiblmaier & Garaus, 2022).

Integrating blockchain technology into the agricultural supply chain involves substantial implementation costs. It requires specialized hardware, software, and technical knowledge, leading to significant upfront investments for both farmers and insurers. As a result, adopting blockchain can be both challenging and costly. In addition, ongoing maintenance and training demands are often viewed as additional burdens (Arokiaraj, et al., 2022). However, service platforms can help mitigate these initial costs by enabling businesses to access blockchain functionalities without developing the infrastructure themselves (Casino et al., 2019; Maniam et al., 2023).

3. METHODOLOGY

3.1. Research Design

This study follows a qualitative research design, as it aims to explore and understand the use of blockchain technology in crop-insurance. Given the small amount of existing research on blockchain technology in crop-insurance, this study takes an exploratory approach. Exploratory research is particularly useful when investigating emerging topics with little prior academic literature (Saunders, et al., 2019)

An abductive approach was used. Aiming to compare current findings in existing literature with the outcomes of the case study. This approach helps assess whether current findings in the literature about general blockchain align with real-world applications of blockchain technology in crop-insurance, to either corroborate or refute them (Saunders, et al., 2019).

For this research project, a case study was chosen as the most appropriate research method. A case study allows to study a phenomenon and help understand how this works. A case study is particularly suited for studying a complex technology such as blockchain in a specific industry, allowing researchers to analyse its practical implementations and implications (Yin, 2018). Yin (2009) highlights that the case study is one of the most widely adopted research methods. Additionally, Gerring (2004) highlights how valuable case studies are for understanding processes in real-world settings, which shows the suitability of using case studies in this particular case. Since blockchain in crop-insurance is underexplored, a case study provides valuable insight. This study adopts a single descriptive case study design to examine blockchain in agricultural insurance in depth (Rashid, et al., 2019)

3.2. Data collection and Analysis

For the data collection, a semi-structured interview was conducted. Semi-structured interviews allow the interviewee to talk about the main topics of interest as well as their ideas and recommendations on the topic (Denzin, 2008). This semi-structed interview is the primary data source for this research, which provided crucial insights in how Etherisc makes use of blockchain technology driven crop-insurance. The interview was a very helpful in getting a clear picture of the process and understanding decisions made regarding blockchain technology within Etherisc from an inside source.

The interview was conducted with Susanne Austin. She joined Etherisc two years ago on a freelance basis. With a focus on project management, business development, strategy, operations, communication, and marketing. Building on ten years of previous experience in the insurance industry. The interview was conducted online via Zoom on the 8th of January 2025 and had a duration of 45 minutes. The possibility was given to the interviewee to keep the information of the company and or interviewee anonymously to create a safe space. The interviewee has permitted to use her name, the company's name and to record the interview. The interview guide can be found in appendix 1.

In addition to the interview, a document analysis was conducted using various sources such as the company's website, (YouTube) videos, media articles and white papers. These secondary sources of information were used to cross-verify statements made during the interview, ensuring reliability and validity of the study performed (Saunders, Lewis, & Thornhill, 2019). Also, Rashid, et al. (2019) highlights the increase of credibility, by doing data triangulation, which is done by analysing multiple data sources.

Figure 4 shows the research framework used in this research is presented.

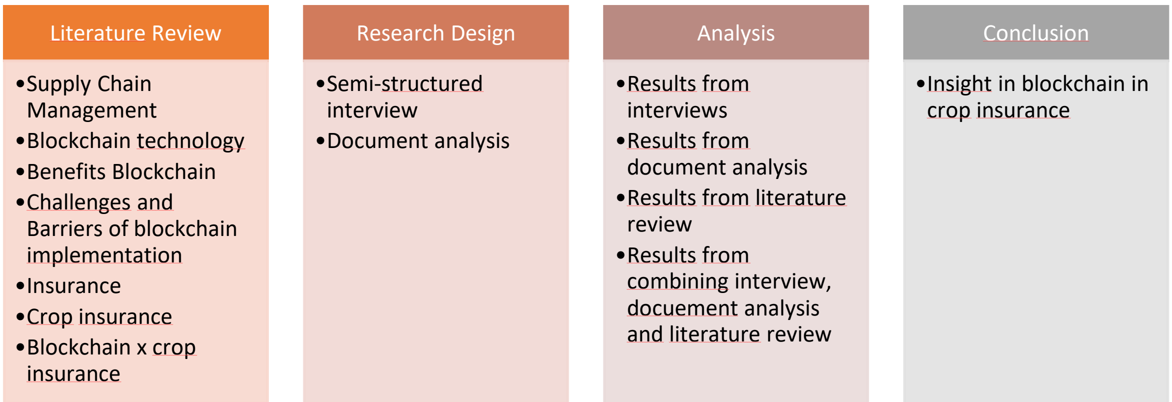

Figure 4: *Research Frame*

4. ANALYSIS AND DISCUSSION OF RESULTS

4.1. Who is Etherisc

Etherisc is a decentralized insurance platform that collaborates with a wide range of partners rather than a licensed insurance company (Etherisc, Etherisc White Paper, 2025). During the interview with Susanne Austin she mentioned, "We are not an insurance company ourselves, we enable partners to distribute their insurance products by offering an insurance platform." By offering a Software-as-a-Service (Saas), Etherisc provides an infrastructure to their partners to distribute insurance while they hold the necessary insurance licenses. This model allows Etherisc to focus on developing the technological framework while leaving the regulatory and distribution aspects to its partners (Etherisc, Etherisc White Paper, 2025).

Etherisc primarily works with innovative insurance providers, who are quick to adopt new technologies. The interviewee highlights the contrasts compared to traditional insurance providers, "This contrasts with traditional insurance providers who often experience slower adoption rates and are more resistant to technological change." The infrastructure provided by Etherisc facilitates the creation and commercialization of new insurance products, which is a significant advantage in a rapidly changing market.

Etherisc's open-source blockchain platforms allow their clients to create and distribute parametric insurance using smart contracts. This increases efficiency but also enhances the transparency and fairness of the products offered. Etherisc wants to ensure that insurance products are accessible to everyone, therefore, their products can be used by a wide range of organizations - from large companies to non-profit and startups – to offer their insurance solutions (Etherisc, Etherisc White Paper, 2025).

As highlighted in Etherisc White Paper, they want to achieve the following: "We want to create insurance products that are transparent, fair and accessible for both customers and investors (Etherisc, Etherisc White Paper, 2025).

According to Etherisc, their Generic Insurance Framework (GIF), allows external parties to build decentralized insurance projects. It is an open-source common infrastructure, product templates, and insurance license-as-a-service enable the seamless and efficient creation of fully automated insurance products with increased transparency and fairness for all parties (Etherisc, 2023).

Etherisc’s journey in agricultural insurance started with a small pilot with a local insurance company in Sri Lanka in 2019. Where they introduced the first blockchain technology powered insurance solution (Etherisc, Etherisc's Journey with Acre Africa, 2021).

Today, Etherisc offers a wide variety of products to its customers, such as crop protection, flight delays and health insurance, with plans for additional services in the future (Ethersic, n.d.).

4.2. Who is Acre Africa

Agriculture and Climate Risk Enterprise Ltd., known as Acre Africa is considered one of the largest micro-insurance service providers in Sub-Saharan Africa, having sold over 1.7 million policies in six countries. They specialize in parametric insurance solutions, particularly in weather index insurance (Etherisc, Etherisc's Journey with Acre Africa, 2021). As stated by the interviewee, Acre Africa is an important partner of Etherisc and they have been working together for many years. Acre Africa connects farmers to innovative insurance. They are an authorized insurance intermediary (ACRE Africa, 2025; Etherisc, 2023). Acre Africa approached Etherisc since they wanted to improve the payout rates and attract more farmers in this way (Etherisc, Etherisc's Journey with Acre Africa, 2021).

By 2023, Acre Africa had insured three million farmers in Africa, offering a variety of insurance products such as crop, livestock and index insurance. The products offered aim to protect farmers against financial consequences of unpredictable weather conditions, such as floods and droughts (Etherisc, 2023).

Acre Africa, in collaboration with Etherisc, wants to make climate risk insurance more affordable, efficient and transparent with the use of blockchain technology (Etherisc, Etherisc's Journey with Acre Africa, 2021).

4.3. Traditional versus Parametric Insurance

Traditional insurance companies have several shortcomings, one of which lies in the financial structure of these insurers. As explained by the interviewee, “Traditional insurance companies want to keep as much of the collected premiums as possible. These companies generate significant returns by investing premium funds, while customers do not get these financial benefits.” This perspective on traditional insurance aligns with the literature discussing inefficiencies and trust issues seen in conventional insurance models (Elabed & Carter, 2015; Miranda & Glauber, 1997; Miranda & Farrin, 2012; Mishra, et al., 2025; Skees & Barnett, 2006; Valdes, et al., 1986).

As presented in one of Etherisc’s white papers, the company's ultimate goal is “to avoid cases like customers having to fight for reimbursement from companies whose profits often depend on avoiding paying out in a targeted manner.” (Etherisc, Etherisc White Paper, 2025). This goal aligns with findings from the literature, which highlight the complexity and slowness of traditional insurers' claims processing and their sometimes adversarial behaviour as major barriers to effective agricultural insurance (Elabed & Carter, 2015; Miranda & Glauber, 1997; Miranda & Farrin, 2012; Mishra, Kokare, & Bhoite, 2025; Skees & Barnett, 2006; Valdes, Hazell, & Pomareda, 1986).

In their blog (Etherisc, 2022), Etherisc state that “Climate risk insurance enables vulnerable people to cope better with climate shocks. It can support smallholder farmers to absorb the effects of failed harvests ….””. The literature also identifies climate risk insurance, particularly parametric crop-insurance, as a solution for smallholder farmers to deal with climate shocks (Barnett & Mahul, 2007; Miranda & Farrin, 2012; World Bank, 2011).

Moreover, in the same blog traditional insurance companies are characterized as expensive, slow and complicated. Payouts from traditional insurance companies can take weeks after an event occurs, and trust in these systems is low due to their inefficiencies (Etherisc, 2022). These inefficiencies are mentioned in the literature, where high administration costs and payout delays are mentioned as barriers in traditional insurance (Alderman & Haque, 2007; Barnett & Mahul, 2007; Barnett, et al., 2008; Bryla & Syroka, 2007; Clement, et al,, 2018; Hazell, et al., 2010; Miranda & Gonzalez-Vega, 2011; Skees, 2008).

In another blog Etherisc state “With tailored agriculture microinsurance products, farmers can confidently invest in quality inputs, increase their productivity and access agricultural loans (Etherisc, 2023). Which will ultimately improve economic stability.

In Etherisc's Journey with Acre Africa (2021), Etherisc also explains their view on Weather Index Insurance (WII), which protects farmers against adverse weather conditions. Rather than relying on damage assessments, as is the traditional approach, it pays out based on a predetermined index. This parametric approach eliminates the need for claim assessors, making the process cheaper, faster, and more objective. This aligns with the benefits of index insurance discussed in the literature, where payouts are based on indexes, which help to reduce moral hazard and adverse selection (Hazell, et al., 2010; Miranda & Gonzalez-Vega, 2011).

4.4. Etherisc's Blockchain Solution for Smallholder Farmers

In their blog, 'Next exciting chapter for Etherisc: Acre Africa crop-insurance is now on the Celo blockchain' (2023) and 'Etherisc's climate risk insurance' (2022), Etherisc state that, in order to protect smallholder farmers from the increasing effects of climate change, they require access to affordable crop-insurance (Etherisc, 2023). The company also recognises a significant opportunity to address this issue by providing blockchain technology to protect millions of farmers against the impacts of the climate crisis (Etherisc, 2022). This aligns with literature stating that blockchain technology can play a role in lowering costs and improving accessibility (Demestichas, Peppes, Alexakis & Adamopoulou, 2020; Sunny, Undralla & Pillai, 2020). The literature also highlights the effects of climate-related events on farmers (Isik & Devadoss, 2006; Musshoff, Odening & Xu, 2011; Field, Barros, Stocker & Dahe, 2012).

The blogs and white papers of Etherisc, the company explains that, in collaboration with Acre Africa, Etherisc offers an innovate kind of crop-insurance. By utilizing blockchain technology, Etherisc is able to offer cheaper, faster and easier insurance (Etherisc, 2022) (Etherisc, Etherisc White Paper, 2025). These findings are consistent with those in the literature, which suggests that blockchain technology has the potential to efficiency, reduce operational costs and improve processes (Bhawna, et al., 2024; Demestichas, et al., 2020; Hackius & Petersen, 2017; Hackius & Petersen, 2017; Saberi, et al., 2018; Thangarasu & Alla, 2025; Tian, 2016; Wang, et al., 2019).

Through this innovative model, vulnerable farmers can purchase insurance policies and receive payouts by using mobile money. Etherisc explains that: “Farmers automatically receive payouts if a pre-defined climate event occurs (e.g. certain amount of rainfall). The climate event is verified through a smart contract with publicly available data (e.g. satellite imagery)" (Etherisc, 2022).

With the rise of more severe climate change, farmers need solutions that help them immediately and sustainably (IFAD, 2025; Etherisc, 2025). Etherisc wants to help improve farmers' financial stability since the climate vulnerability of crops is increasing, and this will help improve food security and increase resilience of smallholder farmers against climate change (Etherisc, Etherisc's Journey with Acre Africa, 2021).

The collaboration between Acre Africa and Etherisc brings together respective knowledge from the insurance industry (Etherisc, Etherisc's Journey with Acre Africa, 2021).

4.5. Reasoning for Blockchain adaption

Etherisc has chosen blockchain technology as the platform, through which their customers can distributing their insurance products. According to Etherisc's White Paper, blockchain shows potential to offer faster, cheaper, more transparent solutions (Etherisc, Etherisc White Paper, 2025). During the interview Susanne Austin elaborated on this decision by saying: "We chose blockchain technology because we wanted to simplify all the complicated parts of insurance and make insurance products accessible for everyone." This motivation aligns with the literature that recognize that blockchain technology can reduce costs, risk, and time (Hackius & Petersen, 2017; Demestichas, et al., 2020; Wang, et al., 2019).

The adoption of blockchain technology in crop-insurance has shown improvements in cost reduction, efficiency and transparency. According to the interviewee "By making insurance data publicly accessible, blockchain has increased trust, enhanced transparency and improved speed and efficiency of processes." These correspond to the benefits identified in the literature where blockchain technology enhances transparency, traceability and efficiency in supply chains (Bhawna, et al., 2024) (Wang, et al., 2019). As well as the benefits for long-term cost reductions by cutting out third-party validators (Demestichas, et al., 2020; Hackius & Petersen, 2017; Sunny, et al., 2020; Yadaw & Singh, 2019).

Figure 5 presents the main reasoning and benefits of blockchain technology.

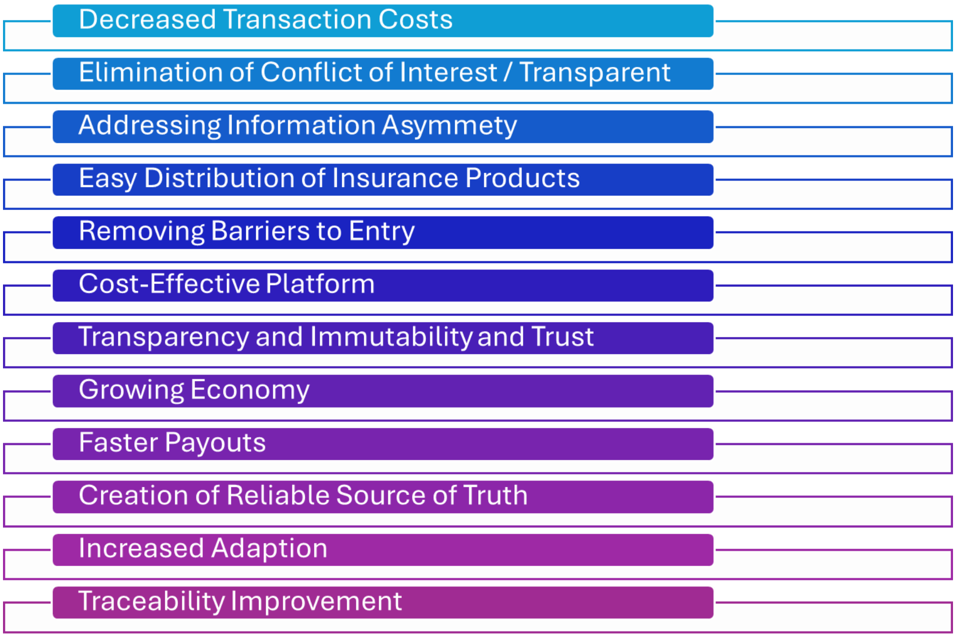

Figure 5: *Reasoning and Benefits for Adaption of Blockchain Technology*

1. Decreased Transaction Costs

Blockchain technology reduces transaction costs by eliminating intermediaries and automating the process. As Etherisc explains in their White Paper: “A decentralized solution on the blockchain implements such open marketplaces in a way that is collusion resistant and has no single points of failure” (Etherisc, Etherisc White Paper, 2025).

The interviewee added to that by saying that: “In a traditional insurance company, numerous employees are involved in verifying claims, who then require managerial oversight and additional reviews. Blockchain technology replaces the middlemen, automating the entire process, which will save both time and money.” In a blog on Etherisc website this cost reduction is also confirmed, they mention the following: “by eliminating operational overhead through smart contracts, we’ve reduced transaction costs by 80%” (Etherisc, 2022; Etherisc, 2023).

This motivation directly reflects the literature’s recognition that blockchain technology reduces transaction costs by removing intermediaries and third-parties (Demestichas, et al. 2020; Hackius & Petersen, 2017; Sunny, et al, 2020; Wang, et al., 2019; Yadaw & Singh, 2019).

2. Elimination of Conflict of Interest / Transparency

In traditional insurance, conflicts of interest often arise, especially in claim management. Insurance companies are incentivized to minimize payouts, leading to potential biases. Etherisc claims the following about blockchain technology in their White Paper: “Blockchain solves this conflict of interest, by enabling truly independent experts (who for example may be publicly ranked by their reputation for efficiency or fairness), and whose work is independent of the insurance provider, as well as transparent and auditable by the whole community.” (Etherisc, Etherisc White Paper, 2025). Conflicts of interest and information asymmetry are eliminated since all policy details are stored transparently on the blockchain, ensuring fairness for all parties involved (Etherisc, Etherisc White Paper, 2025). The interviewee collaborated on that by mentioning, “Blockchain is transparent and efficient because rather than having people all those people around in the middle, it is predetermined.”

This confirms the findings of the literature on how blockchain technology creates transparency and reduces conflicts of interest and information asymmetry (Mishra, et al., 2025). As well, the concept of smart contract, where events will be triggered based on specific conditions (Christidis & Devetsikiotis, 2016; Guo & Yu, 2022; IBM, 2021).

3. Addressing Information Asymmetry

Etherisc explains the following in their White Paper: “Since insurance companies are often keeping data private, this creates information asymmetry. Blockchain technology, with the use of smart contracts, makes data transparent and accessible to all stakeholders. Decisions made by the system are based on verifiable data. Since all information is clear and open for validation, this will ensure no manipulation or hidden information” (Etherisc, Etherisc White Paper, 2025).

The interviewee delves deeper into this topic, explaining how data is collected and verified: “Blockchain can interact with real-world data. The data is verified thru the oracles making sure they are trustworthy and accurate.” And she also said that:

"Blockchain gives a single, transparent, and reliable source of truth that everyone can access and trust."

The literature highlights that blockchain technology minimizes information asymmetry by creating a shared, verifiable ledger that is accessible to all parties (Hackius & Petersen, 2017; Guo & Yu, 2022; Rajasekaran, et al., 2022). It also explains how information is recorded on the ledger, and cannot be altered (Ehsen, et al., 2022; Yadaw & Singh, 2019).

4. Easy Distribution of Insurance Products

Susanne Austin mentioned in the interview the challenges of using a new insurance product. She said: "Building and commercializing new insurance products is complex, difficult, and out of reach for many innovators." Blockchain technology simplifies this process, enabling development of new products without a need for technical expertise. Susanne Austin mentions: "Blockchain allows great innovative ideas to come to executing, since it is easy to use." This benefit is not directly reflected in the literature about the use of blockchain in crop-insurance.

5. Removing Barriers to Entry

Etherisc mentions in their White Paper that blockchain technology removes barriers to entry in the insurance market as the company's aim to make it accessible to all (Etherisc, Etherisc White Paper, 2025). The interviewee added, "The open-source nature of blockchain makes it available for everyone to create and distribute insurance products."

This reflects the literature's insights on how blockchain's open-source nature fosters broader participation (Raikwar, et al., 2019; Strehle, 2020). But the literature does not go into the distribution of products sold through blockchain-based platforms.

6. Cost-Effective Platform

Etherisc uses blockchain technology to reduce the cost of running the insurance platform. As the interviewee mentioned, "It offers an inexpensive platform to run, making insurance accessible to a larger audience.” One of Etherisc blogs states: “The smart contract-based platform will deliver to consumers an efficient, completely transparent, less costly system that requires little or no regulation.” (Etherisc, 2017) The cost-effectiveness of blockchain technology is widely acknowledged in the literature (Demestichas, et al., 2020; Hackius & Petersen, 2017; Sunny, et al., 2020; Wang, et al., 2019; Yadaw & Singh, 2019).

7. Transparency, Immutability and Trust

Blockchain technology is transparent and immutable. This is one of the key attributes that let Etherisc to choose it. With blockchain technology, automatic payments can be triggered on predefined conditions stated in policies. For example, if a certain amount of rainfall is recorded, then your policy will be paid out automatically. As the interviewee noted, “This immutability ensures trust in the process.” The Etherisc White Paper, states that, “Some blockchains, like Ethereum (which we use), enable programs (called 'smart contracts’) that are uncensorable, immutable, and permanent.”

All policy details and transactions are recorded publicly on the blockchain. Making the system more transparent. Farmers can easily access their policy details through SMS, leading to an increase in trust and take-up (Etherisc, 2022). A blog on Etherisc’s website states that: “Smart contract transparency increases trust: over half of participating farmers reporting increased trust in insurance.” (Etherisc, 2023).

This matches the literature that transparency with stakeholders promotes trust and therefore has a positive effect on the relationship with the customer (Bhawna, et al., 2024) (Demestichas, et al. 2020; Saberi, et al., 2018; Thangarasu & Alla, 2025; Tian, 2016).

8. Growing Economy

The blockchain market is rapid growing economy, with significant investment flows into various blockchain-based applications, including digital currencies. The interviewee observed that: “Etherisc taps into the rapidly growing blockchain sector, creating new opportunities.” This issue is also mentioned in the literature (Bhawna, et al., 2024; Wang, et al., 2019).

9. Faster Payouts

Automating the policy lifecycle has decreased payout time significantly. Etherisc states the following on their blog: “by automating the policy lifecycle, we’ve reduced payment times from an average of 45 days to 24h — 5 days / less than a week, and we’ve also enabled mid-season payouts which is revolutionary” (Etherisc, 2022). As well do they mention: “Smart contract integration into weather index insurance drastically reduces payout times: we reduced payout times by 97%” (Etherisc, 2023). In the interview we did not go into the specifics of this, but the interviewee pointed out these blogs for specific numbers.

Blockchain has eliminated cash-flow problems that were previously caused by delayed claims and payouts (Etherisc, Etherisc's Journey with Acre Africa, 2021). This outcome aligns with the literature presented, which highlights that one of the thresholds for reaching blockchains full potential is reduction of time (Demestichas, et al., 2020; Hackius & Petersen, 2017; Wang, et al., 2019).

10. Creation of a Reliable Source of Truth Adoption

During the interview Susanne Austin explained how data had previously been stored: “Previously, a lot of spreadsheets with data were shared among corporations, which created multiple conflicting versions of the same data. Blockchain technology gives a single, transparent, and reliable source of truth that everyone can access and trust.” This reflects the literature’s argument that blockchain technology creates a consistent, immutable data trail that enhances traceability and accountability (Hackius & Petersen, 2017; Guo & Yu, 2022; Rajasekaran, et al., 2022).

11. Increased Adoption

The interviewee mentioned the following regarding farmers onboarding, “Farmers onboarding has become significantly easier and also this has increased demand.” She added the following reasoning for this: “ This is primarily due to two key factors. First, lower costs have made insurance more accessible and viable for farmers.” Additionally, the increase in trust has also led to higher adoption rates (Etherisc, 2022).

12. Traceability Improvement

Blockchain technology at Etherisc has greatly improved traceability. The interviewee mentioned the following: “Blockchain enables anyone to view transactions, whether they occurred, the amounts and details of policies. There is no need to request data access since it is publicly available on the blockchain.” And Etherisc’s blog adds that payments are: , “not only fast but also transparent and traceable.” (Etherisc, 2024) The literature supports the idea that blockchain technology improves traceability and that this is one of the main reasons why companies implement blockchain technology (Bhawna, et al., 2024; Saberi, et al., 2018; Tian, 2016; Wang, et al., 2019; Yadaw & Singh, 2019).

4.6. Benefits of Blockchain Technology

The interviewee states that the main objectives of using blockchain technology are to foster trust, transparency and efficiency, and to increase accessibility.

Susanne Austin makes the following point about trust in the interview: “Trust is created since all transactions are open and accessible to anyone.” And the following about transparency, “Blockchain enhances transparency, since users can see full details of their smart contracts, which gives a lot of clarity on decisions made.” Regarding efficiency, Susanne Austin states that blockchain technology: “replaces the need for intermediaries by automated processes. Everything is predetermined; if one event occurs, a specific outcome will follow.” This aligns with the literature, which explains that blockchain technology plays a role in creating transparency, traceability and trust among stakeholders (Bhawna, et al., 2024; Thangarasu & Alla, 2025; Wang, et al., 2019). In order for blockchain technology to reach its full potential, costs, risks and time should be reduced, while trust and transparency should be increased (Demestichas, et al., 2020; Hackius & Petersen, 2017; Wang, et al., 2019).

Etherisc aims to make insurance more affordable and accessible for everyone. As the interviewee notes, “So it is cheaper. And because it is cheaper, more people can buy it.” Numerous studies confirm that blockchain technology has the ability to reduce costs

(Demestichas, et al., 2020) (Sunny, et al., 2020).

4.7. Operationalizing Blockchain-based Insurance

In Etherisc's case, basic insurance premium is prepaid (Etherisc, Etherisc's Journey with Acre Africa, 2021). The interviewee explains this further as following: "Farmers usually buy insurance thru their phones, which most often is not even a smartphone. They will be able to read their policy details and payout details. Which keeps is very easy and simple for them."

Smart contracts define the covered risks and collateralize them to ensure transparency, and they are carried out in an auditable manner (Etherisc, Etherisc White Paper, 2025). These findings are supported by the literature, which states that blockchain technology with smart contracts improves traceability and transparency (Demestichas, Peppes, Alexakis, & Adamopoulou, 2020; Sunny, Undralla, & Pillai, 2020; Hackius & Petersen, 2017; Yadaw & Singh, 2019). And the meaning of smart contracts stating the defined risks covered (Christidis & Devetsikiotis, 2016; Guo & Yu, 2022; IBM, 2021).

A YouTube video about Etherisc's journey with Acre Africa fully explains the insurance process. Once the insurance is active, the following process takes place:
- Weather data relevant to the farmer's policy is constantly tracked.
- This data is sourced from satellite weather providers, also referred to as 'oracles'.

If the conditions outlined in the farmer's policy are met, an automatic payment will be made (Etherisc, 'Etherisc's Journey with Acre Africa', 2021; Etherisc, Etherisc's Journey with Acre Africa, 2021).

During the interview Susanne Austin made the following claim regarding the involvement of end customers with blockchain technology: "For most end customers, interacting with the blockchain itself is neither relevant nor necessary. Their focus is on farming and receiving a payout when their crop fails. The system is designed to be flexible and adjustable to customers' preferences and needs." This is not presented in the literature review. The interviewee adds, " Being a farmer making use of parametric crop-insurance, you would not know you are making use of a blockchain-based insurance. But intermediaries require more detailed insight. They need access to real-time visibility in outstanding policies. The literature does not highlight different levels of interaction with blockchain technology, but this is a more specific situation related to Etherisc and their customers.

4.8. Barriers and Challenges

While blockchain-based crop-insurance offers many advantages, Etherisc has also faced some barriers and challenges during the application process. The main barriers and challenges faced by Etherisc are shown in figure 6 and then further explained below. Some of the barriers and challenges discussed are not directly related to blockchain technology, but more to the insurance product in specific.

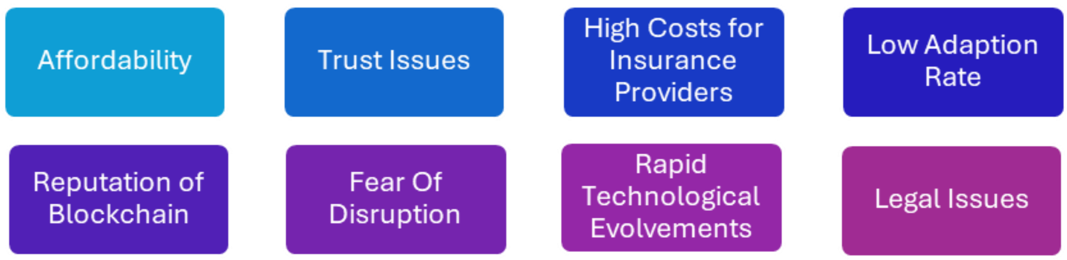

Figure 6: *Barriers and Challenges Etherisc*

1. Affordability (financial barrier)

Many insurance solutions remain unaffordable for smallholder farmers. The interviewee explains that: “One of the main difficulties farmers face is that they cannot afford insurance.” Also, the YouTube video about Ethersic’s Journey with Acre Africa explains the problem of farmers not being able to pay for insurance (Etherisc, Etherisc's Journey with Acre Africa, 2021). The interviewee highlights the following related to this problem: “To increase participation of smallholder farmers, premium costs need to be reduced. This often requires heavy subsidies and government support to make insurance accessible for these farmers.” The literature briefly expresses high costs for insurer holders and farmers to be a barrier for implementing blockchain technology for crop-insurance (Arokiaraj, et al., 2022). But also mentions how service platforms can reduce these costs (Casino, et al., 2019; Maniam, et al., 2023).

2. Trust Issues

The YouTube Video about Etherisc's Journey with Acre Africa explains that farmers have little trust in insurance companies, since in the past, there were often delays in payouts, leading to process time from three to six months (Etherisc, Etherisc's Journey with Acre Africa, 2021). The interviewee mentions that: “There is a lack of trust for crop-insurance products from the customers. Customers feel like they are being scammed. They do not know where their money has gone and what is done with it.” And also shares another misinterpretation about blockchain technology, “People think blockchain is complicated and inapplicable to their needs**.** With that being said, the interviewee expressed the following to create trust, “The farmers need to understand the technology and get trust in blockchain technology to see that it is reliable and proven. This is consistent with the literature, stating that building trust is crucial for the success of blockchain technology (Awan, et al., 2021; Jardim, et al., 2021; Zhang, 2020).

3. High Cost for Insurance Providers

The interviewee mentioned: “Insurance companies have to invest a lot of money in data and information storing.” Insurance companies must invest heavily in data collection and information storing, leading to increased operational expenses. The literature also highlights the high costs of the initial investment to be a main barrier (Cuellar & Johnson, 2022; Ehsen, et al., 2022; Saberi, et al., 2018; Wilson, et al., 2024).

4. Low Adoption Rate

Currently, many farmers are not insured, have never used insurance before, or are hesitant to adopt insurance. Given this, the adoption of crop-insurance is both a huge challenge but also a massive opportunity. The interviewee mentioned the following “The challenge lies at getting farmers to get insurance. It is important that the farmers understand that the technology is trustworthy and proven, and that payouts will happen when an X event happens. For insurance providers or other partners, they also need education to fully understand blockchain technology. Since some might be hesitant to make use of it out of fear of negative media coverage or false information." The literature also emphasizes the importance of education and training for overcoming resistance to blockchain technology (Awan, et al., 2021; Jardim, et al., 2021; Zhang, 2020). As well does the literature confirm current problems with low uptake (Nshakira-Rukundo, et al. , 2021; Wodaju, et al., 2023; Ankrah, et al., 2021).

5. Reputation of blockchain

The interviewee mentioned that there is a misinterpretation of blockchain technology: "Blockchain technology suffers from a misinterpreted image and negative reputation. While blockchain has way more to offer." Moreover, she suggested a way of dealing with this barrier: "To drive adoption, the industry has to change the public image and highlight the benefits of blockchain technology. Alongside sharing the meaning of blockchain technology and making sure people make use of the technology for the right reasons." The misunderstanding and inflated expectations are recognized in the literature (Upadhyay, 2020).

6. Fear of Disruption

The interviewee mentioned another barrier related to fear: "Some stakeholder are hesitant to adopt blockchain technology due to concerns about the big potential disruptive opportunity it offers in the insurance industry. This fear is recognized in the literature (Haessner, et al., 2024; Treiblmaier & Garaus, 2022).

7. Rapid Technological Evolvements

Blockchain technology is evolving rapidly. The interviewee, Susanne Austin, mentioned rapid technological evolution as a barrier: 'Technology is evolving rapidly, and so is blockchain technology. The challenge lies in keeping up to date with these changes and adapting to them." This is recognised in the literature (Treiblmaier & Garaus, 2022).

8. Legal Issues

Ensuring compliance and widespread adoption is crucial for the legal side of blockchain-based insurance. Some of the legal issues that the interviewee mentioned are: “regulation is very, very tightly managed for insurance”, “mainly regulators struggle with crypto and blockchain and how to regulate that”, “And regulation is different in every country, and everyone's thinking about it very differently.” However, it is important to understand that, as the interviewee mentioned, Etherisc is not a licensed insurer, they provide the insurance platform. Therefore, most of these problems lie with insurers.

In Etherisc’s White Paper, it states that: “Insurance companies are highly regulated worldwide for good reasons, to protect customers and investors.” It also states that “For each project, product and jurisdiction, the legal framework has to be considered and the product owner is responsible for the proper implementation.” The literature supports the idea that legal issues can be a barrier (Demestichas, et al., 2020; Mishra, et al., 2025; Zhuk, 2023).

4.9. Expected future improvements in the use of blockchain technology

Ethereal has its sights set on the future of blockchain technology and is looking to make further improvements to the following aspects of crop-insurance.

1. Faster payouts

One of the future goals is making payouts even faster, from 5 days to less than 24 hour, with very low transaction costs. This will be achieved by enabling an instantaneous oracle based settlement, that will add transparency to the insurance claim process (Etherisc, 2023).

2. More accurate and transparent claims

Currently, payouts are triggered thru an on-chain smart contract based on satellite imagery. Some factors affect the reliability of this data, like cloud cover, vegetation and not being able to account for water run-offs. To improve accuracy, Etherisc plans to transition to cutting-edge soil moisture content data, which will result in more accurate and transparent claims (Etherisc, 2023).

During the interview Susanne Austin mentioned, “Etherisc currently has achieved the outcomes they wanted with blockchain technology. But with that said, there is still so many cases, farmers, countries where they want to operate in. They have untapped the opportunity so far. But thinking of the amount of farmers still not protected, this is just the start.”

Etherisc has set itself ambitious goals for the future focusing on growth and expanding their offering. During the interview, Susanne Austin discusses these goals in more detail, stating: “All future goals are related to growth, growth in community of people who build, supply chain, policies offered, products offered and projects.”

In figure 7 the main goals are summed up.

Figure 7: *Future Goals Etherisc*

The interviewee was asked to give her advice to others considering adapting blockchain technology. She said: “It is really not that hard. Really not that scary. It is really great. It just gets a bad reputation for the wrong reasons, but the underlying technology has incredible applications.”

5. CONCLUSION

5.1. Main Conclusions

This study uses a case study methodology to examine the collaboration between Etherisc, a decentralised insurance platform, and Acre Africa, a micro-insurance service provider in Sub-Saharan Africa. The aim is to understand the role of blockchain technology in parametric crop-insurance in this region.

The research question of this research project was as following: "How do insurance companies make use of blockchain-based crop-insurance?" We will now go into the main conclusions related to the research question.

Small-holder farmers are play a crucial role in food production but are also one of the most vulnerable to impacts of climate change such as droughts, floods and storms which are increasing in likelihood. Many farmers are not protected against these extreme weather events since they do not hold insurance.

One of the main reasoning for adapting blockchain technology in crop-insurance is changing the traditional way of insurance which sees a lot of inefficiencies and trust issues.

Blockchain technology is applied to address major barriers and struggles in traditional insurance, such as complexity, expensive, slow claims processing, and at times adversarial behaviour, that hinder the effectiveness of agricultural insurance. By utilizing blockchain technology, Etherisc makes insurance cheaper, fast and easier.

Etherisc offers a platform for insurance providers that is easy the use and can be altered accordingly. Which makes the use and application of blockchain technology easy and simplifies the distribution of insurance products.

Blockchain-based crop-insurance enhances efficiency, reduces operational cost, and improves transparency and traceability . Additional benefits include the creation of trust, which in return increases adoption rates. This is further supported by faster payouts and the overall accessibility of blockchain-based insurance solutions.

The main barriers seen in this study are linked to financial, social and regulatory barriers. Financial barriers related to the affordability of blockchain-based insurance solutions. Social barriers include lack of trust and the misunderstanding of blockchain technology. Regulatory barriers involve varying government regulations and legal uncertainties. In addition to those, low adaption and difficulties in keeping up with rapid technological advancements further hinder widespread implementation.

5.2. Theoretical contributions

There is only a limited number of case studies in the field to be studies and many references did not explicitly clarify what type of food products their article was focused on. Therefore, this study had a theoretical contribution.

5.3. Practical implications

The findings of this study show that insurance providers could benefit from adopting blockchain-based crop-insurance to improve trust, increase take up and reduce payout times.

For smallholder farmers blockchain based crop-insurance offers a solution that they can be trusted more and a faster process. It is way more transparent and since it is automated it improves their access to timely financial support. Changing their view on insurance of being unreliable and inaccessible. Main benefit for farmers is faster payout and very clear indexes of when payouts occur.

At a community level, the increase of adaption of blockchain based agricultural insurance can protect against climate related shocks and making sure farmers have a more stable income.

5.4. Limitations

The case study performed during this research project was focused on one company. In this research project an interview was conducted. Since only one company was reviewed and only one interview within the company was performed this can be seen as a limitation.

As with any case study research, the generalisability of our findings is limited. For this reason, it was hard drawing broad conclusions regarding the barriers, benefits and challenges identified in the adoption of blockchain technology in crop-insurance.

5.5. Suggestions for further research

To improve the validity and generalisability of the findings (Yin, 2018), future research should focus on other countries and types of insurance. It is also important to understand the perspectives of other stakeholders, such as farmers and insurance companies.

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***Note**: During the MFW presentation, the teachers noted that some information in reference list are incomplete*.

7. APPENDICES

Appendix 1 : Interview Guide - Etherisc

My name is Kim Vervoorn and I'm currently developing my final master's thesis in **Management and Industrial Strategy at ISEG**. The study aims to investigate the use of blockchain-based crop-insurance by insurance companies in Sub-Saharan Africa.

I **thank you** in advance for your willingness to participate in this interview and recognize the **invaluable contribution** it will make to the development of my master's thesis.

This interview, consist of several open questions with no right or wrong answers, aimed at eliciting your insights based on your experience within Etherisc. If you agree, this interview will **be recorded** to ensure a thorough record of the discussion. The interview consist our of **6 sections** and is estimated to last approximately **30-60 minutes**. Furthermore, I assure you that any information shared during this session will be **treated in the strictest confidence** and used solely for the purpose of enriching my thesis. Your **anonymity** may be maintained at your discretion.

Interview questions

Section 1: Getting to know Etherisc x Acre Africa

- How long have you personally been with Etherisc?
- What are your main responsibilities?
- How was the collaboration with Acre Africa established?

Section 2: Reasoning for Blockchain Technology Adaption

- Why did the Etherisc decide to implement Blockchain?
- What were the main reasoning for applying blockchain?
- What specific problems was you trying to overcome by implementing blockchain technology?
- Prior to the implementation of blockchain, were there any alternative technologies that you gave thought to or experimented with?
- If yes, what made you decide to go for blockchain?

- How does blockchain technology affect transparency and traceability in the agricultural sector?
- What role does blockchain play in fostering trust among stakeholders?

Section 3: Application process of blockchain
- Could you explain how blockchain technology is used to insure farmers in Kenya?
- Could you talk me through the implementation process of blockchain?
- How do farmers interact with the blockchain system? (Are they directly involved in the process, or does the system operate behind the scenes?)
- How is data collected and validated through blockchain technology to ensure accuracy and reliability?
- How is agricultural supply chain date (e.x. weather conditions) integrated into the blockchain system?
- What was the Acre Africa's role in the application process?

Section 4: Barriers and Challenges
- What key barriers did Etherisc face when implementing blockchain technology?
- What key challenges did Etherisc face when implementing blockchain?
- If farmers and or other stakeholders interact with blockchain: Where challenges might they face?
- Where there any challenges related to educating farmers and other stakeholder about how to use blockchain?
- Were there any legal barriers faced during the implementation process?
- What was the role of Acre Africa in overcoming these challenges?

Section 5: Desired outcomes of using Blockchain
- What were the main expected outcomes for implementation of Blockchain technology?
- Did the implementation achieve all of these desired outcomes so far?
- If not, which ones were not achieved and why not?
- How has blockchain improved transparency and traceability in the supply chain?
- Do the users (farmers) see this as a valuable asset? What value is added for them?

- Has blockchain helped reduce cost for the Etherisc and or the farmers, and if so, how?
- How is the success or efficiency of blockchain measured? (Which metrics or KPI’s?)
- Can results about success be shared?

Section 6: Long term vision and reflections
- In the long term, what further improvements or expansions is Etherisc hoping to achieve through blockchain technology?
- Is there any other important information you would like to add?
- Do you have any advise to share with companies considering implementing blockchain?
- Are there any other people in the company who be interesting to talk to?
- Would it be possible to speak to one of the farmers using the blockchain-based insurance to hear their opinion on blockchain?