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Navn:	Isha Khawas og Kiran Nagaraja Reddy

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Variations in Critical Factors Influencing Blockchain Adoption Across European Industries

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Supervised by Shery W. Smith

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Abstract

This paper investigates the factors influencing blockchain technology adoption across various industry sectors in Europe. Through quantitative research involving 74 European blockchain companies, it identifies key trends and challenges in the industry, particularly in FinTech and software services. Despite the promise of blockchain, this study highlights the prevalent lack of understanding about this technology and its applications, emphasizing the need for enhanced education and clear regulations. The main contribution of this study is to assist entrepreneurs, businesses, policymakers, and future researchers in successfully navigating the European blockchain industry. The conclusion considers certain limitations, including unbalanced representation across industries and countries. Future research should aim to address these limitations to yield more comprehensive insights into Europe's blockchain industry.

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Chapter 1: Introduction

The rapid advancement of technology has brought forth numerous innovations that have revolutionized various industries and sectors. One such emerging technology with immense potential is blockchain. This master's thesis focuses on the implementation and adoption of blockchain technology in a European context, specifically examining the relationship between industry factors and the variations observed across different industry sectors.

Previous research has shed light on the adoption and implementation of blockchain technology in diverse sectors, considering various geographical environments. These studies have explored factors such as organizational readiness, regulatory frameworks, compatibility with existing systems, and perceived benefits and risks. While these findings have contributed significantly to the understanding of blockchain adoption, there remains a need to delve deeper into the nuanced differences between industry sectors and their unique challenges and opportunities.

This thesis paper will dive deeper into the European blockchain industry, researching the following topic: **'What are the critical factors influencing the adoption and implementation of blockchain technology across different European industries, and how do these factors vary across industry sectors?'**.

The research problem addressed in this thesis is two folded. Firstly, it aims to investigate how industry factors influence the adoption and implementation of blockchain technology in a European context. By examining the interplay of factors such as flexible innovation, secure data storage, transparency, and traceability, this research seeks to uncover the specific determinants that go through the implementation and adoption of blockchain in across various industries.

Secondly, this study endeavors to explore the sectoral variations in blockchain adoption within the European context. Different industry sectors, characterized by their distinct requirements, regulations, and market dynamics, may experience varying degrees of readiness and challenges in adopting blockchain technology.

Understanding these variations is crucial for tailoring strategies and frameworks that align with the specific needs and circumstances of each sector.

Studying the implementation and adoption of blockchain technology is of great significance due to its potential to disrupt and transform multiple sectors. Blockchain offers enhanced transparency, security, and efficiency, presenting opportunities for streamlining processes, reducing costs, and enabling new business models. By examining the factors influencing blockchain adoption and implementation, this research aims to contribute to the existing body of knowledge and provide valuable insights for stakeholders such as, entrepreneurs, existing startups, policymakers, and future researchers.

While blockchain technology has since been adopted in various other sectors, its relationship with cryptocurrency remains definitive. Crypto currency is often recognized as one of the major applications of blockchain technology. People tend to think of crypto when discussing blockchain, and the digital currencies embedment in blockchain makes it an interesting field of exploration. Therefore, though it is not the prime focus on this study, this thesis paper will seek to find the implementation, challenges and limitations of the companies dealing with cryptocurrencies in the blockchain industry.

This comprehensive research paper embarks on a multi-faceted exploration of the blockchain industry. It presents an exhaustive overview of the industry's current state, followed by an identification of potential business opportunities facilitated by the adoption of blockchain technology. It dives deeper to scrutinize the challenges businesses encounter when deploying blockchain technology. Moreover, it provides discerning insights into the various forms of blockchain technologies, elucidating on their applications in the genesis of new businesses or the enhancement of existing products and services.

For startups and established businesses alike, this paper is a treasure trove of resources and tools to help navigate the initiation into the world of blockchain technology. Policymakers are also catered for, with detailed insights into the possible benefits and risks associated with the implementation of blockchain

technology. A critical examination of the various stakeholders in the blockchain ecosystem, coupled with the diverse perspectives on blockchain technology, is also incorporated. This substantial body of work concludes with a future-focused roadmap, outlining potential avenues for forthcoming research in the ever-evolving field of blockchain.

1.1 Target group

This paper assumes that the reader has a certain level of prior knowledge and understanding in blockchain technology and its use cases. While providing a small introduction to the technology, it assumes that the reader has some familiarity with the basic concepts and terminologies associated with blockchain. The target group for this paper includes various stakeholders who are involved or interested in the blockchain industry. This paper acknowledges four primary target groups:

Entrepreneurs looking to enter the blockchain industry: This group consists of individuals who are interested in leveraging blockchain technology to develop innovative business models or launch startups. Entrepreneurs that seek insights and recommendations on how to navigate the blockchain industry, identify potential opportunities to better understand the challenges and risks associated with blockchain adoption and implementation.

Startups and businesses looking to adopt blockchain technology: This group comprises existing businesses or startups from various industries that are considering incorporating blockchain technology into their systems and business models. Understanding the benefits, feasibility, implementation strategies, and potential pitfalls associated with integrating blockchain is crucial when deciding whether to incorporate the technology into their operations.

Policy makers seeking to change industry laws and regulations: This target group includes government officials, policymakers, and regulators who are responsible for shaping the legal and regulatory frameworks surrounding blockchain technology. This is crucial in gaining insights into the implications of blockchain technology, understanding its potential impact on industries and economies, and

formulating appropriate policies to foster innovation while addressing potential risks and challenges.

Researchers in the blockchain field: This group consists of scholars, academics, and researchers who are actively involved in studying and advancing blockchain technology. Researchers interested in the findings, methodologies, and insights presented in this master thesis paper as a foundational knowledge base for their own research endeavors. This paper can serve as a building block for further research and contribute to the collective understanding of blockchain technology.

1.2 Personal motivation

The personal motivation to research the factors affecting the adoption and implementation of blockchain technology stems from its position as an emerging industry with significant potential to impact various sectors. The transformative power of blockchain is yet to be fully realized, and this potential for disruptive change makes it an appealing area for research.

Despite its potential, the widespread adoption and implementation of blockchain technology face numerous challenges. Understanding these challenges is crucial for developing effective strategies to overcome them. Factors such as regulatory frameworks, scalability, interoperability, privacy, and security concerns can impede the adoption of blockchain solutions. Exploring and understanding these factors are vital for advancing blockchain technology and maximizing its potential impact. By delving into the complexities of this technology, this paper aims to contribute to the existing body of knowledge, bridging the gap between theoretical understanding and practical implementation.

1.3 Research method in brief

In this master's thesis, the chosen research method is quantitative research. The choice of the quantitative research methodology for this is driven by the need to obtain a substantial amount of data, conduct statistical analysis, and draw meaningful conclusions regarding the factors affecting the adoption and implementation of blockchain technology. By employing a specific set of questions

and structured survey instruments, this research method enables the collection of objective and replicable data. The quantitative approach allows for the identification of patterns and correlations, enhancing the generalizability of the research findings. Overall, the utilization of quantitative research methodology ensures a systematic and data-driven exploration of the research topic.

Chapter 2: Literature Review

Blockchain technology, a radical innovation that shifts trust from institutions to algorithms, has gained significant interest in various sectors due to its unique value proposition. It is a complex technology that requires revisiting the standard way of addressing problems and tackling them from a decentralized perspective (Capocasale & Perboli, 2022). At its core, blockchain technology is a distributed ledger that records transactions across many computers so that the record cannot be altered retroactively without the alteration of all subsequent blocks and the consensus of the network (Ruoti et al., 2019). This makes blockchain technology particularly secure and trustworthy. With digital currencies like Bitcoin, blockchain has gained significant attraction in the past decade. However, the applications of blockchain technology extend far beyond cryptocurrencies.

The applications of blockchain technology are vast and expanding, with a particular focus on the potential for significant changes in business models and asset digitization. A Delphi study conducted by Levis, Fontana, and Ughetto (2021) projected that blockchain-based applications might substantially impact firms' organizations, innovations, and strategies by 2030. The societal areas primarily affected by these changes span multiple dimensions, including business, culture, society, policy and regulation, economy, and technology. This study highlighted the potential of blockchain technology to store a significant portion of the world's GDP, an estimate of 10% by 2025, underscoring the immense potential for growth and influence of this technology.

Blockchain technology is applicable across diverse domains such as finance, software, logistics, healthcare, gaming, NFT´s, and education. However, the complexity of the technology, and the variety of potential applications, have led to

divergent perspectives regarding its future impact. Some stakeholders remain skeptical, viewing the technology as too immature to become a dominant paradigm in the near future. Conversely, enthusiasts believe that blockchain, as a radical innovation, will disrupt many industries, significantly alter business models, and profoundly change people's behaviors, much like the internet did in the 1990s (Levis et al., 2021).

2.1 Evolution of blockchain technology in Europe

Blockchain technology, started to gain significant traction in Europe around the year 2012. This development was largely precipitated by the advent of Bitcoin, the pioneering cryptocurrency that was based on blockchain. During the initial stages, the spotlight was intensely focused on the financial sector as businesses and institutions began to realize the revolutionary potential of this technology (Blandin et al., 2020).

Thought leaders like William Mougayar, in his seminal work "The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology" published in 2016, began to theorize and speculate about the ways in which blockchain could significantly disrupt traditional banking systems. The advantages were clear: blockchain technology had the potential to offer faster, cheaper, and more secure transactions than the conventional methods available at that time. These predictions triggered a surge of interest and investment in the field, prompting a series of research and development efforts. However, as the years passed, the potential applications of blockchain technology began to diversify and extend far beyond the financial sector. In 2020, the European Union recognizing the immense transformative potential of blockchain, launched a series of pilot projects (European commission, 2020). These projects were aimed at exploring the use of blockchain in various industries such as supply chains, where the technology could offer unprecedented transparency and traceability; healthcare, where it could secure patient records and streamline processes; energy sector, where it could enable peer-to-peer energy transactions and promote green energy; and digital identity verification, where it could ensure privacy and security.

Among the various European countries that showed significant interest in blockchain technology, Estonia stood out. According to a 2018 study by Kovács, Estonia has successfully integrated blockchain technology into its e-governance platforms. This integration has not only led to increased transparency but has also resulted in reduced administrative costs, demonstrating the practical benefits of adopting this technology on a large scale. At the EU level, the response to the rise of blockchain technology has been proactive and forward-looking. The European Union has initiated various programs, the most notable of which is the European Blockchain Partnership (EBP), launched in 2021. This initiative was designed to foster cooperation among EU member states and promote the use of blockchain services throughout the Union (*European Blockchain Partnership*, 2023).

Despite these advancements, the regulatory frameworks concerning blockchain technology are still evolving. These regulations need to strike a careful balance: they must promote innovation and encourage the use of blockchain technology while at the same time protecting consumer rights and data privacy. In order to fully leverage the potential of blockchain, it is necessary to develop an inclusive, well-regulated, and transparent blockchain ecosystem. This ecosystem must align with European values and legal frameworks, ensuring that technological advancement does not come at the cost of rights and values.

2.1.1 Leading countries within Europe

Germany, the United Kingdom, Switzerland, and Norway have been leaders in the blockchain industry in Europe due to several factors, including a conducive regulatory environment, developed technology infrastructure, government support, and a skilled talent pool. Firstly, these countries have established a favorable regulatory environment that encourages the development of blockchain-based businesses (Mougayar, 2020). For instance, both Germany and the UK have clear regulatory guidelines and supportive government strategies towards blockchain technology (Federal Ministry for Economic Affairs and Energy, 2020; Financial Conduct Authority, 2020). Switzerland, specifically in the "Crypto Valley" of Zug, is known for its open regulatory approach towards crypto and blockchain businesses, fostering an environment of innovation (Reuters, 2019). In addition to

regulatory support, the well-developed technological infrastructure in these countries plays a vital role in promoting blockchain technology. For instance, the robust financial technology ecosystem in the UK, underpinned by London's global financial hub status, is a major asset (Jones, 2022).

Government support and strategic investment in blockchain technology is another factor. Both Germany and Norway have explicit government strategies that encourage the development of the blockchain sector, and Switzerland's Federal Council has laid out a clear framework for blockchain in the financial sector (Federal Ministry for Economic Affairs and Energy, 2020; Federal Department of Finance, 2020; Jones, 2022). These countries benefit from the presence of strong academic and research institutions, offering specialized courses and research programs in blockchain and cryptography, contributing to a steady supply of skilled professionals in this field (Cascarano, 2020).

2.2 General adoption of blockchain

Blockchain adoption has taken place slower than expected (Janssen et al., 2020). Several articles have been researching and understanding the reasons for why the adoption rate is slow, or slower than anticipated. Understanding the reasons for why and how blockchain is adopted, and the explanation behind its adoption rate is crucial for businesses wanting to engage in blockchain related activity. Studies show that factors such as cost, trust, awareness, efficiency, and storytelling are crucial to give industries unbiased information and directions in how to build and expand their blockchain strategies (Mohammed et al., 2020).

2.3 Research on blockchain adoption

The four major target groups that this paper is looking to contribute are:

1. Entrepreneurs looking to enter the blockchain industry.
2. Existing startups/ businesses looking to adopt blockchain technology.
3. Policymakers looking to change the industry laws and regulations regarding blockchain technology and its business/ industry benefits.
4. Researchers looking to add to the existing body of blockchain based research and knowledge.

The present literature concerning blockchain technology and its adoption, while extensive, leaves some notable gaps which, if filled, would provide a much more comprehensive understanding of the subject. The deficiencies of the current literature can be broadly categorized into four main areas.

Firstly, a fundamental issue in the current body of literature is that it is predominantly confined to specific industries. This means that the analyses and insights provided in these studies are often only applicable to these select sectors, and the conclusions drawn cannot be easily generalized to others. In other words, the scope of the current literature is restricted and does not encompass the diverse array of industries that comprise the global market. In addition to the industry-specific focus, many of these studies are situated within a singular industry in isolation, without consideration of how multiple key industries may interact or influence each other. This lack of comprehensive and inter-industry analysis is a major shortcoming, as it precludes a holistic understanding of the broader market dynamics. This is further complicated by the fact that industries do not exist in a vacuum - they intersect and interact with each other in complex ways, shaping and being shaped by the broader market landscape. Therefore, the absence of studies that examine multiple key industries simultaneously leaves us with an incomplete picture of the market.

The second noticeable gap is that the existing literature is often country-specific. A large portion of these studies is grounded in the context of one particular nation and rarely extend beyond its borders. Although it is crucial to understand local market dynamics, focusing exclusively on a single country can result in an oversight of global or regional trends that might be impacting industries. Specifically, there appears to be a dearth of research that focuses on Europe as a whole. This is a significant oversight given the integral role that Europe plays in the global economy. By concentrating on individual European countries, researchers may overlook important trends and dynamics that are unique to the continent as a whole. This lack of pan-European analysis is detrimental to our understanding of market trends, as it fails to capture the interactions between different European markets and the broader impacts of EU policies on industry trends and performance.

Third, the current literature tends to rely heavily on theory-based research. While theoretical research is crucial in providing a solid foundation for understanding the principles, benefits, and potential applications of blockchain technology, it can sometimes detach from practical realities. This form of research often lacks concrete, real-world examples that can demonstrate the practical hurdles and issues encountered when adopting blockchain technology. Thus, the focus needs to shift towards more empirical research, which examines real-life case studies and experiences.

Lastly, very few academic papers have conducted direct surveys with blockchain startups to grasp the core factors influencing the adoption of blockchain technology and the challenges these companies face. Such firsthand information is invaluable as it can provide an authentic and detailed perspective on the practical challenges and opportunities associated with the adoption and implementation of blockchain. These surveys could also offer insights into how these startups are pioneering solutions to overcome such challenges, potentially serving as blueprints for other businesses interested in adopting blockchain.

2.3.1 Industry limitation

The potential of blockchain technology to disrupt various industries has given rise to parallel discussions across a variety of sectors where the technology has had a notable influence. These sectors include supply chain management (SCM), financial technology (FinTech), software services, construction, and even the burgeoning market of tokenization through non-fungible tokens (NFTs).

In the world of industry-specific research, there has been a considerable amount of attention directed towards the role of blockchain technology and its potential to reshape numerous sectors. Among these sectors, one that has particularly captured researchers' interest is supply chain management . A multitude of studies have been conducted to investigate how blockchain can potentially revolutionize the processes in SCM, thereby introducing greater efficiency, transparency, and security. One noteworthy theoretical study that stands out in this extensive body of research was conducted by Horst Treiblmaier in 2018. In this comprehensive exploration, Treiblmaier critically scrutinizes the potential transformative impact that

blockchain technology could have on SCM. The study meticulously dissects the influence of blockchain technology on SCM, making sure to account for all possible variables, ranging from logistical efficiencies to security enhancements. Through its rigorous analysis, this research has contributed significantly to the ongoing academic discourse about blockchain's potential in the SCM sector.

However, Treiblmaier's study is not alone in this examination. Complementing and aligning with Treiblmaier's work are other significant research contributions such as those from Ghode et al. (2020) and Yadav & Singh (2020). In their respective studies, these researchers delve deep into the intricate nexus between blockchain technology and SCM. They base their research on a wide array of pre-existing literature to set the foundation for their studies, and then proceed to elicit insights from experts in the field. Their aim is to rank the various factors that influence the relationship between blockchain and SCM, providing a more detailed understanding of how the technology can be optimized for the supply chain industry.

Despite the extensive nature of these studies, a discernible gap exists in the research landscape. Specifically, there appears to be a notable dearth of firsthand accounts from the perspective of startups, which play a crucial role in driving blockchain innovation in various industries, including SCM. There's a significant need for research that specifically explores how startups perceive and navigate the blockchain landscape - especially in identifying the range of influential factors and challenges associated with integrating blockchain technology into their operations. This gap signifies an opportunity for future research, with the potential to shed new light on how startups can successfully navigate the integration of blockchain technology.

In the realm of FinTech, there has been a significant amount of scholarly activity. For instance, researchers Raghavendra and Peddinti in 2022 embarked on an ambitious research project that entailed an exhaustive review of over 100 academic and industry publications. The goal of their research was to understand and deconstruct the factors fueling the adoption of blockchain technology within banking and finance sectors. Their comprehensive analysis was intended to generate a thorough understanding of how blockchain technology is transforming

the traditional mechanisms of these sectors and what propels its growing acceptance. Parallel to this, a methodologically similar study was conducted by another set of researchers, Patel et al,. (2022), in the same year. Their approach involved a rigorous analysis of an extensive corpus of 154 published papers ranging from the period of 2009 to 2021. The objective of their study was to meticulously dissect the subtleties and complexities involved in the integration of blockchain technology within the broader financial industry. Their analysis was aimed at unveiling the intricate dynamics of how blockchain technology intertwines with existing financial structures and processes.

Moving away from the financial sector, the construction industry has also been a subject of discussion in the context of blockchain adoption. Li and his colleagues in 2022 took the approach of surveying professionals within the industry. Engaging 244 industry experts, they sought to understand the factors influencing the uptake of blockchain technology in the construction business. The study aimed to provide empirical evidence of the potential benefits and challenges associated with implementing blockchain in construction. In parallel, a study conducted by Teisserenc & Sepasgozar in 2021, explored the same theme but employed a more theoretical approach. Their research sought to frame the potential application of blockchain technology in construction from a theoretical perspective, aiming to contribute to the academic discourse on this topic. However, a notable limitation in both of these studies was their regional confinement - they did not offer a comprehensive global perspective on the subject. Therefore, there is room for further research that expands the geographical scope of the analysis.

2.3.2 Geographic limitation

The problem of focusing too much on a specific location often comes up in research, especially studies about new businesses. This is an issue because it cuts off a lot of valuable insights that could be found in different places around the world. This paper illustrates this with a few examples.

There's the research conducted by Malik et al. in 2021. They directed their focus specifically on the organizational adoption of blockchain, but their approach was largely confined to an Australian perspective. Their exploration considered the

unique nuances of the Australian startup landscape, examining the conditions and factors that facilitated or impeded the integration of blockchain technologies within the organizational fabric. The resultant insights were undoubtedly informative, shedding light on the specific factors that influence blockchain adoption in Australian organizations. However, these findings are primarily applicable only within Australia's distinct economic and regulatory context and may not wholly translate to other parts of the world.

Next, this paper considers the work of Veuger, also from 2021, who undertook an exploration of the digitization of financial blockchain specifically within the Netherlands. This research delved into the unique intersections between the digitization of financial processes and the implementation of blockchain technologies within the Dutch business ecosystem. It shed light on the country's blockchain digitization journey and offered considerable insight into the particularities of the Dutch scenario. Again, while enlightening in the context of the Netherlands, its geographic restriction significantly limits its Europian applicability. Jena's 2022 study on the adoption of blockchain within the Indian FinTech sector serves as another prime example. Gathering data from leading banks nationwide, Jena's study critically examined the challenges encountered in the blockchain implementation process within India's growing FinTech sector. While this study offers a deep understanding of the blockchain adoption hurdles specific to India, the geographically constrained focus could potentially lead to an incomplete or skewed perspective when extrapolating these findings to a broader, international context.

These are valuable contributions to the existing body of research on blockchain adoption. Each study offers significant insights into the particular circumstances within their respective regions - Australia, the Netherlands, and India. However, by their very design, these studies are geographically confined and, thus, they might not entirely reflect the full scope of blockchain adoption challenges and opportunities worldwide. The geographical limitation of these studies can result in a fragmented understanding of the European blockchain adoption narrative, underscoring the need for more comprehensive, internationally inclusive research.

Chapter 3: Research Methodology

The research methodology for this study was designed to identify and understand the critical factors that influence the adoption and implementation of blockchain technology across different European industries. This research employed a mixed-methods approach with a quantitative focus, employing survey methodology for data collection and supplemented with secondary data analysis where necessary. The survey methodology was chosen for several reasons:

Broad Reach: The survey methodology allows for the collection of data from a large and diverse group of participants, which is essential for understanding the multifaceted nature of blockchain technology adoption across different European industries. By gathering data from respondents representing various sectors, regions, and organizational sizes, the research captures the varying perspectives and experiences of stakeholders. This broad reach ensures that the study's conclusions are more generalizable and relevant to the European context, providing valuable insights for policymakers, industry leaders, and academics.

Standardization: Standardized questions in surveys enable consistency in the data collection process, ensuring that each participant is presented with the same set of questions in the same order. This uniformity is crucial when comparing the factors influencing blockchain adoption across different sectors, as it eliminates potential biases introduced by variations in question phrasing or order. Standardization makes it easier to aggregate and analyse data, allowing researchers to draw more accurate and meaningful conclusions about the topic under investigation.

Efficiency: Survey research is known for its time and cost efficiency, which is particularly important given the rapidly evolving nature of blockchain technology. As this study aims to capture a snapshot of the current state of blockchain adoption across Europe, it is vital that data is collected quickly and efficiently. Surveys can be easily distributed electronically to thousands of potential respondents simultaneously, resulting in a relatively fast and cost-effective data collection process. This efficiency allows researchers to gather valuable data within a limited

timeframe, which can be crucial for informing time-sensitive decisions and recommendations.

Quantitative Analysis: Surveys primarily collect quantitative data, which can be systematically analysed using various statistical methods to identify trends, correlations, and significant differences among groups. In this study, such analysis is essential for ranking the critical factors influencing blockchain adoption and understanding their relative importance across different industries. Quantitative analysis allows for the empirical testing of hypotheses and the generation of evidence-based conclusions, lending credibility and robustness to the research findings.

Anonymity: Surveys provide a level of anonymity that can encourage participants to provide honest and accurate responses, particularly when addressing sensitive topics such as barriers to adoption, internal resistance, or perceived risks. By ensuring the confidentiality of respondents' identities and their responses, researchers can minimize social desirability bias and collect more reliable data. Anonymity can help to increase response rates, as participants may feel more comfortable sharing their opinions and experiences when they know their privacy is protected.

3.1 Research design

The research design for this study will employ a cross-sectional survey methodology, focusing on understanding the current state of blockchain technology use, its future, and perceived challenges and opportunities among blockchain start-ups. This design will provide a snapshot of the industry at a specific point in time, allowing for a comprehensive understanding of the factors shaping the blockchain start-up landscape.

The cross-sectional survey approach offers several advantages for this study. It enables a broad examination of the subject matter, encompassing various aspects related to blockchain technology use, strategies, and perceptions among start-ups. This holistic view allows to identify patterns and trends that may not be apparent

when examining these factors in isolation. The cross-sectional design also allows for the efficient collection of data from a large and geographically dispersed sample. By utilizing the online survey platform Qualtrics, the study can reach participants from different regions and backgrounds, enhancing the generalizability of the findings. This approach also enables the rapid collection and analysis of data, facilitating timely insights into the blockchain start-up landscape.

To ensure the survey instrument effectively captures the required data, it will be designed with a combination of closed and open-ended questions. Closed-ended questions will facilitate quantitative analysis of key indicators, such as the extent of blockchain technology adoption, types of applications being developed, and investment in blockchain solutions. Open-ended questions will provide qualitative insights into participants' perceptions of challenges and opportunities, allowing for a more nuanced understanding of the factors influencing the blockchain start-up ecosystem. The cross-sectional survey design will support the examination of relationships between variables, helping to identify potential associations and correlations. For example, exploring whether the level of blockchain technology adoption is related to the perceived challenges or opportunities, or if certain industry sectors are more likely to invest in blockchain solutions. These analyses can provide valuable insights into the underlying dynamics shaping the blockchain start-up landscape.

Data analysis: Once the necessary data has been compiled through the survey, it is followed by initiating a comprehensive analysis using multiple methodologies. The centerpiece of this analysis will be the utilization of a tool known as Crosstabs iQ, which is offered as a feature within the Qualtrics platform. The use of this tool, coupled with our various other methods of data interpretation, will provide us with a multi-dimensional understanding of the gathered responses.

Crosstabs iQ is specifically designed to create new column variables that integrate data points. This enables us to scrutinize the patterns that might emerge in specific groupings of responses. At its core, the crosstabulation feature is essentially a statistical tool that allows for a juxtaposition of two or more variables to explore their interdependence. This will be crucial in understanding how certain variables within our survey data are interacting with each other.

The process of using Crosstabs iQ will involve several stages. This paper will identify the specific variables that are interested in examining. These might be demographic factors, responses to certain key questions, or any other aspects of the data that is deemed to be of particular importance. After these variables have been determined, the process will proceed to configure Crosstabs iQ to create the necessary new column variables. This involves combining selected data points into singular entities that represent a specific group of responses. For example, if this study is interested in understanding the interaction between age and response to a specific question, it could easily create a new variable that combines these two data points. Once the new column variables are in place, Crosstab iQ will then move to the analysis stage. Here, patterns will be shown in the responses based on the created variables.

3.2 Inclusion criteria's

The criteria for the selection of startups, which will constitute the research sample for this particular study, are thoroughly delineated and comprise several essential parameters. These criteria are employed to ensure that the resulting research findings will be both comprehensive and representative of the specific sector being investigated, in this case, the blockchain industry within Europe.

Startup Status: The primary criterion for the selection of the research sample is that the business must qualify as a 'startup'. This stipulation is rooted in the common understanding of what constitutes a startup - typically an organization in its formative years. More specifically, the startup should be relatively new, often less than five to eight years old. This timeframe is considered appropriate as it is sufficiently long to allow for the maturation of business models and market validation, while still being representative of the challenges and dynamism typical of the startup phase.

Industry of Operation: The second key criteria is the domain or industry within which the startup operates. For the purpose of this research, the startups need to be involved in the burgeoning field of blockchain technology. This sphere includes,

but is not limited to, companies that are involved in a myriad of applications such as the burgeoning cryptocurrency market, the development and execution of smart contracts, distributed ledgers, and any other innovations that leverage the decentralization and security features of blockchain technology. This condition is imposed to ensure that the sample is representative of the unique challenges and opportunities presented by this rapidly-evolving technology sector.

Geographic Location: Another important criteria for the selection of startups is their geographical location. For the purpose of this study, the startups should be based in Europe. This includes all countries within the geographical confines of the European continent, and is aimed at ensuring that the results are sensitive to the unique economic, regulatory, and cultural context prevalent in this region.

Stage of Operation: The study is designed to be inclusive and representative of startups in varying stages of growth and development. Consequently, the inclusion criteria account for startups at different stages, ranging from early-stage startups that are still working on product-market fit and business model validation, to growth-stage startups that are focused on scaling and market expansion. It could also include a mix of both to capture a broad spectrum of experiences, challenges, and strategies.

Funding Level: In relation to funding levels, it is important that the selected startups should have achieved a significant milestone in terms of securing external funding. At a minimum, the startups should have procured seed funding. This is the initial capital used when starting a business, often coming from the founders' personal assets, friends, or family, but can also include funding from angel investors or venture capitalists. This stipulation is key to ensure that the startups have demonstrated a baseline level of viability and market potential to attract external investment.

Current Operational Status: Finally, to ensure the relevance and applicability of the research findings, the startups included in the study should be currently active and operational. This means they are actively involved in business activities and have not ceased operations or declared bankruptcy. This condition is essential to

ensure that the research results reflect the current state of the market and the contemporary challenges and strategies in the blockchain startup ecosystem.

3.3 Sample selection

Sampling method: This research paper utilized a combination of convenience and stratified geographic sampling methods to select a sample of blockchain startups. This hybrid approach was undertaken to ensure a robust and diverse sample that could be indicative of the general trend within the blockchain start-up ecosystem.

The initial step involved the identification of the population, which in this case was blockchain startups. To gather this population data, convenience sampling was used by leveraging online directories of start-ups such as Crunchbase, CB Insights, and LinkedIn. These platforms provided an extensive database of start-ups, allowing to create a comprehensive list of blockchain-based start-ups globally. The online directories were chosen due to their accessibility and the wealth of relevant data they contained, making them a practical choice for defining the base population of this study. This method was chosen as it allowed to ensure that the sample was representative of the diverse characteristics within the population, and thus more likely to provide valid and generalizable findings.

It had to be determined an appropriate sample size that would provide meaningful and generalizable results, while still being manageable in terms of data collection and analysis. Based on these considerations, a sample size of 1000 blockchain companies was shortlisted. This number was deemed sufficient to ensure a high degree of statistical power and to allow for meaningful inferences to be made about the larger population of blockchain start-ups.

3.4 The population

The startups that participated in the survey are as follows:

Startup/company name	Country	Industry	Year Founded
RYSKEX	Germany	FinTech	2016
StakeHound	Switzerland	FinTech	2020
Cygnetise	UK	FinTech	2016
Grid Singularity	Germany	FinTech	2016
BrightNode	Switzerland	Software services	2020
GET Protocol	Netherlands	FinTech	2016
DigiShares	Denmark	FinTech	2018
Brickken	Spain	FinTech	2020
Bitrefill	Sweden	FinTech	2014
Authena AG	Switzerland	Consulting	1993
Cadeia GmbH	Germany	FinTech	2017
Q2i	UK	Software services	2018
Alephium	Switzerland	FinTech	2019
Matter Labs	UK	Software services	2018
AstraKode	Italy	Software services	2021
Mangrovia	Italy	Software services	2018
INNOMAGIC GmbH	Austria	Software services	1993
Block Green	Switzerland	FinTech	2022
Kaiko	France	FinTech	2014
Reltime	Norway	FinTech	2018
CircularTree	Germany	Supplychain	2018
Black Manta Capital	Germany	FinTech	2018
Fnality International	UK	FinTech	2019

Tilkal	France	Supplychain	2017
AEY Metaverse OÜ	Estonia	Gaming	2022
Morfin.io	Luxemburg	FinTech	2018
Mangata Finance	Slovakia	FinTech	2020
Centre Blockchain de Catalunya	Catalonia	Software services	2022
Lattice Labs	Monaco	Software services	2022
Latvian Blockchain Association	Latvia	Consulting	2017
Kaupang Krypto AS	Norway	FinTech	2017
FineryMarkets	Cyprus	FinTech	2019
NMKR	Switzerland	Tokens (NFT)	2021
Flowciety	Germany	Software services	2019
SKNUPS	UK	Tokens (NFT)	2020
IBF Net Limited	Ireland	Consulting	2021
Trustwise.io	Switzerland	Software services	2017
Blocksure	UK	FinTech	2016
Convex Foundation	UK	Software services	2020
2018	Norway	FinTech	2020
BlockInvest	Italy	FinTech	2019
Energy Web Foundation	Switzerland	Software services	2017
Iagon	Norway	Software services	2017
CF Benchmarks Ltd	UK	Consulting	2016
Momint	UK	Tokens (NFT)	2021
Tex Tracer BV	Netherlands	Supplychain	2020
Unisot	Norway	Supplychain	2017

Polymesh	Switzerland	FinTech	2021
Secretum	Lithuania	FinTech	2021
Tracr	UK	Software services	2018
ChainCo	Belgium	FinTech	2021
Twinu	Germany	Software services	2021
Farmer connect	Czech	Supplychain	2019
CargoX	Slovenia	Supplychain	2017
pink.gg / AtomicHub	Germany	Gaming	2019
Aleph Zero Foundation	Switzerland	Software services	2018
Concordium	Switzerland	Software services	2018
CV VC AG	Switzerland	Investment	2018
Trace Labs	Slovenia	Software services	2018
Guardtime	Estonia	Software services	2007
Papers AG	Switzerland	Software services	2019
Hiveonline	Denmark	FinTech	2016
Prosegur Crypto	Spain	Software services	1976
Norwegian Block Exchange	Norway	FinTech	2018
IAAI GloCha	Austria	FinTech	2020
FlexiDAO	Spain	Software services	2017
CBCat	Catalonia	Software services	2021
YAY Network	Serbia	Software services	2021
Leloup Partners	France	Software services	2022

Fyblo	Italy	FinTech	2021
BOTLabs GmbH	Germany	Software services	2019
Futura Law Firm	Italy	Software services	2020
Cashlink	Germany	FinTech	2018
Nxchange	Netherlands	Token (NFT)	2015

Chapter 4: Survey Questioner Set

The following set of questions were used through Qualtrics to take a survey from the European blockchain startups. The multiple variable options that were provided for the selected set of questions were chooses based on the relevant research papers that are referenced in table-01.

Survey question set:

Q1: Your start up or company name?

Q2: What country are you based in?

Q3: What is your job designation?

Q4: Does your start-up/ company use blockchain technology at any capacity?

- YES
- NO

Q5: Was your startup/company.

- Founded around the blockchain technology.
- Incorporated the blockchain technology down the line.

(Follow up question if NO is selected in Q4)

Q6: Is there any plans to use/ integrate blockchain to your start-up/ company in the future?

- YES
- NO

(Follow up question if NO is selected in Q6)

Q7: What are some of the factors that are influencing your start-up/company to not use blockchain at the moment? Choose multiple if applicable

- High energy consumption

- Self-maintenance
- Hard to integrate
- High implementation cost
- Data immutability
- Transparancy
- Still not mature enough
- Not applicable/relevant to the business model
- Other

Q8: How is blockchain being used in your start-up/ company? Choose multiple if applicable

- Smart contracts
- NFT related activities
- Supply chain management
- Transactions and reimbursements
- Security and commodities trading
- Token related activities
- Voting
- Identity and record management
- Other options

Q9: What are some of the following factors that influenced your start-up/ company to use the blockchain technology? Choose multiple if applicable

- Secure cloud storage
- Smart contracts
- Unique ownership/ digital synergy
- Transparency (Cost, users, and transactions)
- Visibility and traceability
- Efficient and secure data/ documents managements
- NFT related activity's
- Tokenization
- Decentralized structure
- Speed of transactions
- Innovation
- Other options

Q10: What are the biggest difficulties that your startup/ company is currently facing with the use of blockchain technology? (Optional)

Q11: Does your start up/ company, use/provide cryptocurrency services?

- YES
- NO

(Follow up question if YES is selected in Q11)

Q12: At what capacity is your start-up/ company involved in cryptocurrency? Choose multiple if applicable

- Buying and selling
- Investing
- Trading options for customers
- Payment options for customers
- Loans and credits
- R&D
- Securities
- Other

(Follow up question if NO is selected in Q11)

Q13: Was any of the following factors influential to not use/provide cryptocurrency services? Pick several answers if relevant.

- Market volatility of cryptocurrencies
- Environmental mining effects
- National/ local laws and regulations (Including tax laws and regulations)
- Lack of trust on the concept of cryptocurrency
- Limited customer base
- Not applicable/relevant to the business model
- Other

(Follow up question if NO is selected in Q11)

Q14: On a scale 1-10 what is the likelihood of providing cryptocurrency services (Trading/payment) to your customers in the future?

Q15: Was any of the following factors influential to use/provide cryptocurrency services?

- Speed of transfer transactions
- Fear of discontinuity/ customer stops using their current services
- Customer need/ customers asking to provide these services.
- Disruptive technology/ market potential/ first mover
- Keeping up with the technology/ adapting to market trends/ adaptation of innovation and technology

- Cryptocurrency investment
- Custom

(*Q16, 17,18, & 19 are the follow up questions depending on the selected options in Q13)*

Q16: Would you consider in providing cryptocurrency services if it is made a legal tender for transactions?

- YES
- NO

Q17: Would you re-consider if governments come up with better/ makes changes to current crypto laws?

- YES
- NO

Q18: On a scale of 1-10 how likely are you to re-consider implementing cryptocurrency if the mining effects are reduced?

Q19: Any possibility to integrate green cryptocurrencies?

Q20: How likely are you to re-consider if there is a high customer demand for crypto services?

Q21: Do you have a contingency plan in case if the government plan on banning cryptocurrency?

- YES
- NO

Q22: What has changed the most in your start-up/company due to the result of incorporating cryptocurrencies?

Q23: What are the biggest difficulties that your startup/ company is currently facing with cryptocurrencies? (Optional)

Table 01: Scholarly articles from which the factors were selected

Qn. No.	Literature	Topic title
7	(Huo et al., 2022)	A Comprehensive Survey on Blockchain in Industrial Internet of Things: Motivations, Research Progresses, and Future Challenges
	(Duy et al., 2018)	A survey on opportunities and challenges of Blockchain technology adoption for revolutionary innovation
	(Ratta et al., 2021)	Application of Blockchain and Internet of Things in Healthcare and Medical Sector: Applications, Challenges, and Future Perspectives
	(Hasan et al., 2022)	Blockchain Technology on Smart Grid, Energy Trading, and Big Data: Security Issues, Challenges, and Recommendations
	(Ma & Fang, 2020)	Current Status, Issues, and Challenges of Blockchain Applications in Education
	(Lypnytskyi, 2019)	Opportunities and challenges of blockchain in industry 4.0
	(Sopheara & Sotharith, 2022)	Social Disadvantages of Ease of Transactions Using Blockchain
	(Tokkozhina et al., 2023)	Uncovering dimensions of the impact of blockchain technology in supply chain management
8 & 9	(Kaur et al., 2021)	A Research Survey on Applications of Consensus Protocols in Blockchain
	(Bao et al., 2021)	A Survey of Blockchain Applications in the Energy Sector
	(Ghode et al., 2020)	Adoption of blockchain in supply chain: an analysis of influencing factors
	(Miraz & Ali, 2018)	Applications of Blockchain Technology beyond Cryptocurrency

	(Siyal et al., 2019)	Applications of Blockchain Technology in Medicine and Healthcare: Challenges and Future Perspectives
	(Khanfar et al., 2021)	Applications of Blockchain Technology in Sustainable Manufacturing and Supply Chain Management: A Systematic Review
	(Kakkar et al., 2021)	Blockchain Applications in various sectors beyond:Bitcoin
	(Abdelmaboud et al., 2022)	Blockchain for IoT Applications: Taxonomy, Platforms, Recent Advances, Challenges and Future Research Directions
	(Kumar & Raghavendra, 2022)	Blockchain technology adoption in banking and financial sector: a literature review
	(Grida et al., 2023)	Critical Success Factors Evaluation for Blockchain's Adoption and Implementing
	(Kamarulzaman et al., 2021)	Factors Influencing Blockchain Adoption in Government Organization: A Proposed Framework
	(Guych et al., 2018)	Factors influencing the intention to use cryptocurrency payments: An examination of blockchain economy
	(Almekhlafi & Al-Shaibany, 2021)	The Literature Review of Blockchain Adoption
12	(Sunny et al., 2022)	A Systematic Review of Blockchain Applications
	(Yuan & Wang, 2018)	Blockchain and Cryptocurrencies: Model, Techniques, and Applications
	(Pournader et al., 2020)	Blockchain applications in supply chains, transport and logistics: a systematic review of the literature
	(Pestunov, 2020)	Cryptocurrencies and Blockchain: Potential Applications in Government and Business
	(Flori, 2019)	Cryptocurrencies in finance: review and applications

13	(Naqvi, 2018)	Challenges of Cryptocurrencies Forensics: A Case Study of Investigating, Evidencing and Prosecuting Organised Cybercriminals
	(Kurniawan et al., 2021)	Factors That Influence Challenges and Opportunities of Cryptocurrencies in Developing Countries
	(Tavasoli, 2020)	Identification and prioritization of the challenges of using cryptocurrencies in international transactions
	(Tolossa & Khawrin, 2022)	The opportunities and challenges of cryptocurrencies: a systematic review

Chapter 5: Analysis and Discussion of Results

The countries that represented the greatest number of responses were Switzerland, Germany, Norway, and the United Kingdom. These nations, in particular, contributed significantly to the overall pool of responses. The observation of the geographical distribution of blockchain startups presented itself with an interesting trend. Western Europe exhibited a higher number of such startups in comparison to Eastern Europe. There are multiple reasons for this including factors like differing levels of economic development, variations in technological readiness, and regulatory environments that are more supportive of blockchain innovation in the west.

One of the most striking features of the survey was the demographics of the respondents. More than 95% of the responses came from individuals occupying top managerial positions in their respective organizations. This included CEOs, CTO, CFOs, directors, and founders. The high percentage of these upper-management respondents lent a significant degree of authenticity and authority to the survey responses. These individuals typically possess a comprehensive understanding of their company's strategic direction and operations, providing insights that are both nuanced and reliable. Their responses are likely to reflect the realities of blockchain implementation and usage within their organizations, contributing to the reliability and validity of this study.

The 26 countries that participated in the survey

Country	Number of companies	Country	Number of companies
Germany	10	Slovakia	1
Switzerland	13	Catalonia	2
UK	10	Monaco	1
Norway	6	Latvia	1
Netherlands	3	Cyprus	1
Italy	5	Ireland	1
Spain	3	Lithuania	1
France	3	Belgium	1
Sweden	1	Czech Republic	1
Austria	1	Slovenia	1
Estonia	2	Serbia	1
Luxemburg	1	Denmark	2
Serbia	1	Austria	1

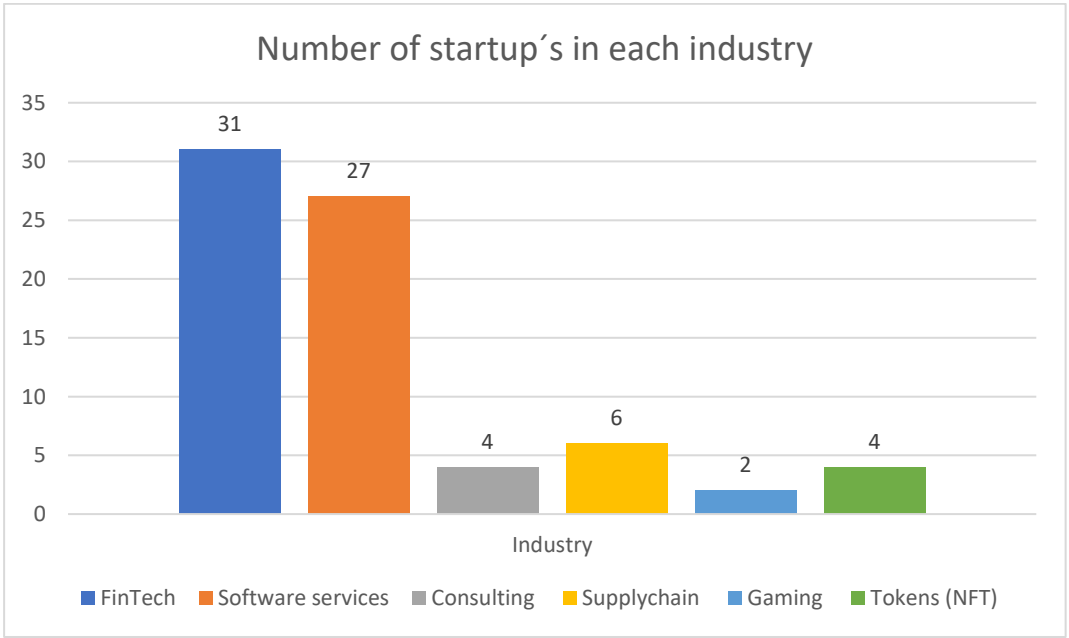
5.1 Number of startups vs industry

This research captured responses from startups in six different industries. The participants' industries are categorized and represented in the following graph (Graph-01). This visualization provides an in-depth view of the distribution of startups across different sectors, highlighting the concentration of ventures in each sector. The startups participating in the survey showed a significant skew towards two sectors: FinTech and Software Services. These two sectors collectively accounted for more than half of the startups surveyed, with a combined total of 54. Driven by digital transformation trends and the demand for financial technology solutions and software services, this considerable figure suggests that there is currently a strong inclination among entrepreneurs and investors towards the FinTech and Software Services industry.

The rest of the participating startups spanned across four other industries, although their representation was less dominant. Each of these sectors had the participation

of startups falling into single-digit percentages. One such sector was the supply chain industry. Despite the fundamental role supply chains play in the smooth operation of various other industries, the number of startups in this sector was significantly lower than that in FinTech and Software Services. Next, participation from the token industry, specifically ventures focused on Non-Fungible Tokens (NFTs). This niche sector, an offshoot of the broader blockchain and cryptocurrency industry, also had limited representation in the survey. Its single-digit presence could be attributed to its emerging nature and the relatively high barriers to entry due to the technical complexity of blockchain technology. Similarly, the consulting industry also featured in the survey, albeit with single-digit representation. These startups likely encompass a range of specializations, offering expert advice to businesses and individuals in different fields. Lastly, the Gaming industry also contributed to the diversity of the startup ecosystem represented in the survey. Despite the global popularity of gaming and esports, the representation of gaming startups in the survey was under single digits.

The distribution revealed by this survey provides a snapshot of the current blockchain startup landscape. The dominance of FinTech and Software Services and the under-representation of other sectors might indicate the direction in which market trends, investor interests, and entrepreneurial efforts are currently oriented.

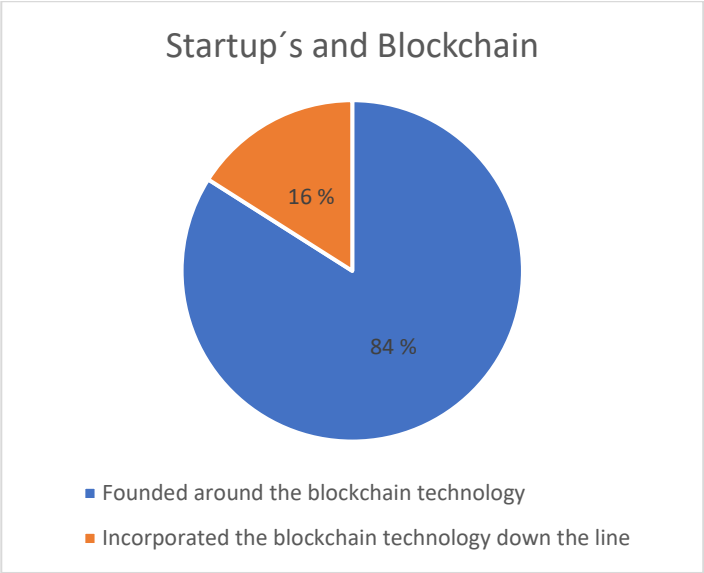


Graph-1: Number of startups in each industry

This survey queried if these startups were established with a focus on blockchain technology from their inception, or if they incorporated this technology at a later stage in their development process. From the results of the survey 84% indicated that they were founded around the blockchain technology. This implies that the fundamental idea that drove the establishment of these startups was inherently tied to the utilization of blockchain. Blockchain technology was not an afterthought or an added feature for these companies; rather, it served as the backbone of their business models from the very beginning. This also suggests that these startups identified the disruptive potential of blockchain technology and trusted in its capability to revolutionize various industries.

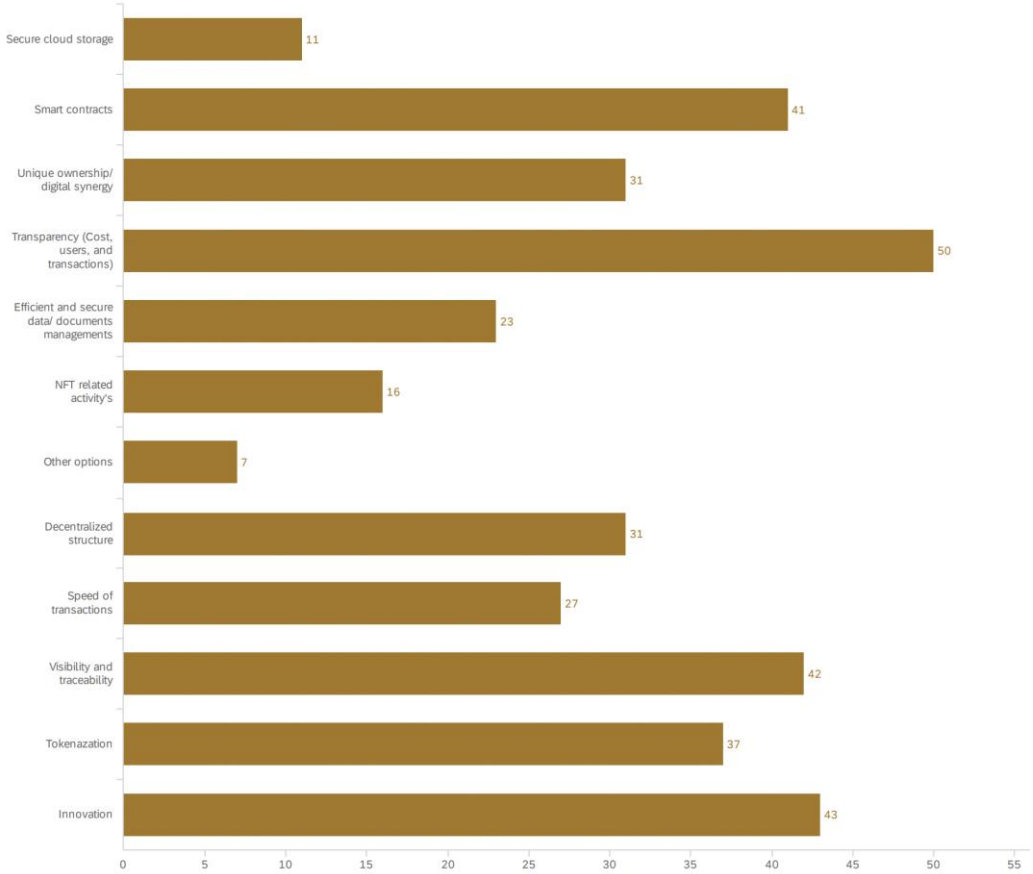
On the other hand, the remaining 16% of startups incorporated blockchain technology down the line. This portion of the companies did not have blockchain as a foundational part of their initial business model. Instead, they recognized the value and potential of blockchain technology during their growth and development, choosing to integrate it into their existing operations. This shift could have been influenced by a multiple factors, such as changing market conditions, the need for improved security and transparency, or the desire to stay competitive in an increasingly digital world.

However, that the number of startups in these four sectors - Supply Chain, Consulting, Gaming, and NFT’s - is relatively low. This brings certain limitations to the interpretation of the data. Due to this smaller sample size, the trends may not necessarily be representative of these sectors as a whole. The survey data, while valuable in providing insight into these startups' focuses, becomes harder to quantify and generalize to a wider audience. The smaller number of startups in these sectors could also reflect these industries being in the earlier stages of exploring the potential of blockchain technology. Alternatively, it may simply indicate that the majority of entrepreneurs and investors are currently focusing their blockchain-related efforts in other industries, such as FinTech and Software Services.



Graph 02: Incorporation stage of blockchain in startups

5.2 Factors that influenced the startups to use blockchain technology



Graph 03: Factors influencing the startups to use blockchain technology

The startups were asked to identify and choose the most influential factors and features of blockchain technology that have motivated them to integrate it into their business models. For the purpose of this survey, a list of predetermined factors associated with blockchain technology was provided for the startups to choose from. They were also given the freedom to add their own factors if they found that any of their key motivations for using blockchain were not included in the pre-curated list.

Sitting at the top of the list, Transparency was chosen 50 times. This part of blockchain technology is about making it clear to see things like costs, who's using it, and what transactions are happening. Startups appreciated the fact that blockchain's public ledger ensures accountability and preventing fraudulent activities, increasing confidence in the system. Innovation, which was picked 43 times, stems from the groundbreaking and disruptive nature of blockchain that opens new avenues for novel and creative solutions to problems. Startups are leveraging this innovative aspect of the technology to disrupt traditional models and create cutting-edge solutions. Visibility and Traceability, being noted 42 times, stood at third place. The ability to track and trace any transaction or operation performed on the blockchain is a crucial aspect for startups, especially those in supply chain and logistics.

Smart Contracts, which were chosen 41 times, are computer programs that carry out deals automatically, getting rid of the need for middlemen while cutting down on costs. Tokenization was selected by 37 startups. It is the process of converting rights to an asset into a digital token on a blockchain, providing enhanced liquidity, security, and accessibility. Decentralized Structure and Unique Ownership both stood at a tie, being picked 31 times each. This emphasizes the distribution of authority in the blockchain and the importance of individual rights and ownership in the digital world. Speed of Transaction was selected 27 times. This attribute of blockchain technology allows businesses to execute and confirm transactions in significantly less time than traditional financial systems. Secure Data was identified by 23 startups, indicating the importance of security and data protection. Through its cryptographic nature, blockchain provides robust security features, keeping data safe from unauthorized access. Finally, NFT-Related Activities were the least

selected, with 16 instances. While not as popular as the other factors, NFT's, allow for the unique representation of digital assets, and have found their use in various sectors such as art, music, and real estate.

Table 02: Factors being broken-down by startups industries

Options	Industry					
	FinTech	**SaaS**	**Supplychain**	**Consulting**	**Gaming**	**NFT**
Secure cloud storage	2	6	1	0	1	0
Smart contracts	17	15	2	3	1	1
Unique ownership/ digital synergy	13	9	3	3	1	3
Transparency (Cost, users, and transactions)	24	13	4	3	1	3
Efficient and secure data/ documents managements	9	9	2	1	1	1
NFT related activity's	4	6	1	2	1	0
Decentralized structure	13	12	3	0	1	2
Speed of transactions	13	6	1	2	1	2
Visibility and traceability	17	12	6	3	1	3
Tokenization	18	12	2	2	1	0
Innovation	22	14	1	3	1	2
Other options	3	3	1	0	0	0

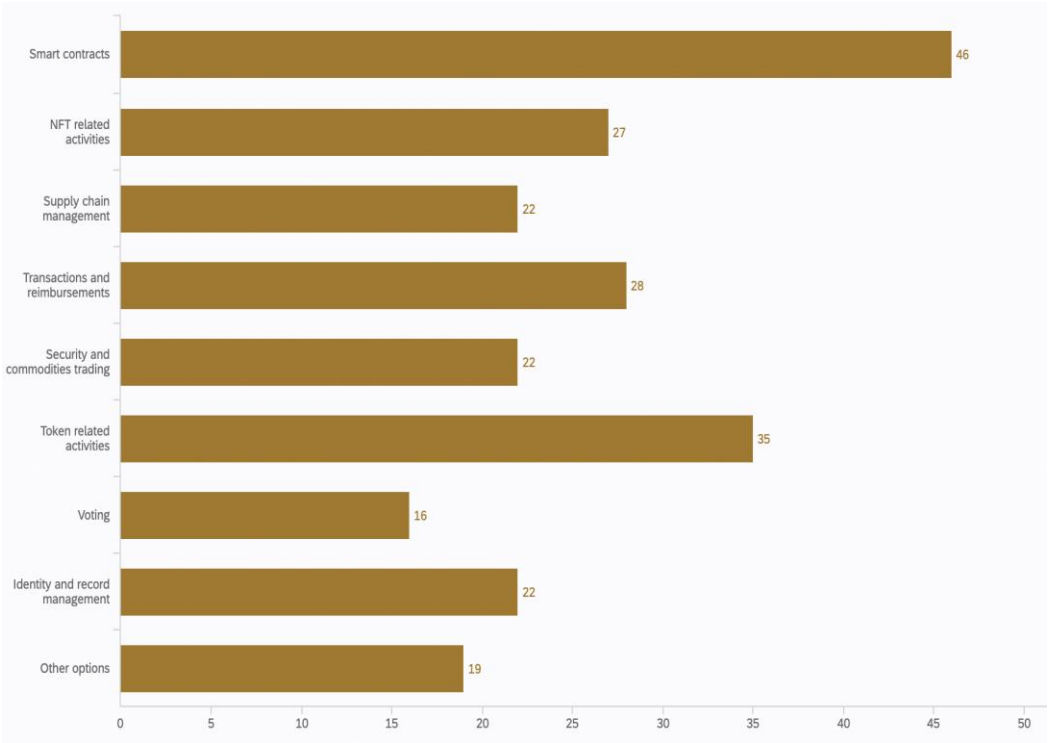
The table above (table-02) breaks down the selected factors from the startups by their respective industries, giving unique insight into the nature of these emerging businesses, their areas of focus, and the impact these are likely to have on the broader market landscape.

The findings from the data indicate a preference for speed of transactions as a significant factor for startups operating within the FinTech industry, as compared to those in the software services sector. These FinTech businesses value the ability to swiftly process financial transactions as a key element in their operations. This reflects the fast-paced nature of the financial technology space where speed and efficiency is important. Similarly, the transparency factor, a business's commitment to being open and accountable in its operations, was found to be of greater importance to FinTech startups than to those in the software services industry. This indicates that within the competitive FinTech arena, the ability to build and maintain trust with stakeholders is highly valued. However, when examining the secure cloud storage factor, the data illustrates that it was prioritized more frequently by the software services industry as compared to the FinTech industry. This possibly reveals that data security is of great concern for software service startups, given the nature of their work which involves the handling and storing high amounts of data. These factors of tokenisation, visibility and traceability seem to be more critical within the FinTech industry than in the software services industry. This may suggest the growing importance of secure digital identity and trackable transactions in the financial technology landscape.

Turning the attention to startups in the supply chain industry, the most frequently selected factors were visibility & traceability, followed by transparency. These choices are understandable, given the complexities involved in supply chain management that requires complete visibility and the ability to trace products and services throughout their lifecycle. The need for transparency further demonstrates the importance of ethical and accountable business practices in this field. The the survey reveals that startups in the NFT industry prioritize factors such as unique ownership, transparency, and visibility. Given the nature of NFTs, which represents a unique digital item or asset, it's logical that unique ownership is a top priority. Additionally, transparency and visibility reflect the critical need for accountability and traceability in transactions involving digital assets.

5.3 How is blockchain being used in startup´s

In an effort to gain a better understanding of the applications of blockchain technology, the startups were given a choice to select from a list of pre-determined activities. This selection process allowed the startups to indicate which activities they were actively utilizing blockchain technology for. It is important to note that they were given the flexibility to select more than one activity if it was applicable to their operations. The list of pre-selected activities was carefully curated to encompass a broad spectrum of potential blockchain applications, allowing for a comprehensive examination of the technology's use cases. Startups were also provided with an option to specify any additional activities not included in the pre-selected list. This open-ended approach was intended to encourage the startups to provide a more expansive perspective on the possible applications of blockchain technology.



Graph 04: Different uses of blockchain in startups

The data represented in a graph, highlighting the number of startups that had selected each specific activity. The visualization of this data presents a clear picture of the most popular applications of blockchain amongst the participating startups. At the forefront, it is observed that the prominent application of blockchain

technology is the creation and management of smart contracts. With 46 selections, this was the most popular choice amongst the startups. This preference for smart contracts underscores the potential of blockchain technology in establishing self-executing contracts with the terms of the agreement directly written into the computer code. Token-related activities, notably those connected to Non-Fungible Tokens, followed closely, garnering 35 selections. This indicates a strong interest in the use of blockchain technology to create, buy, sell, and trade unique digital assets, further reinforcing the growing significance of NFTs in the digital space.

The remaining pre-selected activities, except Voting, had relatively consistent popularity, receiving between 22 to 28 selections each. The least popular activity was voting-related applications of blockchain, which saw 16 selections. This suggests that while there is interest in using blockchain for voting purposes, it is currently not as widely adopted or explored as other applications.

In addition to the pre-selected activities, a number of startups chose to provide their own unique blockchain applications. Some of these included the use of blockchain for creating messaging or community platforms, managing energy, providing consulting services, ensuring traceability, decentralised event financing (DeFi), and wealth management. These selections underscore the versatility of blockchain technology and its potential for continued expansion and innovation across various sectors.

Table 03: Factors being broken-down by startups industries

Options	Industry					
	FinTech	SaaS	Supplychain	Consulting	Gaming	NFT
Smart contracts	18	18	3	3	1	3
NFT related activities	5	14	1	3	1	3
Supply chain management	2	11	6	1	0	0

Transactions and reimbursements	11	10	1	2	1	1
Security and commodities trading	9	9	0	1	0	2
Token related activities	17	14	0	1	1	2
Voting	7	8	0	0	0	1
Identity and record management	7	12	2	0	0	1
Others	10	7	0	2	0	0

The study encompassed a variety of industry sectors, but some of the most revealing data emerged from the FinTech and Software Services industries. It was in these sectors that a significant diversification of focus areas among blockchain startups was noted, some of which stood out due to their popularity and others due to their uniqueness.

In the FinTech industry, it was observed that the activities related to Smart Contracts and Tokens were selected most frequently by the startups surveyed. They claimed the highest number of selections, garnering 18 and 17 respectively. This points to the strong emphasis that blockchain startups within the FinTech sector are placing on these two aspects. The popularity of Smart Contracts and Token related activities suggests a growing interest in using blockchain technology to streamline financial transactions, provide greater transparency, and in return: aid the democratization of the financial industry. Following the lead of Smart Contracts and Token related activities, Transactions and Reimbursements activities came in next with 11 selections. Security and commodities trading related activities were also among the top selections, featuring in 9 of the startups' focus areas. These activities are important components of financial services and it's clear that these startups see significant potential in applying blockchain technology to these domains. Interestingly, Supply Chain Management and NFT related activities were

at the lower end of the selection scale within the FinTech industry, amassing just 2 and 5 selections respectively. While these numbers are comparatively low, it should be noted that these fields also represent exciting opportunities for blockchain application, despite not being the primary focus of the current wave of FinTech startups.

However, the priorities in the Software Services industry told a slightly different story. NFT related activities were highly popular here, with 14 startups selecting them as a core part of their business. This could reflect the growing enthusiasm for digital ownership and unique digital assets within this industry. Supply Chain Management also saw an uptick in interest with 11 selections. The potential of blockchain technology to improve transparency, security, and efficiency in supply chain operations appears to be well-recognized in this sector. Smart Contracts remained a top priority across both sectors. In the Software Services industry, it matched the FinTech industry with 18 selections, underscoring its significance as a central blockchain application across industries.

The other four surveyed industries - Supply Chain, Consulting, Gaming, and NFTs - the pattern of selected activities exhibited different dynamics compared to those in FinTech and Software Services. In these sectors, Smart Contracts was again selected as the top activity from the startups. Interestingly, voting activity, which could be leveraged for enhancing transparency and accountability in decision-making processes, didn't find any takers in the Supply Chain, Consulting, and Gaming industries. The absence of this selection could be attributed to the nature of these industries where perhaps the need for such blockchain applications is perceived to be less urgent or relevant.

The findings from the survey reveal intriguing trends in how blockchain startups across different industries are selecting their focus areas. Understanding these trends not only offers a glimpse into the potential future of these sectors, but also provides a blueprint for where new businesses could find niche opportunities in the growing world of blockchain technology.

5.4 Difficulties for startups in the blockchain industry

Examining the challenges startups face in the blockchain industry, several key issues were identified across multiple industry sectors. The results indicate a clear need for improved education, integration, and regulation in the blockchain ecosystem, along with the necessity for technological maturity and adoption.

FinTech Industry: The most significant issues mentioned in the FinTech industry revolved around interfacing with traditional finance and banking systems. A common challenge was the general skepticism from the traditional business world towards blockchain technology. Respondents noted difficulty in garnering support for corporate business functions and getting customers to adopt blockchain-based solutions. Potential clients often hesitated due to fears around regulatory uncertainty and inadequate understanding of blockchain technology. Other problems included the high price volatility of cryptocurrencies, processing capacity issues, and interoperability problems between different blockchain ecosystems.

Software Services Industry: In this sector, respondents pointed out that the reputational risks associated with cryptocurrencies and NFT's were undermining the credibility of blockchain technology. There were concerns about a misalignment between blockchain and its current use cases, lack of awareness about the technology itself, and PR issues due to controversies around cryptocurrencies. Costs of implementation and adoption of blockchain technology by the wider public were also cited as significant problems. Different understandings in accounting and legal topics of customers in different countries posed additional challenges. Additionally, issues like privacy concerns, lack of technological maturity, hype and ensuing disappointment, and hesitancy from big companies were also pointed out.

Supply Chain Industry: The primary issues in this industry included misinformation and misunderstandings about public blockchain and the challenges associated with automated data ingestion into the blockchain. The respondents indicated the necessity for comprehensive education about the applications and limitations of public blockchain in supply chain management.

Consulting Industry: The primary challenge identified in the consulting industry was the task of educating consumers about blockchain technology. The issue highlighted the need for blockchain experts to effectively communicate the benefits and potential drawbacks of blockchain to a non-technical audience.

Gaming Industry: In the gaming industry, startups faced challenges around token economics and token utility. As gaming increasingly intersects with blockchain and cryptocurrency, understanding and effectively implementing token economics becomes a significant hurdle for startups.

NFT Industry: Startups in this industry cited challenges in reducing friction for end-users to claim and interact with their NFTs. They also expressed the need to promote the interoperability of Web 3.0 platforms for mainstream events. Respondents mentioned the possible downturn, referred to as 'NFT winter', as a looming challenge. Additionally, a common misunderstanding in the market that blockchain equals cryptocurrency was also cited as a problem. This indicates a pervasive lack of understanding about the broader applications of blockchain technology.

5.5 Takeaways for target groups (Blockchain)

Entrepreneurs Looking to Enter the Blockchain Industry: Entrepreneurs looking to set foot in the blockchain industry can greatly benefit from the comprehensive insights provided by these survey data. Serving as a valuable road map, the information guides entrepreneurs in understanding where potential opportunities exist within the ever-evolving blockchain industry. By highlighting the activities currently being embraced by startups, entrepreneurs can shape their business plans accordingly and identify potential focus areas. Ultimately, the less explored areas might uncover potential niches, providing fresh and underutilized opportunities for startups. For example, the relatively scarce selection of voting activities might represent a lucrative opportunity for startups that can effectively capitalize on this aspect of blockchain technology.

The data collected from the survey equips entrepreneurs with a holistic perspective of the preferences and priorities spanning various sectors of the European

blockchain startup landscape. It gives specific insights into high-importance factors in sectors like FinTech and software services, both of which play pivotal roles in the larger blockchain ecosystem. For instance, gaining an understanding of the critical importance of transaction speed, transparency, and tokenization in the FinTech industry can greatly aid entrepreneurs in tailoring their business models and product offerings. Likewise, insights into the vital role of secure cloud storage in the software services sector can steer the development of innovative solutions to address this particular need.

The survey results offer a reality check for entrepreneurs, laying out the challenges faced by startups in diverse sectors. This understanding helps entrepreneurs anticipate potential obstacles and strategize accordingly. For example, entrepreneurs aspiring to enter FinTech blockchain industry would have a better understanding of the traditional banking systems and skepticism from the conventional business world. Likewise, those venturing into the NFT, or gaming industry should prioritize end-user experience and token economics, given the specific insights from the survey.

This wealth of information is not only vital for shaping business plans but also crucial in developing convincing pitches to investors. It reflects a thorough comprehension of the industry landscape, demonstrating that the entrepreneur is well-prepared and strategic. Hence, aspiring entrepreneurs looking to enter the blockchain industry can make the most of this data to identify opportunities, understand sector-specific priorities, anticipate challenges, and to strategically develop robust business plans and pitches.

Startups and Businesses Looking to Adopt Blockchain Technology: For startups and existing businesses exploring the integration of blockchain technology, these survey data could be a critical tool in guiding strategic decisions. By gaining an understanding of the priorities of comparable businesses in their field, they can make a more informed assessment of the blockchain applications that could be most beneficial to their operations. Moreover, observing where competition is strongest, such as in the application of smart contracts in the FinTech and software services sectors, can aid in strategic planning. Simultaneously, the data reveals areas with

more room for innovative blockchain applications, such as supply chain management in the FinTech sector, which could offer a competitive edge.

These insights can assist startups and businesses in refining their strategies for adopting blockchain technology. Grasping the significance of factors like visibility and traceability in the supply chain industry. For instance, prompt the implementation of blockchain solutions that enhance these aspects, leading to more efficient and transparent operations. In the context of businesses operating in the NFT space, the emphasis on unique ownership, transparency, and visibility underscores the importance of these features in any blockchain platform they choose to adopt. Therefore, they can select or design solutions that cater to these specific needs, effectively meeting industry standards and customer expectations.

The survey offers existing businesses and startups a comprehensive overview of the potential challenges they may encounter when implementing and utilizing blockchain technology. For example, businesses in the software services industry can anticipate potential reputational risks linked with cryptocurrencies and NFTs, enabling them to proactively manage any related PR issues. The survey also highlights the crucial need for education, not only for their workforce but also for their customers. Understanding the technology is a key factor in ensuring successful adoption, and as such, businesses should prioritize educational initiatives to foster understanding and acceptance of the blockchain technology. These insights serve as a strategic roadmap for startups and businesses interesting in the adoption of blockchain technology. They provide an overview of industry trends, highlight key considerations in different sectors, and illuminate potential challenges, enabling these entities to navigate their blockchain journey with a greater degree of confidence and foresight.

Policy Makers Seeking to Change Industry Laws and Regulations: For policymakers, the survey data offer crucial insights into the current landscape of the blockchain industry. Understanding the areas where startups are directing their efforts can guide the development of regulation to support such activities, thereby ensuring that laws and regulations stay abreast of the technological advancements. Policymakers can leverage this information to identify sectors that need increased oversight or enhanced consumer protection measures. The data also points to

underdeveloped sectors, informing the creation of supportive policies to enhance growth in these areas.

The analysis provides valuable guidance to policymakers aspiring to adapt laws and regulations to better accommodate the evolving needs of industries impacted by blockchain technology. For instance, the importance of secure cloud storage to software services startups highlights the urgent need for robust data security and privacy laws. The value placed on transparency across different sectors reiterates the necessity for regulations that mandate accountability and openness. The emphasis on tokenization within the FinTech sector might suggest the need for legislation concerning the use and security of digital tokens, thereby safeguarding consumers and promoting industry standards.

Policymakers can use these survey findings to gain a better understanding of the industry's pain points, thereby informing the creation of new policies and regulations. For instance, knowing that fear of regulatory uncertainty is a major concern, they can strive to establish a more defined and comprehensive legal framework for blockchain. This not only promotes transparency and consumer protection but also fosters an environment conducive to innovation and growth. Understanding the education gap highlighted in the survey can motivate policymakers to implement measures designed to enhance public understanding of blockchain technology. By doing so, they could foster a more informed and supportive environment for the integration and adoption of such transformative technologies. In essence, these insights offer a strategic compass for policymakers aiming to steer the industry's regulatory landscape. By taking into account the trends, needs, and challenges in the blockchain sphere, they can shape regulations that not only safeguard stakeholders but also promote the healthy growth and development of the industry.

Researchers in the Blockchain Field: For researchers in the blockchain field, the survey data present a valuable resource for comprehending the real-world applications of blockchain technology. By observing trends across different sectors, they can orient their research towards the most impactful areas, which in turn can help to inform future developments in the field. Furthermore, gaps in adoption revealed by the survey could serve as fertile grounds for future investigation,

providing opportunities to understand the barriers to adoption or the potential of certain applications that are currently underutilized.

This analysis can assist researchers in honing their investigative focus. The priorities underlined by various startups provide a practical roadmap to the needs and concerns of industries that are beginning to adopt blockchain. By gaining a thorough understanding of these factors, researchers can seek out solutions to existing challenges and uncover opportunities for further innovation. For instance, the recognition that transaction speed is pivotal in the FinTech industry could steer research towards enhancing the performance and efficiency of blockchain transactions within this sector.

This survey extends valuable insights to researchers intending to explore the implementation of blockchain technology across a range of sectors. It allows them to probe into the specific challenges faced by different industries, such as integrating blockchain in traditional financial systems in the FinTech industry, or tackling the interoperability of Web 3.0 platforms in the NFT industry. These issues could stimulate new directions in research. Together, these survey insights equip researchers with a clear picture of the current blockchain landscape, guiding their investigations and helping to direct their efforts towards areas with the most significant potential for impact. In tur, this contributes to the ongoing development and refinement of blockchain technology, driving innovation and fostering the evolution of the field.

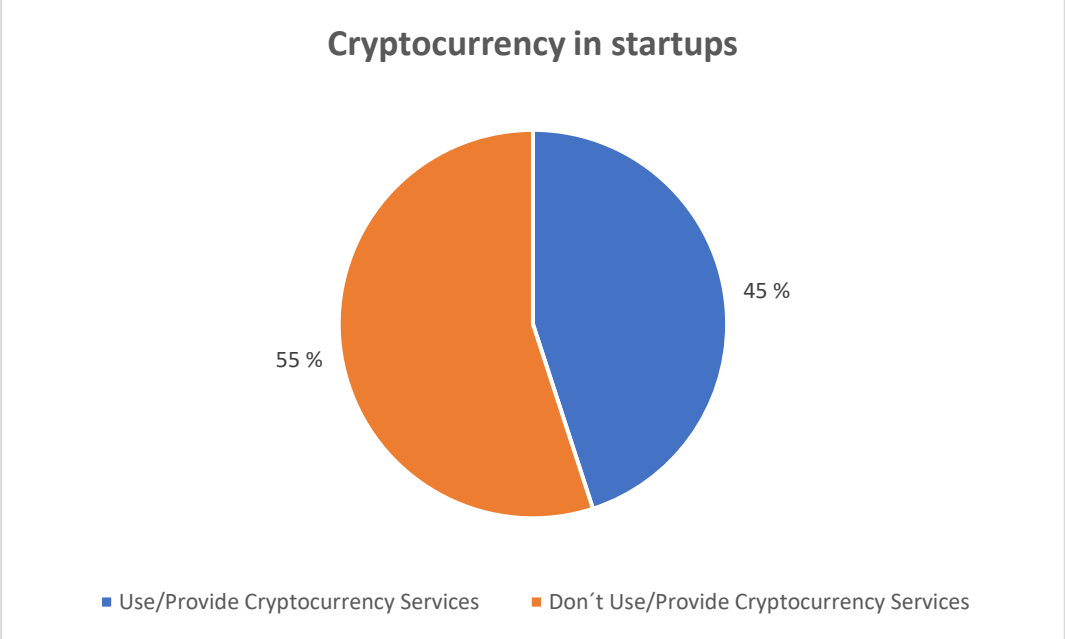
5.6 Cryptocurrencies

Cryptocurrency is often identified as the primary or one of the most significant applications of blockchain technology, largely due to the intrinsic connection between the two (Zheng et al., 2017). The inseparable bond between cryptocurrency and blockchain stems from the way they were conceptualized and designed to work together, inextricably combining the financial and technological aspects. Cryptocurrency, which is a form of digital or virtual currency, operates on these principles set forth by blockchain technology. It uses cryptography for security, and transactions are recorded and verified on a blockchain. The reason why cryptocurrency is seen as a key function of blockchain is because it was the first

use case that demonstrated the potential and functionality of this innovative technology (Zheng et al., 2017).

Bitcoin, the first and arguably the most well-known cryptocurrency, was indeed the initial real-world application of blockchain technology. While blockchain technology has since been adopted in various other sectors, its relationship with cryptocurrency remains definitive. Thus, this paper found it necessary to look at the cryptocurrency side of things with the participating startups.

5.6.1 Cryptocurrency in startups



Graph 05: Number of startups using/providing cryptocurrency services.

A notable 45% of startups indicated their engagement with cryptocurrency services, either by using them as a part of their internal operations or by offering them as a part of their service portfolios. This clearly underscores the widespread adoption and acceptance of digital currencies within the startup ecosystem.

A deeper dive into this data unveils the varying extent of cryptocurrency usage across diverse industry sectors. FinTech, has been the leading adopter, with a substantial 46.7% of cryptocurrency-engaged startups originating from this field. The high rate of adoption within this sector is hardly surprising, given that FinTech companies are often at the cutting edge of financial innovations and are, therefore,

more likely to adopt and integrate novel technologies such as cryptocurrencies. The software services industry constitutes the second largest group, accounting for 36.6% of the startups that leverage cryptocurrencies. The usage of cryptocurrencies in this sector is suggestive of the growing trend of integrating digital currencies into software solutions, as well as the use of blockchain technology for secure data management. The consulting sector, while lagging behind FinTech and software services, is still showing substantial engagement, with 10% of cryptocurrency using startups originating from this field. Interestingly, the gaming and NFT sectors, despite being frequently associated with cryptocurrency transactions and blockchain technology, constitute only 3.3% of the startups using or providing cryptocurrency services. The relatively low percentage could be due to the fact that this industry is still experimenting with the integration of cryptocurrencies into its mainstream operations. The supply chain industry, as of now, have not yet adopted cryptocurrency services, with the percentage standing at 0%. This might be indicative of the complexity and regulatory challenges involved in integrating cryptocurrencies within traditional supply chain models.

5.6.2 Key factors that influenced the startups to use/provide cryptocurrency services

Only four startups from distinct industries—supply chain, consulting, gaming, and NFTs—participated. This resulted in a dataset too limited to draw significant conclusions from, as the data points were not robust enough to represent these complex industries in their entirety. The narrow scope of this sample risked producing skewed or biased findings that wouldn't reliably reflect larger industry trends. Given the specific and evolving nature of the cryptocurrency industry, this limited dataset was not deemed suitable or informative for the cryptocurrency section of the survey and was subsequently excluded.

Table 4: Factors influencing the startups to use/provide cryptocurrency.

Key Factors	SaaS Industry (%)	FinTech Industry (%)
Speed of transfer transactions	13.5%	12%

Fear of discontinuity/ customer stops using their current services	2.7%	0%
Customer need/ customers asking to provide these services.	19%	12%
Disruptive technology/ market potential/ first mover	29.7%	28%
Keeping up with the technology/ adapting to market trends/ adaptation of innovation and technology	16.2%	36%
Cryptocurrency investment	11%	4%
Custom	8%	8%

This section of the survey aimed to identify and understand the crucial factors that motivated these startups to adopt, incorporate, or provide services linked to cryptocurrencies. Two primary sectors were focused on: FinTech and software services.

In the FinTech sector, about 30% of the startups identified blockchain as a disruptive technology and expressed their desire to position themselves as early adopters or first movers in this new, innovative field. As pioneers in leveraging this technology, these startups expected to derive substantial first-mover advantages such as market dominance, brand recognition, and customer loyalty. Similarly, about 28% of startups in the software services sector shared a similar perspective. They also acknowledged blockchain's disruptive capabilities, being at the forefront of this technological trend. Both these sectors reflected an inherent willingness to embrace change and capitalize on novel opportunities presented by the cryptocurrency ecosystem.

However, the motivations somewhat diverged when it came to keeping up with technology and adapting to market trends. Here, 36% of startups in the software services sector chose this as a key influencing factor. These businesses understood the dynamic nature of the tech industry, where keeping pace with technological advancements is not just an option but a prerequisite for survival and growth. They considered the incorporation of cryptocurrencies a strategic move to stay relevant and competitive in the rapidly evolving digital landscape. On the other hand, only 16% of the FinTech industry startups considered the need to adapt to technological progressions and market trends as their key motivation. Although this number was

significantly less than their counterparts in software services, it does underscore the strategic focus of these FinTech startups, which might be more attuned to specific industry needs and financial compliance regulations.

When it came to the aspect of investments in cryptocurrencies, there was again a disparity between the two sectors. 11% of FinTech startups chose this as a key factor, indicating a more active participation or interest in cryptocurrency investments as part of their business strategy. Comparatively, only 4% of software services startups marked this as a key influencer, suggesting a more cautious approach or different priorities within their business strategies. The survey also highlighted the difference in recognizing customer needs between the two sectors. In the FinTech industry, addressing customer needs was found to be a more significant factor in adopting or providing cryptocurrency services than in software services. This finding indicates a more customer-centric approach in the FinTech sector, aligning their services with changing customer demands in the digital financial field.

5.6.3 Type of involvement in cryptocurrencies

Table 5: Type of involvement in cryptocurrencies by startups

Key factors	FinTech Industry (%)	SaaS Industry (%)
Buying and selling	7.7%	20%
Investing	11.5%	5%
Trading options for customers	11.5%	0%
Payment options for customers	23%	10%
Loans and credits	15.4%	0%
R&D	11.5%	25%
Securities	3.8%	5%
Others (custom)	15.4%	35%

The usage of cryptocurrency varies substantially between the FinTech and software services industries. Specifically, it was found that 23% of FinTech startups employ cryptocurrency as a payment method for their customers. This is in contrast to the software services industry, where only 10% of companies use cryptocurrency in the same way. This could be attributed to the fact that FinTech startups are at the forefront of digital financial innovations, thus more inclined to adopt and experiment with newer forms of digital currencies. Interestingly, the software services industry, although less likely to use crypto as a payment method, appears to have a more intensive usage of it in the research and development sector. 25% of these companies use cryptocurrency for R&D, as opposed to 11.5% in the FinTech startup realm. This could be because the software services industry is often engaged in cutting-edge technology and innovation, where cryptocurrency and its underlying blockchain technology can play a critical role in new product development.

However, when it comes to trading, loans, and credits involving cryptocurrency, these are non-existent in the software services industry. This makes sense considering the nature of the industry, which isn't typically involved in these types of financial transactions. An intriguing finding was that almost 20% of startups in the software service industry utilize crypto for buying and selling, which is substantially higher than the 7.7% in FinTech startups. This could suggest that software services companies might be capitalizing on the volatility and liquidity of cryptocurrencies to generate revenue or as a means of procurement. Moreover, cryptocurrency investments were notably more prevalent in FinTech startups, with 11.5% of companies investing in crypto assets. This figure is double that of the software services industry, which isn't surprising considering the very essence of FinTech lies in embracing digital financial innovations.

5.6.4 Key factors that influenced the startups to NOT use/provide cryptocurrency services

Table 6: Factors that influenced the startups to NOT use/provide cryptocurrency services.

Key factors	Startups (%)
Market volatility of cryptocurrencies	13.85%
Environmental mining effects	13.85%
National/ local laws and regulations (Including tax laws and regulations)	16.92%
Lack of trust on the concept of cryptocurrency	7.69%
Limited customer base	1.54%
Not applicable/relevant to the business model	38.46%
Other	7.69%

Of the 55% startups that neither utilized nor provided cryptocurrency services in any capacity, these startups were then probed on whether they would entertain the idea of adapting their operations to incorporate crypto services in the future. A large majority, totaling 79%, maintained their position, stating categorically that they had no intention of revising this stance. However, the remaining startups (21%) displayed some degree of flexibility, admitting that they might be inclined to reconsider their stance or consider the possibility under the right conditions.

Another question posed to the startups revolved around the hypothetical scenario of cryptocurrencies being made a legal tender. Here, the responses were perfectly balanced, with exactly half the startups stating they would consider associating with cryptocurrencies if such a development came to pass. The survey also sought to understand the reasons behind the startups' reluctance or resistance to associating with cryptocurrencies. Approximately 38.5% of respondents stated that cryptocurrencies did not fit within or align with their current business models, rendering them irrelevant or inapplicable to their operations. Additionally, 17% of the startups identified national and crypto-specific laws and regulations, including tax laws and regulations, as a significant obstacle to their engagement with cryptocurrencies. However, when the same group was asked if their stance would

change if governments implemented more favorable or clearer crypto laws, a surprising 64% affirmed that they would indeed reconsider their position. This shows a significant number of businesses could potentially become more open to crypto if regulatory barriers were addressed. Another group constituting 13.85% of the startups cited environmental concerns related to cryptocurrency mining as a major deterrent. Despite the ongoing advancements in environmentally-friendly mining technologies, a significant 67% of these startups asserted they would still remain unswayed, even if the environmental impact of crypto mining was significantly reduced.

5.6.5 Biggest difficulties for startups with the incorporation of cryptocurrencies

According to feedback provided by startups they are facing a multitude of challenges when it comes to the incorporation of cryptocurrencies into their operations. These difficulties encompass a broad range of areas, and each of them poses a significant hurdle that needs to be overcome for these startups to succeed.

One of the biggest issues reported is accessing financial services. Many banks and financial institutions still perceive cryptocurrencies as a high-risk area, leading to hesitancy in providing services to businesses dealing in digital currencies. This hesitance extends to the opening of bank accounts, offering credit, and even general financial advice. It seems that banks are taking a cautious stance, waiting for clear regulations before diving into the cryptocurrency space. Regulatory hurdles and unclear legal status are also contributing factors. The slow pace of regulation has been identified as a major concern. Banks are generally risk-averse, and in the absence of a clear regulatory framework such as the anticipated Market in Crypto Assets (MICA) publication, they are reluctant to take any definitive position on cryptocurrencies. The lack of clear regulation leads to a regulatory burden on startups and may inhibit them from operating efficiently.

Another considerable issue is the prevailing negative sentiment towards cryptocurrencies. This is especially prevalent among people who do not understand the technology and the potential benefits it can offer. This lack of understanding often results in distrust and negativity, which can be a significant barrier for startups

trying to establish themselves in the cryptocurrency space. The market instability, which is a known characteristic of the cryptocurrency market, is another challenge. Price volatility may deter both retail and institutional investors, resulting in decreased investment and growth opportunities for the startups. This instability also leads to negative investor and market sentiment, further impacting the prospects of startups.

This study shows that startups struggle with global adoption of cryptocurrencies. While the use of cryptocurrencies is growing, widespread acceptance is still an uphill battle. Understanding the customer use cases that benefit from cryptocurrencies and persuading a wide audience to adopt these can be a complex and time-consuming task. The technical difficulties related to cryptocurrency transactions, such as transaction speed, are also a matter of concern. Slow transaction speeds could impact the user experience negatively and act as a deterrent to adopting cryptocurrencies. Startups also reported challenges with 'Airdrop farmers' who exploit the system to gather free tokens, affecting the overall health of the crypto ecosystem.

5.7 Takeaways for target groups (Cryptocurrency)

For entrepreneurs aspiring to venture into the blockchain industry: The comprehensive insights derived from current market trends and the experiences of existing startups provide useful guidance. This information helps create a thorough understanding of the prevalent applications of cryptocurrency in the FinTech and software services industries, and illuminates potential opportunities, existing market gaps, and looming challenges that they can exploit or navigate.

For instance, the high prevalence of cryptocurrency usage in FinTech payments signifies vast opportunities for innovative startups. Entrepreneurs can leverage this trend by developing solutions that simplify or enhance the customer experience, meeting a rising demand for more efficient and seamless financial transactions. Simultaneously, the significant application of cryptocurrency in research and development within the software services industry suggests potential for entrepreneurs who could provide pioneering solutions in this area, thereby filling a

critical market gap. Understanding the collective sentiments and usage trends of blockchain and cryptocurrency technologies among existing startups can inform new entrants' strategies. Noticing that a substantial proportion of startups across both FinTech and software services sectors are harnessing the disruptive potential of blockchain can inspire newcomers to adopt similar early-adopter attitudes. It could also drive the development of their customer value proposition, factoring in both the emphasis on customer needs within the FinTech sector and the urgency to stay technologically updated within software services.

According to the study, 38.5% of startups state that cryptocurrencies are not relevant to their business model. This observation can serve as a guiding beacon for entrepreneurs, encouraging them to design solutions that make blockchain technology more applicable and pertinent across diverse industries, thus expanding its adoption. The environmental concerns highlighted by 13.85% of startups indicate a promising market for entrepreneurs who can develop sustainable blockchain solutions, addressing an increasingly urgent global need. Being cognizant of the difficulties and challenges experienced by current startups in the blockchain industry can provide aspiring entrepreneurs a head start. Recognizing potential obstacles, such as securing financial services, navigating regulatory uncertainty, and tackling the negative sentiments associated with cryptocurrencies can inform a more robust business strategy. By preparing for these challenges ahead of time, entrepreneurs can create contingency plans and strategies to mitigate these issues, thereby enhancing their chances of success in the competitive landscape of the blockchain industry.

Startups and businesses looking to adopt blockchain technology: Stand to benefit from a comprehensive analysis of data and surveys highlighting the innovative use and potential of such technology in the current market landscape. As illustrated by numerous startups, blockchain technology exhibits immense potential and versatility through innovative uses of cryptocurrency, for example launching their native chains and tokens, and establishing reward systems. These approaches serve as compelling examples of how this technology could be incorporated into various business models, stimulating companies to reflect on similar strategies potentially applicable to their own operations. The unique industry-specific

applications of crypto can offer critical guidance in tailoring blockchain strategies to align with the distinct dynamics of their specific industries.

For existing startups and businesses deliberating the adoption of blockchain technology, valuable insights can be gleaned from the industry's prevailing sentiments. A noteworthy point from the survey reveals that 64% of startups would consider integrating crypto services if regulations were to become more favorable, implying a latent willingness to adapt among many businesses. Leveraging such insights can empower these businesses to make informed decisions on whether to embrace crypto services, possibly concentrating on the legal aspects of their operations to guarantee a seamless transition.

The challenges outlined in adopting blockchain technology can also serve as a strategic roadmap for businesses and startups. These insights provide an understanding of what to anticipate the obstacles related to the adoption of this technology. This invaluable knowledge can assist businesses in more effectively planning their projects, aligning their strategies, and foreseeing potential challenges that might affect their operations. Therefore, startups and businesses considering this transition would benefit from these surveys and data, harnessing the insights, and strategizing accordingly.

Policy makers seeking to change industry laws and regulations: Policymakers will find this comprehensive data valuable as it sheds light on the expansive use of cryptocurrency across various industries. Their widespread use underscores the necessity for clear, exhaustive, and flexible regulations that govern cryptocurrency activities. For example, in the FinTech industry, where cryptocurrency is extensively used in payment services, there is a pressing need for regulations that prioritize consumer protection and financial stability. On the contrary, in the software services sector, where cryptocurrency is employed in research and development, as well as consulting services, there might be a need for regulations that stimulate innovation and safeguard intellectual property rights.

This extensive data not only offers insight into the factors driving the adoption of blockchain and cryptocurrencies but also serves as a guidline for policy makers striving to devise fair, suitable, and effective regulations. For instance,

understanding that a considerable number of FinTech startups are influenced by customer needs and cryptocurrency investments can indicate a requirement for policies that safeguard both consumers and investors. The interest in blockchain technology, seen as a disruptive force across various sectors, could encourage policy makers to establish regulatory frameworks that foster innovation while also mitigating potential risks. The survey findings provide crucial insights for policy makers, indicating that lucid and favorable regulations could catalyze a significant number of businesses to engage with cryptocurrencies. If the aim is to foster the growth of the blockchain industry, policy makers should contemplate revising existing regulations and clarifying crypto laws, taxation, and compliance requirements.

The challenges and gaps that startups face within the current legal and regulatory framework surrounding cryptocurrencies demonstrate the need for policy revision and adaptation. Policymakers can utilize this information to shape more suitable and supportive laws and regulations. This might involve formulating clearer regulations for cryptocurrency-related activities to alleviate the regulatory burden on startups and persuade financial institutions to be more accepting of businesses dealing in cryptocurrencies. Altogether, these changes can foster a more conducive environment for the growth of the blockchain industry.

Researchers in the Blockchain Field: The survey's extensive data provides an illuminating glimpse into the practical applications of cryptocurrency across various industries, laying a firm groundwork for future scholarly exploration. By delving deeper into the reasons behind certain industries' gravitation towards specific applications, researchers can glean insights into the impacts of these applications on the overall performance of these sectors. This will also pave the way for investigations into potential optimization strategies. The data offers insights into the unique ways in which startups employ cryptocurrencies, thereby opening up fresh avenues for research. This serves to broaden the scope of knowledge within the blockchain field and uncovers an array of topics to be explored.

The survey's rich and empirical data can further fuel research momentum in this field. It unveils significant differences in motivation for blockchain adoption between sectors like FinTech and software services, which could be explored in

greater depth. The paramount importance placed on the disruptive potential of blockchain technology can serve as a catalyst for studies delving into how this disruption manifests across different industries and the long-term implications thereof. Collectively, these findings can guide researchers in pinpointing key areas of focus and formulating impactful research questions for future studies.

This survey highlights some of the most significant barriers to widespread cryptocurrency adoption, such as legal ambiguity, environmental concerns, and perceived relevance. Researchers are thus presented with an opportunity to investigate these issues more intensively. Detailed studies examining why businesses harbor such perspectives and what measures could potentially shift their perceptions may prove highly beneficial. Insight into the challenges faced by startups also offers substantial value to researchers examining the blockchain and cryptocurrency realms. By focusing on these challenges, researchers can direct their efforts towards exploring solutions, thereby contributing meaningfully to the field's advancement. Research topics could range from the development of new blockchain technologies that address transaction speed issues to investigating the socio-economic impact of comprehensive cryptocurrency adoption.

Understanding these challenges furnishes additional context for broader research areas. For instance, studying the influence of market sentiment on cryptocurrency prices or the role of regulatory frameworks in the evolution of blockchain technology could be enhanced by a thorough comprehension of the hurdles that startups encounter. Ultimately, this survey equips researchers with comprehensive insights, guiding future research endeavors and further enriching the knowledge base in the blockchain field.

Chapter 6: Conclusion

This master thesis has researched the factors influencing the adoption and implementation of blockchain technology and identified how these factors vary across industry sectors in a European setting. By engaging in a quantitative methodology, this research collects vast amounts of data from a sizable range of European blockchain companies operating within multiple industries. Combining

the gathered data with previous academic knowledge and research, this paper identifies four major target groups that would benefit from this study: entrepreneurs, startups, policymakers, and researchers.

This research has showed that companies tend to build its business models around the technology, rather than incorporating it in later stages. Factors such as transparency, innovation, visibility and traceability, tokenization, and decentralized structure and unique ownership were critical influences for startups to enter the blockchain industry. With two industries, FinTech and software services, dominating the utilization of blockchain technology.

Smart contracts and token related activities were the primary focus areas within the FinTech sector, reflecting a strong inclination towards using blockchain technology to enhance financial transactions and promote transparency. However, in the software services industry, there was a pronounced interest in NFTs and supply chain management, showcasing enthusiasm for digital ownership and the potential of blockchain to boost supply chain operations.

Despite the diverse industry dynamics, smart contracts remained a shared priority across sectors, underscoring its wide-ranging applicability in the blockchain domain. Among the other surveyed sectors - supply chain, consulting, gaming, and NFTs - activities displayed varying patterns, with voting activity less prioritized, suggesting these industries might perceive lesser immediate relevance for such blockchain applications. Overall, these findings reflect the unique and evolving landscapes of these industries and their adaptive use of blockchain technologies.

The data highlights distinct preferences in operational factors among startups in various sectors. FinTech startups value speed of transactions and transparency, reflecting the sector's need for efficiency and trust-building. In contrast, secure cloud storage is a higher priority for SaaS startups, who deal with large amounts of data. The importance of tokenization, visibility, and traceability in the FinTech industry suggests an increased focus on secure digital identity and trackable transactions. Supply chain startups prioritize visibility & traceability and transparency, reflecting the industry's requirements for managing complex processes and maintaining ethical practices. NFT industry startups place the highest

importance on unique ownership, transparency, and visibility, demonstrating the sector's emphasis on individual digital asset ownership and the need for transaction accountability and traceability.

This study also shows that startups face operating in the blockchain industry face numerous amounts of challenges. Most notably the lack of understanding and education about blockchain technology and its applications. For the FinTech industry, difficulties lie in integrating blockchain into traditional finance and banking systems, overcoming skepticism from traditional businesses, and navigating complex regulatory landscapes. The SaaS industry grapples with controversies and risk stemming from cryptocurrencies and NFT's. The supply chain industry faces challenges related to misinformation about public blockchain, while the consulting industry is burdened with the task of educating non-technical audiences about blockchain technology. For the gaming industry, the intersection of gaming with blockchain and cryptocurrency raises challenges around token economics. NFT startups face issues in user interaction with NFTs, promoting interoperability of Web 3.0 platforms, and addressing misunderstandings that conflate blockchain solely with cryptocurrency. Collectively, these challenges underline the pressing need for improved education, clear regulation, and technological maturity within the blockchain ecosystem.

By identifying the potential entry points into the blockchain industry, as well as narrowing down the numerous challenges and pitfalls, this research paper aims to contribute to, and impact, the decision making of four major stakeholders. For entrepreneurs, the data serves as a roadmap, helping to identify potential opportunities, understand industry priorities, anticipate challenges, and develop robust business plans and pitches. For existing businesses considering the adoption of blockchain technology, the insights help to guide strategic decisions, offering an understanding of industry trends and potential challenges, thereby fostering successful integration of blockchain into their operations. For policymakers, understanding the landscape of the blockchain industry is essential in crafting effective and responsive laws and regulations. Insights from the survey can guide regulatory development, inform the creation of supportive policies, and aid in addressing industry pain points, thus fostering a environment for innovation and growth. For researchers in the blockchain field, the survey data offer a rich source

of information, highlighting critical application factors, industry challenges, and gaps in existing literature.

These insights guide research focus towards impactful areas, encourage exploration of underutilized applications, and stimulate investigation into industry-specific challenges. This aids in the ongoing development and refinement of blockchain technology, ultimately driving innovation and fostering the evolution of the field.

This study faced certain limitations which are important to acknowledge for an accurate interpretation of the findings. Firstly, the study was conducted among 74 companies, a seemingly large number, but given the aim of this research - to understand the nuances of the blockchain industry across Europe - it's challenging to ascertain if this sample size is sufficiently representative. A larger sample could have offered a more comprehensive picture of the industry's landscape. Secondly, there was an unbalanced representation of countries and industry backgrounds in the responses received. This could potentially skew the results and limit the ability to draw reliable conclusions that are representative of the entire European blockchain industry. Ideally, a more evenly distributed response across various countries and sectors would have added more depth and reliability to the study.

A major constraint was the uneven response rate across different industries, particularly in regard to cryptocurrencies, which are often intertwined with blockchain operations. The two dominant industries that participated in this study were FinTech and SaaS, and only four startups from other major industries contributing to the survey result. This disproportion has limited the ability to derive diverse and holistic insights, particularly into how the broader range of blockchain-related industries interact with cryptocurrencies. Therefore, while this research offers valuable insights into the blockchain industry in Europe, the limitations in sample size, geographical and industry representation, and the imbalance in responses across sectors, must be considered. Future studies may benefit from a more balanced participation across different industries and countries to yield a more comprehensive understanding of the European blockchain industry.

This paper serves as a foundational resource, offering an analysis of the blockchain landscape in Europe and highlighting the potential of this technology across various

sectors. Looking ahead, it is crucial to acknowledge that the blockchain industry is still in its developing stages, with its potential yet to be fully realized and understood. This study emphasizes the potential of blockchain technology, creating suggestions for stakeholders such as entrepreneurs, businesses, policymakers that hopes to stimulate them to drive the blockchain knowledge and innovation, creating new value, and shaping the future of various industries.

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