Dimensions, Success Factors and Obstacles of the Adoption of Blockchain Technology

Full Paper

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Abstract

The adoption of new technologies is one of the tasks affecting not only the IT departments but all related business functions. However, the impacts of technologies are different and so are the adoption processes. One of the most relevant technological innovations at present is blockchain. However, unstructured experimentation with the technology, uncoordinated efforts across units or missing understanding of how blockchain connects with the firm's current information systems hinder the adoption of blockchain. Hence, firms need to clearly understand the dimensions of the adoption across the organization and what is decisive within these dimensions. Based on an explorative study with in-depth interviews in nine cases with experts in the field of adopting blockchain technology, we distil seven dimensions of the organizational adoption of blockchain. Furthermore, we analyse the organizational dimensions and, per dimension, derive factors of success or failure of the adoption of blockchain.

Keywords: organizational adoption, blockchain, success factors, obstacles.

1 INTRODUCTION

The potential of blockchain has been widely discussed among scholars and practitioners. Firms are discovering the various opportunities of the technology, which is probably strong enough to disrupt entire industries within coming years. One of these industries is the financial services sector. Among all impacted industries, blockchain might trigger the biggest changes in this sector. The technology is assumed to have a disruptive effect and to be a game-changer here (Holotiuk et al. 2019). However, the potentially disruptive implications of blockchain are well discussed also beyond the financial services sector (Wörner et al. 2016).

Based on its technological specifications blockchain bears huge potential for innovation. "Innovation is considered a source of competitive advantage and economic growth, and worthy of study under the conditions of increased global competition, technological change, fast-changing market situations and continuous customer/client demand for quality services" (Damanpour and Schneider 2006, p. 215). Thompson adds that innovation also covers "the generation, acceptance, and implementation of new ideas, processes, products or services" (Thompson 1965, p. 2). Consequently, we understand the use of blockchain at its current stage as an innovation.

An innovation is considered to be disruptive if it is likely to create new markets or value networks, disrupt existing markets or value networks or replace established firms and products (Bower and Christensen 1995). Hence, in order to maintain their market share and expand their businesses, firms need to adopt blockchain by providing an organizational environment suitable for applying the technology. The adoption affects various parts of the organization and, furthermore, has a strong impact on the business models of firms as well as on their processes and resources.

The focus of our paper lies on the organisational changes that have to take place to ensure a successful adoption of the technology. In particular, our research will focus on how firms should adopt blockchain as a digital innovation, considering various aspects across the organization. These include company-internal as well as -external aspects, e.g. processes, technical customization opportunities and regulatory aspects. The objective of our study is to categorize these aspects in the form of dimensions and to understand how these aspects affect the development of blockchain-based innovations. Furthermore, we aim to derive the key success factors of the organizational adoption of blockchain. Hence, we formulate the following research questions:

RQ1: What are the dimensions of the organizational adoption of blockchain technology?

RQ2: What are the key success factors of the dimensions regarding the organizational adoption of blockchain technology?

The paper is structured as follows: First, we outline the theoretical background of blockchain and explain the importance of the adoption of innovations based on digital technologies such as blockchain. Second, we present the method of our study and, particularly, the background of acquiring experts knowledgeable in the blockchain domain as interviewees. Our findings reveal that the relevant aspects of the organizational adoption of blockchain can be aggregated in seven dimensions. Furthermore, we present the success factors and obstacles of the adoption. Finally, we discuss the findings by linking the dimensions to the key success factors and outline how the findings extend our current knowledge of blockchain.

2 BACKGROUND

2.1 Blockchain Technology

Blockchain technology has been initially launched as an alternative approach to payment transactions (Nakamoto 2008). It enables a collective bookkeeping system (ledger), which, by means of a mathematical function (e.g. hash function), allows participants to reach an agreement on the approval of the transactions. The information concerning single transactions is registered in 'blocks'. These blocks are reviewed and verified by the network and added in a chronological order on the computers of all participants of the network. A distributed ledger of verified transactions is then provided to the network. As such, the traditional role played by financial institutions as trusted third parties able to mitigate the risk behind a transaction is under scrutiny (Beck and Müller-Bloch 2017; Nofer et al. 2017).

Despite some scepticism regarding its first application (Bitcoin), blockchain technology has reached notable attention (Swan 2015; Tapscott and Tapscott 2016). Even beyond the financial services sector, firms from various industries are applying blockchain to coordinate movements of goods, tracking health records, manage original content etc. (Beck et al. 2017; Morabito 2017). Blockchain raised interest also in the academic community, e.g. with regard to trust and cryptographic aspects (Beck et al. 2016)

or various issues of virtual currencies (Kazan et al. 2015). Our analysis is not limited to a specific application of blockchain (Bitcoin, trade financing etc.), but rather focuses on numerous applications of blockchain in the payments industry.

2.2 Adoption of New Technologies

Companies must often react on environmental changes. Innovative technologies alter the way how products, processes, and sometimes whole industries work. If companies fail to adapt to changing environments and markets, they are likely to fail. In the past, this has happened to large companies like Nokia, Blackberry and Kodak that have been leaders in their industry but failed to maintain this position as competitors adopted new, superior technologies. Thereby, it is important to understand how companies adopt new technologies and how they benefit from technological improvements.

The adoption process starts with the advent of a technological innovation (Gallivan 2001). Additionally, the management has to be willing to adopt the innovation and to change their current business model and processes. This part of the adoption process is called primary adoption, where the management takes the initial decision and triggers the entire process. Without the primary adoption decision, a company is very unlikely to adopt new technologies since employees will not be able to trigger such a process without management support (Ebers and Maurer 2016).

Once the primary adoption is underway, the individual adoption by users, called secondary adoption, can be started. Depending on the nature of the innovation and the existing organizational environment, this can be performed using one of the three following approaches: "(1) they [the management] can mandate that the innovation be adopted throughout the organisation at once; (2) they can provide the necessary infrastructure and support for users to adopt the innovation, while allowing it to diffuse voluntarily; or (3) they may target specific pilot projects within the firm, observe the processes and outcomes that unfold, and decide whether to implement the innovation more broadly later on" (Gallivan 2001, p. 53).

The first approach of Gallivan (2001) is suitable for minor changes, which can be implemented relatively fast. However, for major changes including a high impact on the business model this might not be appropriate. Hence, the second approach leads to a less strict implementation process. Moreover, its outcome can differ from the expected result. This approach will take more time than the first one. The third approach is usually the most time-consuming choice but provides an enhanced predictability of the outcome. The usage of pilot projects allows to observe whether the technology is successful and how the implementation could look like. If it becomes apparent that the technology is not suitable, reversing the actions taken is much easier. This approach is appropriate for innovations that have a major impact on the company or for entirely new innovations that are not comparable to previous experiences. The three approaches are often referred to as the "total commitment implementation strategy, support strategy and advocacy strategy" (Gallivan 2001, p. 53).

In many cases, intermediate steps are necessary, especially in larger organisations. This leads to a multistage adoption process. However, the basic concept remains the same and is independent from the size or sector of the organization.

A combination of success factors is crucial for companies when adopting innovations. The adoption process is influenced e.g. by environmental and contextual/internal factors, behaviour and attitudes of the employees, the firm's characteristics, and the attributes and characteristics of the innovation itself.

3 METHOD

The primary data collection for our research was performed by means of a panel of experts (Greene et al. 1989). Quantitative data that is useful to contribute to the research questions is not yet available. Therefore, an empirical series of in-depth interviews with qualified experts in the blockchain area was used to generate qualitative data. This delivered comprehensive insights into current developments and practical implementations of firms. The advantage of such a study is that it results in differentiated and individual results. In addition to the interviews, we used secondary data like publicly available information about adoption as well as further studies on organizational change (Earl 1996).

In total, nine expert interviews were conducted for this study. All participants approved the recording of the interviews, leading to 530 minutes of interview material and resulting in ~75,000 words of qualitative data. The target was to find out how firms adopt blockchain and to understand how different factors influence the adoption. The experts were chosen based on a clear set of criteria. They needed to demonstrate a high interest in the field of blockchain and must spend most of their working time on the implementation of the technology. Thereby, they gained practical knowledge of the technology. Additionally, their professional scope must cover the organisational adoption of blockchain in the

respective firm. We did not exclude experts with a focus on technological specifications of blockchain, but focused on experts with an understanding of the effects of blockchain adoption across the organisation. To reach diversified and representative results, experts from business functions as well as from IT units were included. All experts hold leading positions in their firm and have a major influence on the adoption of blockchain (e.g. decision power about investments, new projects, employee staffing). Furthermore, many of the experts engage as organisers or speakers for blockchain events and conferences, which also demonstrates their knowledge and provides external validation.

Our sample is composed of participants from different industries. These industries are all impacted by blockchain and experience substantial changes. We put a focus on the financial services industry because blockchain originated from this industry and further major changes are expected in this industry. However, as we want to explore the adoption of blockchain independently of the industry, further industries were considered. We paid attention that the firms' profiles are comparable to ensure data consistency. No significant differences between the industries have been identified. The selected companies are all well established in their respective business area. They are all adopters of blockchain technology and aim to implement and use it in their business operations. For this reason, start-up companies, technology providers, consulting firms and regulatory authorities were excluded from this study. These types of organisations usually do not use blockchain themselves but provide or regulate blockchain technology for others. Table 1 provides an overview of all conducted interviews, including the firms' industry, the position of the expert as well as a short profile of each interviewee.

ID	Industry	Position	Profile	Min
ID1	Financial Services	Senior IT Manager	Head of IT app. development, > 3 years of experience with blockchain and the development of use cases	65
ID2	Financial Services	Senior Business Manager	Member of the executive management, knowledge gained through practical as well as by theoretical use cases including own studies and research	44
ID3	Logistics	Senior Project Manager	Global blockchain coordinator, blockchain expertise grew over more than 3 years of practical engagement in this are	72
ID4	Financial Services	Project Manager Blockchain	Business coordinator in a large blockchain lab, personal interest within the area of developing and implementing emerging technologies (strong focus on DLT)	65
ID5	Automotive	Senior Manager Digital Transformation	Digital transformation expert with blockchain knowledge and 3 years of practical work in the blockchain domain, applying blockchain for innovative products and services	65
ID6	Financial Services	Senior Manager Digital Trans-formation	Responsible for the blockchain implementation since 2016, leads the digitalization unit with multiple strategic initiatives to digitalize the firm	45
ID7	Financial Services	Director Innovation Management	Director focusing on innovation and IT architecture, more than 3 years' experience in the area of digitalisation.	52
ID8	Financial Services	Senior Manager Product Management	Head of product management, experienced in product innovation, development and management, extensive knowledge in blockchain and interledger technologies	66
ID9	Real Estate	Senior Manager IT/Digitalisation	Head of the process management and IT department, focuses on blockchain start-ups and prototypes in the real estate industry, founded a foundation for the exchange about blockchain developments in the real estate industry	56

Table 1: Overview of the interviewees

We conducted all interviews as guided interviews using a semi-structured interview guideline covering content-related topics (Earl 1996). Our focus was on open questions to allow interviewees to elaborate on various points and capture the most relevant aspects of the adoption from their perspective. All interviews have been fully transcribed after recording and coded using MaxQDA. We applied an open coding scheme and iteratively developed the codes emerging from the data. The codes were analysed and clustered into the relevant dimensions for the organizational adoption of blockchain.

4 FINDINGS

Based on the clusters of codes, we synthesized the different aspects into a framework consisting of seven dimensions (Figure 1). The framework presents the main categories that have been identified as being

relevant for the adoption of blockchain. To classify and cover all answers from the interviewees, dimensions have been added if the code was not reflected in any other dimensions.

The core of the framework shows five aspects (grey boxes): Organisational structure, business unit, IT unit, technology and people. Firms must provide an **organisational structure** which allows for improvements and provides flexibility. It needs to be flexible enough to allow people to shift between business and IT units. The **business units** have different expectations about technology, but often also very different requirements which need to be considered when developing uses cases. Use cases are developed jointly between the business units and the IT unit. The **IT unit** develops blockchain prototypes and links the prototypes to the IT infrastructure. Nonetheless, blockchain is still an evolving **technology** and work is still on-going regarding the technological specifications (e.g. standards and interfaces). The adoption of blockchain relies on **people** knowledgeable about blockchain and able to work in the business functions or IT units to design use cases and develop prototypes. The right people must be identified and enabled to support the adoption.

These five dimensions are coordinated by the **project management** that manages the firm's approach to the adoption, the degree of autonomy of the implementation projects and the initiative across the organisation to make people more familiar with blockchain. The project management links the blockchain adoption to the top management and reports about the progress. The **environment** surrounds and influences the firms adopting blockchain. Since blockchain can hardly be adopted by one firm alone, a number of dependencies on consortia, technology providers and regulatory bodies exist.

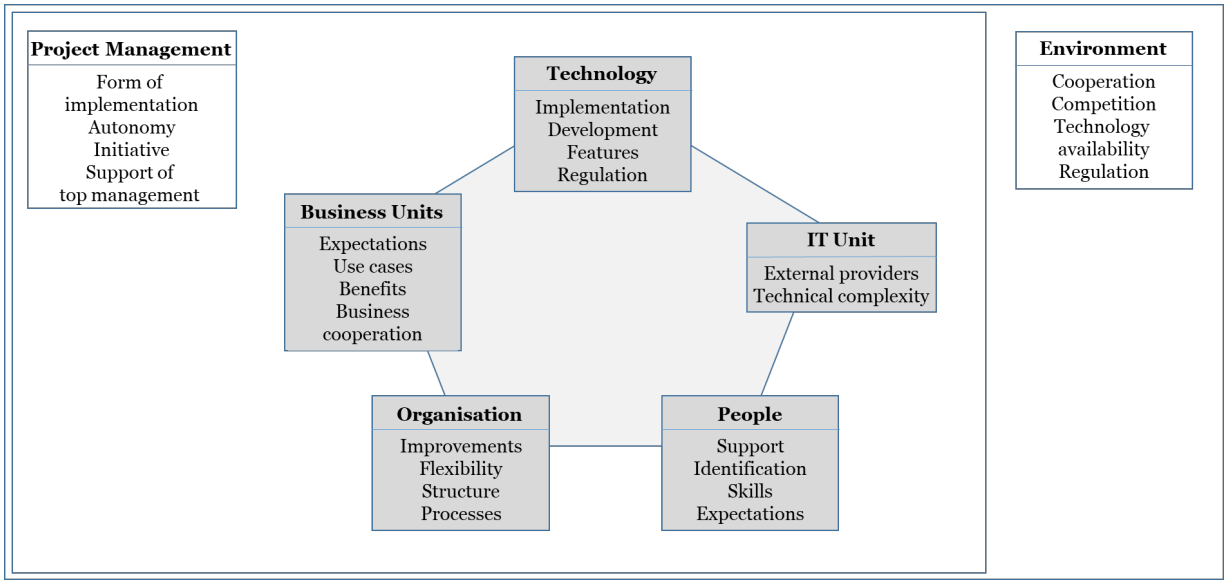

Figure 1: Framework of the organisational adoption of blockchain technology

4.1 Dimensions

People

According to the interviewees, one of the most important factors for the successful adoption of blockchain are skilled people. An organisation needs people experienced in IT as well as people from the business and front office side who are familiar with the customer needs, products and business processes. Since blockchain is a technological innovation, that is expected to have a huge impact on the business and the underlying IT systems, a lively exchange and cooperation of the persons involved is crucial.

Skilled experts in the area of blockchain, that may fill existing knowledge gaps, are currently expensive and rare in the market (ID1, ID4, and ID6). If companies involve third parties, they do so by means of consultants and external service providers. In most cases, the interviewed persons refer to company-internal knowledge in the case they do developments by themselves. Blockchain experts in the companies often have a personal interest in that area. In many cases this triggers the organisational adoption of blockchain technology. For gaining further blockchain knowledge companies rarely make use of internal and external trainings (ID1-9). The preferred approach to build up required skills is "learning by doing" and learning from in-house development of prototypes. Exchange with other companies is important as it allows people to share knowledge about prototypes (ID1-9). Public

blockchain events, interest groups or research facilities offer the possibility to discuss about the technology and its application as well as to develop new ideas and a better understanding of blockchain.

Technology

Companies who adopt blockchain consider it as useful and beneficial for their business. They expect efficiency gains, a more transparent business from the standpoint of customers, cost reduction, reduction of processing time or even the possibility to access new business areas (ID1-9). Our interviewees support the often discussed technological advantages of blockchain (Beck et al. 2017). However, the interviewees still see a huge gap between the potential and the actual implementation. A lot of work needs to be done on the implementation and mainly the integration with existing IT systems. Blockchain is not in a productive state yet, but the adoption has started. Hence, we are observing a major technology in a developing stage.

To boost the adoption in the financial services sector and to standardize blockchain interfaces, banks formed consortia in the last years. Furthermore, consortia are needed as blockchain as a standalone basis is not feasible. The performance increases with further and wider application of the technology (Morabito 2017). Nonetheless, after a huge number of announcements in the past, interviewees are disillusioned about the actual outcomes. Interviewees "do not see that much at the moment. This can mean two things: Either they are really working behind closed doors and present results in the next years. Or it was just marketing and they went back to working on a standalone basis. But then they must conclude that blockchain might not be the solution. In that case we could focus on other technologies" (ID7).

Although the technological potential of blockchain sometimes remains unclear, actions are needed now: "Take a look into the Gartner hype cycle and what follows the hype. I am sure the big impact follows in two years. And then you need to be ready" (ID7). The research results confirm that these developments can be observed for blockchain adoption. Interestingly, some interview partners see deviations from this classical hype cycle. After a very long hype period, that included several waves, the decrease of attention and especially the reduction of expectations were not as strong as usual (ID2, ID6). This can be explained by the characteristics of blockchain: the hype was mainly triggered by cryptocurrencies like Bitcoin. This special use case raised massive attention, but as ID2 states: "(…) The party is over". Cryptocurrencies are not considered to have a significant impact on business models (ID2, ID4). Blockchain as the technology behind cryptocurrencies has a much higher potential.

IT Unit

By definition, IT units have a key role in the implementation of blockchain (ID1). IT units have the technological know-how and are responsible for the administration and maintenance of the operational IT systems. The main challenge remains how to find a feasible way to incorporate blockchain into the existing IT infrastructure. In comparison to start-up companies, established firms cannot just set up entirely new IT systems (ID6). The daily business relies on existing systems that are difficult to replace and often hard to understand. It is more likely that new features are incorporated into existing systems rather than developing entirely new systems that replace existing ones. This approach focuses on replacing only isolated features of the current IT infrastructure by blockchain, but requires a lot of technical customization. Regardless of the approach, IT units take on different roles in the adoption of blockchain. Whereas in some companies the IT unit leads the adoption or even works on a standalone basis (ID1, ID2, and ID9), in other cases the IT unit fulfils a supporting function (e.g. support of initiatives with development know-how) (ID3, ID4, ID7). On top of that, we found technology providers to fulfil the tasks of the IT department in the context of blockchain technology (ID6, ID8).

Business Units

Firms are currently focusing on the development of use cases (ID2, ID9). These use cases must be driven or at least supported by business units. The actual integration into the operating business did not happen so far for all cases. The further development focuses on two aspects: either the development of new ideas and use cases or the realization of existing proof of concepts. The majority of firms in our sample (i.e. eight out of nine) focus on the implementation of developed use cases. The technical implementation is extensive, since blockchain is an infrastructure technology (ID9). This leads to high implementation efforts. Business units are reluctant to invest in changes in the IT infrastructure. Currently, "it works, but it is highly unstable and cannot be changed at the basis. Blockchain technology is high-tech and difficult" (ID8).

Hence, ID5 sees more efforts needed in the conception phase, which can decrease the reluctance. Blockchain projects are different compared to other technology projects. "Difference are mostly or completely before the project starts, when you need to consider what you would like to do, how do business processes look like and how what advantages do we want to take. These initial considerations

are more extensive (…). This is the main difference. Apart from that it is just a new technology (…)" (ID5). The key question for the business functions remains: "Where do I see use cases, does that make sense for me or not?" (ID9).

Organisational Structure

The successful adoption of blockchain requires a lot of organisational support in various forms. In all cases, the blockchain adoption is widely supported by the top management and considered important enough to invest in the adoption. Top management's interest is generally very high in this area, because managers value the technology's potential. Due to the high management attention and the breakthrough potential, organizational changes to adopt blockchain occur. One approach is a special sub-unit that leads the implementation of blockchain prototypes (ID3, ID6). Often these units are part of the general digitalisation efforts. A second approach is a separate lab that bundles all efforts, analyses the technology and develops prototypes (ID4). In some companies only a few organizational changes have been implemented and the IT unit manages the adoption (ID1, ID2). Nonetheless, in all cases the cooperation within the own organisation and between the different kinds of units has been improved. Combining knowledge, identifying relevant use cases and providing required skills throughout the organization is important to make the adoption successful (ID2, ID3).

The overall acceptance of blockchain in the firms differs strongly. According to the interviewees, broad parts of employees do not know about blockchain technology at all (ID1-ID9). Therefore, they are indifferent with respect to its adoption. Other employees do not differentiate between cryptocurrencies and the underlying technology: "Many people put blockchain and bitcoin on the same level, they reduce the technology to the digital currency. This makes the topic unapproachable for them" (ID9). Hence, their attitude towards the technology remains sceptical. People who understand blockchain are either positively inclined, interested and support the implementation or they are suspicious because of its disruptive potential and far-reaching consequences. Firms adapt their organizational structure to establish processes, which allow a wider audience to participate and contribute to the adoption (ID3, ID6).

Project Management

The project management teams are responsible for organisational tasks concerning blockchain. Compared to previous years, contact persons for blockchain have been established in all cases (ID1-ID9). They report to the top management, allocate resources and ensure an exchange of knowledge between business and IT units. Additionally, they are responsible for the identification of skilled people internally as well as externally and further educational measures. Additionally, the communication with other market participants is part of their responsibilities (ID7, ID9). This includes cooperation with other companies, working groups and regulatory authorities. Therefore, typical project management skills and techniques are essential. Moreover, firms apply agile methods like scrum for blockchain implementation (ID1, ID4, ID5, ID9). Scrum as an agile working method is applied for developing blockchain prototypes.

Blockchain implementation is usually initiated bottom-up in the organisations, triggered by employees interested in blockchain or cryptocurrencies (ID1, ID6, ID8). Subsequently, bottom-up turns into top-down when it comes to resource allocation and strategic steering (ID2, ID3). The high visibility, the strong expected impact and the market pressure require a high degree of management attention. This underlines the importance of linking the adoption of blockchain to senior management (ID6).

Environment

The market environment plays an important role in the blockchain adoption. Some differences compared to other technologies arise from this dimension. All cases experienced indirect pressure to adopt blockchain technology because of media visibility, business partners (including customers) asking for blockchain solutions as well as start-up companies developing new products and even creating new business models to disrupt the market. The external pressure to deal with blockchain technology is especially strong in the banking industry (Wörner et al. 2016). Here the focus is on combining new technologies and customer centricity. „When now developing our innovations, we focus on the customers, which is very important. In the last ten years banks did not do that. They [banks] developed solutions nobody was waiting for" (ID7).

Furthermore, start-ups (e.g. fintechs) and other relatively new competitors threaten the traditional business models: "(…) this raises the question, will a bank be necessary in such a business case or can it be done without a bank? I am afraid you do not need a bank anymore, the intermediary changes. What has been typical bank business in the past, (…) is today covered by nonbank- and nearbank-companies. (…) Today you would call them start-ups. (…) Therefore, we ask ourselves the question how can we adjust and digitalise our business model, to have a reason for existence in a digitalised world" (ID8). To find the right solution in the 'digitalised world', many firms formed partnerships for the development of

blockchain solutions. The level of much cooperation is higher compared to previous new technologies. Blockchain is designed for connecting several parties. All experts confirmed that their adoption of blockchain focuses on blockchain use cases involving partners. However, often the current prototypes remain on a standalone, internal basis (ID1, ID7). ID8 highlighted the following aspect: "If one bank understands the technology, this is not enough. What would it be good for if there are no partners he can work with?".

Furthermore, the interviewees see regulation as an obstacle, as it may restrict the usage of blockchain and slow down its development. Contrary, standard setting by regulatory authorities might increase the acceptance in the market and mitigate the threat of legal risks if regulatory requirements are met (ID1).

4.2 Success Factors and Obstacles

The findings of our empirical study lead to a number of insights that are relevant for blockchain adoption. Most importantly, we see the adoption underway with new services or products in the next year: "If certain banks and even nonbanking companies employ 20-40 people to develop blockchain solutions, this can only mean two things: Either they will present results within the next year, or they realize they paid 20-40 people the whole year without results. In that case they must stop" (ID7). Across all cases we find that the integration into the daily operations did not take place yet. However, the empirical evidence of our study allows to identify success factors and obstacles.

Success Factors

All experts mentioned internal know-how and enough budget or resources as a key success factor for the development and implementation of blockchain prototypes. The internal cooperation between the business functions and the IT unit is very important, because they have to work together on blockchain solutions. It is key to integrate business requirements and focus on technological feasibility. Since blockchain is a technology for the interconnection of several participants, the cooperation goes beyond a firm's boundary. Cooperation with partners is crucial and allows to test blockchain prototypes across firms. Top management support is also a success factor to all experts: on the one side for promoting and supporting the adoption; on the other side, top management provides the resources and the secondment of employees.

The 'right' environment is important for the adoption of blockchain. It delivers inspiration for new solutions and it allows for external cooperation. When developing blockchain use cases, new ideas are key. Furthermore, the proper understanding of the underlying business, blockchain is applied to, is essential. However, skilled people are needed for the development of blockchain uses cases and the implementation of blockchain prototypes. To attract employees internally and get enough support to hire external people, blockchain needs to be accepted across the organisation. Appetence then also fuels good internal cooperation which allows to get skilled people for blockchain projects. Classical project management skills, e.g. coordination and communication are important as well. Agile methods like scrum have been mentioned by four experts in this context (ID1, ID4, ID5, ID9). The experts mentioned the successful integration of the blockchain project team into the firm as a success factor. This is especially true for the design of Blockchain-based use cases. Having relevant and well-designed use cases (and later on proof-of-concepts) is increasing the success of the projects.

Furthermore, the motivation of employees, upfront planning of the project, focus on the customer when designing use cases, a certain level of speed to keep up with the environment and to satisfy the management are further success factors. The importance of the own development of blockchain prototypes and a sufficient IT infrastructure were mentioned by three experts. Moreover, independence of the blockchain project from the daily business, the effective use of resources (no deadlock between business units and IT unit) and well-thought commercialisation of the blockchain solutions have been identified as success factors by two interviewees.

Obstacles

The adoption of blockchain is hindered by various obstacles. Missing resources and uncertainty about upcoming regulation are most commonly stated. Resources in form of people (either internal employees or external experts from consultancies or technology providers) are crucial for blockchain projects. Often resources are limited as there is a lack of skilled people as well as insufficient support for the blockchain project. Sometimes people are held back and placed on other projects. Forthcoming regulation is likely to influence the future of blockchain as the technology can store substantial amounts of sensitive data, including payment information and customer data. In addition, missing know-how limits the development of blockchain prototypes and the integration into existing IT landscapes. Low internal acceptance of blockchain restricts cross-divisional support, openness among important partners and willingness to invest in the integration.

Three experts identify the hype as a problem for blockchain adoption: "The hype was not good for the technology" (ID6). The hype raised expectations and "people think that we will have rapid changes triggered by this technology. I rather think we will observe small steps" (ID9). Furthermore, the high expectations are a great contrast to the low market maturity, which makes blockchain non-tangible for many people and increases reluctance. Three experts raised concerns with regard to the integration of blockchain in legacy infrastructures. Some technical specifications of blockchain are still insufficient developed for wider application and present an obstacle for two experts of our panel. Currently missing regulation is a problem, but regulation also has the potential to increase the acceptance among customers as well as employees and provide legal certainty. Two experts see legal risks when applying the technology (ID1, ID2). This is in line with concerns regarding compliance with current business rules.

These obstacles regarding the adoption along with the uncertainty of the further development of blockchain impede high investments at this early stage. Interestingly, when being asked how the adoption of blockchain could be improved and accelerated, most interviewees state that additional resources would be beneficial. Consequently, it seems that not necessarily the technological challenges of blockchain are hindering the further adoption, but management issues are slowing down the adoption. Additional resources could be used to hire knowledgeable people and improve the IT infrastructure. Moreover, a better understanding of blockchain-based use cases and the technological opportunities of blockchain would improve the adoption and generate better outcomes of projects.

5 DISCUSSION AND CONCLUSION

Analysing the interviews delivered results in terms of dimensions for the organisational adoption of blockchain (RQ 1). Furthermore, we derived a huge spectrum of factors for success as well as a number of obstacles for the adoption effort (RQ 2). Table 2 summarizes the success factors and obstacles per dimension of the organisational adoption of blockchain.

Dimensions	**Success factors**	**Obstacles**
People	Internal know-how, Skilled people, Improve acceptance, Motivation	Missing know-how, Low acceptance
Organisational structure	Internal know-how, Internal cooperation, Management support, Acceptance	Inflexible structures, Missing support
Technology	Integration in IT architecture, In-house/ internal development, Flexible infrastructure	Legacy systems, Underdeveloped specifications, Low market maturity
Business unit	Resources, Internal cooperation, Valid use cases	Missing resources
IT unit	Resources, Internal cooperation, Understanding of business, In-house development, IT resources	Missing resources, Compliance
Project management	Internal cooperation, Cooperation with partners, Management support, Environment, Acceptance, Project management skills, Motivation, Planning, Speed	Low acceptance, Compliance, Bad communication, Missing willingness
Environment	Cooperation with partners, Focus on customers	Potential regulation, Hype as a problem, Low market maturity, Too high expectations, Missing regulation, Uncertainty of the development

Table 2: Success factors and obstacles of the organisational adoption of blockchain

The results of our study indicate that the seven dimensions encapsulate the relevant aspects of the organizational adoption of blockchain. However, it is obvious that still a lot of work needs to be done. For this, the identified success factors may help channel the managements' attention to the right dimensions. For example, we see a lot of success factors in the project management dimension which suggests that a dedicated project manager is feasible. In the case of ID3 and ID4 dedicated positions have been established to push forward the adoption.

Moreover, using the dimensions we tried to work out the differences between the various approaches regarding the adoption. This reduces overlaps and potential interferences of the dimensions. For example, initial considerations concerning blockchain have sometimes been assigned to the business (I7) and sometimes to the IT unit (I2). We can easier distinguish those approaches and provide a more nuanced view in the adoption of blockchain. During our study we have not only seen euphoric experts.

We have also noticed a great deal of criticism of the current hype of blockchain as well as scepticism about the actual potential of the technology. Beside the technical limitations of blockchain, our list of obstacles can provide insights into what hinders further adoption. The obstacles can help to understand the scepticism and why some experts are still critical. Furthermore, the success factors and obstacles show that more work regarding the adoption is needed. By no means is organizational adoption defined by a clear end where the technology is fully used in the organization. It is rather an ongoing, multitudinous process of technology innovation and organizational change management (Markus and Tanis 2000).

The contributions of our study are twofold. First, we see a strong managerial relevance since firms are currently undergoing great changes due to blockchain. The relevance of innovative and disruptive technologies such as blockchain is of utmost importance not only for IS researchers, but equally for managers. Our study helps understand the adoption of blockchain with regard to the seven dimensions. Additionally, the dimensions can guide managerial actions regarding changes in the organization and support the decision-making of managers. Our study supports that it is not only the technical aspects of blockchain that should be stressed during the adoption, but organizational as well as management aspects should be equally discussed. It is important to understand that people and organizations have to adopt blockchain. Second, scholars can gain a deep insight into the adoption of blockchain and how the adoption can be structured. Hence, we are contributing to the emerging topic of blockchain and provide a further perspective to the increasing need for academic research on the topic. We argue that studying the adoption of blockchain allows scholars to learn more about upcoming disrupting technologies and their organizational adoption. Consequently, our research can lay the foundation to develop new models for adoption of digital innovations and facilitate comparisons to other technologies. Future research may use the identified dimensions and develop stages of adoption to allow for a classification of approaches to blockchain adoption.

Our study is limited in the sense that the number of interviews is low, but not the number of cases. Increasing the number of interviews per case would reduce the potential bias by the experts. Furthermore, our research captures only the current configuration of the seven dimensions and does not consider interactions between the dimensions.

Our study could be extended in three directions, which would also overcome some of the limitations. First, research could verify the findings across industries and discuss varying characteristics of the dimensions in the different industries. Using our dimensions and data from different industries would allow to develop taxonomies for the adoption of blockchain. Second, an evaluation of the success factors and obstacles using a Delphi study might be interesting. Following the evaluation, an analysis of how the success factors could be translated into measures for organizational adoption would be promising. Third, more interviews along multiple points in time would be interesting. This would allow for a longitudinal study that provides changes over time. Thus, key success factors could be analysed regarding the stage of organizational adoption. Previously, research has often analysed the adoption on an individual level. We are among the first researchers to analyse the organizational adoption and focus on different dimensions within the organization. Although our study draws on small sample, we argue for a high generalizability of our results, as we observed high consistency and saturation in the answers of the experts. The dimensions, success factors and obstacles are less focused on concrete applications (which might be industry-specific) than on the general organizational adoption. The focus on the financial services sector is justified, since firms here are regarded as among the most affected ones (Nofer et al. 2017). As a conclusion, our insights help to advance the research on blockchain and shed light into its adoption. We provide a framework of the organizational adoption of a novel technology which yields implications to adoption (Damanpour and Schneider 2006) and digital innovation research (Fichman et al. 2014; Yoo et al. 2012).

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