Smart Contracts for Smart Insurers: The Potential of Smart Contracts in the Travel Insurance Industry
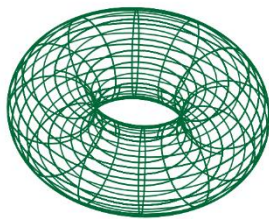
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Abstract

The travel insurance industry faces significant challenges, including extended claims processing times and a lack of transparency. Nonetheless, the integration of smart contracts holds tremendous promise for transforming the industry and enhancing the customer experience. This paper explores the potential of smart contracts to address these issues. Smart contracts offer transparency, security, and immutability, making them an ideal tool for tackling these challenges. The paper examines current implementations of smart contract-based travel insurance products, highlighting their benefits and limitations. It also identifies potential future use cases for smart contract-based travel insurance, such as baggage loss, medical evacuation, and travel health insurance. This study demonstrates the immense potential of smart contract-based travel insurance to revolutionize the industry and improve the customer experience. Moreover, further research is needed to fully realize this potential and overcome the regulatory, legal, and technical challenges that currently hinder widespread adoption.

Content

1. Introduction

a. Background and Context

The size of the worldwide travel insurance market was roughly USD 13,193.40 million in 2021, and it is projected to increase to approximately USD 49,132.95 million by 2028, with a compound annual growth rate (CAGR) of about 24.50% from 2022 to 2028 (Facts and Factors, 2022). Travel insurance is a form of insurance that offers protection against unexpected or unfavourable incidents that may happen during travel, whether they be domestic or international. Comprehensive travel insurance policies can provide coverage for a range of issues such as trip cancellation, lost baggage, public liability, delayed flights, and other unforeseen expenses (Nationwide, n.d.).

The global travel insurance market is growing due to two main reasons: the rise in demand for travel insurance as tourism increases following the pandemic and the overall rise in insurance coverage (Uğur & Akbiyik, 2020). The possibility of booking flights and vacation packages online through smartphones and websites has led to a boost in tourism. This has therefore also increased the frequency of various incidents such as flight cancellations, lost baggage, and health issues. Customers choose travel insurance to reduce these risks. In addition, incorporating advanced technologies such as Artificial Intelligence (AI), data analytics, and machine learning with GPS (Global Positioning System) is expected to improve the current travel insurance offerings. Consequently, adopting these new systems will result in higher quality for these solution providers in the future (Facts and Factors, 2022).

However, issues in the industry could significantly impede or slow its expansion. The difficulties with communicating, using, and understanding the exclusions and conditions of insurance products are already a widespread topic in research (Tan & Caponecchia, 2021). These are compounded by low awareness of insurance products and low penetration of insurance policies (Facts and Factors, 2022). Moreover, the industry must, more than ever before, address more effectively its inherent challenges, including the reliability and transparency of information, fraudulent activities, opportunistic behavior of intermediaries, and foreign currency risks (Balasubramanian et al., 2022).

Researchers proposed several ideas and examples aimed at improving insurance knowledge to meet the demands of the modern situation and to support the continuous development of tourism in the future. These proposals focus on improving the quality and reliability of tourism services, which is crucial, especially after the pandemic (Diakonidze, 2021). One of these is the blockchain-based approach in tourism.

Blockchain is a distributed digital ledger technology that allows for secure and transparent peer-to-peer transactions without the need for intermediaries such as banks or governments. This technology has evolved and expanded beyond cryptocurrency and has been applied to various fields such as finance, healthcare, supply chain management, voting systems and insurance (Ozdermir et al., 2020). These platforms allow for secure, transparent, and immutable record-keeping of trans-

actions that can be verified by multiple parties without the need for a central authority (Balasubramanian et al., 2021). Blockchain technology, especially through the implementation of smart contracts, has the potential to transform the insurance industry by enabling more efficient, secure, and transparent processes (Treiblmaier et al., 2020). It has the potential to improve the areas of claims processing, fraud detection, data management and payment processing. Overall, it enables insurers to offer better services to customers, reduce costs, and improve efficiency (Balasubramanian et al., 2022).

b. Problem Statement and Research Questions

The current insurance policies on the market are still widely dependent on manual work for processing, which lets costs skyrocket and slows down the overall process. This is a weakness which could be fixed by using blockchain technology. This research focuses on the practical applications and benefits of using smart contracts in the travel insurance industry, as well as the potential risks and challenges involved. The potential use of blockchain technology and smart contracts would provide insurers with a competitive advantage in the field of travel insurance since the new technology helps to cut costs, prevent fraud and streamline the insurance process. Thus, this technology offers a lot of possible advantages which could increase the efficiency of the already existing products.

However, it's application still seems too complicated to be understood by both companies and consumers. Moreover, as this is not yet a well-regulated area, it seems risky to introduce sensitive information such as insurance-related data into these systems. In fact, despite the potential benefits of using blockchain and smart contracts in insurance, including travel insurance, the technology is still in its early stages, and widespread adoption will likely take some time (Balasubramanian et al., 2022). Furthermore, while the significance of blockchain applications is increasing, only a limited number of researchers in the tourism and travel industry have conducted studies on this subject (Ozdemir et al., 2020). These studies also seem to be aimed rather at academia than at the practical world, as they are often difficult for companies in the industry to understand. There are a lot of theoretical drawbacks described in other research papers about the use of blockchain technology, but not many on the practical drawbacks, also from a market/business standpoint, i.e., a shortage of demand. Consequently, travel insurance players hesitate to fully embrace blockchain-based solutions, also due to regulatory concerns, technical challenges, and a lack of understanding of the technology. In fact, these solutions are not perceived as user-friendly, and they seem to add unnecessary complexity to the claims process (Deloitte LLP, 2016).

This research builds on previous work in the field of blockchain-based travel insurance, including studies by Balasubramanian et al. (2022) and Hoffman (2021), as well as real cases such as Fizzy and Insurwave. The hypothesis emerges from the fact that the use of blockchain technology and smart contracts can provide significant benefits to the travel insurance industry, specifically cost reduction, shorter processing times, and fraud prevention. However, due to a lack of understanding of the technology and regulatory challenges, travel insurance industries are hesitant to adopt the

technology. Therefore, the questions arise: how can the travel insurance industry effectively adopt blockchain technology and smart contracts to improve their operations and provide more innovative and flexible coverage options for travellers?

The aim of this paper is to inform established insurance providers and startups in the travel insurance industry with limited knowledge about blockchain technology. To achieve this goal, the paper outlines the current challenges facing the travel insurance industry and provides an introduction to blockchain technology. Additionally, the paper offers practical examples of how smart contracts can be utilized both in today's market and in the future to address those inefficiencies in the industry. They also highlight potential drawbacks and considerations for companies before implementing smart contracts in their travel insurance products. Overall, the paper aims to help insurance companies to determine whether the adoption of blockchain technology is worthwhile.

c. Overview of the Structure of the Paper

In the following, the paper lays out a small theoretical contestation, in which the technology of blockchains, its key features, and the current inefficiencies in the travel insurance market are described. This chapter aims to provide readers with the basics for understanding the remaining research. In the third section, current use cases of smart contracts for smart contracts are presented as well as potential future solutions on how they can be implemented to address inefficiencies in the market. This is followed by a discussion of the advantages and limitations and the examination of the initial hypotheses. Finally, the paper provides the conclusions and further research opportunities.

2. Literature Review

This chapter collects key sources on the topic of blockchain technology and discusses its evolution and current state. Potential advantages of using blockchain technology, such as cost reduction and improved customer satisfaction are highlighted, and previous academic research in this field is examined. The use of smart contracts for competitive advantages and the application of parametric insurance in the travel industry are also discussed.

Blockchain technology was initially introduced in 2008, primarily for transactions involving bitcoin. However, since then, blockchain has evolved and numerous prototypes and applications have been developed. Today, blockchain technology is not only used for money transfers but also in various other industries, including insurance (Casino et al., 2019).

Gatteschi et. al. (2018) state that Blockchain technology in the insurance sector is in the innovation trigger phase, which means that the technology is not universally adopted yet. Still, interest is increasing and has led to the foundation of "B3i", an industry initiative founded by the major players in the insurance sector: Aegon, Allianz, Munich Re, Swiss Re, and Zurich. This industry initiative aims to explore potential uses for blockchain technology in the insurance sector (Munich Re, 2016) and thus proves that interest in the technology exceeds theoretical usage and is finding its way to

industrial practice. Also, McKinsey, a leading strategy consulting firm, published reports covering the use of blockchain technology, one especially focusing on its usage in insurance (McKinsey, 2016). The report focuses on potential and theoretical use cases of the technology and points out the most interesting applications.

The insurance industry is, like many other industries, an incredibly competitive market. The intense competition is amplified by the increased transparency through comparison platforms, increased price sensitivity of customers and new market entries. As a result, to survive in this market you need competitive advantages. These advantages can be achieved through price, speed, quality and innovation. Hoffman (2021) explains how the use of smart contracts can lead to competitive advantages that are needed in the insurance industry.

But there is also high interest in academic research. Authors like Gatteschi et. al. (2018) offers an introduction to blockchain technology and an overview of general applications in insurance. They aim to provide guidelines for decisions and to show the advantages and disadvantages of the technology (Gatteschi et. al., 2018). Others like Kar and Navin (2021) provide a review of academic research and trade literature. They compare different academic sources and analyze levels of implementation based on an assessment of experts (Kar & Navin, 2021). Smart contracts and their development were covered by Zheng et. al. (2019). The authors point out obstacles and advances of smart contracts, thus delivering a theoretical framework for the insurance industry.

Zhao (2020) concludes, that to avoid low customer satisfaction, insurers need to adapt to modern technologies such as for example, blockchain technology. Not only could it increase satisfaction for customers, but it can also save them costs. PwC released a report estimating that blockchain solutions could remove 15-20% of expenses from the reinsurance industry by simplifying reconciliation and multiple data entries. Blockchain technology can speed up the process of claim verification (PwC, 2016). Similarly, the implementation of Blockchain Technology in the insurance industry can reduce costs as it can simplify the claim verification process and the effort. This can improve customer satisfaction since efficiency is provided.

Traditional insurance requires payment of a premium in advance for coverage of an actual loss, which is only paid after assessment and investigation. In contrast, parametric insurance covers the probability of a predefined event occurring, and compensation is triggered by the occurrence of a predefined parameter, rather than an actual loss or damage (Swiss Re, 2018). Jia-lan et. al. (2019) focus on the travel insurance industry, covering the topics of parametric insurance and introducing an improved and modified travel insurance system based on blockchain technology (Jia-lan et. al., 2019).

3. Theory

This chapter aims to provide travel insurance companies with a fundamental understanding of blockchain technology, specifically its consensus mechanism, oracles, smart contracts, and blockchain platforms. The travel industry has been facing inefficiencies such as fraud, delays, and high transaction costs. These challenges can result in customer dissatisfaction and financial losses for insurance companies. In response, this chapter explores the potential of blockchain technology and smart contracts to address these inefficiencies. By leveraging the transparency, immutability, and automation features of blockchain technology, travel insurance companies can create more secure, efficient, and cost-effective processes. Through a review of relevant literature this chapter will provide an overview of the key concepts of blockchain technology and explore its potential for the travel insurance industry.

a. Blockchain Technology

Blockchain is a computer technology that uses a distributed network of computers, called nodes, to store and transfer data without the need for a central intermediary (Tobler & Brönnimann, 2023). Unlike a traditional database, the blockchain is structured into blocks, with each newly added block being linked to its predecessor. Each block contains a limited number of transactions, which can refer to payment transactions for cryptocurrencies like bitcoin, smart contracts for blockchain platforms like Ethereum, or private information for private blockchains.

When a block is filled with transactions, a new block needs to be added to the chain, which is accomplished through cryptographic methods and a "consensus mechanism." Every node in the network has a complete copy of the blockchain, and when a new block is added, each node must verify it. If most nodes agree that the new block is valid, it's added to the existing chain. Once a block has been successfully verified and added to the chain, it cannot be removed, and the transactions on it cannot be altered. As a result, the blockchain creates an unchangeable, auditable record of all previous transactions.

i. Consensus Mechanism

A consensus mechanism is an administrative process (Amponsah et al., 2021) in which individual nodes agree to validate transactions in the current block that will be added to the existing blockchain if verified. The main purpose of this process is to prevent fraud, specifically the double-spending problem. To incentivize individual nodes, also known as miners, to participate in the consensus mechanism, a reward is given to the miner who adds a new block to the chain after validation. This reward usually takes the form of a fee or a fixed amount of coins from the blockchain. There are several consensus mechanisms available, each with unique advantages and issues, as described in detail by Amponsah et al. (2021).

The most well-known ones are proof of work (PoW) and proof of stake (PoS). In PoW, all nodes, also referred to as miners, try to solve the mathematical problem simultaneously. The miner who solves the problem first adds the new block to the chain and is rewarded (Nakamoto, 2008). Unfortunately, due to its high-power consumption because of the simultaneous computation of all miners, this consensus mechanism is not environmentally friendly.

PoS solves this problem by selecting a validator to verify the current block. In return for their service, the validator earns coins as a reward (King & Nadal, 2012). The probability of being chosen increases with the number of coins at stake, which leads to the phenomenon of the rich getting richer and the poor staying poor. This issue must be addressed in the future.

ii. Smart Contracts

A smart contract is a self-executing contract. The peculiarity is that the conditions of the contracts are written in lines of code (Trinidad, 2023), which then is uploaded onto the blockchain. This means that the execution and enforcement of the contract is carried out autonomously. This characteristic provides an instantly certain outcome for all parties involved in the agreement. Unlike common contracts, there are no intermediaries, which lowers the cost and enhances efficiency (Trinidad, 2023). Hasan et al. (2021) describe smart contracts are digital contracts that are supervised by validators during the processing stage, minimizing the possibility of manipulation.

Despite these advantages, certain risks must be taken into consideration. Since the smart contract runs on the blockchain, it cannot be taken off afterwards. This characteristic makes the smart contract highly inflexible and leads to unmanageable risks if bugs in the code were not discovered and removed before activation. The design of smart contracts requires a high level of technical expertise and thus must be conducted cautiously, but can add value, especially in the travel insurance industry.

iii. Oracles

Oracles are trusted third parties that connect the on-chain world with the off-chain world (Tobler & Brönnimann, 2023). Their main task is to feed the blockchain with relevant off-chain information, which can then be used on-chain for the execution of smart contracts. They play a crucial role since blockchains do not have access to information on the internet and can only rely on data that has been actively put on-chain. Thus, enabling applications to rely on external information.

While oracles can decrease fraudulent activities, there are still some security concerns. Oracles represent a possible centralized point of failure because smart contracts rely and autonomously execute on the information provided by them. Thus, manipulated or false data provided by oracles lead to fraudulent transactions, which are irreversible after the execution of a smart contract (Tobler & Brönnimann, 2023).

v. Blockchain Platforms

Since the introduction of Bitcoin (Nakamoto, 2008) numerous other blockchain platforms have been introduced. Some of them gained notable relevance over the years, for example, Solana, Polygon, or, as mentioned above, Bitcoin which is the most valuable cryptocurrency today. Another blockchain platform that is important to mention is Ethereum, which plays an important role in the implementation of smart contracts (Kar & Navin, 2021) and thus, also in the implementation of blockchain technology for processes in the travel insurance industry.

Yang et al. (2020) differentiate between private and public blockchains, where private blockchains are restricted to a limited number of participants, while public blockchains are open for everyone to join. Public blockchains are slower but more secure and transparent, while private blockchains are faster and offer higher data privacy due to limited access. Hybrid networks are also discussed (Yang et al., 2020).

b. Inefficiencies in Travel Insurance

The main insurance policies cover health, business and vehicles (Hassan et al., 2021). One of the most important insurances is travel insurance, whose sales are expected to increase further after the COVID-19 global crisis (Uğur & Akbıyık, 2020). In fact, after the pandemic experience, even travellers who did not use to get travel insurance may now include it in their plans (Uğur & Akbıyık, 2020). Travel insurance usually covers travel, medical and dental expenses. It is important for travellers to know exactly which expenses are covered, as the expenses incurred abroad can be very high (Leggat et al., 2000). The objective of this type of insurance is also to protect travellers from trip cancellations or flight delays and to help them in the event of a medical emergency or loss of luggage.

The common problems with traditional insurance are lengthy transaction processing times, falsified claims, payment settlement times and fragmented data sources (Mayank et al., 2018; Morabito, 2017). Falsified claims are a major problem, as insurance companies refuse to pay policyholders by falsifying terms and conditions. These contracts lack transparency and can therefore be exploited by insurers and policyholders (Hassan et al., 2021). These inefficiencies, which also translate into the travel insurance industry, can lead to low customer satisfaction (Morabito, 2017). To avoid low customer satisfaction, insurance companies need to adapt to modern technologies, such as blockchain technology (Zhao, 2020).

Smart contracts are "designed to automatically facilitate, verify, and enforce the negotiation and implementation of digital contracts without central authorities" (Wang et al., 2019). Therefore, they hold a lot of potential to solve inefficiencies regarding the processes involved in travel insurance.

In this section, the major problems of travel insurance processes are discussed with a focus on the lengthy claim processing time, risk of fraud, and pricing risk. Additionally, the potential of blockchain technology and smart contracts for solving these inefficiencies will be shown.

i.   Lengthy Claim Processing Time

Claim processing for travel insurance has been a significant challenge for insurance companies, as it requires a time-consuming investigation to verify the authenticity of the claim because of a lack of standardized procedures for claims processing. One of the primary reasons for this is the lack of transparency and communication between insurance companies and their clients. This can lead to misunderstandings and disputes, which ultimately delay the settlement process and reduces customer satisfaction.

The use of smart contracts can eliminate the lack of transparency, increase the trust between insurers and customers and drastically decrease the settlement time. The insurance policy is stored transparently on the blockchain, eliminating the risk of hidden conditions being put in by the insurer. The immutable nature of blockchain transactions also hinders insurers from changing the conditions and/or procedures subsequently, after a claims process has been made. And since smart contracts are self-executable, claims are automatically paid out instantly once the trusted third party provides the information to the smart contract, without the customer having to fill out any paperwork or getting in contact with the insurer.

ii.   Fraud Risk

Travel insurance fraud is a significant issue that affects both the insurance industry and consumers. McKeeken (2013, as cited in Hasan & Abdullah, 2015) found that in 2011 the value of detected travel insurance fraud in the United Kingdom was £7.1 million, with the common types of fraud being false baggage claims, exaggerated or invented medical treatment claims and false cancellation claims (MCKeeken, 2013, as cited in Hasan & Abdullah, 2015). According to Sharifinejad et al. (2020), the biggest challenge in the insurance industry is addressing the forging of documents of the involved parties for financial gain. The consequences of travel insurance fraud are significant, as it not only leads to financial losses for insurance companies but also contributes to rising premiums for honest consumers. Therefore, it is essential for insurance companies to invest in effective fraud detection and prevention strategies to protect both themselves and their customers from the negative impact of fraudulent activities.

Smart contracts can be used to significantly reduce the risk of fraudulent claims by leveraging the characteristics of blockchain technology. The transparent nature of blockchain transactions allows insurers to detect fraudulent claims, for example, multiple claims made by the same customer for the same insurance event. Further, the utilisation of a trusted, independent third party as an oracle prevents the forging of documents, both by the insurers and the customers.

iii.   Pricing Risk

Naseeb et al. (2020) found that the travel insurance industry is also at an immediate pricing risk following the COVID-19 pandemic since insurers are not able to anticipate the severity of the claims. For parametric insurance products, smart contracts can eliminate the pricing risk of insurers by eliminating the uncertainty of the potential claim payouts, as the compensation paid out in case

of a claim is predetermined, fixed and stored immutably on the blockchain. It also increases the trust of the customers, as the compensation amount is also predetermined and immutable, which eliminates the risk of a claim only partially being granted.

4. Case Studies

After analyzing the current problems in the travel insurance industry and the theoretical solutions that smart contracts can provide, the practical world must also be investigated. This chapter discusses the potential of blockchain technology to revolutionize the insurance industry by addressing its key challenges. Two different, already implemented use cases of smart contracts will be presented and future possible use cases explored. The first use case is about Fizzy, which has implemented smart contracts to address the lengthy claim processing times, and the second one is Insurwave, whose framework used in marine hull insurance could be translated into the travel insurance industry.

a. Current Implementations

i. Lengthy Claim Process

Fizzy, a French startup, has developed a unique approach to improve the efficiency and transparency of the travel insurance claims process by utilizing blockchain technology and smart contracts. This chapter explores Fizzy's approach and its potential benefits, highlighting the use of smart contracts as a means of reducing delays, inaccuracies, and disputes during the claims process.

Traditional claims processes for delayed flights can be complex and lengthy, often taking several weeks or even months to complete. The process typically involves multiple parties, including the policyholder, insurer, and service provider, leading to delays, disputes, and frustration for all parties involved.

Fizzy uses smart contracts to automate the claims process. The contracts are stored on the Ethereum blockchain network, enabling secure and transparent transactions without intermediaries. Fizzy's platform allows customers to enter their flight details, and if the flight is delayed for more than two hours, the smart contract triggers a payout based on the coverage purchased and the delay time, without the policyholder needing to file a claim (Rosenberg, 2019).

Their approach offers several benefits to both the policyholder and the insurer. First, it significantly reduces the time taken to complete the claims process, with payouts occurring within minutes, once the block containing the information has been added to the blockchain network. Second, the process is transparent and accurate, ensuring that policyholders receive the correct payout based on their coverage and delay time. Third, the process is cost-effective, reducing the need for intermediaries and minimizing the risk of fraud (Arslanian et al., 2019).

Fizzy's use of blockchain technology and smart contracts to streamline delayed flight compensation claims processes offers a promising solution to the challenges posed by traditional claims processes. Fizzy's success demonstrates the potential for blockchain to revolutionize the insurance industry and improve the overall customer experience.

The project ultimately failed due to a lack of customer adoption and intense competition from established insurers and other startups. The insurance industry's heavy regulation also made it challenging for Fizzy to offer a seamless customer experience while complying with regulations. Despite its potential, Fizzy struggled to gain traction in a highly competitive and regulated industry. Further research in this field will enable the development of more effective and efficient insurance solutions, which can benefit policyholders and insurers alike (Arslanian et al., 2019).

ii.   Fraud Prevention

The insurance industry is facing a constant challenge in preventing fraudulent claims, which not only results in significant monetary losses for insurers but also erodes customer trust. Insurwave, a London-based startup founded in 2018 as a joint venture between EY, Guardtime, and Maersk, aims to address this issue by leveraging blockchain technology to develop a fraud prevention solution that provides greater transparency, security, and efficiency in the claims process. This subchapter explores the Insurwave project in detail, including its background, key features, strengths, weaknesses, and potential impact on the insurance industry.

Insurwave's primary focus is on providing a blockchain-based platform for marine hull insurance to improve the efficiency of the claims process and prevent fraud. The platform utilizes smart contracts to automate the insurance lifecycle from underwriting to claims settlement, providing real-time visibility into policy data and claims status. This ensures that all parties involved, such as policyholders, insurers, and third-party service providers, have access to the same information and can monitor the progress of the claims in real-time.

The Insurwave platform offers several key features that help prevent fraud in the insurance industry. These include immutable data, smart contracts, and real-time visibility. The platform's use of smart contracts automates many manual processes prone to human error, ensuring that the terms of the policy are enforced transparently and automatically. Real-time visibility into policy data and claims status enables all stakeholders to monitor the progress of the claims in real time and identify any discrepancies or irregularities early on, thus reducing the risk of fraudulent claims (Averian et al., 2021).

The Insurwave platform's primary strengths include improved efficiency, greater transparency, and enhanced security. Automating the insurance lifecycle and providing real-time visibility into policy data and claims status improves the efficiency of the claims process, reduces the risk of errors or delays, and helps insurers process claims more quickly and accurately. The use of a private blockchain provides greater transparency in the claims process, reducing the risk of fraud and improving trust among insurers and customers. The use of blockchain technology also provides enhanced

security, as all data is encrypted and stored in a tamper-proof manner, reducing the risk of data breaches and ensuring that sensitive information is always protected (Sapian et al., 2021).

Despite its strengths, the Insurwave platform has some weaknesses that must be addressed for its widespread adoption. Currently, the platform is limited to marine hull insurance, which may not be suitable for other types of insurance products. Insurwave will need to expand its platform to other types of insurance to achieve widespread adoption. Additionally, the platform's use of block-chain technology can be complex, requiring a significant amount of technical expertise to implement and maintain, which may limit its adoption in some cases.

The Insurwave project shows promise in revolutionizing the insurance industry with its use of blockchain technology and smart contracts for greater transparency, security, and efficiency in the claims process. In addition, the platform's features, such as real-time visibility and smart contracts, are particularly relevant to the travel insurance industry, which also faces challenges such as lengthy claim processing, fraud risk, and pricing risk due to traditionally manual processes. Therefore, the potential impact of Insurwave's framework on the travel insurance industry could be significant.

To achieve widespread adoption, the Insurwave platform needs to address weaknesses such as expanding beyond marine hull insurance and making the technology more accessible. Overall, Insurwave's potential for fraud prevention and trust-building is significant, and its success will depend on its ability to adapt to market needs and remain competitive (Farell, 2019).

b. Future Use Cases

i. Baggage Insurance

Baggage insurance is a form of travel insurance that provides financial protection against lost, damaged, or stolen checked-in or carry-on baggage. Passenger luggage is normally dropped off at the beginning of the journey and is picked back up, usually at the destination. During the travel, the luggage item goes through a lot of intermediary steps and must be traceable, regarding possible claims in case of loss or damage. Thus, baggage insurance is a possible use case for the implementation of blockchain technology, which offers transparent and immutable traceability. A possible implementation could be the use of blockchain technology in supply chain management, which is shown by Sunny et al. (2020) in various examples. Another approach could be like "Savemylug-gage", an already existing Ethereum-based platform mentioned by Aleksieva et al. (2020), which was developed in 2018 and unites people to protect their luggage during flights. Such platforms and adoptions could become the standard in baggage insurance and thus offer a new use case of blockchain insurance in the travel insurance industry.

iii. Travel Health Insurance

Despite the findings of Leggat and Leggat (2006), that most claims (66.6% from Australian travellers) originate from travel health insurance, there are not any implementations yet for smart contract-based travel health insurance products. A variety of factors differentiate travel health insurance from other parametric travel insurance products. The main factor is the complexity of travel health insurance, as it can't be translated into a simple "if…then…" condition as for parametric insurance, but rather requires a significant amount of customisation based on factors like destination, length of stay, and pre-existing conditions. Azaria et al. (2016) have published a prototype for a blockchain-based electronic medical records (EMRs) system called MedRec, which could revolutionize travel health insurance. MedRec allows the clients to map their medical information across all providers to a comprehensive and immutable log and give access rights to insurance providers. This could simplify and significantly speed up background checks as customers could simply grant access to an insurance provider to the log rather than having to individually prove pre-existing conditions. The other big factor that hinders the development is the lack of adoption, as travel health insurance relies on multiple intermediaries from different industries. As smart contracts become more widely adopted and the benefits become clearer, we may see more insurance companies and medical information providers exploring the use of this technology for travel health insurance and other types of insurance products.

iv. Etherisc

The traditional travel insurance industry is often criticized for its lack of transparency, inefficiencies, and limited coverage. This is where Etherisc comes in, a blockchain-based insurance platform that is disrupting the traditional insurance industry with its innovative use of technology.

Etherisc's platform provides greater transparency in the travel insurance industry by leveraging the power of blockchain technology. With Etherisc, policyholders have full visibility into how their premiums are being used, how claims are being processed, and how payouts are being determined. This increased transparency helps build trust and confidence among policyholders, ensuring that they receive fair and timely payouts for their claims (Shushkevich et al., 2021).

In addition to transparency, Etherisc's platform is highly efficient, thanks to its use of smart contracts. By automating and streamlining the claims process, Etherisc reduces the need for intermediaries and administrative overhead, resulting in faster claims processing and payouts. This efficiency not only benefits policyholders by reducing the time it takes to receive payouts, but it also reduces costs for insurance companies, allowing them to offer more competitive premiums to policyholders (Shushkevich et al., 2021).

As the travel industry continues to grow, so too will the demand for more flexible and adaptable insurance products. Etherisc's innovative use of blockchain technology in insurance could pave the way for new business models such as micro-insurance and peer-to-peer insurance, which are more

tailored to the needs of the modern traveller. These new business models could make travel insurance more affordable and accessible for a wider range of travellers, while also increasing competition in the industry and improving the overall customer experience.

In conclusion, Etherisc's platform is revolutionizing the travel insurance industry by offering greater transparency, efficiency, and security. As the platform becomes more widely adopted, it is likely to become a key player in the travel insurance market, providing policyholders with the peace of mind they need to enjoy their travels without worrying about unexpected events.

5. Discussion

The travel insurance industry is currently facing numerous challenges that pose significant issues. These challenges include the risk of fraudulent claims and pricing, long processing times for claims, lack of transparency, and misunderstandings between companies and customers. As previously mentioned, these challenges are becoming increasingly prevalent and require attention as well as action from industry players.

These traditional problems can be solved through the implementation of blockchain technologies, particularly the use of smart contracts. These self-executing contracts can automate and expedite the claim and premium payment process, resulting in a clearer, more transparent, and immutable record of travel insurance policies, data, and claims. This can help insurers detect and prevent fraud and provide greater efficiency by eliminating intermediaries and cutting administrative costs. Smart contracts can also rely on trusted third parties acting as oracles to provide the necessary information for claim conditions, thus significantly reducing the risk of fraud. Real-life examples of smart contract implementation include Fizzy, which uses smart contracts on the Ethereum blockchain to automatically trigger payments for a delayed flight, and Insurwave, a blockchain-based platform that creates a transparent and auditable record of marine insurance policies and claims.

Despite the potential benefits of blockchain technology for travel insurance, the authors noted several limitations that may impact its effectiveness. Currently, the use of this technology is restricted to certain areas such as delayed flights or marine hull insurance, and legal and regulatory issues associated with data privacy and security remain significant barriers. The required technical expertise may also be a limiting factor, and the non-compatibility of different blockchain platforms can create challenges for collaboration among travel insurance companies. Implementation of smart contracts can also be costly and require upfront investments in training and development. Finally, the lack of customer adoption can hinder the demand for blockchain technology in insurance. Many consumers do not even know of the existence of these solutions or are hesitant to use them, perhaps because they have so far only been associated with cryptocurrencies. Policymakers must carefully regulate this area to ensure its adoption, and travel insurers must focus on educating customers about the benefits of blockchain technology to drive demand.

The use of smart contracts in the travel insurance industry could be expanded by drawing inspiration from existing use cases. Insurwave's framework could be adapted to address the issue of multiple claims by the same customer for the same insurance event in travel insurance. Similarly, Etherisc's framework can be used for other parametric travel insurance products. The potential applications of smart contracts in travel insurance are diverse, including baggage loss, trip cancellation, travel health, and medical evacuation insurance. However, customers may be concerned about sharing sensitive data for health insurance and location data for baggage loss insurance. This underscores the importance of more precise regulations for blockchain-based travel insurance.

6. Conclusion

In summary, while blockchain technology has the potential to improve efficiency, transparency and security in the travel insurance industry, there are several limitations that companies should consider before adopting the technology. These include legal and regulatory issues, lack of technical expertise and poor customer adaptation. Despite these limitations, existing use cases demonstrate the potential for the expansion of blockchain technology in the travel insurance industry, for example in the areas of baggage loss insurance, trip cancellation insurance, travel health insurance and medical evacuation insurance.

This paper aims to increase knowledge and make it more accessible to travel insurance companies, but the companies must put this knowledge into practice on their own initiative. In addition, regulators should be pushed to regulate this type of technology, also spreading these possibilities among consumers. Blockchain technology is ready to implement parametric travel insurance products. Platforms like Etherisc reduce the technical expertise needed for designing smart contracts by providing customizable building modules, making market entry easier for insurance companies. This means that the industry is already pointing in the direction to reduce the obstacles to blockchain technology implementation. These efforts extend to various aspects, such as the way individuals and organizations engage with each other, how businesses work together, the transparency of data and processes, and the overall productivity and sustainability of the industry.

Thus, should smart travel insurers integrate the use of smart contracts into their procedures? Overall, the decision of whether to implement smart contracts in the travel insurance industry ultimately depends on the specific needs and goals of each company. However, with the potential benefits of increased efficiency, transparency, and security, it is worth considering the use of smart contracts in the travel insurance industry to address the current challenges and improve efficiency and the overall customer experience. In the next years, the growth of the blockchain ecosystem will lead to more substantial changes in this industry. Companies that do not take the initiative and wait for others to adopt smart contracts are unlikely to acquire the necessary expertise or overcome the organizational and cultural barriers needed to work effectively with this new technology. As a result, they are not acting in a *smart* way and miss out on a great opportunity to gain a competitive advantage in the market, remaining one step behind others.

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