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The Great DeFi Dilemma:

How stakeholders can navigate the uncertain waters of decentralised finance adoption: An explorative study

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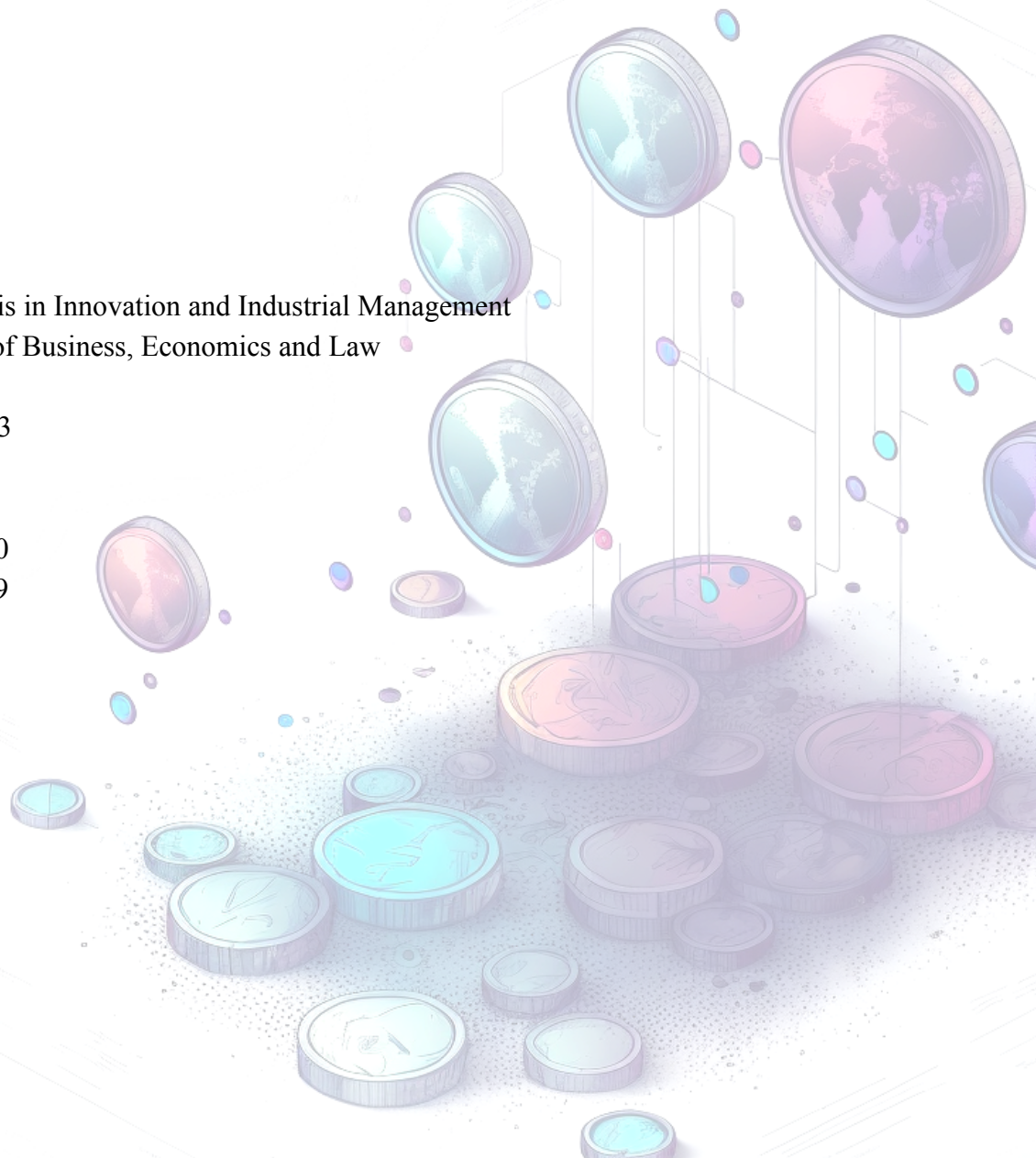
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Abstract

This study explores the key challenges in the adoption process of Decentralised Finance (DeFi) technology and its implications for stakeholders, including bankers, users, developers, and regulators; tying in to a broader perspective of economic evolution. The data consist of over 20 semi-structured interviews with individuals among the different stakeholder groups, primarily in Sweden and the USA. The research identifies the main challenges, their impact on adoption, and potential strategies for addressing them.

The findings reveal that regulatory uncertainty and technical issues are the primary challenges currently hindering DeFi adoption. From a legal perspective, the biggest difficulty is to create regulations that balance innovation and user security along with the need for international coordination. Banks are unwilling to integrate DeFi products into their offerings before there are clear regulations in place. Developers struggle with these uncertainties and face difficulties building legitimacy for their products, while users on the other hand are concerned with user friendliness and security.

This study offers several strategies for stakeholders to address these challenges. Banks can choose to opt for an active or passive approach, either exploring options or imitating competitors' proven solutions. Users are more likely to adopt DeFi once regulations are in place or banks have implemented DeFi services into their products. Developers should collaborate with other stakeholders with the goal in building legitimacy, improve products, and foster security and education for users. Regulators need to work with the DeFi industry and other international regulators to create a consistent regulatory framework that balances innovation and security.

This research concludes that the DeFi adoption process will be an ongoing, evolutionary journey involving collaboration among all stakeholder groups, aligning well with literature within evolutionary economics. This collaboration is crucial for ensuring that regulations, adoption, and focus areas also evolve in line with market developments in the future.

Keywords: DeFi, blockchain technology, economic evolution, adoption, adaptation, innovation

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1. Introduction

This paper will focus on understanding the key challenges in the adoption process perceived by different stakeholders in the DeFi industry. These groups include bankers, users, developers and regulators. This includes investigating the opinions of stakeholder groups and how their perceptions may influence the adoption and development of the DeFi industry. The research questions for this paper are as follows: (1) What are the current key challenges in the adoption process of DeFi? (2) In what ways do these key challenges affect the adoption of different stakeholders (bankers, users, developers, and regulators) and development of the DeFi technology? (3) What are the potential strategies or solutions that can be employed by each stakeholder group to address the key challenges in the DeFi adoption process?

DeFi is a developing industry which combines blockchain, digital assets, and financial services with the goal of disintermediating the finance industry (Wharton, 2021). The DeFi industry has seen large growth between 2019-2021 and has the potential to revolutionise the way the financial system operates, as it offers decentralised access to financial services to all (Wharton, 2021). DeFi may serve to eliminate fees that banks and institutions profit from, while also making lending and borrowing more accessible. While the DeFi industry has the potential to disrupt traditional financial systems and offer new opportunities for investors and users, it also carries significant risks and challenges, due to the lack of regulations and the newness of these innovations (Wharton, 2021).

To understand DeFi adoption, it is crucial to examine how all stakeholders perceive the industry. Developers and creators may have different motivations for shaping DeFi platforms, such as creating new financial products or disrupting traditional systems. Bankers have mixed views on DeFi, some seeing it as a threat and others as an opportunity (Bender & Gupta, 2022). User perception depends on factors like accessibility, security, and value (Vereckey, 2022). Regulators also have varying perspectives based on factors like risk, innovation, and compliance.

By gaining a better understanding of the perspectives among the stakeholders, one can make more well informed decisions on how to engage with the new technology. This information can be used to better align stakeholder interests, influence DeFi adoption and development, and contribute to the responsible and sustainable development of the DeFi industry.

This research paper utilises interviews as the main data to investigate stakeholder perceptions of DeFi adoption. The questions and interview guide was based on the theoretical base within economic evolution that can be found in the following literature review chapter. Following this, the research methodology will be presented, followed by the results from a thematic analysis before finishing up with analysis and conclusions.

2. Literature review

The following chapter will present a literature review split into three subsections with different perspectives relevant for understanding the DeFi industry. First and foremost, relevant innovation concepts and theories will be introduced to create a solid understanding of economic evolution, which in-turn discusses both adaptation and adoption. Following this, relevant literature regarding the DeFi industry and DeFi technology will be expanded and relevant concepts contextualised.

2.1. Innovation theories

DeFi is an emerging technology which has seen a limited amount of research.. Although DeFi technology is unique and has distinct features, multiple general innovation theories and concepts can be applied to help create a better understanding of the technology. Therefore, relevant innovation concepts will be presented in the coming sections before exploring theories within economic evolution.

2.1.1. Innovation adoption phases

When studying innovations, it can be helpful to identify its current stage of development. This can be done at different levels, anywhere between consumer level and the entire market. To understand how innovations are adopted at a market scale, one must understand how a single consumer approaches new technologies. One of the most famous theories within this area was brought to light by Rogers (2003), which proves that innovations generally are adopted in an *s-curve* as illustrated in Figure 1. Rogers (2003) split the market into five main categories of consumers with their own characteristics and made the argument that innovations are perceived differently throughout their lifecycle. With this in mind, innovations can be analysed differently based on what stage they are currently in, as seen in Table 1.

Table 1: Overview of market groups and their characteristics (Rogers, 2003)

Market group	Characteristic
Innovators	Willing to take risks. Close social contacts with researchers/entrepreneurs. Financially very strong, therefore they can adopt innovations that may fail at times without problems.
Early adopters	Opinion leaders. Generally, well educated. More filtered in what they choose to adapt compared to innovators. Financially stronger than later groups.
Early majority	Adopts much later than the first two groups. Usually in contact with people that are early adopters. Financially above average.

Late majority	Adopts innovation after the average participant. High degree of scepticism towards innovation. Financially below average.
Laggards	Last in society to adopt an innovation. No contact with people involved in innovation. Focused on “traditions”. Financially the weakest among the groups.

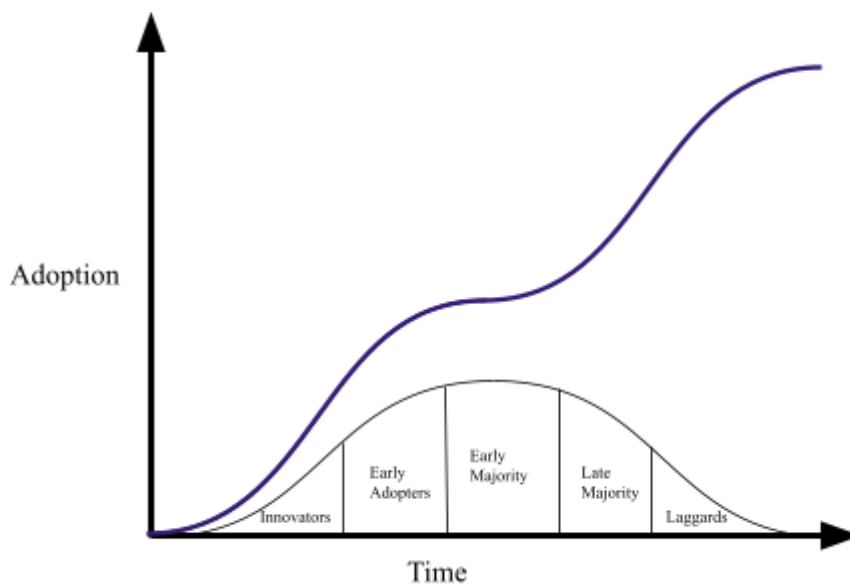


Figure 1: S-curve illustration (Rogers, 2003)

At an aggregate level, innovations are generally adopted in an exponential way as seen in the figure above (Rogers, 2003). Analysing where in the adoption curve an innovation is at can be helpful for organisations to base strategic actions (Rogers, 2003). Innovations themselves can also be improved from a product standpoint based on knowledge on what stage the adoption is currently in. It can be seen that for a product to be adopted, each user group has different criteria which they use to decide if they want to adopt the product or not (Rogers, 2003). To exemplify, if a product requires a lot of knowledge by the user, it is generally less of a problem for the first two market categories, since they generally are able to identify the benefits the product may bring. On the other hand, for the last two groups to adopt, the importance of user friendliness increases (Rogers, 2003).

2.1.2. Innovation strategies

There are many decisions that affect the strategic direction within an organisation. One of the most important strategic decisions that management needs to decide upon is how to balance exploration and exploitation (March, 1991). He describes the relationship between the exploration of new opportunities versus old certainties within an organisation (March, 1991). The two can be seen as somewhat opposite to each other in the model, and organisations can be anywhere on a scale between the two depending on their actions.

On one hand there is exploration. Exploration is the process of trying to find new opportunities, processes, products and markets to potentially replace the status quo (March, 1991). An organisation that focuses heavily on exploration is characterised by a fast internal pace, a high level of research and development and a quick time to market (March, 1991). Overall, to succeed with exploration, the organisation needs to be agile and dynamic. In general, the innovations that explorative organisations aim to find tend to be more radical rather than incremental (Christensen & Bower, 1996).

On the other hand, there is exploitation. Exploitation does not involve the search for a new product, process or market but rather focuses entirely on the core operations of the organisation (March, 1991). The goal is typically to become as efficient as possible and deliver the best possible financial metrics. Instead of aiming for agility, an organisation with a focus on exploitation would be more concerned with standardisation, scalability and cost efficiency (March, 1991). The innovations developed in an exploitation-focused organisation, therefore, are more of the incremental type (Christensen & Bower, 1996).

As with all theories, organisations are rarely only one of the two types but rather a mix of them. To find a perfect equilibrium of exploration and exploitation is difficult (March, 1991). If an organisation chooses to only exploit what is currently known, development will struggle, and future results may suffer because of it (March, 1991). Meanwhile, restricting an organisation to exploration will not yield the best financial results since the organisation would be too focused on finding the next opportunity instead of exploiting and profiting from what they already have (March, 1991). While this balancing act is incredibly challenging, it may be positive for management to discuss in what overall direction they wish to push the organisation towards, since the kind of efficiencies required by the organisation to become efficient at the two options differ (March, 1991). Exploration favours a high degree of dynamic efficiency, whereas exploitation favours static efficiency (March, 1991).

2.1.3. Categorising innovation

To better understand the nature of an innovation, research can help us to categorise it based on its characteristics, which can be helpful when analysing the innovation at hand. The theory of disruptive innovation was established by Christensen & Bower (1996) and has become popular within innovation research. A disruptive innovation is characterised as an innovation that enables new technology, allows for the creation of new business models or markets, as well as a coherent value network (Christensen et al., 2015). Disruptive innovation is generally uncommon, and innovations are more often seen as incremental (Christensen et al., 2015). Disruptive innovations are characterised by targeting the low, least profitable end of the market that is neglected by incumbents by offering a technically superior product (Christensen & Bower, 1996). This innovation can lead to a gain market share over time thanks to the technical advantages it has over established products by incumbents and over

time disrupt the market, potentially threatening incumbents from the market (Christensen & Bower, 1996).

An incremental innovation, on the other hand, is symbolised by an improvement or innovation that fulfils a need that is known (Christensen & Bower, 1996). The goal with incremental innovation is usually to improve the organisation in small steps to achieve a more efficient overall result. Over a longer time period, many combined incremental innovations can help an organisation gain a competitive advantage (Christensen & Bower, 1996). The majority of innovations are incremental, and disruptive innovations are rare (Christensen et al., 2015).

2.2. Economic Evolution

Previously, adoption was described from a consumer perspective. In the following chapter, the perspective will broaden to a macro level to understand how markets accept or reject innovations into the economic system. Understanding these theories facilitates a more grounded analysis regarding the adoption of DeFi. The chapter starts off broad with seminal authors such as Nelson & Winter (1982) to provide a foundation of economic evolution, before narrowing down to more niche findings. The chapter emphasises the process of adaptation and adoption, which can provide an indication of the typical barriers and enablers that exist when analysing new technologies, which can be applied to DeFi

2.2.1. Evolutionary economics

Evolutionary economics studies how an economic system develops, why innovation happens and how markets adapt to changes in the environment (Nelson & Winter, 1982). The large breakthrough in terms of research within economic evolution was made by Nelson & Winter (1982), which developed foundational ideas by two other researchers, namely Alchian (1950) and Schumpeter (1942). To provide a brief overview of this development, the main ideas from both will be presented, starting off with Alchian (1950).

Prior to the research of Alchian (1950), mainstream economic theories were focused on maximising results and finding optimal equilibria. The main point conveyed by Alchian (1950) was that firms should fight for survival, rather than maximising results. Alchian (1950) based this reasoning on the idea that maximising results in a dynamic and uncertain system is difficult or impossible. Alchian (1950) further provided a new perspective of how economic behaviours evolve over time, much like what can be seen in ecosystems in nature. To provide a metaphor, flowers that catch enough sunlight will grow and thrive over time, whereas flowers that do not catch enough sunlight will die. However, it is not required for each flower to get more sunlight than another to survive. Transferring this to an economic discussion, it can be said that firms only need to make a positive profit to survive. It doesn't matter if another firm makes more, as long as the firm stays in the market and survives (Alchian, 1950).

A core influence on evolutionary economics was Schumpeter (1942), who studied how the use of innovations made it possible to dismantle old processes and creatively destroy the status quo. Schumpeter (1942) mainly focused on innovations that truly had a large impact in society, such as the manufacturing processes developed by Henry Ford which shaped the automotive industry. Schumpeter (1942) emphasised the importance of looking at innovations from a holistic perspective, which accurately can be described with the following quote “Innovation is the market introduction of a technical or organisational novelty, not just its invention.” (p. 109). This indicates that economic evolution is defined by more factors than the product alone, a concept which can be seen in more recent economic evolution theories as well.

As discussed, the large breakthrough came decades later when Nelson & Winter (1982) contextualised their ideas on economic evolution. At a foundational level, they agree with many of the prior findings, such as the difficulty of maximising results in an uncertain environment and approaching the innovation adoption process from a holistic perspective (Nelson & Winter, 1982). They describe firms as a group of heterogeneous organisations based upon routines (which we elaborate upon later). These organisations all strive to improve their processes and profits by trying innovative solutions or by imitating the leading firm. At an aggregated level, this becomes an evolutionary process which is shaped over time. Finding the perfect solution is impossible and thus part of the evolutionary system (Nelson & Winter, 1982).

Nelson & Winter (1982) acknowledges the importance of what is going on inside the firm, namely the routines and also the people inside. This is contrary to prior economic theories which employed a shallower analysis in terms of the firms themselves. Routines inside firms explain a wide range of actions taken by the firm, for example how daily tasks are performed, how internal communication is held, deliberative market strategies, how to tackle unexpected scenarios and how to implement innovations, to name a few. As an extension of this, the decision making process behind these routines within the firm becomes an important theoretical element for understanding economic evolution and how DeFi may be viewed within organisations. Nelson & Winter (1982) further state that the skills of the employees have a direct relation to how routines can be developed. It is impossible for a firm to create a routine which requires skills that no employee possesses. This is closely related to the resource-based view and has large implications for the arguments about imitations.

To start off, Nelson & Winter (1982) was critical towards an argument by Alchian (1950) who said that a dynamic firm that was able to quickly imitate the leading firm could survive using this strategy. Nelson & Winter (1982) agreed upon the first point by Alchian in terms of the importance of agility and dynamic capability within the organisation as a way to survive in an uncertain environment. However, they criticised the fact that he presented this solution without backing it up with any practical examples of how to achieve this. Nelson & Winter

(1982) found it difficult to implement this advice in practice, based on the fact that some routines are based upon the unique capabilities of employees within a firm, and thus cannot easily be copied. This indicates that some or many routines may be difficult to imitate, which has been a trending research topic in later years.

The overall consensus is that imitating and copying internal processes from another organisation is difficult in practice (Posen & Martignoni, 2018). Posen & Martignoni (2018) view imitation similarly to Nelson & Winter (1982), stating that the lack of an exact copy of internal resources and capabilities in many cases may result in imperfect imitations. However, the process of perceived imitation may still be positive for the organisation, since it may still create new processes and innovations within the organisation based on the available resources (Posen et al., 2013). Connecting the process of imitation back to economic evolution, it can be seen that perfect imitations are difficult to execute in practice. However, the process may result in imperfect imitations which can be a source of innovation, even though it is not the intention (Posen et al., 2013).

Adaptation

As presented in the chapter above, adaptation is an increasingly important capability for the survival of firms based on increasing uncertainty in the world (Nelson & Winter, 1982). To give an overview of organisational adaptation, the area is split into three large categories which will be addressed in the following order: (1) The pursuit of adaptation, (2) internal factors that enable or constrain adaptation, (3) external environmental factors that urge adaptation.

The pursuit of adaptation

Firstly, regarding the pursuit of adaptation, it can be seen that the area is closely associated with internal resources, capabilities and evolutionary economics. One of the dominating perspectives within research is to approach adaptation as an outcome of internal decision making, as established by Cyert & March (1963). This is important to acknowledge, since it shifts the focus to an internal focus of the organisation, which increases the emphasis on how decisions are made within the organisation in practice (Cyert & March, 1963). An important variable that shapes decision making is the size of the organisation, meaning that in small organisations the individual entrepreneur might control the entire decision-making process alone (Cyert & March, 1963). On the other hand, in large organisations, decisions tend to be made by groups of people with different perspectives, such as managers, co-workers, suppliers or stakeholders. Cyert & March (1963) further expands upon the decision-making process within larger organisations and provides a model where decisions are made at top management then filtered through lower management at least once, which can be considered a typical hierarchy in many large organisations.

There are many factors that are taken into account that affect whether or not the decision will be approved or not, but to simplify, these factors are split into two variables, namely the

financial metric and the improvement measure (Cyert & March, 1963). The financial metric is straightforward and assesses how a decision would affect the financial situation of the organisation, such as costs. The improvement measure examines what improvements a decision would bring to the organisation (Cyert & March, 1963).

In many cases, the interests between the groups conflict. As individuals have different perspectives and thoughts of what improvements a decision would bring, it is rarely possible to be certain of forecasted outcomes beforehand, which makes things more complex (Cyert & March, 1963). The theory further acknowledges the fact that data and knowledge collection is a vital part to the decision-making process, highlighting the fact that collecting sufficient information is in itself an investment that sometimes must be made before the organisation can proceed in the decision-making process (Cyert & March, 1963). This perspective further exemplifies one of the reasons why reaching a maximised result is very challenging in practice, as conveyed by Alchian (1950).

With these factors in mind, reaching a perfect agreement tends to be difficult in practice, and therefore the outcomes tend to target a result that is satisfying rather than maximised for the involved groups (Cyert & March, 1963). Connecting this back to the adaptation of the overall organisation, it can be argued that internal decisions are one of the driving forces of organisational adaptation and that they are difficult to manage perfectly.

Research emphasises the importance of some factors that impact overall adaptation more than others; namely, openness towards pursuing new capabilities, search initiatives, overall risk level, and lastly, routines (Ahuja & Katila, 2004). The first decision that is important for overall adaptation is the attitude and openness towards pursuing new capabilities through different search initiatives (Ahuja & Katila, 2004). It can be argued that for an organisation initiating such search initiatives there are two main driving motivators. The first is based on technology exhaustion, meaning that the current technology does not facilitate the required functions, which leads the firm to search for new technology (Ahuja & Katila, 2004). The second is geographical expansion beyond the national market (Ahuja & Katila, 2004). It has been argued that this is based on the idea that such expansion may showcase potential technologies that could be used within the organisation that would not have been noticed if the organisation continued without expanding their business (Ahuja & Katila, 2004). It can be argued that this search process as a whole is evolutionary and that firms often go through a trial and error process when adapting (Ahuja & Katila, 2004).

In relation to search initiatives and looking for new capabilities, the third factor that firms need to decide upon is their risk level and how they aim to balance their current operations with the search and new potential opportunities (March, 1991). On one hand, the firm can continue to run their operations as usual and try to exploit it as much as possible. This can be a good option to grow the current operation and is stable by nature, but it may risk the organisation missing out on potential innovative opportunities (March, 1991). On the other

hand, the firm may opt to explore new opportunities and technologies that could potentially bring value to their organisation in the future. The downside to this is of course that these explorations are not guaranteed to make an impact on the firm, and requires more agility (March, 1991). These strategies may require different management methods and impact the overall firm when looking at both ends of the spectrum. However, in this perspective, the majority firms may find themselves somewhere in between the two extremes (March, 1991). Naturally, a firm that favours exploration and search of new opportunities tends to be more adaptable compared to a firm that is very static and focuses only on maximising its current business (Walter et al., 2016).

Studies show that experiences hold an important role within the decision-making process, even though the individual or group making the decision tries to rely on data as much as possible (Denrell & March, 2001). Furthermore, it can be seen that human behaviour tends to avoid uncertainty and can therefore be considered risk-averse by default unless there are very obvious reasons to take a risk (Denrell & March, 2001). Findings by Denrell & March (2021) show that in an experience-based decision-making process, there is a bias towards early findings in sample groups, and our initial thought of phenomena generally shape our view as a whole. This is especially an important finding when studying attitudes towards new technologies such as DeFi, perhaps even more so when the industry has a volatile nature as described in the following Chapter 2.4 (Ojog, 2021).

The final factor to keep in mind regarding decision-making and adaptation within the scope of this paper is how to manage organisational routines. As elaborated upon earlier in the chapter, by altering routines within the organisation, it is possible to become more unique or more alike to competitors (Nelson & Winter, 1982). Being alike to competing firms in the market in terms of routines and products has both pros and cons which needs to be considered in the decision process (Deepphouse, 1999). On one hand, similarity can increase legitimacy and the market is less likely to oppose a well-known company structure with an offer that is widely available (Deepphouse, 1999). On the other hand, being unique reduces direct competition, which could result in an ability to price products more freely. However, this increases the likelihood of potential exchange partners in not understanding the product or process, which in turn may lower the volume of sales (Deepphouse, 1999). The optimal situation is described as being unique enough to offer a unique upside compared to competitors, but similar enough as to not create legitimacy issues. This balance can be applied to each product within a company; thus a company could mix traditional and unique products to create an overall balance (Deepphouse, 1999).

Knowledge of what factors that affect organisational adaptation capabilities is valuable, and a well-researched area within the adaptation field. There are many factors which contribute to a strong adaptation capability, but some seem to be more impactful than others, which is what will be the focus of this section.

Donaldson (1987) has made a large impact within this research area through his studies on *contingency*. He argues that contingency is something that causes organisations to become static, which he does not agree with. Instead, he argues that contingency is a way to align functionality of fit and can thus be used by organisations to both gain and regain fit in a strategic way. The perspective strengthens the idea that adaptation is relational and must fit in with the given environment to possibly result in stronger performance (Donaldson, 1987).

This background knowledge is important and relates to another large finding about what impacts organisational adaptation capabilities, namely an appropriate identification of environmental changes (Barr et al., 1992). An environmental change can be perceived differently by two otherwise similar organisations. If the organisation views changes in the environment as a threat to their organisation, they will have a more difficult time to adapt (Barr et al., 1992). On the other hand, if the organisation can see opportunities in a changing environment, they will generally have an easier time to adapt (Barr et al., 1992). This is in line with the findings by Walter et al. (2016) presented above which made similar arguments in relation to how a firm approaches the balancing of exploration vs exploitation.

An important perspective to include on the internal factors that enable or constrain adaptation is *networks*. Many times, organisations act in clusters, and therefore adaptation needs to be coordinated among several interlinked companies (Doz, 1996). Research within this area shows that strategic alliances are conditioned by initial success, implying that they need to work somewhat immediately after launching (Doz, 1996).

To summarise, it can be argued that, to enable adaptation, the ability to obtain managers' attention across all hierarchies within the organisation is important (Joseph & Ocasio, 2012). This means that the organisational architecture and the ease of internal communication correlate with adaptation capability (Joseph & Ocasio, 2012). The need for adaptation can be discerned within any area of the company or even within a strategic alliance, thus management needs to be able to notice potential signals for the need for adaptation throughout all levels and functions within the firm (Joseph & Ocasio, 2012). Potentially, a lack of critical mindset and an overly strong internal belief may be the reason why companies don't focus on facilitating this internal need enough (Doz, 1996). This "over belief" in the organisation tends to crowd out the capabilities needed to pursue new technologies needed to facilitate adaptation (Doz, 1996).

What environmental factors urge adaptation?

Not all adaptation initiatives are driven from the organisation itself, but rather stem from changes in the environment which forces the organisation to change to fit (Venkatraman, 1989). Venkatraman (1989) explains that some external factors may serve as a "kick-start" which initiates an adaptation process within the organisation. Haveman & Rao (1997) identifies two main external reasons that force organisational adaptation, being institutional pressure and competitive pressure.

Institutional pressure explains how legislation and initiatives at an institutional level forces organisations to adapt (Haveman & Rao, 1997). It can be argued that legislation has a large impact on how markets develop and how they are perceived by customers, which will be further explained in the next chapter covering adoption. Naturally, this becomes an important element within adaptation theories as well, since organisations are then forced to change if they want to survive in a developing market (Haveman & Rao, 1997).

Competitive pressure is defined as other, more technical factors, such as how the product develops and what the overall market looks like (Haveman & Rao, 1997). If a competing firm in the market develops a superior technical offer, it forces competing firms to adapt in some way (Haveman & Rao, 1997). It can be said that suitable actions depend on circumstances, but two possible actions could include 1) to improve one's own products, as discussed by Ahuja & Katila (2004); or, 2) to imitate the competing firm as suggested by Nelson & Winter (1982). Haveman & Rao (1997) concludes that in general, these two external factors are closely linked together and are described as *coevolution*.

The coevolution perspective is agreed upon by other researchers, which show that in many cases organisational changes force peers to adapt (Durand, 2001). Durand (2001) explains that when several peers adapt at the same time, the overall market changes, which in turn might pressure institutions.

Table overview

Table 2: Summary of adaptation chapter

The pursuit of adaptation	Internal factors that enable adaptation	External factors which urge adaptation
Adaptation is an outcome of internal decision-making based on financial and improvement metrics.	Contingency can be a tool to gain and remain fit.	Two main factors: Institutional and competitive pressure.
Perfect agreements are rare, satisfying results are often sufficient.	Appropriate identification of environmental changes.	Institutional pressure includes new legislation which forces organisations to adapt.
Attitude and openness towards pursuing new capabilities through different search initiatives.	Spotting opportunities in a changing environment and coordinating accordingly facilitates adaptation.	Competitive pressure emphasises technical factors, such as product development or innovations by competing firms that urges adaptation.

Organisational risk tolerance and strategic balance between current operation and new potential opportunities.	Obtaining managers' attention across hierarchies within the organisation enables adaptation.	Generally, the two factors evolve together in a coevolutionary cycle.
Management of organisational routines.	“Over Belief” in the organisation may crowd out the capabilities needed to facilitate adaptation.	

2.2.2. Adoption

Adoption concerns how the market ‘perceives’ different organisations and the process of accepting or rejecting them into the economic system. This is directly related to whether the firm's services and product innovations are successful in the sense of generating income (Nelson & Winter, 1982). If, on one hand, the firm does not adapt to the market they may fail, but on the other hand if the market does not deem the firm a ‘fit’ in the current market environment, it may also fail. These two phenomena are closely related and are fundamental to the firm's success in an industry.

Branstad & Solem (2020) presents three different perspectives of adoption, being (1) incumbent legitimation logic, (2) the consumer activist logic, and (3) the market co-creator logic. To categorise these further, the authors created a life-cycle model in their selective review where they presented different stages of the market adoption patterns to enable comparison of the three perspectives (Branstad & Solem, 2020). This life-cycle model will be re-used in this chapter, with different names and additional relevant sources to expand on important topics for the research purpose of this paper.

Incumbent legitimator logic

The first stage concerns the initial thought of creating a new market to obtain more opportunities to succeed. This is something that Johne (1999) mentions is important for firms to stay ahead of competitors. This can be carried out by different types of innovation, such as product, process and market innovation (Johne, 1999). The first stage focuses on the market innovation that a firm must identify, or new potential markets of target customers to stay ahead of the competition (Johne, 1999). The need for a new foundation of a product or activities was not anything that Humphreys (2010) discussed; he rather talked about how new markets are created, this will be touched upon in more detail in the next four stages. To exemplify this stage, it can be that a big firm sees a small market or a non-existing one and tries to revitalise it into something big, such as the gambling industry.

The second stage is the first real step for firms creating a new market, e.g., turning the gambling industry from a criminal activity to a legitimate form of entertainment. Humphreys (2010) discusses that in this stage it is important to create a good foundation consisting of legitimacy as well as knowing what cultural and normative environments in which the product or activity will be used in. The manager must narrow down the potential frames of opportunity to see where most stakeholder interests align. Different stakeholders will be interacting with the products or activities differently, and the manager must therefore amplify certain features over others (Humphreys, 2010). To exemplify, it would be that for some, gambling could be seen as a form of entertainment while for others it could be seen as an addiction of risk and reward where one could lose or gain a lot of money. The marketer and managers of the firm would need to find which one of these are best suited for their target audience and then focus on that.

The third stage concerns the validation of the narrowed frame of meaning and to build legitimacy in the market. Humphreys (2010) argues that this is made through the use of a firm's political, economic, and social resources to promote the selected frame. To gain legitimacy, coalitions can be created with other actors on the market to set industry standards or become isomorphic and imitate other firms and competitors' structure to build legitimacy (Humphreys, 2010). Creating legitimacy is an important step to form connections with institutions and enable regulatory legitimacy (Humphreys, 2010). The S-Curve starts between stage two and three, where adoption is still slow but more apparent, as the industry and firms gain legitimacy and networks to build associations with institutions. This would generally be where the innovators, and to some extent, some early adopters would come into play (Rogers, 2003).

To exemplify, the firm could create coalitions with other casinos and gambling establishments to set industry standards, or to adapt to the structure of other gambling establishments. Once this standard is set within the industry, one can use the network connections or establish new connections to media firms, regulatory or financial institutions and influential spokespersons to build normative and regulatory legitimacy in the industry.

The fourth stage concerns diffusion into the general environment. This is when social networks are in place and the innovation is redefined one more time to be attractive to more multiple stakeholders - not only to the early adopters, but also to the early and late majority (Humphreys, 2010; Rogers, 2003). This is where the S-curve is very steep as more and more enter the industry and adopt it as argued by Rogers (2003). These potential users could see some adoption barriers which the firm would need to mitigate. That is what Antioco & Kleijnen (2010) mention in their article regarding the adoption barriers for new technological innovations where the focus is on customers. Similarly, to Alchian (1950) they mention how high uncertainty has high impacts on certain barriers of adoption of innovations for customers (Antioco & Kleijnen, 2010). They mention two contexts; the first being with high uncertainty and high incompatibility, called "lack of content"; and a second one with low uncertainty and

low incompatibility, i.e., “presence of content”. Furthermore, they have found that psychological barriers such as image and tradition as well as functional barriers like performance risk and value barriers are significant in the lack of content and presence of content contexts of a consumer's adoption (Antioco & Kleijnen, 2010).

Both psychological barriers; image and tradition, are important predictors of how the customer adopts the new technological innovation (Antioco & Kleijnen, 2010). Especially in a presence of content context it can be seen that tradition is more likely to be broken, to achieve a sense of uniqueness, or to stand out from the crowd to confirm one's self-image (Antioco & Kleijnen, 2010). On the other hand, in a lack of content situation with high uncertainty it is most likely that the consumer has a hard time grasping what the tradition is and therefore not being able to know if this tradition break would make any significant change to achieve a different self-image (Antioco & Kleijnen, 2010). The lack of getting perfect information or knowledge is the barrier in lack of content (Cyert & March, 1963).

Another barrier that can play a significant role in the adoption of new technology is the value barrier. In the presence of content situations, it is very important that the value ratio is aligned with the product one receives (Antioco & Kleijnen, 2010). This has to do with the transparency of how decision-making for the price was made, since in a presence of content context the customer is more likely to know what other products with similar functionality are valued at and can easily compare it to the innovation's value (Antioco & Kleijnen, 2010). An example could be the new iPhone vs. the new Samsung. Why is the iPhone 500 SEK more expensive? Is the difference in functionality perceived as in alignment with the difference in price? In a presence of content situation, the consumer would have the relevant information to value what the innovation provides and from that act accordingly.

Finally, the performance risk in a presence of content situation is tied to financial risk to convince the adoption of new technology (Antioco & Kleijnen, 2010). Due to lower uncertainty, it is more likely that the consumer has the information available to know if they are making the right investment (Antioco & Kleijnen, 2010). If the customer knows that the performance of the new iPhone is better than the Samsung, then they might buy that over the other. On the other hand, in a lack of content context it is more likely that the consumer will not buy anything due to the high uncertainty of performance risk until there is more information available to mitigate the uncertainty (Antioco & Kleijnen, 2010). It is important that firms keep these potential barriers in mind when trying to onboard the early majority but also use established connections in the industry to teach consumers norms and practices and rituals, educating them about how to use the products or activities.

In the context of the gambling industry, the fourth stage might involve emphasising additional desirable attributes of gambling beyond those established in the previous stages. This could include pushing new social and communal aspects of gambling, or the potential economic benefits to local communities. Additionally, educating consumers about responsible gambling

practices and setting industry standards for promoting responsible gambling can further help to legitimise the industry. The goal of this stage is to solidify the legitimacy of the industry and make it widely accepted among multiple stakeholders (Humphreys, 2010). This theoretical approach might be applicable in the DeFi industry.

In the fifth and final stage of incumbent legitimator logic everything is diffused to many users as the new market is established (Humphreys, 2010). The finalised frame of meaning of how the product or activity is used sets a new culture as well as regulatory legitimacy is achieved. It is important for the firm to keep developing the norms and standard of the industry as this is something that will be counter-worked by the activists (Humphreys, 2010). Humphreys (2010) clarifies that this can be used from both sides. On one hand from a side that wants to make gambling fun and gamified while on the other hand anti-gambling activists might try to empathise that it is addictive and bad financially (Humphreys, 2010). On a visual S-curve, this would be the part where the curve has peaked and stagnates as much of the market has adopted the innovation with only a few laggards left behind (Rogers, 2003).

Two bottom-up perspectives

In addition to the incumbent legitimator logic, there are scenarios where change is initiated from the bottom of the market. These scenarios are consumer activist logic and the co-creator logic. *Consumer activist logic* is when a market innovation is in a conflict between the producing firm and the consumer (Giesler, 2008). In this situation, it is the consumers that are driving the change of a market to create a new segment. The consumer in this logic is an activist while the producer or firm is an object of activism (Giesler, 2008). A new market may arise from an escalation between these two parties when the consumers demand something not currently offered and some companies act on this demand because they view it as an opportunity to profit.¹

Lastly, the *co-creator logic* explains when a collaboration process is made between the market stakeholders, such as consumers, producers, regulators and more to create a new market practice (Callon, 1984). This process is similar to how Christensen & Bower (1996) theorised the way in which a disruptive innovation is born, which involves entrepreneurial

¹ An example of the consumer activist logic would be the adoption and legitimising of music downloading. The development of downloadable music worried actors in the music industry, but on the consumer side it created a demand for more music on the internet (Giesler, 2008). This resulted in a conflict between the “hackers, pirates, or pioneers” and the industry leaders (Giesler, 2008). Websites such as Napster and Piratebay satisfied the demands of the consumers but the industry answered with a “war against downloading”. The resistance of the consumers led to new ideas being created that were somewhat in-between the free music downloads and no downloads at all, namely iTunes (Giesler, 2008). The situation escalated and led to a foundation being laid to diffuse the market situation and create a new market that would then go on to create new possibilities for other companies, such as Spotify and YouTube. This market evolution was not triggered by the industry or institutions. They were triggered due to the resistance of the consumers which forced a new market to be made.

consumers that seek new opportunities that are ignored by incumbents. They then co-create their business to expand the market where new consumers are being targeted and a new network is created (Callon, 1984). In the final stage, the co-created market is legitimised and operates in parallel to the market it originated from (Callon, 1984). Since there is no real conflict between the incumbents and the entrepreneurial consumers, they collaborate to mutually gain from potential profitability.

Table overview

Table 3: Summary of adoption chapter

Incumbent legitimator logic	Consumer activist logic	Co-creator logic
Incumbents use their influence and networks to influence the market.	The consumer plays a crucial role to force organisations to come up with new products by not accepting anything less.	There is a collaboration effort between all market stakeholders.
Can be divided into five stages, from initiation to full adoption of the market.	Escalation is needed to drive change in the market.	Market segments that are ignored by incumbents.
By building relations with institutions and regulators, new standards are created.	The consumers resist until a middle ground has been created.	Market stakeholders see an opportunity and work together with incumbents and other stakeholders.
Market is fully accepting the new standards and a new segment has been fully integrated.	New segment is created by a firm that sees the opportunity to satisfy the consumers.	Create a new segment together.

2.3. Products from a user perspective

As mentioned in the previous chapters, theories within economic evolution can help create an understanding of the most important factors that determine the success of an innovation. As DeFi is a new phenomenon within the financial industry and an economic evolution, the following part of the paper will look into the DeFi market and will be compared with the traditional financial market to DeFi s based on a user perspective. More technical information and aspects of how DeFi functions will be presented in Chapter 2.4.

2.3.1. Lending and Borrowing

Traditional lending works in the way that the individual saver deposits their money with a bank to earn interest (Aramonte et al., 2022). What the bank then does is it lends that money to other individuals and firms, the borrower. The bank acts as a central intermediary or middleman and often takes a fee for their services (Aramonte et al., 2022). The bank is typically very picky on who they lend money to and screen every borrower's credit scores and educational background to see how high risk they are (Aramonte et al., 2022).

In contrast, lending in the DeFi industry is performed through a peer-to-peer system and eliminates the central authority. Another crucial difference is that in DeFi everything is anonymized, since it is encrypted behind cryptography digital signatures, making it hard for the lender to know who the borrower is and what credit scores or income statements they have (Aramonte et al., 2022). It consists of lenders that deposit their cryptocurrencies and earn deposit rates, on the other hand borrowers pay a borrowing rate and have to leave collateral as a safety guarantee (Aramonte et al., 2022).

2.3.2. Staking

Staking is a unique phenomenon for the DeFi industry as there is no direct equivalent product in the traditional financial industry. The most similar product within traditional finance would be a high yield savings account (Sandor, 2022). A high yield savings account generates a yield in return for the user locking up their money during a given time span. The yield is higher generally the longer the user locks their money (Sandor, 2022).

As mentioned, this process of locking up assets is called staking. In exchange for staking the cryptocurrencies the user gets a yield percentage which is often higher than interest rates offered by traditional banks (Sandor, 2022). When a user stakes their digital assets, they essentially lend their cryptocurrencies for voting and development of the blockchain to the platform the user decides to stake their cryptocurrencies within. As opposed to the locking aspect within traditional finance, it is generally possible to stake and unstake cryptocurrencies either instantly or relatively quickly. The technical functions will be covered more in-depth in Chapter 2.4.

2.3.3. Automated market maker (AMM)

Automated Market Maker (AMM) is a protocol that is at the core of all decentralised exchanges (DEXs) which enables users to exchange cryptocurrencies peer-to-peer (Sergeenkov, 2021).

To understand AMM, one must first understand what a traditional market maker is.² A market maker provides liquidity for financial products to make it easier for the users to buy and sell the products, such as stocks (Sergeenkov, 2021). For instance, if trader A wants to sell 1 Bitcoin for 200,000 SEK the market maker ensures that trader B, who wants to buy 1 Bitcoin, can connect them seamlessly. An AMM is a smart contract that performs this process, but on the blockchain and without a central entity involved (Sergeenkov, 2021).

AMMs require liquidity to work, which they receive by encouraging users to deposit their cryptocurrencies. Platforms incentivize users to provide liquidity by offering rewards systems where the liquidity providers get fees or percentages of the spread in the market (Sergeenkov, 2021). This enables a seamless interaction for users that want to buy or sell a cryptocurrency, just like a centralised market maker would provide.

2.4. DeFi technology overview

With some background to the DeFi market and what economic evolution is, the following chapter will explain more in-depth what technologies DeFi is built upon, such as blockchain and smart contracts. The chapter will present the most important technical aspects of DeFi concepts to create a foundational understanding for this research paper. The concepts are presented in a funnel, starting with the broadest subjects first before moving into more niche areas such as peer-to-peer lending. DeFi is a new research area and there are a limited number of peer reviewed research papers available at the time of writing this paper. One of the largest sources for the chapter has been Ojog (2021), who is a PhD student at the University of Bucharest and has created what the authors of this paper deem to be a well grounded paper, in addition to being peer-reviewed. Ojog (2021) provides reliable information within the area with explanations to the relevant concepts. To ensure that the information that Ojog (2021) discusses is correct, the data has been triangulated in most cases to make sure it is valid with other sources mentioned in the text.

2.4.1. Blockchain

Blockchain is a public distributed database, in other words, a decentralised database (Tapscott & Tapscott, 2016). A centralised database would be based on the traditional business model where there is a central authority, who has all the power and is in control. Blockchains on the other hand are made out of numerous participating entities called *nodes*, which is a shift from the central entity that would typically control everything in the process (Ojog, 2021). The blockchain operates on a peer-to-peer network where no node has greater authority than the other (Tapscott & Tapscott, 2016). A node could be any computer and anyone could join or leave the network of nodes at free will as illustrated below (Tapscott & Tapscott, 2016). This

² Specifically, a “market maker” is someone who sets the price, in this case, the “bid” or “ask” price within an order book, in the form of a “limit order”. The difference between the top bid and lowest ask is called the “spread”. A market taker, on the other hand, is someone who simply agrees to the bid or ask, in the form of a “market order”.

shifts the security risk from a central entity to the network of nodes and in principle, lowers the overall risk of the system.

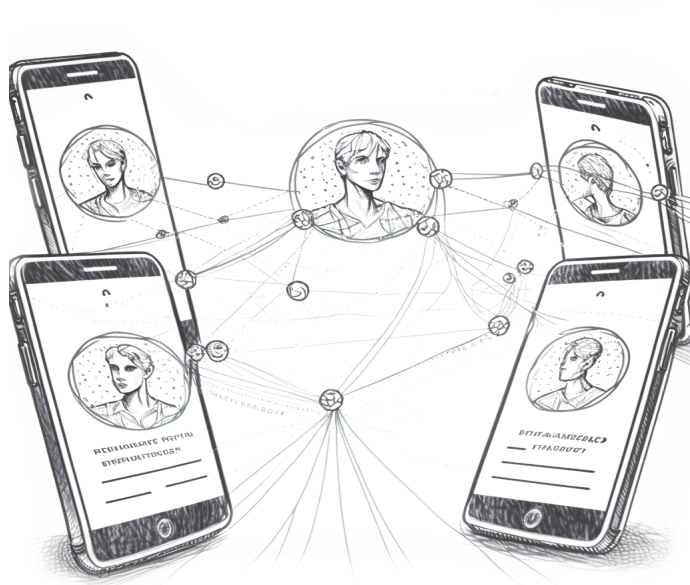


Figure 2: General illustration of users participating in the blockchain node network.

Some early examples of entities using this decentralised system to operate were Napster and BitTorrent. In both these cases, the permissionless systems were mainly used to share files among users. However, blockchain technology added several dimensions to this structure (Tapscott & Tapscott, 2016). There are puzzles that the node has to solve, which is called “proof of work”. In addition to sharing files, this system made it possible to also conduct transactions of value that typically had a necessity of peer review, identification of participants, democratic decision making, or audit trails to work properly (Banafa, 2022).

The purpose of having several nodes is to verify the ownership and legitimacy of a transaction (Nakamoto, 2008). A transaction occurs when data or a token is transferred between two addresses on the blockchain (Banafa, 2022). In a traditional financial system the trusted central authority, such as a bank or institution would check every transaction to ensure that no one is spending the same dollar twice (Nakamoto, 2008). In practice, this means that the system will verify when a user transfers one SEK from their personal bank account to another to make sure that it transfers that one SEK does not create duplicates. On the blockchain, there is no central authority thus making it more important for the individuals that want to transact value throughout the blockchain that it is conducted in a safe manner. To ensure this, the blockchain utilises two main concepts to enforce this. Firstly, to keep the system as transparent as possible, everything on the blockchain is recorded and stored for anyone to view (Nakamoto, 2008). Secondly, the majority of nodes need to agree on every transaction that is made before it is validated and stored on the blockchain. This means that if a user tries to send a token, nodes will verify if it is a real token and if it complies with the history of the blockchain, the transaction will go through. This can be compared to how

banks make sure that the money deposited by the user is real and not a fraudulent copy. Additionally, this prevents the same coins to be used several times or faulty or fraudulent transactions from being validated on the blockchain (Nakamoto, 2008).

Nakamoto (2008) created an incentive for people to be part of the Bitcoin node network and contribute to the validation process needed for each transaction. The proof-of-work system rewards the individual who partakes in running one of the nodes, by giving them cryptocurrency coins (Nakamoto, 2008). These coins will be discussed further in Chapter 2.4.3. An additional incentive includes a nominal transaction fee, which has been standardised across all transactions. In this system, the miner who first solves the puzzle receives a bonus payment (Böhme et al., 2015). These rewards can be seen as a payment for partaking in the upkeep of the blockchain, thus attracting more people to act as a node, which in turn increases the decentralisation and security of the blockchain. It is worth mentioning that there are other technologies apart from proof-of-work that can be used to run a blockchain, such as proof-of-stake which is used by Ethereum. These different technologies have their pros and cons but the overall idea of the blockchain is similar, and will therefore not be further covered in this research paper (Tapscott & Tapscott, 2016).

Blockchains serve as a mediation between individuals, replacing the role of trusted central authorities such as banks (Ojog, 2021). Since there is no central authority that handles users' assets, the blockchain operates on a security system where private-key public-key infrastructure is used. The public key is derived from the private key, both of which consist of long randomised numbers that are used to encrypt and decrypt transactions (Szabo, 1996). In the blockchain infrastructure, a private key is something that generally is kept confidential and must be safeguarded as it essentially represents ownership of digital assets. On the other hand, the public key serves as an address for receiving transactions and can be shared freely without compromising security. Since blockchains are built to be transparent and publicly announce all transactions including the public keys partaking in a transaction when validated by the blockchain (Nakamoto, 2008). Nonetheless, users can preserve their anonymity on the blockchain by ensuring that the person associated with the public key remains undisclosed. For instance, a public key labelled X111 is disconnected from any identifiable person, the user behind it remains fully anonymous. If the user publicly discloses that their public key is X111, other users would be able to see all transactions that they have taken part in.

Nick Szabo (1996) provides an example of how public and private keys are used on the blockchain in a transaction. The illustration below shows a transaction between Alice and Bob. Bob wants to send "Hello Alice!" to Alice, he does this by sending it to her public key, this will then encrypt the message, to randomised codes, once Alice has received it she automatically decrypts it with her private key as seen below.

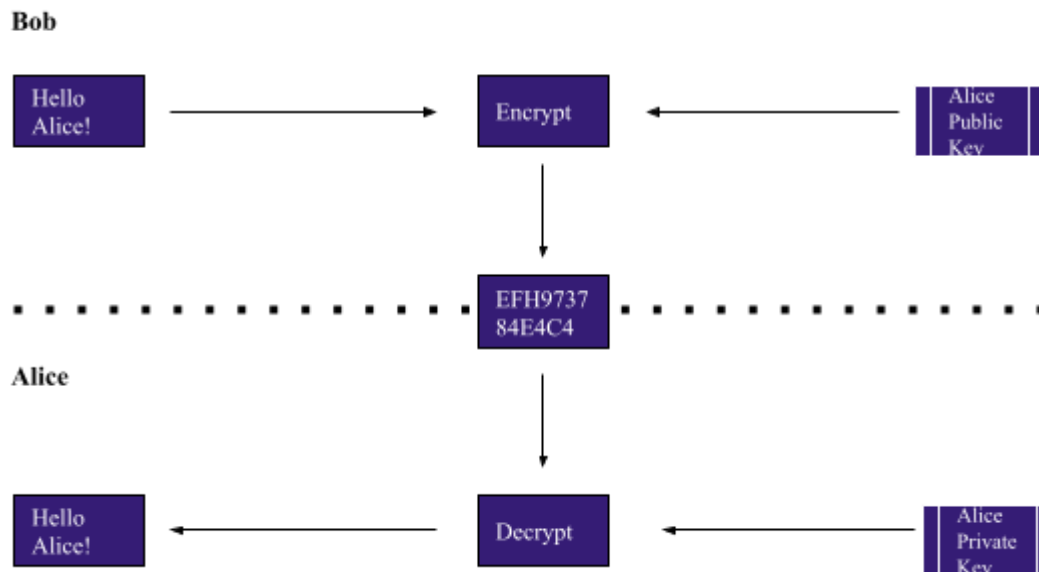


Figure 3: Illustration of how a transaction is conducted (Szabo, 1996)

On the blockchain, whoever has control over the private keys has control over the funds and can carry out transactions, move funds and access accounts (Ojog, 2021). This means that for the average user, there is a new responsibility for managing their private keys. Losing control of the private keys means losing control over the assets, and this risk applies equally to everyone conducting transactions on the blockchain. To reduce this risk and improve the user experience, centralised third-party exchanges offer custodial wallets, with the keys being managed by a third-party organisation (Ojog, 2021). The upside is that the user is no longer solely responsible for handling their private keys, but simultaneously this may create a third party risk if the company behind the exchange goes bankrupt or if their system gets compromised. Another potential downside presented in this approach is that the key pairs are connected to the user as an individual. This implies that signing up to a third-party and applying to use their service, the anonymity of the user is reduced in order to comply with know-your-customer regulations.

2.4.2. Smart Contract

Smart contracts are pieces of code on the blockchain that enables the users to share and transfer value (Ojog, 2021). In traditional finance an individual, typically a broker, at a bank or financial institution would act as an escrow (Tapscott & Tapscott, 2016). All this manpower of these 3rd parties inquire operational costs which are being paid by the high transaction fees while also often being inefficient (Tapscott & Tapscott, 2016). Smart contracts are more efficient and mitigate the high fees by only taking a small transaction fee for the same work. A smart contract can be programmed to do many things, one of them is to act as an escrow, replacing the need of a central authority or middleman. (Ojog, 2021). The contract can receive, redistribute and reverse transactions of funds if certain thresholds are achieved or not achieved (Tapscott & Tapscott, 2016). All these transactions are transparently displayed on the blockchain which eliminates any possible disputes, making it easy to see

where the transaction was sent. While on the other hand it puts more pressure of knowledge on the individual who uses it to make sure that the smart contract works as intended.

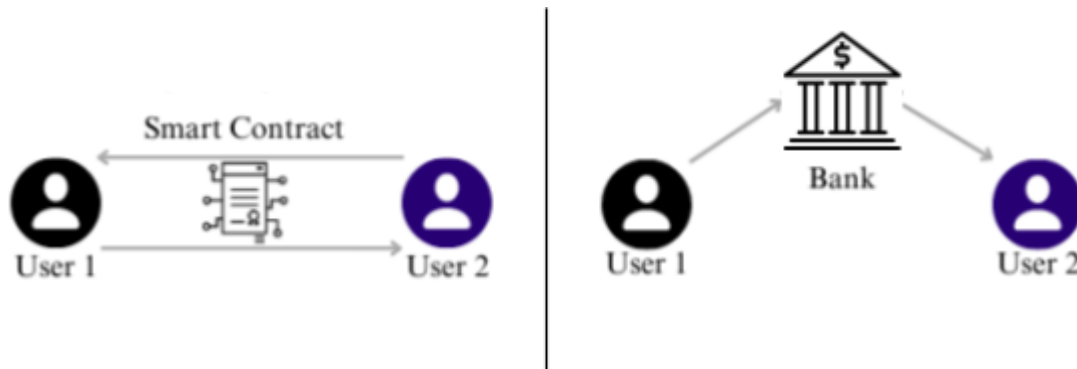


Figure 4: Simple visualisation of smart contracts work vs. traditional banking system

2.4.3. Cryptocurrencies

According to Ojog (2021), cryptocurrencies are tokenized assets that represent value, which are synonyms with tokens or coins. The value is mostly based on what individuals perceive it as, but also based on the utility it provides to the ecosystem and its users. The technology behind cryptocurrencies can vary slightly, for example Bitcoin is a cryptocurrency that is built on its own blockchain and can only be used on the Bitcoin blockchain (Ojog, 2021). There are other blockchains where several cryptocurrencies are built upon, however this will not be touched upon any further based on the scope of this paper. Generally, the function of these cryptocurrencies is to perform transactions of value on the blockchain. Another factor that defines the value of these currencies is the total market capitalization and the supply of the tokens, coins or cryptocurrencies (Ojog, 2021). For example, Bitcoin has a capped maximum supply of 21 million tokens, while other cryptocurrencies have an unlimited supply (Böhme et al., 2015). However, there are many forms of cryptocurrencies with different technical structures which implies that certain types of cryptocurrencies have an infinite supply and are adjustable with the possibility of both creating new coins and deleting them. To create new coins and increase supply, there is a process called minting, whereas there is a process called burning to reduce the circulating supply (Ojog, 2021). This can be compared to the most common form of monetary value instrument, fiat currencies which are controlled by central banks and governments. Monetary policies that regulate these fiat currencies can be changed, which in practice gives the opportunity to create more money at any time. The potential effects of printing more money could cause inflation which is outside the control of regular users. To solve this, Bitcoin was one of the first blockchain based cryptocurrencies that would be an alternative way to transacting money on the internet, instead of regular fiat (Nakamoto, 2008).

Even though cryptocurrencies can serve as a way to transfer value, there are some downsides to these based on the large volatility in value they face. To solve this, there is another form of

cryptocurrency called stablecoins, which were created with the purpose of transacting value (Ojog, 2021). Stablecoins have a unique characteristic since their purpose is to copy or mimic the fiat currencies of governments. For example, two stablecoins are USDT and USDC, which both are backed by regular fiat USD in a one-to-one ratio in an external bank account (Ojog, 2021). Therefore, every time a USD leaves the vault a corresponding USDT gets burned and vice versa. Based on this, one stablecoin always corresponds to one traditional USD, which mitigates the volatility issue while keeping the upside of the blockchain technology in other aspects.

A general issue with the blockchain ecosystem and particularly the cryptocurrency ecosystem is the lack of regulations. Since the technology is relatively new and also unregulated, scams and fraud are common. For example, some cryptocurrencies are only developed as scam coins, which do not yield any value or utility (Ojog, 2021).

2.4.4. DeFi and peer-to-peer lending

To simplify what DeFi is, it uses similar instruments as traditional finance but replaces all types of middlemen and central authorities that usually are involved when two parties make transactions with smart contracts (Tapscott & Tapscott, 2016). Smart contracts that run on the blockchain require no censorship, since there is no know-your-customer (KYC) process, credit scores, or geographical location that has to take place like in a typical traditional system (Ojog, 2021).

Salami (2021) elaborates on the challenge with applying know-your-customer principles within DeFi and the blockchain technology. Salami (2021) points out that regulation is still lacking within DeFi, especially in terms of stablecoins but also currently not having to fulfil any anti-money laundering requirements. Know-your-customer is a vital step of knowing who is transacting and where the money is coming from, in the traditional system these documents are often sent before a transaction is sent, but for DeFi this is no requirement as the individual is anonymous on the blockchain (Salami, 2021). This makes it easy to transfer money and funds that have been used in illegal activities. The U.S Infrastructure Investments and Jobs Act tried to address this but found it difficult to implement in practice as they do not intend to go after blockchain developers and miners (Salami, 2021). The main effort right as of 2023 is to try to regulate anti-money laundering and know-your-customer processes for DeFi, which is difficult since every country is adopting different approaches (Salami, 2021). Another problem within DeFi are the possible exploitations of the smart contracts and code on their platforms that could end in permanent losses if the developers go rogue or get hacked from the outside (Ramachandran et al., 2021).

The privacy allows borrowers to more easily borrow money than in traditional finance. There is no need for a credit score, thus anyone can borrow as long as there is someone on the peer-to-peer network providing a loan (Tapscott & Tapscott, 2016). Since there are no restrictions apart from providing a collateral, the borrowers are generally willing to pay a

relatively high interest rate for the loans (Ojog, 2021). This incentivises lenders to provide their liquidity and in return get a high interest on their coins.³ The developers building these services with smart contracts are mostly decentralised with a few aspects being centralised, such as server hosting, website and domain name services due to lack of decentralised options (Ojog, 2021).

2.4.5. Decentralised exchanges

DEX uses smart contracts from the different blockchains to exchange the cryptocurrencies for their users (Ramachandran et al., 2021). A DEX operates similarly to a stock broker but instead of exchange stocks, DEXs exchange cryptocurrencies. The main difference is that a DEX is not controlled by a central entity, as it is decentralised. DEXs can be divided into two main types, the first type is the classic order-matching system and the second one utilises an AMM system (Ramachandran et al., 2021). The main difference between these systems is that AMMs are fully automated with smart contracts while also generally treasuring more liquidity in them, which decreases the spread between assets. Furthermore, the centralised exchanges require users to verify with an ID to be able to use all of their products, as a way to comply with knowing-your-customer and prevent money laundering.

DEXs operate with one common goal of becoming the best decentralised venue to exchange cryptocurrencies for the users (Ramachandran et al., 2021). They generally also have lower trading fees and the users have full control of their assets, in comparison to the traditional exchange where the platform is holding the assets in custody (OJOG, 2021).

³ These types of transactions are very similar to the traditional pawn transacting system, where the borrower must supply a collateral, in case they fail to repay the loan and prevent the lender losing the provided liquidity (Tapscott & Tapscott, 2016). The borrower gets an end date on when the loan should be paid back, plus interest, if failing to do so the borrower loses the collateral (Ojog, 2021). The collateral in DeFi is usually another cryptocurrency and should also be larger than the borrowed amount (Ojog, 2021).

3. Methodology

In the following section the methodological approach of the research will be presented. The goal is to present the reasoning behind methodological decisions. The chapter is structured like a funnel, starting with the most broad and overarching methodology areas, such as philosophical assumptions and research questions. This is followed by overarching methodological topics before presenting more specific topics such as the data collection process and finally analysis process. An illustration of the methodological design is presented in the last part of the chapter.

3.1. Philosophical assumptions

To set the foundation for the following methodology chapter and to better understand the choices made throughout the chapter, the researcher's perspective of reality must be understood (Bell et al., 2019). Ontology is described as the way the researchers view reality. Epistemology then describes how the researchers acquire new knowledge about reality. To further nuance these concepts, they can be analysed through two large philosophical concepts, being objectivism and constructionism (Bell et al., 2019). The objectivism perspective claims that truths are independent of their environment and that our reality is given. On the other hand, there is constructionism, which explains knowledge and “truth” as constructed (Bell et al., 2019). From a constructionist perspective, social interaction and context matters when discussing a research object. As an extension of this, it can be argued that the background knowledge of the researcher affects the paper, and should be classified as subjective to some degree.

In regards to this study, which aimed to seek perception, it was clear that the research is based on an ontological perspective of constructionism. Perceptions were likely to differ, and the research subjects had different opinions about DeFi depending on their background. Acknowledging the importance of the social context when collecting data was an important factor to take into account during the analysis and at the core of it was what the paper is intended to research.

3.2. Research question

The entire methodological chapter is built around the research purpose: To create a profound understanding for the key challenges in the adoption process of the DeFi industry. While this study aims to seek perceptions of bankers, users, developers and regulators engaged in the DeFi industry to answer the following research questions:

1. What are the current key challenges in the adoption process of DeFi?
2. In what ways do these key challenges affect the adoption of different stakeholders (bankers, users, developers, and regulators) and development of the DeFi technology?

3. What are the potential strategies or solutions that can be employed by each stakeholder group to address the key challenges in the DeFi adoption process?

3.3. Research approach

When designing the research, some fundamental principles in the method approach were taken into account early in the process. There are two main approaches that have a contrary relationship with each other, namely the inductive and deductive method. One must analyse the pros and cons with each method and decide upon which approach to take based on the research purpose (Bell et al., 2019). A third approach can be found somewhere between the two extremes of induction and deduction, namely an abductive approach.

The abductive approach is described by Bell et al. (2019), as a combination of the inductive and deductive premise and can be a way to overcome the limitations of them individually. The abductive approach allows for the identification of the most likely explanation for a given phenomenon, even in situations where there is limited or incomplete data or information available. Furthermore, in this approach, it is possible to circle back and forth within the theoretical framework during data collection to complement findings with new theories. Bell et al. (2019) state that the abductive approach is useful in situations where multiple explanations are possible by comparing and contrasting them with each other to create a stronger analysis with more solid conclusions. The potential flaws with the abductive approach is that it could be subjective as the researchers' own biases could influence explanations in some cases (Bell et al., 2019).

There are several factors to take into account when deciding between taking an inductive or deductive approach to the research. On one hand, the research purpose is to explore and seek understanding of opinions and experiences related to the new and growing DeFi industry, which may suggest using an inductive approach of creating new theories based on the data collected. Philosophically from a constructionist standpoint, it may be difficult to commit to a truly inductive strategy, since the researcher's personal standpoints and perspectives will affect decisions and analysis throughout the process. Further, it is reasonable to believe that even though the DeFi industry is relatively new, there have been other historical cases that have been of similar to the growth of the DeFi industry, which means that there may likely be theories that can be applied from these settings within the purpose of the proposed research.

Meanwhile, a deductive research design is not perfectly suitable for the research purpose either, since the primary goal is to explore and seek insights, rather than trying to validate an existing theory in the DeFi industry setting. Based on the fact that neither of the theories match the objective of this research perfectly, the option of utilising an abductive strategy was opted for. The abductive approach provides greater flexibility and adaptability in the research process compared to inductive or deductive research single handedly. Based on these

factors, the abductive approach was seen as the most appropriate to seek answers to the relatively complex research questions.

3.4. Method approach

Another large distinction in research after deciding upon the initial approach described above, is whether to create qualitative or quantitative research. The main difference between qualitative and quantitative research is that the former focuses on words, whereas the latter focuses on numbers (Bell et al., 2019). Further, the methods somewhat differ in how they approach research in terms of how they view the world at a philosophical level. Quantitative research tends to be more scientific and views the world in an objective way through numbers (Bell et al., 2019). Qualitative research, on the other hand, often assumes that reality is complex, which can make it a great approach to understand topics that are based on experiences and beliefs (Bell et al., 2019). There are shortcomings of both these, and it is clear that studying reality objectively and accurately is very difficult (Bell et al., 2019).

With the two main approaches laid out, there are clear pros and cons with both approaches, and the choice of method must be made based with the intended research in mind (Bell et al., 2019). The qualitative approach was utilised to seek answers for the research questions in this report, based on several reasons. At a general level, this is naturally the most appropriate since this research paper aims to find perceptions of individuals that have different relations and views of the DeFi industry. The qualitative approach allows to create a deep understanding of underlying reasoning and perspectives, which arguably would be very difficult if using a quantitative method of collecting numbers and statistics, especially based on the sampling strategy with respondents of different backgrounds to seek several perspectives on the topic. Furthermore, it can be seen that based on previous methodological studies, a qualitative research method is preferable to create an understanding and meaning within complex topics (Bell et al., 2019). A quantitative method could have been utilised to find cause and effects and proving differences in a statistical way, by for example having a large sample group rate how they perceive DeFi numerically based on given factors. However, it would be impossible to capture the deeper picture and reasoning behind the numbers in such research without a qualitative approach to support it, therefore making it a less optimal choice for the research question in mind. Although the qualitative approach is suitable for this paper, it is important to keep in mind that a qualitative approach also has limitations that need to be taken into consideration (Bell et al., 2019). For example, the sample size will naturally be more limited when performing in-depth interviews as opposed to analysing general data with a quantitative method and identifying cause and effect relations between variables is very difficult. This implies that results may be more difficult to generalise at a general level before performing larger scale studies within the topic.

3.5. Study type

According to Bell et al. (2019) a cross-sectional research design involves collecting data from a sample group of individuals at one point in the time, rather than studying a single case or group over an extensive period of time. This works well in qualitative studies as it involves semi-structured interviews while it also aligns with the possibilities to use a thematic analysis to analyse the data. One advantage of using a cross-sectional research design is that it allows the researchers to study a larger sample of individuals in a relatively short period of time, which is deemed to be useful when studying phenomena and broader topics (Bell et al., 2019). Furthermore, it may also be used to identify correlations between variables which previously have not been thought of and provide valuable insight into relationships between the different factors. This is useful when comparing and contrasting the perceptions of the different stakeholder groups included in the sampling and could help understand the underlying barriers and how the stakeholders can approach them efficiently.

The limitations with a cross-sectional design is that it is very difficult to establish causality of the relationship between the factors (Bell et al., 2019). This could be due to the fact that the data will be collected at a single point in time, making it difficult to determine whether one variable caused the other or if they are both influenced by a third, hidden or unmeasured variable. Additionally, the study subjects of this study may be biased in their opinion, this may differ from individual to individual and could be different between the participants and those who do not. Another limitation is that the cross-sectional study may not provide as much in-depth detail or insight into each participant or groups as they are not followed over a period of time. With this in consideration, the cross sectional study design fits very well when studying economic evolution and the barriers to adoption of new technologies. Barriers are rarely permanent, and the barriers that were found in this study are likely not relevant in the future when they are resolved.

3.6. Data collection

There will be two data categories in this research paper, primary and secondary (Bell et al., 2019). The main data is primary data, which is based on in-depth interviews performed in a semi structured manner. It can be seen that such an approach is aligned with the overall research design since the purpose is to find meaning and perceptions of the interviewees (Bell et al., 2019). Secondary data has been used to further deepen the understanding while simultaneously offering the possibility to triangulate the primary data, in line with the abductive approach described in the research design chapter above (Bell et al., 2019). The secondary data will mainly consist of academic articles.

3.6.1. Primary data collection: In-depth interviews

Based on the research purpose of understanding opinions and perspectives within the complex topic of the DeFi industry, the method needs to accommodate the researchers to

collect deep qualitative data. Based on these needs, interviews have been used to be able to collect in-depth data about how the respondents perceive the DeFi industry.

There are several approaches to performing an interview and there are three main approaches that can be taken (Bell et al., 2019). The interview types are structured, semi-structured and unstructured, each of them having their own characteristics with pros and cons which must be carefully considered based on the research purpose. Since the DeFi industry is very young, knowledge across the different interview objects may differ heavily. The methodology needed to facilitate this, hence the semi-structured interview style was the most appropriate based on the combination of high flexibility within the interview and base structure to keep the data comparable.

3.6.2. Interview guide process

It is clear that to generate high quality data which can be used to make valid conclusions in the analysis part, the interviews had to be performed in a mindful manner with great planning (Bell et al., 2019). The semi-structured interview method requires an interview guide for the interviewers to follow (Bell et al., 2019). Based on the research purpose and the overall methodology, the interviews were performed in one-on-one sessions. This made it possible to compare the different sample groups (bankers, users, developers and regulators) without them being affected by each other as they might have been in a group interview.

The interview guide used in the interview sessions was the same for all groups to make sure all required data was collected. However, since the sample groups have different backgrounds and different knowledge, every individual was able to expand upon different topics. This was facilitated and can be considered in line with previous selection of performing semi-structured interviews, since the interviewees can ask respondents to elaborate based on their individual experiences and background (Bell et al., 2019).

The interview guide has been based upon the purpose of the overall paper and is structured in the most clear way possible, consisting of 11 questions which can be found in Appendix X.I. As suggested by Bell et al. (2019), the interview guide has been constructed by clear and concise questions to make it as easy as possible for the respondents to provide the best possible answers. The overall themes that are treated in the interview guide are the following:

Table 4: Overview of interview themes

Intro, experience & background knowledge	DeFi benefits	DeFi challenges
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Other important aspects of the interview process have been practical ones, such as managing time spent, planning and other logistics to fit the overall scope of the paper and to facilitate time to create a well rounded paper (Bell et al., 2019). Most interviews will be held online

through video meetings, since it allows for a high amount of flexibility from a logistical point of view (Bell et al., 2019). The main downside with performing online interviews as opposed to interviews in person are that it is more difficult to capture body language and other non verbal expressions (Bell et al., 2019). This may somewhat be neglected to a certain degree since video meetings will be used, but it may still impact the data negatively. However, one might argue that the upside of being able to schedule more interviews and booking interviews with people that may not have had the possibility to meet in person outweighs the decrease in quality that stems from performing a video interview as opposed to an in-person interview.

An important part of collecting strong data in interviews has to do with the respondents mindset, something that was to be considered prior to conducting interviews (Bell et al., 2019). Something that can greatly help in the area is to guarantee anonymity, which was offered to all respondents before they participated in an interview. During the sampling process it was found that an overwhelming majority of respondents preferred to remain anonymous during the interviews, which was facilitated. The main reason for allowing this, was to encourage respondents to share their personal beliefs and experiences regardless of how they aligned with the organisation they worked at. For many, DeFi is a new and uncertain industry, therefore this approach was helpful and necessary to generate the quality of data required in the interviews. A downside to this is that the data is more difficult to confirm, but the fact that guaranteeing anonymity increased the amount of quality interviews that was possible, it was considered a valid trade-off.

The interviews were held in either Swedish or English, based on the preference of the respondent. Mixing languages in data collection is a challenge to be aware of, since translations errors and misunderstandings can become a problem (Bell et al., 2019). To deal with this to the greatest extent possible within the scope of the project, the interviews were recorded and transcribed after finishing the interview. This process was done together by both researchers to minimise the risk for human errors. This process has several upsides that strengthens the reliability of the data, since it firstly allows the interviewees to focus on what the respondent is talking about during the interview instead of taking notes, which allows for better follow up questions to be asked (Bell et al., 2019). Secondly, by utilising both researchers when transcribing, the risk of misunderstanding what is being said could be minimised (Bell et al., 2019). Furthermore, after the transcription process, the transcription was sent to the respondents to have them confirm that what they said was correctly understood, which further decreases risks of misunderstandings which could skew the data (Bell et al., 2019).

3.6.3. Sampling

The intention behind the sampling strategy was to pick individuals that most likely can provide sufficient data to answer the research question. With this in mind, it is important to note that there is a clear distinction in this approach compared to an approach that aims to create generalizability (Marshall, 1996). The lack of generalizability comes with a large

upside of larger understanding and clarity in the perception of the respondents, which suits the research purpose much better. Marshall (1996) describes several possible ways to approach sampling, one of which is judgemental sampling. Judgement sampling can also be described as purposive sampling, which enabled the possibility to make thoughtful decisions in terms of which respondents to include in the interviews (Bell et al., 2019). The downside to this sampling is the lack of generalizability and potential biases. On the other hand, the possibility to strategically sample respondents enabled interesting perspectives to be compared intentionally, which would be difficult through other sampling methods. Based on the research strategy of seeking perspectives within selected target groups, it was reasoned that the purposive/judgemental sampling method suited this research project the best. Table 5 provides an overview of example individuals within each group.

Table 5: Sample groups and their characteristics

Target group	Description (Inclusion criteria)
Bankers	Professionals working within the banking industry and possess an strategic position in their organisation.
Users	Active users that utilise DeFi products or services frequently (at least a couple of times weekly).
Developers	Leading figures of developing a DeFi product, preferably co-owners or managers in their DeFi product organisation.
Regulators	People working for governments that regulate and oversee financial markets and the development of the DeFi sector <i>or</i> experts within laws applicable to DeFi such as professors.

The total sample group consists of 21 interviews, including nine users, five developers, four bankers and three regulators. Overall, the interviews were fulfilling and the interview objects had a lot of information to share, which can be seen more specifically in Appendix X.II to X.V.

Getting in touch with the users was relatively straightforward, as there were numerous forums and communities where active users resided. Users represented various nationalities, most commonly from the United States, but also from countries such as Sweden, United Kingdom and Germany. Among the users, their involvement ranged between casual users to heavily invested within various DeFi products. As such, some users were novice, having just adopted the technology, while other users have been using DeFi platforms for a longer period of time.

The five developers represented a wide range of DeFi projects, both established projects with thousands of daily users, as well as emerging projects. All developers had strategic positions

in their projects with great insight into the operations. Despite their busy schedules we successfully secured interviews with these developers. Most of the connections were made possible through professional networks and referrals.

As for the bankers, it was found that they were a more challenging sampling group to book interviews with due to scheduling issues and the necessity of having relatively large insight into the strategic work within the organisation in order to provide fulfilling data. Three out of the four bankers worked at larger Swedish banks, with an emphasis on traditional finance offerings. The interview objects worked within technology development, risk management and product management respectively. One banker worked in the US at one of the ten largest banks and had a leading role within product development.

For the three regulators there were two who came from similar jurisdictions in Sweden while the other was a professor. All three were selected based on their knowledge around DeFi technologies and how potential regulations could look or even affect the industry. Reaching out to the regulators was the hardest and required a more formal approach, where the access was made via their official channels and professional networks.

This sampling strategy was designed with the research purpose in mind, aiming to create a profound understanding for the key challenges in the adoption process of the DeFi industry among different stakeholder groups. As described in the introduction, some theories suggest that bankers and developers may have contrasting relationships towards the DeFi sector, therefore including both brought great insights into the adoption process. Users have first hand experience and will represent the majority of people as the DeFi industry grows, which could give insights into what allows for scalability for example. Regulators have a lot of power in the society and can directly affect how the DeFi sector develops, meaning that their opinions and perspectives of the industry are of high importance. Overall, when these sample groups are combined, their varied perspectives provide a well rounded picture of the overall perceptions of DeFi.

3.6.4. Secondary data collection

Secondary data collection is an important part of the research paper as it allows to gain additional knowledge in the given field and triangulate the primary data collection from the interviews (Bell et al., 2019). This is not solely possible by only looking at primary data, or at least it would have taken extensive research and time in doing so, especially since some relevant data likely already exist. The secondary data collection in this study also served to identify potential theories and frameworks that could be applied to the primary data that is collected by in-depth interviews. This enables for more comprehensive and nuanced understanding of the research questions as well as it provides opportunities to identify gaps in the existing literature and could therefore also contribute to the development of new findings or theories.

This study's focus is to understand the perceptions of DeFi among different stakeholders to identify the key challenges of the adoption process for the DeFi industry. Although DeFi is a new phenomenon, many existing theories can be applied to understand a new technology as a whole. Therefore, the secondary data collection focused on three main areas with different needs and targets. Firstly, general innovation theories create a foundational understanding for how innovations spread and give the reader the most foundational concepts needed to move forward. Secondly, economic evolution was researched, with an emphasis on adaptation and adoption. Both these areas are general and well researched, which is positive since secondary data about DeFi on its own still hasn't been researched for an extensive period of time. These sections therefore include sources of various ages, most of them extremely prominent within their research area and thus well cited. Lastly, information about DeFi was covered in the literature review with the goal of creating understanding for the specific subject. In this section, the age of the source was heavily considered and more recent studies were preferred as the DeFi industry is rapidly evolving. By giving the readers a better foundation of what DeFi is and the different products they can more easily understand the results as well how the analysis and conclusions were formed.

Overall, these three areas were gathered via relevant secondary data and a broad variation of scientific databases, such as Google Scholar and GU super search. The selection of sources was based on the relevance to the given research questions and peer-reviewed articles will be prioritised when possible to ensure credibility of the findings. On the other hand non-peer reviewed sources will be included if there is a lack of available studies on the given topic.

When searching the databases certain keywords were used related to DeFi, financial technology, and stakeholder perceptions. When other areas seemed relevant to be explored in combination with the results of the primary data collection, other keywords, topics and citations found were explored as deemed relevant to the research study. This is in line with the abductive reasoning going back and forth to explore different explanations. When relevant literature was found it was categorised into different blocks depending on the underlying topic.

Table 6: Inclusion and exclusion criteria for literature collection

Inclusion	Exclusion
Peer-reviewed and non-peer-reviewed Articles only about the DeFi industry and related topics, such as decentralised technology and blockchain.	Articles about traditional financial products or services, such as banks or stock markets, that are not directly related to the DeFi industry.
Studies or reports on the adoption and use of innovations.	Articles on the history of decentralised technologies.

Analysis or studies regarding the risks and opportunities of DeFi, including the potential for fraud or malicious activity.	Research from sources that are not considered reputable or reliable, such as blogs or personal websites.
Studies or reports on topics that are relevant to the research questions, such as the technical aspects of blockchain and DeFi technology.	

3.7. Data analysis

The data collected through the semi-structured interviews had been analysed through a thematic analysis, which was a process of identifying patterns and meaning in qualitative data (Bell et al., 2019). Naturally, in the process of finding patterns and meanings in given data, it could be seen that a thematic analysis tied closely together with the overarching objective of qualitative research described in Chapter 3.4. Based on the research purpose combined with the data collection strategy, a large amount of in-depth qualitative data had been generated. To structure the data clearly and transparently, deploying a thematic analysis was considered an appropriate strategy (Bell et al., 2019).

To become familiar with the thematic analysis process, the process described by Bell et al. (2019) was complemented with one of the most cited papers within thematic analysis, which provided a step by step system for creating a thematic analysis (Braun & Clark, 2006). It was first suggested to become familiar with the data by transcribing it, while simultaneously actively reflecting upon what was being said by the respondents and reading the transcriptions carefully (Braun & Clark, 2006). To ensure the highest quality possible throughout this paper, full transcriptions were created of the majority of interviews performed. The downside to this was time consumption, but it was estimated to be feasible within the scope of the project and the upside of added clarity and a considerably stronger data foundation to build the thematic analysis upon was considered worth the time allocation.

Following the transcription, the authors separately created initial codes that represented patterns and meanings found in the data (Braun & Clark, 2006). After this process was complete, the process was redone from the start in an iterative manner, much in line with an abductive research strategy as used throughout this research paper (Braun & Clark, 2006). While doing this, the codes were illustrated directly in the transcripts to increase transparency and decrease the imminent risk with thematic analysis of losing context of the data (Bell et al., 2019). New codes were added throughout the process based on reflections and after seeing what codes most closely described what was being said in the interviews. When this process was complete, both authors looked for commonalities in the coding and based upon these, summary tables were created. These were presented based on each sample group which can be found in Appendix X.II. to X.V.. When inspecting these tables, the reader is provided

with a deeper understanding of each code and all underlying data taken directly from transcripts.

After this step, themes were created by grouping similar codes together to further deepen the understanding (Braun & Clark, 2006). It was said that themes should be nuanced, and not just describing the topic areas of the grouped codes (Braun & Clark, 2006). However, a perspective that must be noted upon this stage is that there was no clear consensus within current research as to exactly how to go about the creation of themes. This might have resulted in a potential bias based on the background of researchers that needed to be taken into consideration by triangulating the data with secondary sources when appropriate, but also when drawing conclusions. However, since there was no clear solution and this was a general research problem, no action was taken apart from acknowledging the problem. The theme creation process was a very iterative process, in line with the overarching research strategy. This aligns with the abductive research approach throughout the theme and code creation process, the data could be linked to new theories if found necessary to deepen the understanding of the data. After completion, Table 7 was created presenting the themes, sub-themes and the underlying codes (Braun & Clark, 2006). This was then used as a foundation to analyse and draw conclusions to answer the research questions.

As mentioned in the process description above, there were a few downsides to be aware of when it came to performing a thematic analysis. Two of the largest problems were that it tended to fragment the data and bring it out of context, and that the coding process itself was prone to biases (Bell et al., 2019). This was counteracted to at least a certain degree by having both researchers review the data separately to avoid biases and finding overlapping perceptions afterwards.

3.8. Relationship between methodological sections

The methodological chapter has been constructed mindfully with each section being closely linked to the research purpose of the paper. Decisions that have been made in the chapter have been motivated and the reasoning behind has been presented throughout the chapters. To summarise, the research purpose is to explore and seek perceptions among bankers, users, developers and regulators. To do this, an abductive approach was taken in combination with a qualitative research design based on the purpose of seeking perceptions with a cross-sectional study design to capture the current perceptions of the DeFi industry. Data collection was performed through in-depth semi structured interviews, combined with secondary data from several sources to enable triangulation. In combination with the abductive approach, this approach enabled the writers of this paper to complement the findings with new sources. Sampling was purposive, also in line with the foundational abductive research approach, thus increasing flexibility and provided the possibility to seek out respondents with different backgrounds based on the research questions.

Based on the research purpose and data collection strategy, a lot of in-depth data was generated which needed to be presented in a clear and concise way. Therefore, a thematic analysis was used with an iterative coding and theming process, much like the overall abductive approach. This way, the deep and complex data can be described and traced in a clear way for the reader. Figure 4 provides an overview of the methodological choices as explained throughout the chapter.

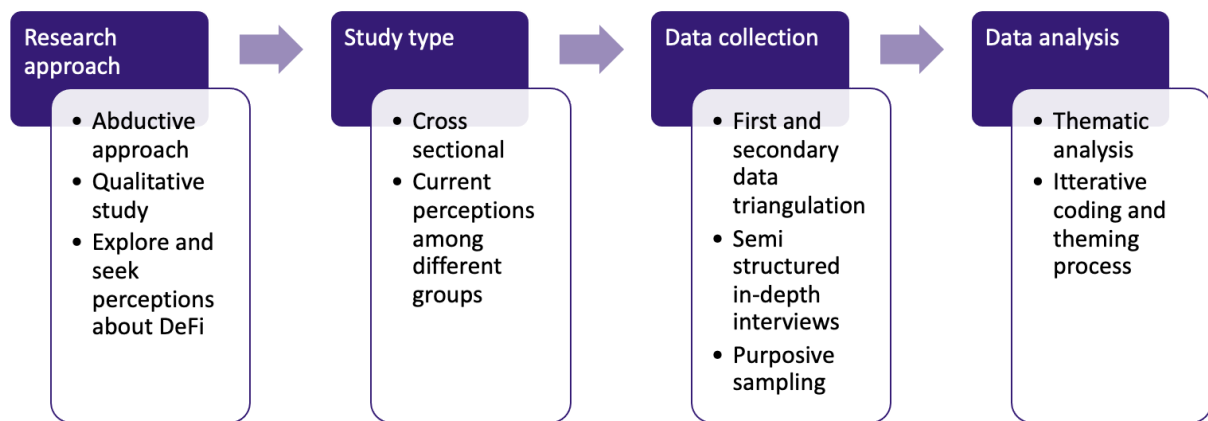


Figure 4: Illustration of relationship between methodology choices

3.9. Delimitations

Some delimitations were made to keep the scope of the study concise and feasible. Firstly, DeFi was a new subject and the knowledge among the people interviewed varies and is subject to potential misconceptions or unclarity based on individual knowledge. This might have affected the data that was generated and must be kept in mind when applying the results from this study. Based on this background, the study limited itself to the DeFi technology as a phenomenon, thus avoiding focusing specific products unless necessary to avoid disparities in knowledge among interview objects.

The second delimitation was that the study focused on the perceptions of DeFi among specific stakeholders, such as bankers, users, developers, and regulators. There might have been other stakeholders which could have had relevant perspectives on DeFi, but the researchers of this study chose to focus on these particular groups to gain a more in-depth understanding of their views and experiences.

Thirdly, the study was delimited by looking at the current state of the DeFi industry, as it is constantly evolving and the perceptions might change over time. The focus was on how the current landscape perceived the DeFi industry during the research of the paper.

Lastly, the geographical focus of the study was mainly Sweden and the USA. This was important to note since these were both relatively digital countries. Results might have

differed if a similar study had been carried out in a less digitised country or a country with other banking traditions, such as Japan.

4. Empirical findings

In the following section, the empirical findings based on the thematic analysis will be presented, and variations in codes will be discussed.

4.1. Thematic analysis

In Table 7 as seen below seven themes derived from the first order codes are presented. The first order code and the supporting quotes has been analysed for each stakeholder group and presented in tables. These tables can be found in appendix X.II. to X.V. The thematic analysis resulted in seven relevant overarching themes which are further presented under each heading with explanation of the supporting first order codes.

Table 7: Presentation of overarching themes, sub-themes and first-order codes

Overarching theme	Sub-themes	First-order codes
DeFi potential and specific products	DeFi has the potential to transform the traditional finance industry	"DeFi as Catalyst for change in traditional finance", "DEX Evolution & Growth", "Most disruptive DeFi Products", "Opportunities", "Societal benefits of DeFi", "Potential of DeFi Products"
	There is a wide range of DeFi products with the potential to be disruptive	"Most disruptive DeFi Products", "DeFi Products with Largest Benefits", "Potential of DeFi products"
Building legitimacy for DeFi adoption	User experience and friendliness must be focused	"User benefits of DeFi", "Barriers to DeFi Adoption", "User Experience", "Education and Awareness"
	Social aspects of building legitimacy	"Adoption of DeFi", "Collaboration with Regulators", "Security and Trust"
	Technical aspects of building legitimacy	"User Experience", "Interoperability and Innovation", "Security and Trust"
Collaboration between stakeholders	Collaboration can facilitate an easier adoption process	"Facilitating change: Collaboration & Integration", "Adoption of DeFi", "Collaboration with Regulators"
	Regulation is difficult and requires coordination (between countries)	"Regulatory Challenges", "Impact of Regulation on DeFi from an user perspective", "Challenges of DeFi products", "Adoption of DeFi", "Collaboration with Regulators"

4.1.1. DeFi potential and specific products

This overarching theme consists of two sub-themes which covers the perceived potential in the DeFi technology. The first sub-theme includes general thoughts about the DeFi technology itself and the second sub-theme includes thoughts about more specific products within DeFi.

DeFi has the potential to transform the traditional finance industry

The first theme, “DeFi has the potential to transform the traditional finance industry”, was combined out of seven first order codes. In the first order codes, bankers and regulators mentioned how there are certain opportunities and challenges where DeFi could transform the financial industry. The bankers generally mentioned how DEXs will be used more broadly as users familiarise themselves with the benefits while the platforms will face challenges like scalability as well liquidity problems. Banker B said “DeFi can spur innovation within the traditional finance industry and improve financial services.”. The bankers did not see DeFi as a threat and rather as a way to improve the industry while it is crucial to be aware of the challenges that may come with it. There is no unanimous product that the bankers thought to be the critical turning point for the disruption of the traditional finance industry, but they all agreed that DeFi could bring better financial services and faster transactions.

The regulators mentioned the potential benefit for the society of DeFi and the products. They aligned with what the bankers said regarding that DeFi gives the users better control of assets, transparency and accessibility, while also including more people into the financial system. A quote from Regulator C “DeFi has the potential to increase financial inclusion in developing countries.”. With this the regulator stated that DeFi can help develop countries where certain financial products are not accessible to the common individual, which both benefits the country and the society.

There is a wide range of DeFi products with the potential to be disruptive

When it comes to DeFi there is a wide variety of DeFi products, and knowing which has the potential to disrupt the industry would possibly also have the most likelihood to bring more users to the industry. The first order codes for this theme included bankers, users and regulators opinions on the different products. There is one code for every stakeholder group, “Most disruptive DeFi Products” coming from users, “DeFi Products with Largest Benefits” from Bankers, and “Potential of DeFi products” from regulators.

As mentioned in Chapter 4.1.1., the bankers are not aligned on what might be the best DeFi product. The bankers mentioned different DeFi products, such as stablecoins, lending and borrowing platforms and decentralised insurance products.

Similarly, users showed no pattern on mentioning a product that most users would think to disrupt the industry. User A said “I personally like yield farming.” while User B talked about AMM protocols and providing liquidity, while User D and I mentioned that stablecoins is in

their interest. User E and H saw no product having a higher benefit than the other as they did not give a definitive answer.

Regulators gave no specific answers to which products might be the one disrupting the industry. They gave broader explanations of the phenomenon as DeFi could disrupt the industry. This can be seen by Regulator A who said “By cutting out intermediaries, these platforms can offer competitive interest rates to both borrowers and lenders.” and “Decentralised lending can improve market efficiency by connecting borrowers and lenders directly, without the need for traditional financial institutions.”. The other regulator did not give a more specific answer as they talked about stablecoins and other DeFi products enabling more inclusion.

4.1.2. Building legitimacy for DeFi adoption

This overarching theme consists of three sub-themes that had legitimacy as their common denominator. The first sub-theme focuses on the user aspects, the second sub-theme covers social aspects of building legitimacy and lastly the third sub-theme includes technical aspects of building legitimacy.

User experience and friendliness must be focused

This theme consists of four first order codes, two from users and two from developers. All codes indicate the importance of the user in the adoption process. Two codes from the users stated some positive examples regarding user experience within DeFi and some potential areas for development in the codes “User benefits of DeFi” and “Barriers to DeFi Adoption”. In general, users enjoy various benefits which contribute positively to the user experience, as described in the first order code “User benefits of DeFi”. For example, User G stated several positive aspects in the following quote “Better interest rates, lower fees, increased accessibility, and more control over one's financial assets”.

The main barriers perceived by users focuses on the risk of fraud, trust towards developers, regulatory issues, technical complexity and steep learning curve. User I stated the following quote as a barrier to DeFi adoption “Risk of rugs, potential crimes and user experience.” and User D stated “Creating trust, many projects have anonymous founders.” which are both factors that do not contribute to a user-friendly environment.

The perspectives of the developers generally agreed with what is said by the users, and stated that they believed it is important to focus on both developing the user experience from a technical point of view but also to teach users what is already developed. For example, in first order code “Education and Awareness” Developer A stated that “Create educational materials and resources to raise awareness about DeFi and its benefits.” could be a way to make it easier for users to adapt to their platform. From a technical point of view as described by first order code “User experience”, Developer D stated that “Design DeFi platforms with simple, intuitive interfaces that are targeted to users with varying levels of technical expertise”,

indicating that the developers are aware of the importance of developing easy to use platforms if they want users to enjoy it. This indicates that developers may have to address this issue from several perspectives simultaneously to improve user experience and increase adoption rate.

Social aspects of building legitimacy

The social aspects of building legitimacy are discussed by several stakeholders in codes “Adoption of DeFi”, “Collaboration with Regulators” and “Security and Trust”. For example, developers recognized the importance of both the social aspect of building trust, but also the technical foundation to it, which is presented in the next sub-theme. At a social level, building trust may require developers to work with regulators to gain approval, which can snowball into a faster adoption rate. Developer C discussed this in the following quote “Establish industry standards and best practices to enhance trust in DeFi platforms and their underlying technologies.”. The answers among developers indicate that they recognize the importance of the social aspect of trust, alongside the technical. Developer D also focused more on the social trust building aspect and said “Forge partnerships with industries outside of finance, such as gaming or content creation, to showcase the versatility of DeFi technology.”.

Regulators pointed towards two main factors to creating social acceptance and building legitimacy for DeFi in the general public. Firstly, getting regulations in place to create structure is considered very important. This statement is also confirmed by users in the barrier code, where for example User C stated that the absence of regulation is one reason that undermines the credibility of the DeFi sector. Secondly, regulators highlighted the role which financial institutions need to take to build a social acceptance for DeFi. Regulator A stated the following regarding this matter “Banks and the financial institutions can help spread information to their customers about DeFi, its potential benefits, and risks, fostering a better understanding and promoting informed decision-making among users. Keep users safe.”.

Technical aspects of building legitimacy

This theme of the thematic analysis consists of three first order codes which are mainly related to the developers. The codes consist of “User Experience”, “Security and Trust”, and “Interoperability and Innovation”. These technical aspects cover different topics which the developers mentioned as important factors to building legitimacy. On one hand to make sure that users feel like they can use the products there needs to be seamless interfaces that are easy to understand. All of the developers mentioned how being able to provide their products to as wide an audience as possible is crucial, hence making it easy to use. Developer A said “Improve user interfaces and streamline onboarding processes to make DeFi platforms more accessible to non-technical users.” while Developer B mentioned “Focus on usability and user-centric design to create more intuitive and user-friendly platforms.” and Developer E

said “Offer a wide range of financial products and services that target the diverse needs of users while maintaining strong community involvement and decentralised governance.”.

Another factor within the technical aspects of building legitimacy is security. The developers presented several ideas on what needs to be done security wise to increase trust. Developer A mentioned it in the following quote “Emphasise thorough security audits and the adoption of industry best practices to minimise vulnerabilities and build trust over time.” and Developer E mentioned that conducting security audits and working proactively is something that is a necessity to create trust by having security measures in place.

The developers mentioned that DeFi could be used to mitigate real world problems as a way to display new potential users that DeFi is something that is needed. The quote from Developer C “Focus on developing DeFi solutions that address tangible real-world problems, demonstrating the value of the technology.” show that the focus of DeFi products should target specific real world problems. This is also something that Developer D said related to “Security and Trust” first order code, “Forge partnerships with industries outside of finance, such as gaming or content creation, to showcase the versatility of DeFi technology.”, which does not mention anything about security but rather about how they would build legitimacy and trust.

4.1.3. Collaboration between stakeholders

This overarching theme consists of two sub-themes regarding collaboration. The two main areas of collaboration are presented with one sub-theme each, starting with general collaboration in the adoption of DeFi. The second sub-theme covers collaboration in the regulation process.

Collaboration can facilitate an easier adoption process

This theme consists of three codes which focus on the collaboration between the different stakeholders, such as banks, regulators and DeFi projects developers. Bankers spoke a lot about the importance of collaborations between the two to facilitate an easier adoption process. For example, a quote by Banker B was “Traditional financial institutions should recognize the potential benefits of embracing and integrating DeFi solutions”. Several other quotes in the same first order code by bankers indicate that many of them recognized the benefit in acting proactively. This approach is seen as a way to control the outcomes easier as opposed to working against technological development.

The developers also spoke about collaboration, but not mainly with banks. Instead, the results indicate that developers saw the need for collaborations with users and regulators. Developer B stated the potential of collaborating with banks, illustrated with the following quote “Seek partnerships with established financial institutions to bridge the gap between DeFi and traditional finance”.

Regulation is difficult and requires coordination (between countries)

The third theme is an extension of the previous theme regarding collaboration, but emphasises the regulatory challenges present in the DeFi industry. The theme consists of four first order codes, most of them based on thoughts by regulators, but also users and developers. The codes describe two main difficulties in terms of regulation, firstly the difficulty of implementation and compliance as described by code “Regulatory Challenges” and “Challenges of DeFi products”. These codes are based on the regulators point of view, supported by the following quote by Regulator A, "Implementing regulations in practice and making sure they are enforced. Many users are still anonymous when using DeFi products".

Regulator B highlighted the need for coordinating regulations across many countries through the following quote "Disparities in regulatory approaches across jurisdictions could result in regulatory arbitrage and create an uneven playing field, potentially undermining the effectiveness of regulations".

The codes by users and developers mainly presented concerns in terms of regulations that would limit their use of DeFi, such as the code “Impact of Regulation on DeFi from an user perspective". The code was constructed by several user quotes, where the majority of users answered similarly to User F which stated “Create supportive and clear regulations that facilitate innovation while ensuring user protection”. Meanwhile, there is some variation in the code, illustrated by User D in the following quote “I don't think regulations would be great for DeFi, it contradicts the decentralised aspect of it.”. This may indicate that the majority of users would be open to certain regulations but that there needs to be a balance with the current upside of freedom.

It can be seen in code “Collaboration with Regulators” that the developers of DeFi platforms generally have a positive attitude towards collaborating with regulators, as long as the regulations are supportive of the DeFi industry. Developer E summarised this with the following quote “Collaborate with regulators to establish clear guidelines that protect users and support innovation within the DeFi ecosystem”.

5. Analysis

The following section contains an analysis of the results presented in the previous chapter. The analysis will be presented in a similar structure as seen in the thematic analysis, highlighting and emphasising the most important findings in this report and explaining their relation to current literature.

5.1. The DeFi industry as a part of economic evolution

By assuming a broader perspective of the development within the economy and the financial industry, DeFi can be seen as a part of a larger scale of economic evolution. At a broad scale, it can be seen that DeFi likely is at an early stage in its lifecycle. When analysing the current market state of DeFi and the results from the interviews performed, it is likely that DeFi is currently between the first and second adoption process presented by Rogers (2003). There are three overarching themes within DeFi currently, which likely are the most important to understand to also understand the current barriers to further adoption. The themes will be presented one by one, starting with the potential in the DeFi technology and specific DeFi products.

5.1.1. DeFi potential and specific products

Looking back at the first theme the bankers and regulators both agree that the DeFi technology is something that will be important for the transformation of the finance industry. The main reasoning behind this is the potential DeFi has in terms of efficiency and transparency. Although DeFi has a lot of potential it also contains uncertainty. The uncertainty in the market environment is an important factor that needs to be managed efficiently when approaching innovations, as described by Nelson & Winter (1982). The core reason behind the uncertainty that DeFi creates is likely due to the newness of the technology itself, which enables innovations and products to be created and developed at a rapid speed.

Bankers recognize the benefits with DeFi technology and acknowledge that DeFi could be used to facilitate development within the finance industry but are unsure of which products are the superior. Since the banks and regulators are uncertain what DeFi products to focus on, one approach could be to ask the users. However, results indicate that there is no consensus among users in terms of what products they believe is superior within the DeFi technology. This might be because of the rapid development within the DeFi industry, or due to insufficient resources among stakeholders to properly identify the best opportunities. This could further be argued with the reasoning that the consumers might not know which product is better than the other due to insufficient information and therefore are not using all the products either and rather stand at the sidelines (Antioco & Kleijnen, 2010). Furthermore, the lack of information could be due to the fact that it is either too complicated, not enough information or that the user is too lazy to try to find the best possible options. This could also be argued to happen when a user wants to pick between DeFi services and traditional

services. With the high uncertainty and struggle to find the right information the user might make suboptimal decisions (Antioco & Kleijnen, 2010). As an extension of this, banks are uncertain where to allocate resources within the DeFi industry to gain knowledge to see what works and what does not. Based on Humphrey (2010) this uncertainty is important for banks to manage when entering the DeFi market currently. In the second stage of the incumbent legitimator logic, selecting products and starting to focus on creating an offer that adds value to the end consumer is very important before moving to the next step (Humphrey, 2010). The developers or banks would have to find a product that is best suited for the target audience to make it attractive to use DeFi products.

Based on March (1991) one approach the banks could take in this scenario is to focus on exploring different opportunities, rather than exploiting their current systems. By exploring opportunities through various search initiatives, they could potentially obtain a better idea of what products have a clear potential and then invest more into those and apply a planned learning strategy, where they aim to identify which resources and capabilities that must be developed in the coming years (March, 1991; Ahuja & Katila, 2004). Furthermore, this reasoning is strengthened by findings within contingency, which imply that organisations that are prepared for potential changes in their market environment increase their dynamic capabilities (Donaldson, 1987). This is a core strength when the future development is uncertain as the results indicate in the DeFi industry (Donaldson, 1987). However, as with any strategic initiative, it is important to balance exploiting the current opportunities alongside exploring future opportunities (March, 1991).

A more passive strategic approach that could be utilised by the banks is to observe how other banks are implementing DeFi into their organisation. After seeing how the product is received within the market, the bank may be able to make a more well grounded decision. This could be an efficient adaptation process since the frameworks as to how DeFi would be utilised in established products would likely become more clear. This strategic approach implies that at least one competitor has explored and come to a conclusion on what is better. One thing to keep in mind is that imitating other banks to perfection is very hard and is also not the best practice to adapt DeFi as the own organisation still has to focus on exploring on its own to find gaps and be able to imitate properly (Posen & Martignoni, 2018; Walter et al., 2016). Furthermore, imitation can be important for the transformation of the financial industry as if one succeeds the rest will follow to not end up behind. When taking the passive approach, Cyert & March (1963) indicate that decision making speed must be as efficient as possible with the goal to reduce the time from decision until an imitation is implemented. This is likely more important for banks when adapting DeFi, since findings indicate that the DeFi industry develops much quicker than the traditional finance industry.

When specific products are discussed, it is clear that the pattern of uncertainty continues among all stakeholder groups. This raises the question of whether the current DeFi products have the potential to be disruptive, and if so, which products possess the largest potential.

According to Christensen & Bower (1996), the product would need to target non consumers or low end users, the least profitable part of the market, and develop technical superiority from there to take on the larger market to classify as a disruptive innovation. This could potentially be a future scenario within DeFi in some areas, but would likely depend on several factors. On one hand, results indicate that DeFi has the potential to both increase financial inclusion and lower transaction costs to target the nonconsumers or low end users areas in the market. In combination, these factors could create an opportunity for DeFi projects to capitalise and offer a product that would be both cheaper for the end user and more efficient than what is currently offered from traditional banks. In practice, this might be applicable for transactions across borders and in countries where the population is not yet widely connected to the traditional financial system. Such a scenario would follow the framework presented by Christensen & Bower (1996) and could result in a disruptive scenario where DeFi directly competes with the banks in traditional finance.

What contradicts a scenario where DeFi disrupts the traditional finance industry is if the banks act early and use their resources to influence future development, both in technical and social terms, as reasoned by Humphreys (2010). The results in this report indicate that banks are open to DeFi which can be seen as a positive factor that contributes to increased agility and dynamic capability within the firm (Walter et al., 2016). This raises the question if DeFi truly is disruptive or an incremental innovation, which is difficult to know at this stage. The development within the sector is closely followed and acknowledged by both regulators and banks, which indicates that it will not surprise them in the future. However, knowing when to take actions will remain difficult and according to theories requires many internal factors in place to be implemented efficiently. These internal factors include efficient communication across hierarchies, an humbleness in the capabilities available in the current technology and a critical mindset to name a few (Joseph & Ocasio, 2012; Doz, 1996). Another approach that banks can do to stay in control in the unpredictable future within DeFi could be to utilise a similar approach to imitation which was discussed earlier. Banks could imitate successful DEX platforms as a way to diversify their offerings and build upon that to continue evolving alongside the technological developments in a similar manner as proposed by Posen & Martignoni (2018).

5.1.2. Building legitimacy for DeFi adoption

The second overarching pattern that can be seen in the results is related to the importance of building legitimacy to facilitate adoption, which aligns with the ideas by Schumpeter (1942) of viewing innovation from a holistic perspective and not only as an isolated product. As stated in the previous chapter, traditional financial institutions have a strong position which can be used to influence the development of the DeFi industry and shape its future if the products that are intended to be implemented are well thought out (Humphreys, 2010). Meanwhile, the findings in this report indicate that banks are in need of regulations before adapting the DeFi technology and start implementing it into their offerings. Users and developers have similar perspectives, stating that getting regulations in place will be a key in

order for DeFi to reach mass adoption. This creates a situation where regulators likely need to initiate the process by regulating DeFi to provide a framework for banks to enable adaptation.

The largest part of creating legitimacy in a mass market environment that was found in the results is related to regulators providing guidelines. Meanwhile, the results show that the regulators face a large uncertainty when creating regulations. The main risks include over regulating, user anonymity, compliance related rules such as know-your-customer and anti-money laundering are challenges that need to be addressed. While regulators are holding off from regulating DeFi, the stakeholders agree that there needs to be some sort of regulation, but their ideas differ in terms of how far the regulations should extend. Achieving this balance between clear regulations and keeping freedom in the DeFi industry is difficult and would require a lot of information which regulators currently do not possess. With the high uncertainty they might wait with legislation or try to regulate which likely is very difficult. Creating regulations based on vague or non-existing data may result in inaccurate regulations, just like when users want to decide on what product they want to purchase without having all information available (Antioco & Kleijnen, 2010). Nonetheless there needs to be a balance for the regulation. If the lawmakers have a goal to create a safe space for users to transact they might on one hand neglect that the space gets over regulated. Overregulations could prevent future innovation and harm the development of new products which would undermine the DeFi industry. On the other hand, under-regulating may not achieve the desired legitimacy effect either because there could be loopholes and/or other ways for individuals and organisations to bypass the regulatory guidelines. This would not help the users nor make them more secure. In a perfect scenario, the regulations are sufficient enough to ensure user safety and enable compliance with current know-your-customer and anti-money laundering standards. This would likely enable both new users and banks to adopt the technology and drive further adoption. As of now, the implementation of know-your-customer is still a hindrance as users can be anonymous on the blockchain, but there might be a middle ground solution to it which is already used by most centralised exchanges, where users need to identify with ID.

Once regulations are in place it can be argued that it will create a sense of institutional pressure (Haveman & Rao, 1997). The legislation will likely push financial institutions to adapt DeFi technology to stay relevant (Haveman & Rao, 1997). With this in consideration it is arguably only possible if the laws in place make it more attractive for banks and other actors to use the services. Another argument could be that the regulations may not force the banks and financial institutions to adapt the technology, but it still gives them the possibility to use parts of it if they choose to.

In the discussed scenario where regulators serve as a catalyst by providing guidelines and a framework for DeFi adoption is likely the most feasible, as most stakeholders think that there is a need for it. However, a contradicting scenario might be possible if developers, bankers and users all collaborate in adopting DeFi. This approach would possibly be closely related to

the co-creator logic presented by Callon (1984). Such collaboration would require relatively extensive efforts from all stakeholders and require a collected vision to be feasible. If the market is in a normal state, stakeholders have to balance their uniqueness with being similar to its competitors (Deephouse, 1999). If a bank deviates too much from the traditional image consumers have of a bank, Deephouse (1999) suggests that it could result in legitimacy issues. A potential scenario that might enable such collaboration might be if the traditional financial market is faced with a radical catalyst as suggested by Venkatraman (1989). To exemplify, a possible catalyst could be that the infrastructure of a huge credit card provider is compromised. Such a scenario could possibly force the need for collaboration, in which DeFi could be a solution. If such collaboration took place, it would in turn pressure regulators to become involved in the DeFi sector and provide future guidelines.

Another aspect of building legitimacy, apart from regulators providing clear guidelines, is the social aspect of adoption. Rogers (2003) illustrates the exponential increase in adoption that takes place after a technology has reached a certain point, which can be explained partly by the factor of social legitimacy. Users tend to trust their close friends and depending on how well connected someone is socially, they will be exposed to new technologies at different rates (Rogers, 2003). Each “level” of adoption generally has different user requirements, which needs to be facilitated to increase adoption. However, even though users trust other users, there might be factors that block further adoption, such as lack of regulation or technical aspects, which was indicated in the result section. According to Humphrey (2010), such lack in the technological aspect of the product itself, would indicate that the second stage of the incumbent legitimator logic is not fulfilled. These issues would likely need to be resolved before moving on to the third stage of legitimacy building.

However, if the stakeholders have narrowed down their focus to fewer concrete products with clear benefits in place, the situation changes. As described by the third stage of the incumbent legitimator logic, the developers and banks would be given more possibilities, and could focus on building coalitions and trust to create legitimacy from the users and regulatory perspectives (Humphrey, 2010). Based on the results, there should be many opportunities available among the wide range of DeFi products, therefore this stage would likely be solved relatively easily if focused by the incumbents. The responses by banks contradict this theory, since they wish regulations to be enforced before approaching the DeFi sector. However, from the perspective of an incumbent developer, this approach might be feasible. A large actor within the DeFi industry that is able to develop a strong product offering and attract many users would likely be able to capture the attention of regulators. This could lead to an acknowledgement by regulators, which could increase legitimacy and the implementation of the needed regulations in the future.

From the perspective of a developer, it is clear that they recognize the importance of their role within the overall evolution and adoption of DeFi. They state three main factors which they focus on to create legitimacy for their offerings, being user experience, security and real

world applicability. Firstly, it can be seen that developers place a large emphasis on the user experience, which aligns with the characteristics described by Rogers (2003) and Humphrey (2010). The earliest users tend to see the potential in an innovation and be more forgiving in terms of the ease of use, whereas users that adapt later in the life cycle are not (Rogers, 2003). In the case of DeFi, it is reasonable to believe since the underlying technology is still new and difficult to understand for non-technical users, the presentation and how end users interact with products become increasingly important since the first experience tends to shape our ideas to a phenomenon (Denrell & March, 2021). Secondly, developers state that security is very important to build legitimacy. This is not surprising, since many users store a lot of value in the systems controlled by the developers. If there is a security breach which affects the users funds, it will be difficult to regain trust in the future thus impacting the overall adoption negatively. By creating DeFi products that are secure and easy to use, developers can provide a solid platform to facilitate growth from a technical standpoint. The third and last factor which was discussed by developers is interesting from an theoretical perspective. Developers suggest that by using their skills and capabilities to solve real world issues could be an approach to build legitimacy and adaptation towards DeFi among the general public. By finding areas where DeFi accurately and efficiently can solve issues in a way that outcompetes traditional offerings, developers may be able to create a competitive pressure on both banks and indirectly users which can force adaptation (Haveman & Rao, 1997). However, it needs to be noted that this perspective is only presented as a solution by the developers themselves, which may indicate that regulators and bankers do not view this approach as impactful enough on its own to spark mass adoption.

Regardless if institutions initiate the legislation process by creating frameworks or if a widespread collaboration takes place which increases the adoption rate of DeFi as discussed above, it is likely that the stakeholders will have a continuous interplay in the future. New technologies and markets have been created many times throughout history, and are a natural part of economic evolution. Based on established theories, it is very likely that regardless of what the initial adoption and legislations look like, they will co-evolve in the future (Durand, 2001). It is not a one sided relationship, but rather an evolutionary process which changes over time.

Based on the large uncertainties, both from a technical and legal perspective, the development of DeFi technology may seem difficult to understand. By analysing the current state of the adoption through an economic evolution framework, the situation can be clarified. The uncertainty is likely a problem for the market to adapt DeFi at a macro scale as of 2023 (Nelson & Winter, 1982; Alchian, 1950). As an extension of this, it is difficult for organisations to maximise the potential in the DeFi technology and a more reasonable target should be to utilise it to the best extent based on the other capabilities and products available within the organisation (Nelson & Winter, 1982; Alchian, 1950).

5.1.3. Collaboration between stakeholders

The third overarching theme was found in several aspects within the first order codes, and discusses the importance of collaboration between stakeholders when adopting DeFi. The theme includes two main areas where collaboration will be important, being the regulation process and the adoption and between stakeholders in the adaptation process itself.

There are several scenarios where one or several stakeholders could work together to create legitimacy and build adoption in the market. One collaboration possibility could be the previously mentioned co-creator logic, a combination where several market stakeholders together form a coalition to adopt the market to DeFi (Callon, 1984). This can for instance be done by developers who want to provide a certain product to users with some help from the banks. Later on in the process they would work together to push it to the bank's customers as well and eventually work with regulators to adapt the broader DeFi products to a mass market.

Another possibility could be the combination of consumer activist logic, where the consumer escalates to get the market to change, and incumbent legitimator logic, where the incumbent uses their power to push adoption (Giesler, 2008; Humphreys, 2010). The users could for instance want a product that is either ignored by the traditional bank or could be unable to provide due to regulatory complexities. If users and developers have a strong collaboration, a developer could seize the possibility to create the desired product for the user to fill that gap. A practical example from the results is that developers mention how they prioritise user friendliness when upgrading their platforms. This process benefits greatly from a strong collaboration process between the developers and their users. It enables the developers to ask users for feedback and use them as a focus group, as the users are very keen on getting easier to understand platforms. This would both benefit the current users and future users by making the platform more intuitive. The product could then in the next wave get more recognition from incumbent banks where they work together with the developers to implement it into the traditional system to get an edge on the competition as well as build regulatory legitimacy. Once this has been accomplished with a wider network of institutional relations as well as having regulatory legitimacy, it will be more likely that DeFi products will get adopted by the masses.

The results indicate that banks want to collaborate with developers, but the developers do not mention anything regarding a possible collaboration. Overall, this openness displayed by the banks indicates an increased adaptability towards DeFi (Barr et al., 1992). As the incumbent legitimator logic describes it is necessary that the incumbent first builds legitimacy themselves before creating a network to get institutional recognition (Humphreys, 2010). If the incumbent is a bank, it is reasonable to argue that banks need to be the one that approaches the developers to initiate these collaborations, since the developers would likely have a hard time getting in touch with strategic managers within the bank. On the other hand,

an incumbent developer with an existing and competitive offering in the market could likely get in touch with banks to build relationships (Haveman & Rao, 1997).

The second part of the overarching collaboration theme is in regard to the role of the regulators. Regulators will need to be collaborative in two main directions, firstly with other regulators across borders and secondly with stakeholders in the DeFi industry. The first collaboration channel is necessary based on the results, which indicate that cross border collaborations are necessary. This is based on the fact that the DeFi industry is digital and not tied to geographical borders. If there is no collaborative effort between countries in DeFi regulations, there is a risk that regulations across jurisdictions become inconsistent, which then can be abused to avoid the regulations. To facilitate this collaboration process, similar internal necessities are emphasised as when banks study and adapt DeFi. To be an efficient regulator in the quickly developing DeFi industry, it will be important to stay up to date on the latest developments since it is a fast moving market. A practical problem in relation to this is the lead times of getting new legislations in place currently. The process requires a lengthy amount of time inside countries already, and having legislations coordinated across borders will most likely take even more time as all countries have to agree. This creates a disparity to the speed of DeFi as DeFi evolves in a speedy manner. This could make it as a new product is released bypasses most laws or other gaps in the regulations can be abused for several years before legislation acknowledges it. Some factors to enable such collaborations can be to maintain a strong internal communication and a critical mindset throughout all hierarchies in the organisation (Joseph & Ocasio, 2012). In addition to internal communication, results highlight the importance of collaborations across borders with other regulators as discussed above, which creates another communication channel which must be effectively managed by regulators. It is difficult to know for sure if these factors are enough to solve the need for coordination within the regulation process or if more measures will be needed. This will be expanded upon as a suggestion of further research in the next chapter.

The second collaboration channel that must be focused by the regulators is towards the leading actors in the DeFi industry, which mainly consists of developers currently. Results indicate that developers are positive towards regulations in the future, but that they must be done in moderation to not inhibit the innovative environment in the market. Regulators must be careful and strive towards creating regulations that balance the needs between all actors in the market. This would likely lead to a much easier implementation and compliance in the future, as opposed to creating rules without collaboration with the actors that already know the DeFi industry very well. Similarly, to how banks can utilise contingency as a tool to increase adaptability, regulators can take a similar approach. If regulators for some reason prefers to stay passive currently to see how DeFi develops in the short term, initiating collaboration efforts with developers can help them be more dynamic when they find its time to implement regulations (Donaldson, 1987). Based on the scenario where the regulators initiate regulations, the main collaboration channels between all stakeholders are illustrated in Figure 5.

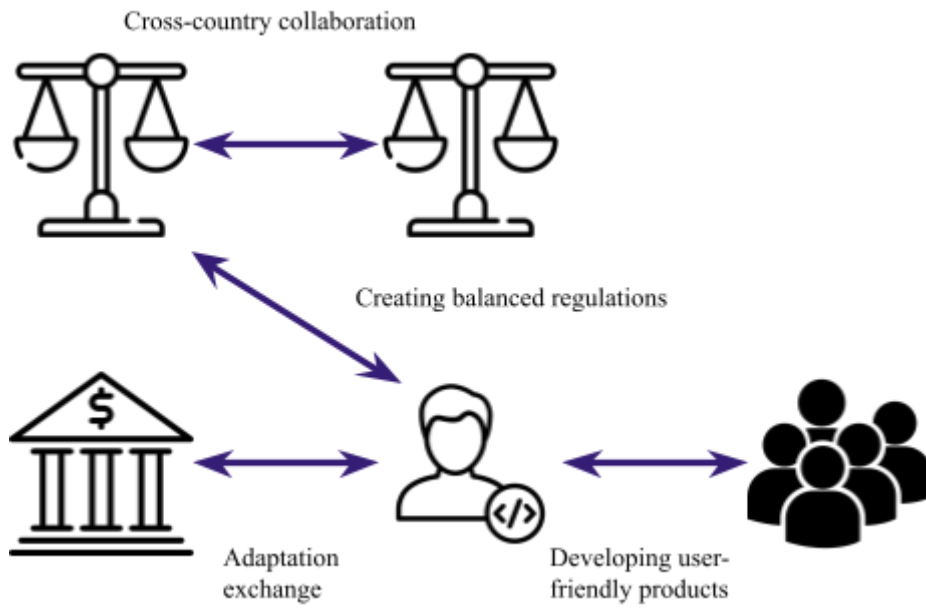


Figure 5: Visual presentation of collaboration map between stakeholders

6. Conclusion

To conclude the most important highlights of this paper, it can firstly be seen that the stakeholders agree on the fact that the DeFi technology has a potential to transform the current financial system. The reasoning behind this is that the underlying blockchain technology can be an efficient way to build products within DeFi. Stakeholders are still uncertain exactly how to approach implementation and what specific products within DeFi that have the largest possibilities. This uncertainty could be based on several aspects as discussed in the analysis, for example there is no specific product currently that stands out more than another. Theories conclude that when moving forward in the adoption process, stakeholders likely need to make up their mind on what products they want to focus on to develop efficient offerings to compete in the market.

The results indicate that there is a prevailing uncertainty among stakeholders regarding how DeFi will develop in the future and the products that will be built on the technology. Banks can take two main approaches to manage this uncertainty, either an active or a passive approach. The active strategy to approaching DeFi is to explore products and collaborations, which likely will increase their organisational contingency and increase their adaptability in the future. The downside to this is that there is no guarantee that the search and exploration objectives will result in any direct implementation that can generate revenue straight away. The passive strategy for banks to handle DeFi is to stay on the sidelines and wait until there are proven examples among competitors that have successfully adopted DeFi. This would reduce the uncertainty in future adoption, but theories suggest that imitation is difficult, which may result in an imperfect imitation based on lacking resources or capabilities.

Expanding upon the importance of the technology itself, it can be concluded that developers and actors in the DeFi industry must design and build their products in a way that is appealing to a broad user base. This includes a wide range of factors, such as user interfaces, educating users about functions and making sure that their platforms are secure and reliable to ensure smooth operation. Once these criteria are met, the products themselves are likely ready to be adopted on a broader scale. Following this, regulations can be implemented which is the next large hindering factor in the adoption process.

All stakeholders agree that implementing some regulation would have a positive effect on the adoption of DeFi, but regulators need to be careful when building legislations to ensure that there is a balance between innovation and legislations. From the economic evolution perspective, getting regulations in place would likely be the next large milestone in DeFi adoption. The report identifies two main scenarios regarding the inception of DeFi regulation. The first option is that regulators take a first step by collaborating with both other regulators in other countries as well as with incumbent developers in the DeFi space. The second option is that developer incumbents use their influence and develop a product that attracts many users, which would allow them to start a discussion with regulators on their own. Another

similar approach is that stakeholders collaborate to build DeFi products which can be socially legitimised and thus pressure regulators to create frameworks and guidelines for the DeFi industry. However, results indicate that banks are likely not willing to take this approach unless there are regulations in place beforehand. Based on this, either incumbent developers within DeFi or regulators themselves will likely have the most important positions in this process currently. Regardless of which stakeholder initiates the process of creating regulations, the stakeholders will very likely co-evolve in the future as the adoption increases.

Once there are regulations in place, the banks will have more freedom to adapt DeFi technology and implement it into their current offerings. This would likely be a large catalyst in adoption, since if one bank successfully implements DeFi products, competitors would try to imitate to stay competitive. This could result in an imitation arms race where banks continually increase their DeFi products, causing more users to adopt the technology over time. Users that currently view DeFi as something suspicious and full of scams could likely be future consumers if there are regulations in place and banks offering the services, since they could likely provide an ensuring effect to suspicious users.

To enable the process of adoption and creation of regulations, the main tool that needs to be developed among the stakeholders is identified as collaboration. Regulators state the importance of collaboration when creating legislation, since inconsistent regulations across borders could impact enforcement negatively. Furthermore, regulators will need to collaborate with current developers in the DeFi industry to ensure the required balance between regulation and innovation in the sector as mentioned earlier. Likewise, in the adoption and implementation process itself, collaboration will be very important across all stakeholders. Developers and banks can collaborate to efficiently develop and reach a broad group of consumers. Developers and users can collaborate to build better products and increase user friendliness. Regulators must oversee the evolution and use their influence to protect users.

6.1. Answering the research questions and implications

In the following section, the research questions will be concluded and answered based on the findings in the report in chronological order.

6.1.1. What are the current key challenges in the adoption process of DeFi?

To recap the first research question of this paper, “What are the current key challenges in the adoption process of DeFi?” results show that the current are two key challenges in the adoption process. The first one being tied to the regulatory uncertainty associated with DeFi products and their development. This affects the possibilities that banks have to adopt the technology into their current offerings. Additionally, this affects the legitimacy among non-users negatively which may be a reason they refrain from adopting DeFi. The second one is related to the technical aspects of DeFi. There is a need for improvements for the user

security, interfaces as well as education. Another key challenge related to is the uncertainty of which products have the best potential to compete on the market.

6.1.2. In what ways do these key challenges affect the adoption of different stakeholders (bankers, users, developers, and regulators) and development of the DeFi technology?

The second research question “In what ways do these key challenges affect the adoption of different stakeholders (bankers, users, developers, and regulators) and development of the DeFi technology?” ties in to the first, but focuses on how the challenges identified in the first question affects the different stakeholder groups.

The challenges affect the different stakeholders differently. Banks are affected by the lack of regulations since this hinders their possibilities to adopt the technology even if they see a strong potential in certain products. The technical uncertainty combined with the large perceived potential of DeFi in the future raises a need to strategize regarding how the organisation should approach DeFi.

For users the key challenges are the lack of security, user-friendly interfaces, education related to the products, and regulatory frameworks that protect the users. These challenges are likely holding a lot of users back from using DeFi products and also affecting the adoption process.

The key challenges for developers are the uncertainty regarding the future development of DeFi products and the need for improved systems and education. The focus on improving the products to make them more user-friendly and how to educate users can hinder developers from making better products as they are stuck on improving the ones they have already created.

From a regulation perspective, the key challenges cause a lot of uncertainty which must be worked around in some way. There is a demand for regulations that balance innovation and user security, which is difficult for regulators to achieve. Furthermore, there is a need for regulators to collaborate internationally to not create inconsistent regulations which can be used to mitigate legislation.

6.1.3. What are the potential strategies or solutions that can be employed by each stakeholder group to address the key challenges in the DeFi adoption process?

The last research question, “What are the potential strategies or solutions that can be employed by each stakeholder group to address the key challenges in the DeFi adoption process?”, builds further upon the previous questions by suggesting how each specific

stakeholder group can manage their main barriers. At a larger scale, these solutions could help the economic evolution within DeFi.

It can be seen that banks are faced with two main strategies to manage the uncertainty in technological development and the current lack of regulation. They could either utilise a proactive approach by exploring options, or a more passive approach which tries to imitate competitors when there is a proof that their implementation works.

For users it would be more likely that they adopt DeFi once regulations are in place or if it has become a safer industry to act within. Additionally, once banks start to offer services with DeFi they might be more keen to adopt. Active users could communicate their demand to both developers and bankers to encourage these stakeholders to focus on DeFi products.

For the DeFi developers to overcome their key challenges they must collaborate with the other stakeholders. By having a clear communication with both regulators and banks they can build legitimacy while having an open conversation with their users helps them improve their products and create security and education.

Regulators need to collaborate with stakeholders in the DeFi industry to ensure that the regulations balance innovation and security. By actively communicating with the developers they could track how the regulations are affecting the market. Furthermore, to reduce the risk of inconsistent regulations across borders the regulators need to communicate and coordinate with other regulators in other countries.

Overall, it is likely to be an evolutionary process among all stakeholder groups which shapes the DeFi adoption over time. Therefore, there will be a consistent need for collaboration among stakeholders active in the industry to ensure that regulations, adoption and focus areas change according to the current adoption in the market.

6.2. Future research

The theories utilised in this study have been constructed around older technological principles and frameworks. As such, there is a necessity for these theories to evolve and adapt to align with the ever-evolving technological landscape to keep its relevance. Nonetheless there are still some potential areas where future research opportunities could be focused.

This study provided an in-depth analysis of the key challenges to adoption of DeFi while also taking different stakeholders perspectives into account. One of the findings is that there is a great need of building legitimacy to facilitate the adoption of DeFi in the traditional finance industry, as well as the requirement for regulations. While the findings of this research paper contribute to a better understanding of DeFi, some areas require future investigation to both enhance knowledge and explore new elements of the fast developing industry.

The first potential direction for future research could be to conduct empirical studies and case analyses on specific DeFi developers, such as, projects, platforms, or products. These studies could potentially create a better understanding and show evidence of how real-life situations support the theoretical discussions presented in this paper. Investigating their key success factors, challenges and strategies used could potentially give valuable insight for both academics and practitioners interested in developing or implementing different DeFi solutions.

Another potential direction for future research could be to explore the role of collaborations between the different stakeholders, including banks, regulators, users, and developers. How these collaborative efforts may or may not accelerate the adoption of DeFi technology and the potential benefits and challenges in doing so. Furthermore, the investigation would be to try to find the most effective ways to foster collaborations, sharing knowledge, and developing joint ventures to help stakeholders navigate through the DeFi landscape.

As mentioned, this study highlights the need for regulations and clear guidelines to build legitimacy and facilitate DeFi adoption. Future research could investigate different regulatory approaches on DeFi and how it would impact the adoption and growth of DeFi. This could be done by analysing the results of different regulatory frameworks as this could give valuable insights for policymakers as well as other stakeholders to more easily get involved in the development of DeFi regulations. In addition to this, the study found that there is a need for collaboration among regulators to avoid geographical differences in legislation. There is further research needed to understand how this efficiently can be managed in practice, and how to reduce the time it takes to create new legislation to keep up with the DeFi market which is moving very quickly.

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X. Appendices

X.I. Interview Guide

Intro, experience & background knowledge:

General introduction by the interviewers before starting:

Research aim: Explore the barriers to DeFi adoption.

Interview objective: Is to focus on understanding what important key factors are to launch a NFT project on a blockchain.

Remarks: Express respect and thankfulness to the participants for participating and address any confidentiality issues and refer to the ethical rules of the Business School of Gothenburg.

1. Who are you, can you describe what you do?
2. Can you describe your experience and understanding of blockchain and DeFi?
3. Please describe any experiences you've had with implementing or using DeFi technology?

Opportunities

4. What do you believe are the main benefits with DeFi?
5. In your opinion, what are some advantages of using DeFi compared to traditional financial systems?

Barriers

6. Do you see any barriers with DeFi adoption?
7. What do you think needs to be done to increase adoption of DeFi technology among different stakeholders?
8. How do you think the regulatory landscape will impact the future of DeFi?
9. How do you think limited regulations might affect the DeFi development and adoption?
10. In your opinion, what role could traditional financial institutions play in DeFi?
11. How do you see the role of decentralised exchanges evolving in the DeFi space?

X.II. Thematic analysis: First order codes and supporting quotes for users

Codes	User A	User B	User C	User D	User E	User F	User G	User H	User I
User benefits of DeFi	"Higher interest rates, lower fees, more control, and easier access to financial services."	"High returns compared to the stock market."	"Increased accessibility, better interest rates, lower fees, and greater control over one's financial assets."	"More accessible financial services, lower fees, higher returns, and increased control over assets."	"Greater accessibility, better interest rates, lower fees, and more control over financial assets."	"Transparency on the blockchain and the high security."	"Better interest rates, lower fees, increased accessibility, and more control over one's financial assets."	"Improved accessibility, lower fees, higher returns, and more control over financial assets."	"Increased accessibility and lower fees"
Barriers to DeFi Adoption	"Unsatisfactory regulatory oversight, high learning curve, and security concerns."	"Overregulations and not enough regulations, potential for scams and rugs, and user experience."	"The absence of regulation, risk of scams, and steep learning curve."	"Creating trust, many projects have anonymous founders."	"The absence of rule makers, the high risks for fraud, and user experience."	"The unregulated environment, high learning curve, and security concerns."	"The absence of regulation, risk of scams, and complexity for users"	"The lack of regulation, potential for fraud, and steep learning curve."	"Risk of rugs, potential crimes and user experience."
Impact of Regulation on DeFi from an user perspective	"Clear, supportive regulations can help build trust, increase adoption, and foster innovation."	"The regulatory landscape will undoubtedly impact the future of DeFi."	"Well-thought-out regulations can provide and security for users and potentially prevent scams."	"I don't think regulations would be great for DeFi, it contradicts the decentralised aspect of it."	"Could be good but there needs to be a balance between freedom and security for users."	"Create supportive and clear regulations that facilitate innovation while ensuring user protection."	"Establish a regulatory environment that balances innovation, consumer protection, and market stability."	"Develop balanced regulations that encourage DeFi innovation while protecting users and maintaining market stability."	"Regulations could easily go overboard which would ruin many functions."
DeFi Products with Largest Benefits	"I personally like yield farming."	"Decentralised lending and borrowing platforms and AMM protocols."	"Decentralised exchanges and staking."	"I believe stablecoins have a great potential."	-	"Probably P2P lending or stablecoins."	"DeFi lending platforms, DEXs, and yield farming."	-	"Initially stablecoins, later on stuff like lending and borrowing."

X.III. Thematic analysis: First order codes and supporting quotes for developers

Codes	Developer A	Developer B	Developer C	Developer D	Developer E
Education and Awareness	"Create educational materials and resources to raise awareness about DeFi and its benefits."	"Develop marketing campaigns that target specific demographics, highlighting the benefits of DeFi for their unique needs."	"Promote financial literacy and DeFi education to help people understand the technology and its potential benefits."	"Leverage gamification techniques to make DeFi more engaging and approachable for new users."	"Focus on easy-to-understand educational content that demystifies DeFi concepts and strategies."
User Experience	"Improve user interfaces and streamline onboarding processes to make DeFi platforms more accessible to non-technical users."	"Focus on usability and user-centric design to create more intuitive and user-friendly platforms."	"Develop DeFi platforms that cater to the specific needs and challenges faced by communities in different regions."	"Design DeFi platforms with simple, intuitive interfaces that are targeted to users with varying levels of technical expertise."	"Offer a wide range of financial products and services that target the diverse needs of users while maintaining strong community involvement and decentralised governance."
Collaboration with Regulators	"Engage with regulators to develop clear and supportive regulatory frameworks for DeFi."	"Seek partnerships with established financial institutions to bridge the gap between DeFi and traditional finance."	"Establish industry standards and best practices to enhance trust in DeFi platforms and their underlying technologies."	"Encourage user participation in the development and governance of DeFi platforms to create a sense of ownership and trust."	"Collaborate with regulators to establish clear guidelines that protect users and support innovation within the DeFi ecosystem."
Security and Trust	"Emphasise thorough security audits and the adoption of industry best practices to minimise vulnerabilities and build trust over time."	"Offer incentives for users to join and engage with DeFi platforms, such as staking rewards or referral programs."	-	"Forge partnerships with industries outside of finance, such as gaming or content creation, to showcase the versatility of DeFi technology."	"Conduct regular audits, implement multi-signature wallets, and promote best practices to minimise security risks."
Interoperability and Innovation	"Implement and adopt layer 2 solutions or alternative blockchain networks to address scalability challenges and reduce fees."	"Foster collaboration between DeFi projects to improve cross-platform compatibility and seamless integration."	"Focus on developing DeFi solutions that address tangible real-world problems, demonstrating the value of the technology."	"Collaborate with popular apps and platforms to introduce DeFi functionality to a broader audience."	-

X.IV. Thematic analysis: First order codes and supporting quotes for bankers

Codes	Banker A	Banker B	Banker C	Banker D
DeFi as Catalyst for change in traditional finance	"I view DeFi as a catalyst for innovation and change within the financial sector."	"DeFi presents both challenges and opportunities for the traditional finance industry."	"DeFi can be seen as a transformative force within the financial industry rather than an outright threat to traditional finance."	"DeFi can be perceived as both a challenge and an opportunity for the traditional finance industry."
Facilitating change: Collaboration & Integration	"Collaboration between DeFi platforms and traditional financial institutions can lead to a more inclusive and innovative financial ecosystem."	"Traditional financial institutions should recognize the potential benefits of embracing and integrating DeFi solutions."	"By collaborating with DeFi platforms and adopting decentralised solutions, traditional financial institutions can participate in shaping the future of finance."	"By embracing DeFi technologies and integrating them into our product offerings, traditional financial institutions may be able to enhance their services, improve efficiency, and increase their competitiveness."
DEX Evolution & Growth	"As more people become aware of the benefits offered by DEXs, their usage is likely to grow."	"If issues such as liquidity, user experience, and scalability are fixed, they are likely to gain more traction among users."	"If decentralised exchanges are able to continue refining the user experience, enhance liquidity, and improve scalability, they will become more attractive to a wider range of users."	"As DEXs improve liquidity, user experience, and scalability, they are likely to attract a broader user base seeking secure, decentralised trading options."
Most disruptive DeFi Products	"DeFi lending platforms have the greatest potential to disrupt the traditional financial industry."	"Stablecoins have the potential to significantly disrupt the traditional financial industry."	"The decentralised lending and borrowing platforms have the potential to be the most disruptive DeFi product for the traditional financial industry."	"I think decentralised insurance products have the potential to disrupt the traditional financial industry significantly."
Challenges for DeFi Adoption	"One of the main barriers to DeFi adoption is the steep learning curve associated with understanding and using these platforms."	"The lack of regulatory clarity can also act as a barrier to DeFi adoption."	"Lack of user-friendly interfaces and the technical complexities of DeFi platforms can be a hindrance to widespread adoption."	"Security concerns and the potential for exploitation of vulnerabilities in smart contracts can impede the adoption of DeFi."
Opportunities	"DeFi platforms can significantly reduce costs, increase transparency, and promote financial inclusion."	"DeFi can spur innovation within the traditional finance industry and improve financial services."	"By leveraging blockchain technology, DeFi can enable greater financial access, particularly for those who are underbanked or unbanked."	"The growth of DeFi can lead to the development of new and innovative financial products and services."

X.V. Thematic analysis: First order codes and supporting quotes for regulators

Codes	Regulator A	Regulator B	Regulator C
Societal benefits of DeFi	"DeFi is an innovative way of offering financial services and provide users with control over their assets."	"Could potentially enhance current financial services by offering increased accessibility, transparency, and efficiency."	"DeFi can offer increased accessibility, speed and transparency compared to traditional financial systems."
Regulatory Challenges	<p>"Implementing regulations in practice and making sure they are enforced. Many users are still anonymous when using DeFi products."</p> <p>"Inconsistent regulations across jurisdictions could lead to regulatory arbitrage, where businesses choose to operate in jurisdictions with more lenient rules, potentially creating a race to the bottom in terms of consumer protection and financial stability."</p>	"Disparities in regulatory approaches across jurisdictions could result in regulatory arbitrage and create an uneven playing field, potentially undermining the effectiveness of regulations."	<p>"If regulations across different jurisdictions are different it might lead to regulatory inefficiencies, as one country has more relaxed rules than others which could create challenges for businesses operating in multiple regions."</p> <p>"Costly compliance requirements could disproportionately affect smaller players, potentially reducing competition and innovation in the sector."</p>
Adoption of DeFi	"Banks and the financial institutions can help spread information to their customers about DeFi, its potential benefits, and risks, fostering a better understanding and promoting informed decision-making among users. Keep users safe."	"Traditional financial institutions could play a role in its adoption, by ensuring that DeFi platforms adhere to regulatory requirements and consumer protection standards."	"Banks can play a role in teach their customers about DeFi, helping them to better understand its potential benefits and risks. It is important for me that the users are safe."
Potential of DeFi products	<p>"By cutting out intermediaries, these platforms can offer competitive interest rates to both borrowers and lenders."</p> <p>"Decentralised lending can improve market efficiency by connecting borrowers and lenders directly, without the need for traditional financial institutions."</p>	<p>"By providing a stable digital currency, stablecoins can potentially promote financial inclusion for unbanked or underbanked populations."</p> <p>"Stablecoins can facilitate faster and more cost-effective cross-border transactions, benefiting individuals and businesses alike."</p>	"DeFi has the potential to increase financial inclusion in developing countries."

<p>Challenges of DeFi products</p>	<p>"Ensuring compliance with AML and KYC regulations is challenging for decentralised lending platforms." "Assessing the creditworthiness of borrowers in a decentralised environment is generally not possible, thus increasing default risks."</p>	<p>"The use and issuance of stablecoins are subject to increasing regulatory scrutiny, which could impact their development and adoption." "Ensuring that stablecoins are adequately collateralized and maintaining their peg to a stable asset can be challenging in practice."</p>	<p>"Complex and difficult to understand for many users, potentially limiting its adoption."</p>
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