

# Acceptance Factors and Obstacles for Cryptocurrency Adoption

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## ABSTRACT

In spite of all the hype, media attention, and explosion in market valuations, cryptocurrencies have so far failed to find wide acceptance as a means of payment. This has led to a wealth of literature investigating why cryptocurrencies such as Bitcoin failed to establish themselves widely. However, these investigations have generally focused on specific cryptocurrencies and did not highlight which features of cryptocurrencies help or hinder adoption. This paper helps close this gap by conducting a qualitative user study with 960 respondents representative of the German population, obtaining freeform answers on the main adoption factors as well as the main obstacles for cryptocurrencies from both existing and potential users. We identify 33 reasons for and against cryptocurrency adoption, distributed into financial, ideological, benefits-based, technical, acceptance-based, and security-based categories. The contribution of this paper is threefold: We go beyond positive reasons and explicitly consider obstacles to cryptocurrency adoption inside a unified framework. We also identify additional payment system features that differ between different cryptocurrencies and influence their adoption. Thirdly, we identify adoption factors based on perceptions and personalities rather than just measurable features. Therefore, this paper also adds to the ongoing systematization of cryptocurrencies in the current stream of literature on the topic.

## CCS CONCEPTS

• Applied computing → Digital cash; • Human-centered computing → User studies.

## KEYWORDS

Cryptocurrencies, technology adoption, user studies

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## 1 INTRODUCTION

When Bitcoin first appeared on the scene in 2008, it was hailed as a revolutionary technology with the potential to disrupt the financial industry by making central intermediaries such as banks obsolete

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[27]. It spawned a huge number of further cryptocurrencies (CC) with different properties and features, which reached a total market valuation exceeding one trillion US dollars as of January 2023 [10, 18]. However, in spite of generally being designed as a means of payment first and foremost [27], their rate of adoption for everyday financial transaction did keep up with their rise in valuations [20]. This observation led to a wealth of literature exploring the adoption of Bitcoin or CC [1, 3, 5], either in general or specifically as a means of payment. However, there is a lack of literature specifically on the acceptance factors and obstacles of adopting CC as a payment system. With this paper, we contribute to the literature by conducting a qualitative user study asking both prospective users as well as non-users for their motivation for using CC as a means of payment, or for the main obstacle they see to doing so. We focus on end-users, as the lack of adoption by this group has been found to be the main obstacle preventing adoption by retailers [20]. This way, we can identify features that future CC can implement that can help them find use for everyday transactions, and avoid pitfalls that could stop individuals from using them for that purpose. We are able to identify a number of CC properties and perceptual factors that influence adoption positively or negatively, grouped into financial, ideological, benefits-based, technical, acceptance-related, and security-related categories.

The remainder of this paper is structured as follows: We discuss related work in chapter 2, our methodology in chapter 3, and our results in chapter 4. These results and their limitations are discussed in chapter 5, before we offer concluding remarks in chapter 6.

## 2 RELATED WORK

The acceptance of new technologies has been an active research topic for decades [11, 13]. CC offer an interesting application for these theories [3, 5] and we present the related work on CC adoption and, more specifically, on the adoption of CC as payment systems in this section. Afterwards we elaborate on how this paper differentiates from prior work in the area.

### 2.1 User Adoption of Cryptocurrencies

The effect of perceived benefits and risks on Bitcoin adoption are investigated in prior work [1] on the basis of the technology adoption model [11], finding that perceived financial, operational, legal, as well as regulatory risks lead to significant concerns stopping individuals from adopting the technology. Further research focuses on barriers to adoption by employing inductive content analysis, going through archival data from peer-reviewed research to Reddit posts, identifying 16 barriers to blockchain adoption ranging from lack of knowledge to specific issues such as storage concerns [29]. Another study with non-users of Bitcoin identifies six primary reasons for resistance behaviors, which are transition costs, uncertainty costs, loss aversion, sunk costs, anticipated regret, and

decisional control [25], with anticipated regret, which is defined as an "individual's feeling that they will regret their decision for something new in the future" [22, 25] being a necessary condition for resistance. A further multi-method research study on individual Bitcoin adoption incorporates a multi-stage approach based on interviews with domain-experts, users and non-users, and different stakeholders [12]. The authors start with expert focus groups in the first phase, then recruit a convenience sample of 110 MMA and BBA students in a large southeastern U.S. university. They include users and non-users in this group and use three open-ended questions, asking for 1) advantages and 2) disadvantages of using Bitcoin compared to traditional payment methods and 3) whether the interviewee will use Bitcoin in their transactions in the future. The third phase then focuses on stakeholders who the authors define as professionals that engage with the cryptocurrency ecosystem on a daily basis and who understand the technology. The authors arrive at a number of positive and negative utilities, and incorporate these into an adoption framework based on both the unified theory of acceptance and use of technology (UTAUT) model [33] and classic utility theory. One study looks at users as well as non-users of crypto-assets [34] and highlights the role of trust, offering recommendations to increase the self-efficacy as well as the trust of non-users to lower the barrier to entry for crypto-assets. Another study [15] employs General Morphological Analysis [4] to create a morphological table of cryptocurrency payment features, and conducts a user study exploring which of these features individuals consider most important, identifying low costs and confidentiality as crucial, followed by convenience factors.

We build upon this work by conducting a qualitative study asking both users and non-users of CC as payment systems either what they consider the main benefits of using this technology, or what main obstacles prevent them from doing so.

## 2.2 User Adoption of Cryptocurrencies as Payment Systems

A recent literature survey on the current cryptocurrency adoption level and adoption-influencing factors argues that there is not sufficient literature on the users' perspective [5]. The analysis solely relies on academic references supplemented by data from online websites, news and blogs. The main finding suggests that the primary adoption drivers are the investment opportunity cryptocurrency offers, transaction anonymity and privacy, payment acceptance by businesses, the fast transfer of funds, the low cost of transactions, and technological curiosity. However, the results of this survey are neither based on an original study of actual users nor do they consider obstacles for adoption. Furthermore, the work only refers to the adoption of cryptocurrencies in general, while we specifically investigate the adoption of cryptocurrencies for payment purposes.

Another closely related research article investigates the use of cryptocurrencies as payment systems in Ghana [28]. The work is based on nine in-depth interviews with staff from 3 different cryptocurrency companies. Findings indicate that with the respective regulation, cryptocurrencies may well serve as payment, but the use of cryptocurrencies for criminal activities is perceived to be the

main risk. In contrast, we survey the end users themselves with a clear focus on reasons for adoption and obstacles.

Esmailzadeh et al. [12] limit themselves to Bitcoin and do not look at other CC. The study aims to answer questions in a similar way to our research, but it focuses on groups that are either very close to the technology at hand with the expert and stakeholder interviews in the first and third phases, or employing a non-representative sample of students in business administration. All these groups can be expected to have a higher education level, and these results may not be generalizable to the overall population. In contrast, we collect feedback from a representative sample of the whole population.

In summary, we go beyond the previous research by conducting a qualitative user study offering insight into adoption factors and obstacles for CC acceptance among the general population, while focusing on the use case of payments, which lagged beyond the widespread use as an investment [20]. To the best of our knowledge, this is the first study of this type combining qualitative methods with a representative large scale user study.

## 3 METHODOLOGY

We first surveyed e-commerce users to learn about their habits using CC. Unfortunately, it showed that among our representative sample of around 250 e-commerce users there was only a limited number of respondents who had actually used CC. Therefore, we used the first survey as pre-test for another survey with more than 1.000 participants to which we refer as main or final survey.

### 3.1 Pre-Test

The pre-test was conducted in January 2021. We first describe how the data was collected and then briefly what we have learned for the main survey. The survey was conducted in German.

*3.1.1 Data Collection.* We distributed our questionnaire with the help of a professional German market research institute (certified following the ISO 26362 norm) and reached a sample of 257 participants representative of users of e-commerce. We relied on the market research institute' knowledge of the distribution of online shoppers.

The participants were asked whether they have conducted a financial transaction with CC in the past, and if not, whether they have at least considered doing so. For the latter group, we asked the respondents to elaborate on what stopped them from employing CC for the transaction via a freeform text field, as we expected this group to have some working knowledge on cryptocurrencies, enabling them to highlight obstacles for adoption. Of the 257 participants, only seven declared that they have used CC in the past, 26 claimed to have considered doing so, and the remaining 224 never considered using CC in a payment transactions.

*3.1.2 Lessons learned.* We had included four questions about concerns using CC, but due to the low number of participants having used CC, refrained from evaluating them in depth. The answers indicated that participants were mostly worried about fraud and volatility of CC while they were not as preoccupied about potential technical issues. For the textfield, we removed three nonsensical answers, and the 23 remaining answers revealed an initial set of

concepts that offered a starting point for future considerations. At the same time, however, the dearth of respondents in that category showed that it may be more fruitful to additionally ask both people who considered using CC for payment purposes, as well as those that would not even entertain the thought, what stops them. Even though it seems reasonable to assume that a high proportion of the group that never even considered using cryptocurrencies consists of people who lack interest or knowledge about CC, we argue that their answers could still reveal further insights into the main impediments of CC adoption as a payment system. Following the pre-test the decision was made to further ask the people who had already used CC for payments what their main reason for doing so was. While this question arguably is not directly related to the main impediments of CC usage, it may still provide interesting insights into what drives those people who do use their cryptocurrencies and tokens for actual payment transactions.

### 3.2 Main Survey

The main survey was conducted in March 2021. We first describe the data collection and then our evaluation process. The survey was conducted in German.

**3.2.1 Data Collection.** While the pre-test was done using a sample representative of e-commerce users, we aimed to obtain a more general and larger sample for the final analysis. We distributed our questionnaire with the help of a professional German market research institute (certified following the ISO 26362 norm) and reached a sample of 1,053 participants. To ensure representativeness, respondents were discarded if age and gender quotas were already fulfilled. Participants were to indicate whether they already have conducted a payment in a cryptocurrency such as Bitcoin, Ethereum, or Monero, or if they would consider doing so. Those that stated that they have used a CC for payment purposes in the past or would consider it were then asked what the main reason for using this payment method was or would be. For the remaining group the question was on the main reason of them declining this option. We will refer to the first group (users) as the “Yes” group, the potential users as the “Maybe” group, and the declared non-users as the “No” group. After clearing out obviously nonsensical answers such as “-,-” or “*BitChain-Power :3*”, the “Yes” group numbered 43 respondents, the “Maybe” group 441, and the “No” group 476, for a total working sample of 960.

**3.2.2 Evaluation.** Based on results from the literature review as well as answers from the pre-test, an initial codebook was created. Codes represent dimensions of a concept and enable the abstraction of answers. One example is the code *usability*, which can cover the ease of learning as well as the difficulty of actually using a CC as a payment method. The statements obtained from the survey were independently screened by two researchers using the initial codebook as a starting point. The positive codes were used for replies by the “Yes” and the “Maybe” group. The other group was asked for what was stopping them, necessitating the use of negatively valued codes. However, each researcher was free to add codes if the existing ones did not cover an answer. This precluded us from employing the widely-used reliability measures such as Cohen’s Kappa [9]. In their place, we employed a very simple reliability

measure where complete agreement between researchers across all codes for each answer was taken as a measure. If both researchers added congruent codes, those were taken as agreement, otherwise these new codes were ignored for the reliability measure, an approach already used in prior work [17].

For the group which stated that they already had paid with cryptocurrencies, the codes agreed in 33 of 43 cases for a reliability ratio of 77%. For the group that would consider it (that we referred to as the “Maybe”-group), our agreement was for 335 in 441 answers, a ratio of 76%. Finally, for those that answered that they would not use CC for payments under any circumstance, the ratio was 370 out of 476, or 78%.

After establishing reliability, discussions between the researchers took place to clarify the disagreements and arrive at a final coding set that will be presented in the next section.

## 4 RESULTS

After removing the answers that were just gibberish or did not pertain to the question asked, we divided the final reasons into the categories *financial, ideological, benefit, technical, acceptance, and security*. An overview over the reasons and their frequency inside each group are given in Table 1. ‘Y+’ denotes the “Yes” group, ‘M+’ and ‘M-’ denote the “Maybe” group and ‘N-’ denotes the “No” group. We did a further differentiation of the “Maybe” group since despite asking for the main reasons why respondents would use CC, a number of respondents answered with obstacles, such as environmental issues (I.5). Therefore, we distinguished between positive acceptance factors (‘M+’) and obstacles (‘M-’).

The following section will define each reason, note in which groups the answer was encountered, which concepts are interrelated, and offer sample responses corresponding to the reason in question.

### 4.1 Financial reasons

Financial reasons include all those answers that focus on financial issues. Investment (F.1) is related to both price stability (F.4) and speculative (F.5), as all three are concerned with movements in the price of CC or the purchasing power associated with it, with the latter two concepts being obstacles to adoption. The difference between price stability and speculative is that the former indicates that the respondent considers CC as a medium of exchange, but one with an unstable exchange rate, while the latter signifies responses that consider CC purely financial instruments. Low costs (F.2) and and too expensive (F.6) are not directly related: Low costs almost universally relates to low transaction costs, while too expensive generally means that respondents consider their funds insufficient for even acquiring CC.

**F.1 Investment** consisted of all answers highlighting opportunities for making profits associated with CC. The code occurred in the “Yes” and “Maybe” groups. We did not expect this to be a popular sentiment as our question was very explicitly about payments using CC as a medium of exchange. Sample quote: *«At the same time, it is also a speculative object, which may allow you to buy high-quality goods based on the profits you have made.»*

**Table 1: Reasons for and against the adoption of CC**

Cat.	Ref.	Item	Y+	M+	M-	N-
Financial	F.1	Investment	5 (11.6%)	25 (5.7%)		
	F.2	Low costs	2 (4.7%)	8 (1.8%)		
	F.3	No value				12 (2.5%)
	F.4	Price stability			5 (1.1%)	41 (8.6%)
	F.5	Speculative				9 (19.0%)
	F.6	Too expensive				4 (0.8%)
Ideological	I.1	Curiosity	3 (7.0%)	18 (4.1%)		
	I.2	Decentralization	2 (4.7%)	5 (1.1%)		
	I.3	Freedom	1 (2.3%)	3 (0.7%)		
	I.4	Innovative	1 (2.3%)	26 (5.9%)		
	I.5	Sustainability			2 (0.5%)	7 (1.5%)
	I.6	Abolition of cash			6 (1.4%)	31 (6.5%)
	I.7	Not real money				14 (2.9%)
Benefit	B.1	Additional payment option	2 (4.7%)	30 (6.8%)		
	B.2	Control	5 (11.6%)	12 (2.7%)		
	B.3	Usefulness		9 (2.0%)		
	B.4	No need			87 (19.7%)	84 (17.6%)
Technical	T.1	Cash free transactions		9 (2.0%)		
	T.2	Transaction speed	8 (18.6%)	69 (15.6%)		
	T.3	Good usability	9 (20.9%)	102 (23.1%)		
	T.4	No exchange required		4 (0.9%)		
	T.5	High effort				11 (2.3%)
Acceptance	A.1	International acceptance	3 (7.0%)	10 (2.3%)		
	A.2	Future acceptance/diffusion		8 (1.8%)		
	A.3	Wide acceptance		8 (1.8%)		
	A.4	Forced adoption	1 (2.3%)	17 (3.9%)		
	A.5	Low acceptance			8 (1.8%)	4 (0.8%)
Security	S.1	Anonymity	13 (30.2%)	43 (9.8%)		
	S.2	CC secure	4 (9.3%)	38 (8.6%)		
	S.3	Data protection issues				5 (1.1%)
	S.4	Criminal reputation				14 (2.9%)
	S.5	CC insecure				87 (18.3%)
	S.6	CC not trustworthy				112 (23.5%)

**F.2 Low costs** denotes primarily low transaction costs. The code occurred in the “Yes” and “Maybe” groups. The reason was often mentioned along with other motivations in answers like “fast, simple, possible across borders”. Sample quote: *«Cheap it may be [sic]»*

**F.3 No value** corresponds to statements that CC such as Bitcoin do not have any fundamental underlying value. The code occurred in the “No” group. The statement was often done by comparing the CC to soap bubbles or stating they they would not have any tangible, real value. Sample quote: *«mathematical hot air»*

**F.4 Price stability** is an obstacle highlighting the volatility in the exchange rate of the cryptocurrency, hindering its use as a store of value. The code occurred in the “Maybe” and “No” groups. Sample quote: *«the price fluctuations are too high for me»*

**F.5 Speculative** encapsulates answers that refer to CC as instruments for financial speculation rather than a means of payment. The code occurred in the “No” group. Speculative is a negatively associated answer often in connection to financial

use by other actors. It was the second-most mentioned obstacle, only training lack of trustworthiness. Sample quote: *«they are for speculation»*

**F.6 Too expensive** denotes an answer type indicating that people state the need for additional funds to buy CC. The code occurred in the “No” group. This may indicate a lack of knowledge on the part of participants, who may see the quoted price of Bitcoin and not be aware that they are able to buy smaller denominations. Sample quote: *«have too little money to allocate to another account»*

## 4.2 Ideological reasons

Ideological reasons revolve around world-views and values influencing CC adoption. Again, there is some overlap: Curiosity (**I.1**) and Innovative (**I.4**) both express interest in learning about CC, but curiosity considers getting to know the technology as an end in itself, while innovative explicitly focuses on the technology being new or “the future”. Decentralization (**I.2**) and freedom (**I.3**) overlap with each other, as well as with control (**B.2**) from the benefit-related reasons. All three emphasize the power afforded to the user due to the lack of strong central counterparties or gatekeepers in most CC implementations, and differ mostly in the specific wording the respondents used. Another set of related reasons is the sentiment that CC are not real money (**I.7**) and have no value (**F.3**). Both represent the view that these currencies are not a viable replacement for existing payment methods, either because they lack underlying value, or because they are not money but a different thing altogether. Both were to some extent associated with the fear of abolition of cash (**I.6**).

**I.1 Curiosity** stands for answers that emphasize the desire to familiarize oneself with CC as a technology. The code occurred in the “Yes” and “Maybe” groups. Sample quote: *«try a small amount as an investment to see how the conversion/reverse exchange is how much the currency “fluctuates” i have also read up a bit on this topic - tokken [sic] etc. very interesting»*

**I.2 Decentralization** highlights the lack of need for a central authority and the openness of C. The code occurred in the “Yes” and “Maybe” groups. Sample quote: *«open system, where corruption cannot simply take place.»*

**I.3 Freedom** counts answers explicitly mentioning terms such as “Freedom” and “Independence”. The code occurred in the “Yes” and “Maybe” groups. Freedom was usually mentioned in conjunction with the enhanced control CC offer. Sample quote: *«anonymity, because we are throwing our freedom overboard with the current plans for the digital euro. Convenience and laziness must not be used lightly as the main reasons for society to limit its freedom. We need an independent supranational, free and fair financial system. Crypto is the only way, because everything else will be abused. But it will happen anyway and in 7 years we will realize how stupid we were.»*

**I.4 Innovative** captures statements that focus on the innovative aspects of CC beyond mere curiosity. The code occurred in the “Yes” and “Maybe” groups. Sample quote: *«Digital is the future»*

**I.5 Sustainability** focuses on the environmental impact of CC. The code occurred in the “Maybe” and “No” groups. Sample quote: *«I am actually rather unwilling to pay with cryptocurrency.»*

*Among other things, the climate factor is responsible for this. Too high CO2 values during “manufacturing”.*»

- I.6 Abolition of cash** covers statements expressing that CC could be used to replace cash. The code occurred in the “Maybe” and “No” groups. A number of participants indicate that they would never use CC for payments, stating that they see these as a ploy to phase out cash. Sample quote: *«I think there are enough other payment methods, such as Paypal, credit card, Paysafecard or conventional online banking, there is no need for cryptocurrencies or a digital euro. In my opinion, it is only a short step from cryptocurrencies and digital euros to the abolition of cash. Call me old-fashioned, but I love handling bills and coins. That’s why I’m an opponent of even more “newfangled” payment methods.»*
- I.7 Not real money** refers to statements that CC do not qualify as “actual” money. The code occurred in the “No” group. The topic is distinct from the “no value” answers in the way that the respondents assign CC to a wholly different category different from “currency”. Sample quote: *«no tangible payment, strange»*

### 4.3 Benefit-related reasons

This category collects specific benefits associated with using CC. The association of control (B.2) with decentralization (I.2) and freedom (I.3) was discussed in the previous section. Usefulness (B.3) and no need (B.4) are related in that (B.3) indicates a respondents sees unique advantages to using CC, while (B.4) explicitly states that respondents see no reason to use CC.

- B.1 Additional payment option** denotes appreciation of CC as an additional option for payments. The code occurred in the “Yes” and “Maybe” groups. Sample quote: *«It would be another payment option on the Internet, which gives you more options.»*
- B.2 Control** encapsulates the desire to be in full authority over their money. The code occurred in the “Yes” and “Maybe” groups. It is often mentioned in conjunction with “Freedom”. Sample quote: *«Not subject to the influence of private banks»*
- B.3 Usefulness** was used as a label for very general statements on benefits, such as “flexible” or “reliable”. The code occurred in the “Maybe” group. Sample quote: *«practical»*
- B.4 No need** signifies answers stating that the respondents do not see any use or benefit from using CC. The code occurred in the “Maybe” and “No” groups. Sample quote: *«i don’t need it, there are other better options, like paypal»*

### 4.4 Technical reasons

Technical reasons cover answers associated with technical advantages or disadvantages of CC. Cash free transactions (T.1) refers to the ability to conduct contactless payments, which may have been salient as the survey took place during the COVID-19 pandemic. It is not associated with the concept of the abolition of cash (I.6), as the former is seen as a benefit from a technical level, while the latter is talked about in more ideological ways by the respondents. However, good usability (T.3) and high effort (T.5) are directly related, as the former denotes answers claiming CC to be easy to use, while the latter refers to the opposite.

- T.1 Cash free transactions** applies to answers emphasizing the advantage of making cashless payments. The code occurred in

the “Maybe” group. Sample quote: *«No need to carry cash with me»*

- T.2 Transaction speed** covers fast transactions as the main attraction of CC payments. The code occurred in the “Yes” and “Maybe” group. Fast transactions were popular when listing multiple benefits, such as “Quick and easy”. Sample quote: *«Fast processing»*
- T.3 Good usability** covers answers focused on the ease of use associated with conducting CC payments. The code occurred in the “Yes” and “Maybe” groups. Sample quote: *«simple and straightforward»*
- T.4 No exchange required** refers to statements mentioning a lack of exchange costs and/or effort as an advantage. The code occurred in the “Maybe” group. Sample quote: *«Anonymous form of payment. No currency conversion for foreign transactions»*
- T.5 High effort** is the opposite of “good usability”. The code occurred in the “No” group. The statement is often given by persons that would not even consider using CC for payments. Sample quote: *«It’s just too much effort for me to get any at all. There are plenty of more direct ways to pay.»*

### 4.5 Acceptance-related reasons

Acceptance-related reasons include any answers related to acceptance of CC by other parties. This means that the users made their decision of adopting dependent on whether they would actually be able to use CC. Wide (A.3) and international acceptance (A.1) differ in whether the respondents explicitly mentioned cross-border transactions as a reason to adopt CC, while future acceptance/diffusion (A.2) explicitly mentioned the temporal component, i.e. the expectation that they would be able to use CC in the future. These distinctions were not present in the stated obstacles, the overall tone among respondents was that acceptance is low (A.5).

- A.1 International acceptance** highlights the usability of CC for cross-border transactions. The code occurred in the “Yes” and “Maybe” groups. Sample quote: *«fast, simple, possible across borders»*
- A.2 Future acceptance/diffusion** means that respondents would use CC for payments once they were accepted by other parties, but they do not think this is the case yet. The code occurred in the “Maybe” group. The difference to the other acceptance reasons is that they do not see this as being the case yet. It follows that this response was exclusively found in the “Maybe” group. Sample quote: *«if that is the future, I am happy to»*
- A.3 Wide acceptance** is used as the residual answer type whenever respondents answered that they see acceptance as a main reason for using CC, but their answer does not fit the more specific categories. The code occurred in the “Maybe” group. Sample quote: *«Convenient and accepted alternative to other online payment methods»*
- A.4 Forced adoption** answers state that they would pay with CC, but only if they are left with no other choice. The code occurred in the “Yes” and “Maybe” groups. Sample quote: *«Would only be considered if the service provider does not accept any other currency.»*
- A.5 Low acceptance** denotes answers stating that the respondents do not feel that they could make use of CC for payments even

if they wanted to, due to lack of acceptance by transaction partners. The code occurred in both the “Maybe” and the “No” groups. Sample quote: *«is still not used enough»*

#### 4.6 Security reasons

The final category were security-related answers. We include lack of trust (S.6) as well as association with criminal activity (S.4). CC secure (S.2) and CC insecure (S.5) are direct opposites. Issues related to privacy were named anonymity (S.1) when highlighted as a strength of CC, and data protection issues (S.3) when named as an obstacle, as the former was the by far most frequent wording by respondents, while the obstacle seen by the “No” group referred to their personal data rather than anonymity.

**S.1 Anonymity** We employ the label anonymity as a generic term for privacy related answers as “anonymity” was by far the most commonly mentioned term. However, we included two references to “untraceability” and one to “data protection” under this label as well. The code occurred in the “Yes” and “Maybe” groups. Answers referring to anonymity and data protection were especially popular among those that already use CC for payment purposes, where it was the most popular reason by a distance. Sample quote: *«Cryptocurrency payments offer an alternative that contains limited data of users. When you pay with digital cash, you can stay away from identity theft. While a third-party gateway may require your name, your remaining information is kept private.»*

**S.2 CC secure** Security refers to answers indicating that the respondent does not feel CC transactions are safe or secure. The code occurred in the “Yes” and “Maybe” groups. Referring to the security of CC was popular especially as a reason that could foster adoption in the “Maybe” category. Sample quote: *«I have never paid with cryptocurrencies until now, but would be interested in doing so if it turns out to be safe.»*

**S.3 Data protection issues** Data protection issues refer to all (perceived) issues about loss or leakage of personal data. The code occurred in the “No” group. Sample quote: *«I am not familiar enough with this and am unsure whether my data will not fall into the wrong hands»*

**S.4 Criminal reputation** Criminal reputation refers to the association of CC with criminal activities. The code occurred in the “No” group. Sample quote: *«they are only something for criminals and speculators»*

**S.5 CC insecure** This refers to answers that declare CC to be “not safe” or “insecure” The code occurred in the “No” group. Sample quote: *«Safety concerns»*

**S.6 CC not trustworthy** CC not trustworthy refers to the lack of trust associated with CC. The code occurred in the “No” group. Sample quote: *«Have not yet dealt with this issue. Do not know how it works and therefore distrust the subject.»*

#### 4.7 Other reasons

We decided to leave two somewhat frequent reasons out of our analysis: Lack of knowledge and lack of interest. Our reasoning is that both answer-types do not signify anything about CC by themselves, and cannot easily be classified in the adoption factor or obstacle categories. Knowledge and interest of (potential) users may

change in the future, but it’s hard to predict how those participants’ answers will then be distributed among reasons and obstacles for CC adoption.

A number of statements were not captured by the listed categories, either because did not occur with often enough to abstract them to one core term, or because they switch usually positive statements to negative or vice versa. One example is a person in the “Yes” group listing *«diversity and sustainability»* as a positive reason to use CC, when every single other response that mentions sustainability or environmental impact argues these to be negative in nature.

## 5 DISCUSSION

In this section, we discuss our findings against the backdrop of prior relevant literature, before discussing limitations and future work.

### 5.1 Comparison of Results

The collection of codes confirms most factors described in prior work by Hamm [15], but it also reveals further features and factors for the potential adoption of CC as a payment system. An overview is given in Table 2. There is a clean mapping between the characteristics found in that paper and our concepts for “transaction costs” (F.2), “confidentiality of data” (S.3), “anonymity of participants” (S.1), “ease of use” and “learnability” (T.3), “transaction speed” (T.2), “acceptance points (number)” (A.3), and “acceptance points (spread)” (A.1). Among the codes from that paper, “payment amounts” was not mentioned at all by our respondents, while “payment service provider” and “receiver of customer data” are associated with concepts such as “decentralization” and “control”, but with no clear one-on-one mapping.

In terms of features, i.e. aspects that are dimensions of CC payment systems themselves, we find five additional dimensions compared to the aforementioned paper: First is “architecture”, which can be central (like in some permission systems) or fully decentral. Decentralization is universally seen as a benefit, and a positive, albeit weak effect was found in prior research [1]. The other feature not already included in the aforementioned paper [15] is security, which can act as both a benefit as well as an obstacle in case of it’s absence, and whose effect is still very well founded in prior literature [1, 3, 5]. The other new features are pure obstacles: Fundamental value denotes that people need to feel that a CC has to represent something valuable. It can be argued to what extent popular CC do represent value in themselves, but making them convertible to other assets such as fiat currency or commodities such as gold could ensure that more people perceive them to be valuable. Price stability was regularly mentioned, as individuals were concerned that they may take losses if they hold off on purchases. This is highly relevant as being a store of value is generally considered one of the three defining characteristics of “money” alongside being a medium of exchange and a unit of account [26]. Notably, even though the “Maybe” group of respondents was only asked what their main motivation of using CC would be, many mentioned that they see a lack of price stability as an obstacle, again confirming prior research [5]. Something similar happened with regards to sustainability: a number of individuals in the “Maybe” group state that the environmental impact of CC mining is stopping

**Table 2: Combined table of cryptocurrency payment system features and adoption factors**

Characteristic		Instances				
Payment system features	Transaction costs	None	Low <b>F.2</b>		High	
	Confidentiality of data	Low <b>S.3</b>	Medium		High	
	Anonymity of participants		Given <b>S.1</b>		Not given	
	Ease of use		Easy <b>T.1 T.3 T.4</b>		Complicated <b>T.5</b>	
	Learnability		Easy		Complicated	
	Transaction speed		Fast <b>T.2</b>		Slow	
	Acceptance points (number)	Low <b>A.5</b>		Medium <b>A.2 A.4</b>	High <b>A.3</b>	
	Acceptance points (spread)		National		International <b>A.1</b>	
	Payment amounts		Micropayments		Macropayments	
	Payment service provider	Banks	Financial service providers	Specialized intermediaries	CC exchanges	Central banks
Receiver of customer data	Banks	Financial service providers	Specialized intermediaries	CC exchanges	Central banks	
Payment system features	Architecture		Central		Decentral <b>I.2</b>	
	Fundamental Value		Given		Not given <b>F.3</b>	
	Price stability		Given		Not given <b>I.5</b>	
	Security		Given <b>S.2</b>		Not given <b>S.5</b>	
	Sustainability		Given		Not given <b>F.4</b>	
	Adoption factors	Perception	Law-abiding users			Criminal users <b>S.4</b>
			Trustworthy			Not trustworthy <b>S.6</b>
Dependent on others					Independent <b>I.3 B.2</b>	
User personality		Payment instrument <b>B.1</b>			Investment asset <b>F.1 F.5 F.6</b>	
	Useful <b>B.3</b>			Useless <b>B.4</b>		
		Open to Experience <b>I.1 I.4</b>			Conservative <b>I.6 I.7</b>	

them from adopting these for payment purposes. This demonstrates to what extend the perception of the environmental impact of CC use, which is an active area of research [6, 21], colors perceptions.

Aside from these features which can easily be translated into characteristics of specific CC, further codes translate into factors that cannot be directly mapped into properties a CC can have or not have. First, we have perception facets: A number of respondents stated clearly that they see CC as a tool for criminals and did not wish to be associated with them. The co-development of CC and darknet markets has been the topic of previous research [19], and this association has to be overcome for CC to achieve wider acceptance. Another crucial perception is trustworthiness. Among those interviewees that do not want to use CC, a lack of trust or a general feeling of disrepute is commonplace, confirming prior research [24, 30, 31]. On the flip-side, there is a positive influence in the perception of independence, encapsulating the freedom (**I.3**) and control (**B.2**) codes, which are concerned with being the master of one’s own destiny (or at least finances).

The differentiation between CC as a means of payment and an investment asset has been explored in prior research [14]. However, these two viewpoints are not mutually exclusive: A number of respondents bought CC as investments, but were happy to use them as a payment option. On the other side, the potential financial upside was referred to as a benefit of CC, when intended as a means of payment. However, this is also associated with speculative activity by some respondents, who feel that acquiring CC carries too much risk. A number of users also note that they lack the funds to buy CC, which indicates that financial considerations

strongly influence their decision of acquiring CC. Thus, the financial perspective offers both positive adoption factors as well as obstacles [1, 8]. The final perception factor is usefulness, which can both be a positive adoption factor as well as an obstacle, if people do not feel that CC affords them any advantages [12].

Finally, we identify personality as an adoption factor, namely openness to experience, which we associate with a number of concepts. Adoption factors positively related to CC are curiosity, as well as the perception that CC offer a novel means of payment. Openness to experience has previously been identified as the most significant personality-based predictor of cryptocurrency adoption [32]. On the other hand, we find fears that CC are a means to achieve the abolition of cash payments, as well as the perception that they are "no real money", both of which are obstacles opposed to the adoption of CC. The former has not been researched previously in the context of cryptocurrency adoption, while the latter perception is well founded in current research [14].

## 5.2 Limitations and Future Work

This study aimed at offering new insights concerning the adoption of CC as a means of payment for the general population. However, we worked with a representative sample of the German population. Future research can investigate whether these findings apply to users with different geographic and cultural backgrounds.

In our study, we asked the participants for their perception of CC, without exactly defining which CC we are referring to. On the one hand, this was necessary as the knowledge of CC is rather low in the general population, and limiting ourselves to a specific CC

would further reduce the number of respondents who can add to the results of our study. On the other hand, not all CC share the same properties, and it is possible be that some of the perceptions of our respondents are not only caused by a different mindset, but rather from thinking of a different CC. Therefore, we propose as future work a study investigating knowledge on one or several specific CC in depth, and further investigating adoption factors and obstacles for the CC in question.

While the qualitative investigation sheds light on different adoption factor and obstacles, it is not possible to deduce which ones are decisive just using this methodology alone. Therefore, we suggest a quantitative study using our contribution as a foundation to identify the influence of each of the possible adoption factors and obstacles on the actual decision to use CC for payment.

There may also be a mismatch between perceptions and real properties. Especially in the privacy-domain, previous research has shown how massive the gap between end-user expectations and reality can be [7, 16, 23].

Recent research of the users of crypto-asset wallets identified distinct subgroups based on psychometric constructs and evaluated their differing risk perceptions and security behaviors [2]. While not directly transferable to our results as we considered non-users as well as users and focused on the singular use case of payment methods, their methodology could possibly be employed on non-users, and it may be evaluated to what extend their subgroups are also found when applying our selection criteria.

## 6 CONCLUSION

We conducted a qualitative study exploring the main adoption factors and obstacles for CC acceptance as a payment method from the perspective of the user. We did this by collecting freeform answers from a representative sample of German population and condensing their answers into a set of concepts that facilitate or impede on the adoption of CC for everyday payments. Our contribution sheds light on what the main acceptance factors as well as the main obstacles to CC adoption are, highlighting ideas that are rarely explored in the literature such as the perception that CC are "not real money" or worries due to their perceived association with criminal behavior. We were able to group these concepts into six categories: Financial, ideological, benefits, technical, acceptance and security-related, where each category contained positive acceptance factors as well as obstacles. These factors can help researchers to categorize CC and allow CC developers to make informed decisions about which features to prioritize if they aim for wide acceptance.

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