

# Blockchain Technology – Short-term Hype or Foundation for Revolutionary Business Models?

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**Abstract.** Blockchain technology and the crypto currencies based on it have increasingly moved into the focus of public attention in recent years. The current perception is that this technology has the potential to change our economy and society in a significant way. Against the background of the increasing importance of crypto currencies and blockchain as well as the resulting technical and legal challenges for the economy, three solutions for companies are described in this paper. The work is based on a literature analysis in which, in addition to scientific publications, practical non-scientific literature is also used. The developed solutions are based on three specific problems with which companies from the IT sector will be confronted in the future. The feasibility of the proposed solutions varies depending on the associated financial and technical expenditure as well as the opportunities and risks. For the evaluation of the feasibility, however, only qualitative (no quantitative) criteria are included, which limits the significance of the assessment.

**Keywords.** blockchain · technology · crypto currencies

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## 1. Introduction

Due to the enormous potential for change in many areas of modern society, the topic of blockchaining is currently at the center of interest of science and industry (Schlatt, Schweizer, Urbach & Fridgen, 2016). Since its emergence in the context of the development of the first crypto currency, "Bitcoin," in 2008, blockchain has been able to steadily increase its perceived value by the public through ever new implementation ideas and rising crypto currency exchange rates. In this young field of research, however, a general consensus on all concepts and their delimitation from each other has not yet been reached (Schütte et al., 2017). Private individuals, companies, and states will face new challenges in the coming years as a result of the establishment of blockchain technology in their everyday lives, such as the use of crypto currencies. Legal and tax issues have not yet been conclusively clarified. Furthermore, it is not certain what effects the blockchain technology will have on companies and the current states. It should be noted that there is a real hype around the blockchain technology and crypto currencies, but the central question of what exactly the effects of this technology will be is not yet clear. To clarify this question, research and practice are working on its technical maturity and implementation examples. Especially in the area of crypto currencies, progress can be observed. New virtual currencies are available to the public daily. Their blockchains bring with them innovations that are intended to increase scalability and security. In the long term, a comprehensive adaptation of crypto currencies is conceivable, which raises the question of the effects of such a change from the perspective of every citizen, company, and state.

### 1.1. Problem

In the current perception, blockchain is attributed the potential to fundamentally and sustainably change the role of diverse intermediaries in different sectors. Especially companies or persons who take on an intermediary role for confidence building in the exchange between two parties are currently facing developments in their own field of activity that are difficult to assess. These sectors include auditing, tax consultancy, legal advice, and accounting. The requirement for a large number of activities in these sectors is audit reliability. A currency based on blockchain can mean a considerable reduction in expenses in these areas due to the subsequent immutability of transaction records and constant availability of all data. Thus, in the future, essential parts of the current field of activity of these professional groups could become automated or obsolete.

### 1.2. Goal and structure of the paper

The goal of the paper is to develop product and solution proposals for affected companies against the background of the increasing importance and challenge of crypto currencies and blockchain technology for the economy. For this purpose, the introduction to the problem begins the paper. Next, the theoretical basics of crypto currencies and blockchains are presented. First,

the history of its origins as well as the technical functionality of the technology is explained, and a consideration of the legal and fiscal treatment of crypto currencies forms the conclusion of the section. Then, the methodology with which the problem is processed is described in more detail. The basis is a literature analysis. In addition to scientific literature, non-scientific literature, such as newspaper articles, is also used. In the results section, three solution approaches are presented, which were developed for companies using the example of a software service company in this paper. All three solutions are in the context of crypto currencies but concern different business areas. Starting from the current challenge, the requirements and implementation are described. Afterward, the opportunities and risks connected with the solutions are presented, and the developed solutions are discussed. The advantages of the developed solutions compared to the current situation are briefly described. After considering the technical feasibility and the required resources, the opportunities and risks are weighed against each other. On the basis of this evaluation, recommendations for action are given for implementation. In the final part of the paper, the current position of the technology in the public is put into relation to its potentials. In addition, further research areas are pointed out, which will be of future importance in connection with blockchain.

## 2. Theory

### 2.1. Definition of terms

There are many different approaches to the definition of the term blockchain in the literature (Mattila, 2016). By comparing the following two definitions, the two approaches most relevant for the continuation of the paper can be clearly distinguished. The first definition is describing blockchain as an overarching concept that combines various technologies and applications (Woodside, Augustine Jr., & Giberson, 2017). It can be seen as a digital, decentralized account book that allows the recording of all peer-to-peer transactions without the presence of an auditing institution. A peer-to-peer network is a network of exclusively equal participants (Schütte et al., 2017).

The second definition, according to Walport (2015), describes blockchain as a database. It divides entries into blocks instead of removing them on a continuous piece of paper. Subsequently, these blocks are cryptographically linked to form a chain. In contrast to the definition according to Woodside from 2017, blockchain is therefore not by definition an account book for recording transactions, but the recording of transactions in an account book is a use case for blockchain (Walport, 2015).

It can be stated that the first definition refers to a complete system. Definition number two, however, describes a specific part of this system. The reason for these different approaches lies in the history of blockchain in the context of a very concrete implementation, which will be described later in this paper.

The word blockchain originated from the underlying logic that blocks are chained with information by cryptographic methods (Mattila, 2016). Most of the components used for implementation had been known since the 1990s, and their innovative combination led to the development of blockchain technology.

Two concepts of cryptography, public key cryptography and the hash function, are among the most important components for understanding the technology. Other components include the use of a peer-to-peer network and the consensus-building process used (Nakamoto, 2008; Schlatt et al., 2016; Schütte et al., 2017). These will be explained below based on the history of the crypto currency Bitcoin.

### 2.2. Development and technical functionality

The initial impetus for the development of the technology came from a publication by Nakamoto in 2008, in which he described his idea of creating an electronic payment system that would enable two parties to handle payment flows without the intermediation of a trusted third party (Nakamoto, 2008). A coin is defined as a chain of digital signatures.

For signing, public key cryptography is used, consisting of a key pair with one public and one private key (Badev & Chen, 2014; Schlatt et al., 2016). The two keys are mathematically linked to each other. The sender signs the transaction by using his private key and sends it to the receiver. The receiver can now decrypt and read the transaction using the sender's public key. If the decryption is successful, the authenticity of the transaction is proven since only the sender knows his or her private key, which was used for encryption. It is also guaranteed that this is the original message. The sender cannot deny having created the message.

When a coin is transferred, the current owner is entered at the end of the chain by the new owner (Nakamoto, 2008). With this form of transfer, however, it is not possible from the recipient's point of view to check whether the sender of the coin has already transferred it to a third party. This problem is known as double spending. One method of solving it, without the introduction of a superordinate monitoring institution, is the central achievement of Nakamoto.

For the recipient to be sure that the payment received has not been spent elsewhere, it is necessary to know the complete transaction history (Nakamoto, 2008). For this purpose, all transactions taking place within a peer-to-peer network are published

and subsequently distributed to all participating computing units, the so-called nodes (Schütte et al., 2017). The transactions are checked for correctness by the nodes and subsequently inserted into the existing transaction chain (Schütte et al., 2017).

For this purpose, several transactions are combined in the form of blocks and coded by hash values (Schütte et al., 2017). A hash value is the result of a hash function that converts a character string of any length into a character string of a fixed length (Schlatt et al., 2016). Subsequently, the hash value of the transactions within a block is hierarchically condensed by forming a new hash value from the hash value of one transaction together with the hash value of another transaction (bitcoin.org, 2018a; Nakamoto, 2008; Schütte et al., 2017). This procedure creates a so-called Merkle tree, at the end of which there is a single hash value, the Merkle root. The special feature of the hash function is that it always delivers the same result for the same input data but outputs a strongly changed hash value even with minimal changes in the input data (Schlatt et al., 2016). The manipulation of a transaction would thus be conspicuous since, in this case, the consistency of the hash tree is not maintained (Schütte et al., 2017).

To create a new block, a block header, also a hash value, must be calculated for this block (Woodside et al., 2017). This is created using the Merkle root—the result of all transactions—of the new block and the block header of the previous block. In principle, however, the manipulation of a transaction would not be noticeable if all subsequent blocks were recalculated, and, in addition, so many additional new blocks were created that the manipulated blockchain represents the longest inherently consistent chain in the network (bitcoin.org, 2018a; Zheng et al., 2017). All other nodes in the network would subsequently accept the manipulated blockchain as true and discard the old one. To prevent this, Nakamoto extended the system by the so-called proof-of-work concept (bitcoin.org, 2018a). The block header of the new block is calculated using a target value and an arbitrary character string, also called nonce (Schlatt et al., 2016). The target value represents a limit that must not be exceeded when calculating the block header (Zohar, 2015). For this purpose, the nonce is changed until the target value is met by the block header after recalculation. This procedure requires a considerable amount of computing power (Zheng et al., 2017). To change a transaction afterwards, all subsequent blocks would have to be recalculated with a very high level of computing effort. This proof-of-work concept is the consensus-building process used for Bitcoin. The node that first calculates a valid block header is allowed to write the next block, which is then taken over by the other nodes.

### 2.3. *Alternative configurations*

In addition to the Bitcoin blockchain, there are other blockchain systems that differ in various forms but can be divided into the following three different categories: public blockchains, private blockchains, and syndicate blockchains (Schlatt et al., 2016; Zheng et al., 2017).

In public blockchains, all nodes can participate in consensus building (Zheng et al., 2017). All transactions are visible to all participants, and the transaction history is stored by all. The public blockchain is thus completely decentralized and is therefore considered particularly secure against manipulation. Private blockchains can also be considered as a closed network. They restrict participation in consensus building to the nodes of a single organization. The transaction history can, depending on the design, be publicly visible or access restricted. By centralizing consensus building on a few nodes, it is susceptible to manipulation. Consortium blockchains are to be placed between public and private blockchains in terms of participation in consensus building although due to the fact that participation is restricted to several organizations, this is also a closed network and thus the private character predominates (Schlatt et al., 2016; Zheng et al., 2017). In terms of read access to the transaction history, it is also similar to the private blockchain—it depends on the desired configuration of the participants. Compared to the private blockchain, however, it is less centralized and thus more difficult to manipulate.

The categorization shown above primarily reflects participation in consensus building. Significant differences between Bitcoin systems can also be found in the way consensus is formed (Schlatt et al., 2016).

In the decentralized blockchain network, consensus building is always about selecting a network node that writes the next block (Zheng et al., 2017). The simplest conceivable solution is a randomized selection, but this is very susceptible to attacks by dishonest network nodes.

In the proof-of-work procedure selected for Bitcoin, the network node that first calculated a valid block header proves that it has made a great effort to write the next block (Nakamoto, 2008; Schlatt et al., 2016; Zheng et al., 2017). The effort is the processor capacity and energy used. This economic effort serves as proof of the honesty of the network node because it lowers the probability of an attack by increasing the necessary costs.

In addition to proof of work, other methods can also be used to build consensus, such as the proof-of-stake method (Schlatt et al., 2016). This was chosen because the advantages and disadvantages of this method are particularly clear when compared with the proof-of-work method.

With proof of stake, the network nodes with the greatest stake of crypto currency are selected for the creation of the next block (Schlatt et al., 2016; Zheng et al., 2017) since these have a particularly strong interest in maintaining the system in order to preserve their capacity and would therefore not maliciously attack it. As a result, the proof-of-stake process is particularly energy efficient.

## 2.4. Wallets

A wallet is a program that stores the user's private key. It also generates the public key to receive incoming payments and uses the private key to sign outgoing payments (bitcoin.org, 2018b). The program must also be in exchange with the peer-to-peer network to send the blockchain information via transactions on the network. A wallet thus has the following three functions: providing public keys, signing transactions, and exchanging with the network. All three functions are mandatory but can also be distributed among different programs to increase security against attacks. The underlying scheme of such split solutions is to store the private key in a program or on a device that does not communicate with the network or is not connected to the Internet. Subsequently, the generated public keys are then made available to a second program that is connected to the blockchain network.

## 2.5. Legal and tax foundations of crypto currencies

Crypto currencies are based on decentralized networks. They are created without the participation of testing institutions. However, a regulatory classification is decisive for possible legal consequences, such as the approval and supervision of business models by the Financial Market Authority as well as the tax treatment of transactions with crypto currencies. Although the EU supervisory authorities are intensively dealing with this issue, there is still no uniform regulation in EU law (McKenna, 2017). In 2013, the European Banking Authority published a "Warning to consumers about virtual currencies" to draw attention to the potential risks involved in buying and selling virtual currencies (European Banking Authority, 2013). One year later, in 2014, the European Banking Authority defined virtual currencies as the digital representation of value that is not created by a central bank or public authority and does not have to have a link to legal tender. They are used by natural and legal persons as means of exchange and can be electronically transferred, stored, and traded (European Banking Authority, 2014). The German Federal Financial Supervisory Authority (BaFin) has given crypto currencies the legally binding qualification as financial instruments in the alternative of the units of account pursuant to Section 1 (11) sentence 1 of the German Banking Act (KWG), and they are therefore not considered legal tender. This legal classification applies in principle to all crypto currencies and is not dependent on the underlying software or encryption technology (BaFin, 2016).

### 2.5.1. Permission requirements

When dealing with business models involving crypto currencies, it should be checked whether these models require permission. The basis of the following explanation on this topic refers to the legal classification of the BaFin and its assessment of the obligation to obtain permission for transactions with virtual currencies (BaFin, 2016). If a transaction requiring approval is not approved, this is generally a criminal offence under Section 54 KWG. A service provider or supplier can accept crypto currency in exchange for his services as payment in cash or book money without a duty to obtain permission for him or his customer from banking transactions or financial services pursuant to the KWG. Likewise, there is no obligation to obtain permission for the purchase or sale of crypto currencies. Proprietary trading, however, becomes subject to permission if a special contribution is made to creating or maintaining a market for the purchase and sale of crypto currencies. This is the case, for example, if a person advertises publicly that he or she regularly buys or sells crypto currencies. The operation of trading platforms and financial commission transactions is also subject to licensing. Depending on the specific business model, the specific contractual terms, and technical implementation, the KWG or the Payment Services Supervision Act (Zahlungsdienstenaufsichtsgesetz, ZAG) may apply in these cases. These include proprietary trading requiring a license as well as investment and contract broking, which require a BaFin license.

### 2.5.2. Tax perspective

BaFin's classification of crypto currencies as units of account in accordance with § 1 para. 11 sentence 1 of the KWG means that trading in digital currencies constitutes a private sale or speculative transaction within the meaning of § 23 para. 1 sentence 1 no. 2 of the German Income Tax Act (EStG) (Zitzmann, 2017). Whether the capital gain from trading is taxable depends on the time of acquisition and sale of the crypto currency. If the time of the acquisition of the respective crypto currency is more than one year before the time of disposal, the resulting capital gains are tax free. However, this does not apply to interest income, for which a final withholding tax is payable. In this case, the speculation period is also extended from one year to 10 years since the asset was used as a source of income (Winheller, 2018)

Taxation of the profit at the personal tax rate also becomes mandatory on the basis of §23 EStG as soon as there is less than one year between the date of acquisition and the date of disposal of the crypto currency (Hoyer, 2018). However, a tax exemption limit of €600 applies to the tax liability. Accordingly, profits of less than €600 remain tax free, whereas profits above this limit are fully taxable. The taxable capital gain then results from the difference between the sales price and the purchase price of the respective crypto currency. If losses are created by a transaction, they can either be offset against profits from the previous year or by means of loss carry forwards. It should be noted, however, that under Section 23 (3) sentence 7 EStG, losses can only be offset against profits from other private sales transactions (e.g., real estate transactions).

The so-called Fifo method is used to determine the tax liability by calculating the speculative period and the amount of the capital gain or loss. Accordingly, shares of the crypto currency purchased first are offset against the shares of the crypto currency sold first. The taxpayer is responsible for documentation and proof (Schmidt, 2018).

### 2.5.3. Restriction of salary payment in crypto currencies

According to legal requirements under Section 107 (1) of the German Trade Regulation Act (Gewerbeordnung), wages and salaries in the Eurozone must be paid in euros (Gennert & Keding, 2018; Wittmann, 2018). In the case of employment abroad that exceeds the period of one month, an exception may be made in accordance with § 2 para. 2 no. 2 Nachweisgesetz (Act on the Certification of Employment). It should be noted that payment is only permitted in the local official currency. However, crypto currencies are not recognized by law as official currency. Classification as a non-cash benefit is therefore more appropriate. A non-cash benefit is defined as any reward given to an employee that is not in the form of money but represents monetary income. According to § 107 (2) of the German Trade Regulation Act, this procedure is not illegal with the consent of the employee, which legitimates a salary payment in crypto currency. However, it should be noted here that only a part of the payment may be made in kind. This means that the unseizable part of the salary must be paid in euros.

In this respect, a decision of the Federal Labour Court (BAG, ruling of 12. 1. 2005 - 5 AZR 364/04) states that only 25–30% of the salary may be paid in crypto currency. It should also be noted that the portion paid in euros may not fall below the non-tariff minimum wage limit (Gennert & Keding, 2018; Wittmann, 2018).

Particularly relevant for the employee are also tax-free limits for non-cash benefits, which amount to €44 per month pursuant to Section 8 (2) sentence 11 of the EStG. Within this limit, the salary payment of crypto currencies is not taxable. According to a decision of the European Court of Justice (ECJ, ruling of 22.10.2015 - ECJ file number C-264/14), the exchange of euros into crypto currencies is exempt from VAT (Gennert & Keding, 2018; Wittmann, 2018).

## 3. Methodology

To elaborate the theoretical basis for the development of concrete application scenarios for companies that will be affected by crypto currencies in the future, the scientific literature on the topic of blockchaining was first analyzed. By comparing the definitions of Woodside et Al. (2017) and Walport (2015), the most relevant approaches for the continuation of the paper could be clearly distinguished. The historical and technical background was then mainly based on the original paper by Nakamoto (2008) as well as the publications by Schütte et al. (2017) and Schlatt et al. (2016), on the basis of which the essential concepts of blockchain and especially crypto currencies could be developed. The legal and tax basis of the application proposals described below for companies facing future challenges related to crypto currencies was mainly based on publications of the European Union (2013; 2014) as well as comments of BaFin (2016) and judgments of the Federal Labour Court and the ECJ. It should be noted that due to the novelty of the technologies, not all legal issues have yet been conclusively clarified by the authorities. For this reason, in addition to the official publications and court rulings, articles and contributions by lawyers and experts, such as Zitzmann (2017) and Gennert and Keding (2018), have been used to interpret and supplement the texts from official sources. After the theoretical foundations as well as the legal and fiscal current state had been worked out, publications with a practical relevance, such as those by blockchain experts or representatives from relevant industries, were particularly relevant for the use cases. This made it possible to consider and further develop already existing experiences and application ideas with regard to this novel technology. Specifically, the market was analyzed for already existing innovative solutions, which were mainly developed by start-ups. One example of this is the "Cointracking" platform, whose business model on crypto currencies and their tax relevance can also show potentials for other companies. To generate the proposed solutions, not only new ideas around the blockchain technology were further developed but also existing processes that could be affected in companies in the future by the spread of blockchain were viewed from a new perspective.

4. Results

Table 1. Solution approaches summarized.

|                   | Platform solution   | Consultancy  | Salary payment in crypto currencies  |
|-------------------|---|--|--|
| Initial situation | The classification of crypto currency as other (intangible) assets makes profits taxable if the purchase and sale of digital currency takes place within one year.              | In the area of blockchain and crypto currencies, tax consultants, auditors, lawyers, and many companies are breaking new technical and legal ground. | The increasing spread of virtual currencies makes a salary payment in crypto currencies conceivable in the future.   |
| Challenge         | To determine the tax liability, all purchase and sale data as well as the transaction date and price must be documented. This is associated with a high amount of manual effort | The professional groups and companies concerned must be provided with expert knowledge on the subject of crypto currencies and blockchain.           | To date, there are no solutions on the market that are suitable for the masses and that can guarantee uncomplicated and secure salary payments in crypto currencies. |
| Solution          | Development of a platform that automates the documentation of crypto currency transactions  | Development of a consulting and information system around the topic of crypto currencies and blockchain.   | An established company organizes the salary payment in crypto currencies as intermediary.  |

4.1. Platform solution

4.1.1. Initial situation and challenge

Due to the high level of public attention and the price development since the creation of Bitcoin, increasingly more players are participating in transactions with crypto currencies. Tax aspects must be taken into account when realizing capital gains. According to BaFin’s classification, crypto currencies are not legal tender but are considered as other (intangible) assets for tax purposes. Based on this classification, profits are taxable if the purchase and sale of the digital currencies takes place within one year and are not taxable if more than one year lies between the date of purchase and the date of sale. To determine or, if necessary, avoid a tax liability, all purchase and sale dates as well as the transaction date and the exchange rate must be carefully documented (Zitzmann, 2017). In the case of a large number of transactions or trading on different crypto exchanges, that is, trading centers for the purchase and sale of crypto currencies, this can lead to a high level of manual effort that must be provided by the taxpayer.

4.1.2. Solution

To simplify the time-consuming manual documentation of transactions with crypto currencies, the development of an innovative platform for the automated fulfilment of this tax law requirement is conceivable. The completeness of this documentation is guaranteed if all transaction data are imported from different crypto exchanges and wallet addresses. For the technical implementation, the comma-separated values (CSV) files, which is a file format that describes the structure of a text file, must be downloaded from the stock exchanges for the transactions made so far and imported into the platform. In addition to recording all transactions for the subsequent tax report, this platform-based solution can also create other value-added services for the end user, such as statistics. The user can manage all coins of different exchanges in one place and keeps an overview of their current values. If the client agrees, the platform also functions as an interface to his tax consultant, who can then directly call up all information relevant to the tax report or send the automatically generated tax report to the tax office. If the client does not want this, he can also generate the tax report himself via the platform and then send it to the tax consultant. This eliminates the need for the manual documentation of all transactions with the purchase or sale dates relevant for tax and the respective market values.

### 4.1.3. *Chances and risks*

The development of an innovative platform for the automated documentation of trades with crypto currencies results in a variety of opportunities—but also risks. As an example of the latter, customer interest in crypto currencies could stagnate or decline. A further risk is the fact that the customer gives up part of his anonymity by documenting his transactions. This risk could, however, be offset by not defining the platform as a binding interface to the tax advisor but instead leaving the client the option of manually transmitting the tax report generated automatically by the tool to the tax consultant. An opportunity for the tax consultant and his client, on the other hand, is the reduced susceptibility to errors in the documentation of crypto currency transactions through the automation of this process. There are already smaller companies on the market, such as the "Cointracking" platform or the "Delta" app, which offer a solution to this tax challenge as a crypto portfolio tracker (Cointracking, 2018; Delta, 2018). By developing their own platform solution, software providers could prevent existing customers from having to fall back on offers from other providers. In addition, new customers could also be acquired.

## 4.2. *Consultancy*

### 4.2.1. *Initial situation and challenge*

The increasing spread of crypto currencies among private individuals (Rehkopf, 2018) means that this form of digital currency is also affecting increasingly more areas of the economy. Due to its disruptive character, many experts believe that the currency based on blockchain has a very high innovation potential (Wilting, 2018). Consequently, crypto currencies could fundamentally change large parts of our economy and society in the future.

Especially the tax law treatment of crypto currencies as well as the complicated documentation of transactions presents tax consultants with completely new problems. To be able to adequately advise clients in the future on questions concerning this subject area, tax consultants must deal with this new subject matter. Lawyers and auditors are also affected by the legal and technical implications of the advance of blockchaining and crypto currencies (Wilting, 2018). Blockchaining and crypto currencies are therefore highly relevant for a large number of professional fields. Also, on the part of companies, the question arises as to whether crypto currencies should be accepted as a means of payment for services and goods (Filbinger, 2018). This is because the high volatility of many virtual currencies is a particular risk for the economy. Legal problems and enforcement difficulties in the event of payment defaults also cause uncertainty for many companies.

In the area of blockchaining and crypto currencies, tax consultants, auditors, lawyers, and many companies are breaking new technical and legal ground. To avoid missing any chances in the working world, which will change in the future due to this new technology, and to be prepared for the possible risks, they need expert knowledge on this subject area.

### 4.2.2. *Solution*

One way to provide the required expertise would be to set up a consulting and information system around the topic of crypto currencies and blockchain. A company that wants to pass on specialist knowledge to customers within the framework of this system must first collect and bundle the necessary know-how. At the center of this consideration is the establishment of a team of experts on the subject of crypto currencies. This team could be built up by training existing employees and recruiting external experts.

Based on this team of experts, the consulting and information system can then be set up. The system should include classical consulting and training as an important component. Solutions and strategies individually tailored to the customer can be developed in personal discussions. There is also the possibility to pass on specialist knowledge about crypto currencies in seminars. In addition to individual consulting, online training courses are also conceivable to impart know-how on crypto currencies. Today, companies already use videos, which are made available to members and customers on the video portal YouTube and within the in-house info database, to explain the functionality of software. The same concept could also be applied to knowledge transfer in the area of blockchain and virtual currencies. In the form of video clips or podcasts, questions and topics relating to crypto currencies can be explained within a few minutes.

### 4.2.3. *Chances and risks*

Building this network not only costs money but is also time-consuming. Even in this use case, it is by no means certain whether the blockchain technology and the crypto currencies based on it will prevail in the market of the future. On one hand, the technology has the potential to fundamentally change both our economy and our society (Wilting, 2018). On the other hand, there are also critics who warn that the potential of blockchain is overestimated and that even crypto currencies in the form we know them today will not prevail (Klingebiel, 2018). Should this judgment be correct, then valuable resources would be wasted in setting up a consulting and information system.

Nonetheless, an opportunity that would result from a consulting and information system would be the possibility of customer retention or customer acquisition. Even today there are some management consultancies that have specialized in questions around

blockchain and crypto currencies. With their own consulting and information system, companies can prevent existing customers from migrating to these competitors and win new potential customers.

A further opportunity would be the development of know-how and the resulting knowledge transfer. The expertise bundled in the expert team could be used not only for consulting but also for the development of new solutions and business models. The opportunity to build an interdisciplinary team consisting of tax consultants, auditors, and lawyers would be of great advantage.

#### 4.3. Salary payment in crypto currencies

##### 4.3.1. Initial situation and challenge

In total, 29% of Germans—almost one in three—find crypto currencies interesting above all as a financial investment. In the future, however, crypto currencies could become the focus of public attention not only as an object of speculation but also as a nationally accepted means of exchange and payment. The payment for services and goods with virtual currencies could, with their increasing spread, become an integral part of our everyday life. Consequently, salary payments in the form of crypto currencies would then also be conceivable.

In Japan, as well as in Germany, there are already companies that pay salaries partly in crypto currencies (Gennert & Keding, 2018). If a company wants to enable its employees to receive their salaries in crypto currencies, there are currently two alternatives available for implementation. On one hand, a cooperation with a start-up, such as the company PEY, which has already organized salary payments in crypto currencies on a smaller scale, is conceivable. However, this might not be a viable option, especially for large companies due to PEY's limited experience in this area. On the other hand, a company can organize the salary payment itself, that is, without an external partner. However, the lack of expertise and the high degree of technical requirements that would be necessary for the implementation pose great challenges for most companies. Until today, there are no solutions on the market that are suitable for the masses and that can guarantee uncomplicated and secure salary payments in crypto currencies for employees and employers.

##### 4.3.2. Solution

An established company that acts as an intermediary and organizes and coordinates salary payments in crypto currencies could fill this market gap. In this case, employee and employer agree that a certain percentage of the salary will not be paid in euros but in the form of a crypto currency. However, the percentage may not exceed the limit of 30% of the salary for tax reasons. As before, the employer transfers the salary to the employee's account, except for the portion intended for payment in crypto currency. The part intended for conversion is transferred to the intermediary. The intermediary in turn exchanges the amount received in euros at the current exchange rate for the crypto currency specified by the employee and transfers the coins to the employee's wallet.

##### 4.3.3. Chances and risks

The assumption of salary payments in crypto currencies by an intermediary could offer great opportunities, especially in the long term—but also involves some risks. As an example of the latter, it is not certain whether the market demand for salary payments in crypto currencies could even justify the high costs that would be involved in implementing this application.

In addition, a company could become more vulnerable to cybercriminals by implementing the salary payment service. Large sums of money would be moved both when receiving transfers initiated by the employer and when exchanging them for crypto currencies and transferring the coins to the wallet. These transactions are therefore potential targets for hacker attacks. A comprehensive security infrastructure is necessary to counteract this risk. Some companies already have high-performance data centers and the technical know-how to handle highly sensitive data. The use of these already existing technical resources represents a central opportunity in the realization of salary payments in crypto currencies. In addition, the first provider of a salary payment service in crypto currencies suitable for the mass market could secure a strategically favorable and economically promising market position. The technological lead over competitors that can be achieved here can represent a decisive opportunity, especially if crypto currencies continue to diffuse in society and the economy. Should the issue of a salary paid proportionately in crypto currencies become more important to employees or should the entire salary be paid in digital currencies in the future, these first intermediaries would already have the necessary infrastructure and experience for widespread implementation.

## 5. Discussion

When realizing a platform that automates the documentation of crypto currency transactions, there are two different possibilities. Either solutions already existing on the market could be purchased, or the platform could be developed by the company itself. However, the development of this platform solution requires technical know-how, which is why it would be particularly interesting for companies with experience in software development. Compared to purchasing, this could be the more cost-effective, but probably also more time-consuming, way. Since 3% of citizens in Germany already own crypto currencies (Rehkopf, 2018), the topic

of the documentation of crypto currency transactions is currently relevant. The creation of a dedicated platform that takes on this task offers the opportunity to win new customers and prevent existing customers from turning to the software solutions of the competition. Some users may fear that by bundling all information on a central platform they will become transparent. However, this risk is rather secondary compared to the opportunities that a company would miss if it did not act.

In summary, the creation of this platform solution is associated with a rather low risk, and the financial and time expenditure would be manageable. Due to the current relevance for users and the fact that competing solutions already exist on the market, the timely implementation of this use case, especially for companies from the financial sector, seems to make sense.

In contrast, the feasibility of the consulting and information system depends strongly on its type and scope. At the heart of this system is a team of experts who bundle know-how about blockchain and crypto currencies. The establishment of this team is both time-consuming and involves financial expenditure. The training and further education of existing employees probably requires more time than the recruitment of external experts but would be less costly. A combination of the two alternatives would probably be most advantageous. All in all, setting up a consulting and information system would involve a mediocre amount of time and money. The technical feasibility should not pose a major challenge.

However, a company would expose itself to certain financial risks when setting up this network as it is not certain that blockchain and crypto currencies will prevail on the market. In view of the opportunities that would be missed in the event of inactivity, the risk in this case appears to be rather low. Especially a company that is active in the field of consulting should have the necessary expertise in regard to blockchain and crypto currencies because, otherwise, it risks that existing customers as well as potential new customers will migrate to the competition. Also, the possibility of an interdisciplinary team of experts and the associated knowledge transfer would not be feasible.

In summary, the development of a consulting and information system would be associated with an average level of effort and a low risk. Therefore, the implementation of this application case seems to be reasonable in the near future.

If the salary payment in crypto currencies were organized by an established company, this could be an alternative suitable for the masses. Compared to the solutions currently available on the market from start-ups, this would represent a more secure and convenient way of paying salaries in crypto currencies. However, setting up this salary payment system would require a great deal of effort. Since there are no mass market solutions available that can be purchased, a large part of the system would have to be developed in-house. Due to the high security requirements and the technical complexity, the development is likely to be both time-consuming and costly. The implementation would therefore be reserved for companies that have experience in software development and in handling highly sensitive data as well as the necessary high-security infrastructure structure. The exception would be the „first mover“ advantage, in which a company not in this select group could obtain the market by becoming the first mass provider of salary payments in crypto currencies. However, there are high risks. The more assets that are managed or transferred in the form of crypto currencies, the more the company could become the focus of hackers. In addition, there is the danger that too few employees will become enthusiastic about this form of salary payment or that crypto currencies will not be able to assert themselves on the market. In both cases, the high investments required to set up this system would not be amortized.

It can be concluded that the payment of salaries in crypto currencies through a large intermediary could provide considerable added value for employers and employees compared to the current situation, but it would require a very great financial and time investment. The technical complexity of the solution is also likely to be a major hurdle. The high risks that a company would have to accept mean that a timely implementation of this solution in practice does not appear likely.

## 6. Conclusion

How the spread of blockchain technology and the crypto currencies based on it will develop in the future is a controversial topic of discussion among experts. In the opinion of many, the technology has the potential to fundamentally change our economy and society but is still in an early development phase (Wilting, 2018). Last year, the sharp rise in the price of crypto currencies, especially Bitcoin, caused virtual currencies and blockchaining to become increasingly more the focus of public and media attention. Since the price peak in December 2017, however, prices have fallen sharply again (Günsch, 2018). While one can still read a lot about the potential of this technology, especially in recent years, reporting on crypto currencies is declining, and this year is increasingly marked by negative headlines. In particular, the slump in share prices and increasing government regulation worldwide are causing uncertainty in the industry and a decline in public attention (Günsch, 2018). However, a decline in media and public attention does not necessarily have to mean something negative. On the contrary, for blockchain, it is a chance for the use of the technology to be limited to the really essential areas. Away from public perception, the technology can then be optimized in order to finally develop its full potential (t3n, 2018).

The platform solution for „Cointracking“ and the development of a consulting and information system as well as a salary payment in crypto currencies offer the industry considerable added value compared to solutions currently available on the market and are thus opportunities to optimize the use of the technology. However, the respective implementation depends strongly on the degree of the spread of crypto currencies in our society. While the implementation of the consulting and platform solution could be

carried out promptly due to the relevance already given today, salary payment in crypto currencies only makes sense when the market diffusion of this technology increases.

In general, the challenge for all companies and society in dealing with blockchain is that the use of the technology is associated with a high degree of uncertainty due to many unclarified legal and technological questions. This technology is therefore also highly relevant for future research. To enable not only companies but also governments and supervisory authorities to correctly classify, promote, or limit the developments around blockchain, especially the risks such as vulnerability to hackers, must be further researched. The user-friendliness beyond corporate areas can also hold many potentials. Social issues, such as the shaping of modern democracy or the assumption of intermediary tasks between different parties, as is the case today with notaries, for example, should be the focus of the future consideration of blockchain technology. All in all, therefore, the technology still holds many interesting questions, the answers to which form the prerequisite for making full use of the technology's future potential.

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