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Identifying Factors Influencing the Popularization of Cryptocurrencies Among Students in Poland in 2024

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Abstract:

Purpose: *This article aims to assess the effectiveness of defence expenditure management in the context of increasing threats to state security. In particular, it analyses the mechanisms of planning, allocation, and control of budget funds in the defence sector and their adaptation to current and future strategic challenges.*
Design/Methodology/Approach: *The article is based on secondary data analysis of the defence budgets of the European Union and NATO countries, including Poland. Methods of comparative analysis, strategic documents analysis, and case studies of good practices in defence finance management were used. The research problem was formulated: Does the increase in defence spending in EU and NATO countries translate into a real strengthening of defence capabilities, or do management and strategic planning deficits limit their effectiveness? The hypothesis assumes that effective management of defence expenditure, based on multi-annual programming, risk analysis and efficiency audits, has a greater impact on improving the state's defence capabilities than the nominal increase in the defence budget itself.*
Results: *The study showed that although defence expenditures in European countries are systematically increasing, the effectiveness of their management is still limited by the lack of long-term planning, fragmentation of purchases, and insufficient connection of budgeting with risk analysis. Countries that implement multi-annual programming and efficiency audit mechanisms achieve higher-quality investments.*
Practical implications: *The analysis results can be used as a basis for formulating recommendations for decision-makers responsible for defence policy. Proposed directions for improvements include, among others, the development of managerial competencies in defence administration, integration of budget planning with analysis of threat scenarios, and strengthening of international cooperation mechanisms in the field of joint purchases and standardization.*
Originality / Value: *The article brings a new perspective to the discussion on the quality of spending defence funds, pointing out the importance of not only the level of financing but, above all, the quality of management of these funds. The analysis emphasizes that state security depends not only on the amount of the defence budget but also on its effective and strategic use.*

Keywords: *Spending, defense, security threat, management effectiveness, budget funds.*

JEL codes: *D24, D61, F52, G32, H56.*
Paper type: *Research article.*

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1. Introduction

In recent years, cryptocurrencies can no longer be regarded as a novel or unfamiliar phenomenon, either by researchers and practitioners or by current and prospective users. While relatively few potential users engage in cryptocurrency use daily, typically limited to investment activities, there is nonetheless a broad awareness of the concept. The phenomenon of cryptocurrencies no longer carries predominantly negative connotations; however, they have yet to achieve widespread adoption.

Therefore, a study was undertaken with the primary objective of identifying preferences related to the perception of cryptocurrency use in the Polish economic context. The research placed particular emphasis on the anticipated role of commercial banks and financial institutions in promoting the adoption of this solution.

Research into the determinants of cryptocurrency use may adopt different approaches and perspectives. They include: considerations of factors to be taken into account, research models or barriers to adoption of this technology.

Some studies focus on the intention to use cryptocurrencies as driven by the perceived value they offer. The perceived value that users derive from cryptocurrency technology is analyzed as a factor shaping their perceptions of both financial and emotional value (García-Monleón *et al.,* 2023) Other studies have examined the key drivers influencing individuals' behavioral intentions toward cryptocurrency adoption. Their study accounted for the national context, with the research being conducted in Jordan.

An extended Theory of Reasoned Action (TRA) was used to analyze the data (Almajali *et al.,* 2022) The national aspect was also included in the research conducted in Malaysia, the country which is seen as one of the leaders in digitization. The research model adopted integrated the factors of innovation diffusion theory, i.e.. compatibility, relative advantage, trialability, ease of use and observability, with consumer behavior theory, which focuses on retail investors' perceptions (perceived risk and perceived value) (Sukumaran *et al.,* 2022).

In the study, researchers attempted to identify the factors that hindered the widespread adoption of cryptocurrencies in Brazil, despite the observed significant growth in electronic banking (Trebat, 2023). Studies on the determinants of technology implementation (Nguyen and Nguyen, 2024) typically examine a variety of factors, including technological (Huarng and Yu, 2022), social (Leister *et al.,* 2022), economic (Dekimpe *et al.,* 2000), cultural (Kumar *et al.*, 2021; Smidt and Jokonya, 2022) and political aspects (Smidt and Jokonya, 2022), which affect the implementation of the technology.

Following the conducted analysis, a research gap was identified. Current research on users' perceptions of cryptocurrencies largely concentrates on their level of knowledge regarding the instrument. Other studies focus on the aforementioned groups of determinants devoting limited attention to security-related issues, as a factor that has a significant impact on the willingness to use cryptocurrencies.

Moreover, these studies do not address the question related to the actions potential users expect from the state or financial institutions for the solution to become popular. An additional rationale for continuing research in the indicated direction is that as the use of cryptocurrencies becomes popular, it will require developing and providing products and services based on the solution.

Due to their nature, they will be made available to customers using all channels of bank-customer communication within the framework of electronic banking. This aspect remains largely unexplored in both institutional market analysis reports and academic research.

The primary cognitive objective of this article is to analyze and present the awareness of cryptocurrency and the associated usage preferences among students of the Faculty of Management at the University of Warsaw. The study placed particular emphasis on identifying the factors that influence the adoption of cryptocurrencies and on presenting the expectations of the respondents regarding the role of the banking sector in developing services based on this technology.

The article is divided into five parts: introduction, literature review, research methodology, discussion of results and conclusion. In the introduction, the research problem, i.e., the propensity to adopt cryptocurrencies, was outlined. This was followed by a review of existing studies concerning the development of cryptocurrency usage from the perspective of its potential users. The research gap was identified, and both the main objective and the related specific objectives were defined.

The structure of the article was also outlined. The literature review examined the current state of research on individual users' perceptions of cryptocurrency solutions. In the methodology section, the adopted research procedure was described in detail, including a comprehensive presentation of the survey questionnaire used for subsequent analyses. The characteristics of the research sample were also provided.

The fourth section, which was the discussion of results, presented the research findings and compared them with prior research conducted by other scholars. Finally, the conclusion detailed key observations drawn from the analysis of the data collected. The limitations of the conducted analysis were identified. The possibilities of using the formulated conclusions, both by theoreticians studying issues related to the financial sector, especially banks, and practitioners with a real impact on the

introduction of new products by banks, were indicated. The section was concluded with the formulation of further research directions.

This article is part of the author's ongoing series of studies on perceptions related to electronic banking, focusing on changes in customer preferences across a range of related phenomena. These include the general perception of the quality of banking services available through electronic channels (Chmielarz and Zborowski, 2024), the use of electronic payments (Chmielarz *et al.,* 2021), the use of various information technologies such as Cloud Computing. (Chmielarz and Zborowski, 2018)

2. Literature Review

The definition of cryptocurrency characterizes the phenomenon as *...a virtual currency that is a specific means of exchange of value between its issuer and users…*. (Marszałek, 2019) The increasing adoption of this technology is largely facilitated by the Internet and the development of related solutions, such as e-commerce and electronic banking (Chen and Wu, 2009; Ertz and Boily, 2019). It is important to view it as one of the financial innovations (Massó *et al.,* 2021; Nieradka, 2019).

This phenomenon shows several advantages (high degree of security, based on blockchain, cross-border, anonymity, etc.), but at the same time raises many concerns, offsetting the evident benefits (lack of state protection, vulnerability to speculation, etc.).

The concept of cryptocurrencies and their potential applications give rise to technological issues such as blockchain (Wikarczyk, 2019) and distributed ledger technologies (Piech, 2017; Przyłuska-Schmitt, 2016)) as well as economic (Sierpiński, 2017) and legal concerns (Homa, 2015).

The article by Chen *et al.* (2022) presents factors influencing the acceptance of cryptocurrencies in the Malaysian digital market. The analysis showed that factors such as social impact, the cost of acquiring cryptocurrencies, the ability to track exchange rates and customer satisfaction positively influence its adoption.

Usefulness and applicability, defined as the potential for widespread use, may have a negative effect, as the limited possibility of widespread adoption of cryptocurrencies discourages their acquisition. A similar study (Almajali *et al.,* 2022), in this case examining Jordan, included an analysis of factors influencing people's behavioral intentions to use cryptocurrency.

Elements such as social factors, perceived risk, perceived usefulness, perceived enjoyment, perceived ease of use and trust have a positive impact on the willingness to use cryptocurrency. The study also found that favorable conditions supporting the use of cryptocurrencies did not affect positive perceptions.

The article by Hadan *et al.* (2024) focuses on analyzing the concerns and motivations of individuals investing in cryptocurrencies. It was pointed out that many of them lacked proper preparation. A survey was conducted with experienced and potential investors. The results showed that the significant volatility of cryptocurrencies, which is characteristic of this market, is perceived both as a major incentive and a significant barrier to investment.

In addition, such factors as the risk of fraud, lack of personal funds, insufficient knowledge and difficulty in identifying reliable sources of information are common obstacles to making investment decisions related to this instrument. Analyses have also shown that the creation of trusted cryptocurrency trading platforms complemented by extensive educational features can have a significant impact on the decisions of potential investors.

Relevant research on the factors sustaining investor interest in cryptocurrencies was presented in an article by Tao *et al.* (2024). The paper indicated that investor interest is more pronounced for smaller capitalization and newer cryptocurrencies. In addition, it was pointed out that a stable external market environment and visible market growth are factors influencing investment in cryptocurrencies. In another article, Marthinsen and Gordon (2021) pointed out that the growth of this market is also influenced by the available volume of these assets.

The article by Almeida *et al.* (2023), which takes the form of a review of recent literature focused on investor behavior in the cryptocurrency market, characterizes the main factors influencing investment decisions. The research demonstrated that social factors and market sentiment are becoming increasingly significant in shaping investors' interest in cryptocurrencies.

The article points out that, the cryptocurrency market is dominated by irrational investors who base their investment decisions on market sentiment, and investor uncertainty leads to increased trading and the formation of a speculative bubble. The analysis presented here may suggest that it is social factors that will have a much stronger impact on people's propensity to start using cryptocurrencies. This preference will influence banks to start providing services based on cryptocurrencies.

Another article by Nabilou (2020) which discusses the possibility of allowing cryptocurrencies to coexist within European payment systems, indicates that granting appropriate licenses to dedicated institutions or implementing ring-fencing mechanisms for these assets could help protect existing payment systems from the risks associated with the coexistence of cryptocurrencies. Based on the considerations presented in this article, it can be concluded that legal changes and the openness of financial institutions in a given market will be important factors influencing the development of cryptocurrency adoption.

The analysis of the literature indicates that the popularization of cryptocurrencies is a multifaceted issue that requires examination from multiple perspectives. Similar to many issues concerning the widespread adoption of information technologies, such as mobile payments, this subject should be analyzed across three key dimensions, technological, economic and legal.

The indicated dimensions should be expanded into more specific ones. In the technological areas, it is necessary to analyze which ICT solutions applied on a large scale would have an impact on the widespread use of cryptocurrencies. In the economic dimension, the potential impact of the introduction of cryptocurrencies on the financial systems of selected economies or macro-regions should be studied.

The legal dimension should cover a series of considerations of changes in complex legal systems, often interrelated, e.g., the legal system of a particular EU member state and regulations adopted by the European Parliament. The literature indicates that, in addition to the aforementioned triad, social factors should also be taken into account, including individual propensity to adopt the technology, perceived benefits of cryptocurrencies and the influence of one's social environment.

Based on the analysis of the literature and the identified dimensions for studying the phenomenon of potential users' perception of cryptocurrencies in the context of its mass use, a research gap was observed. Relatively few studies have identified the factors across technological, economic, legal, and social dimensions that strongly influence the initial adoption of cryptocurrencies or examined which actions taken by banking sector actors may significantly contribute to the development of their mass adoption.

3. Research Methodology

3.1 Research Procedure

Referring to earlier studies of perceptions of information technology use (Chmielarz and Zborowski, 2024; Zborowski and Chmielarz, n.d.), the author adopted a research procedure that includes the following stages:

- conducting literature research and seeking expert opinions on, awareness of the use of cryptocurrencies by both individuals and financial institutions, identifying potential determinants of the initial adoption of cryptocurrencies and related banking sector services within the context of the solution under investigation,
- based on these findings and observations of the phenomenon under investigation, designing an initial pilot version of the questionnaire to be used in the survey,

- verifying the survey form with respect to the clarity and relevance of the questions to the research problem, carried out on a pilot group of randomly selected respondents,
- preparing the final version of the survey form and random selection of student groups for the implementation of the survey,
- distributing the survey link (using the CAWI method – Computer-Assisted Web Interviewing) to the previously selected student groups,
- collecting the survey results, presenting them, measuring regional differences using Euclidean distance, and conducting their analysis and discussion,
- formulating conclusions and proposing potential directions for future research.

The procedure adopted has been successfully applied, among others, by the author of this article in research on the perception of various technologies and information solutions, with particular emphasis on electronic banking (Zborowski *et al.,* 2024; Chmielarz *et al.,* 2022)

3.2 Survey Questionnaire

The analysis of online and academic sources, supported by expert opinions, enabled the identification of requirements for a survey examining the perception of information technology, specifically cryptocurrencies, in the context of both individual customer and banking sector readiness for mass adoption. It was assumed that the survey, apart from assessing respondents' perceptions of the concepts, should also provide them with substantive information on the use and availability of services based on the described solution.

In addition, the survey contrasts students' perceptions of cryptocurrencies with the adoption of this solution by financial institutions within their service portfolios. Furthermore, the survey draws attention to the main advantages and risks perceived by respondents in connection with the use of cryptocurrency technologies. The survey was aimed at students of the Faculty of Management at the University of Warsaw, who, as shown in previous research, already have some knowledge and experience in the use of cryptocurrencies. In the future, once they reach managerial positions, they will also have a tangible impact on their organizations' willingness to consider the studied instrument in organizational management.

Based on the above considerations, the survey in its original form was structured into the following parts, which addressed the following aspects:

- understanding of the cryptocurrency issue,
- assessment of respondents' ability to recognize major cryptocurrencies,

- identification of the most important advantages and disadvantages of the analyzed solution,
- propensity to use cryptocurrencies,
- assessment of respondents' willingness to expand their knowledge regarding the solution under investigation,
- social and economic factors influencing the tendency to use the considered instrument,
- expectations that banks will provide services related to cryptocurrencies,
- willingness to use typical cryptocurrency-based products,
- involvement of a range of public and private financial institutions in the development of the cryptocurrency market.

After consultations with students (a pilot group of 20 randomly selected individuals) concerning the relevance of the questions, the clarity of their wording, and the unambiguity of the provided response options, four questions were eliminated, two new questions were introduced, the range of response options was expanded for four existing questions, and several previously used phrases were changed to enhance the clarity and comprehensibility of the content. Ultimately, the questionnaire included 28 comprehensive, detailed substantive questions as well as a demographic section concerning the characteristics of the research sample.

3.3 Characteristics of the Sample

The data were collected and categorized based on gender, age, level and field of education, place of residence, professional status and financial situation.

Table 1. *Basic demographic data of the sample*

Demographic characteristics	**Percentage share**
Gender	
woman	68.18%
man	31.82%
Age	
-18	1.52%
19 - 24	84.85%
25 - 34	10.61%
35 - 55	3.03%
Education	
secondary	80.30%
Bachelor’s degree	6.06%
higher education in progress	13.64%
Place of residence	
town of up to 20,000 residents	10.00%
town of 21,000 – 50,000 residents	4.84%

city of 51,000 – 200,000 residents	4.84%
city with over 200,000 residents	16.45%
village	63.87%
Field of study (present or completed)	
social sciences, including management, psychology, sociology, economics, pedagogy, administration, law	93.94%
other	6.06%
Financial situation	
very good (I can afford everything I need, and I can save some money)	28.79%
good (I am not complaining, but it could be better)	59.09%
I am a student; I am not financially independent	9.09%
average (I have enough money to live frugally)	3.03%

Source: *Own work.*

With reference to the values presented in Table 1, the research sample displayed considerable variation, and it consisted of more than 67 individuals who are among the most active participants in the labor market in terms of education and age (Batorski, 2015).

4. Research Results

The survey was conducted from December 20, 2023, to January 3, 2024, using the dedicated LimeSurvey survey system deployed on the servers of the Faculty of Management at the University of Warsaw. The survey form consisted of the following four parts:

- an assessment of awareness of the concept of cryptocurrency,
- an examination of the factors influencing the adoption of cryptocurrencies,
- an analysis of the banking sector's impact on cryptocurrency usage,
- survey demographic data.

The first section of the survey included questions examining how familiar respondents are with the issue of cryptocurrencies. The areas covered included: recognition of definitions best describing the subject under study; cryptocurrency ownership; purposes of use for those who own the instrument; and perceptions of the safety of cryptocurrency use. The respondents were then asked about the advantages and disadvantages of this IT solution.

In the definitions section, the survey included four purposefully selected examples, each highlighting a different aspect that characterizes cryptocurrencies. Among the options provided, the definition most frequently selected by respondents was "*an innovative form of 'virtual coin' operating within a distributed ledger system, created through advanced cryptographic techniques. The system stores information about the holdings of individual wallets (referred to as nodes within the system) in*

pre-approved units of cryptocurrency. In this system, the security key takes the form of a token." ("Kryptowaluta – co to jest?," n.d.). The least frequently chosen definition was the one that included a number of terms familiar from IT areas like 'distributed system', 'cryptography', 'system node'.

Table 2 presents all definitions included in the survey. It can be observed that each definition emphasizes a different aspect of cryptocurrencies, with some placing greater emphasis on technical elements and others on financial aspects. It can be noted that respondents chose a definition characterized by comprehensiveness, addressing both technical and financial aspects. This may indicate a high awareness of the characteristics of cryptocurrencies.

Table 2. *Summary of definitions of the term cryptocurrency*

No.	Definitions	% of responses
1.	Digital determinants of value that are not issued by a central bank or public authority, are not tied to fiat currency, and are accepted by individuals or legal entities as a means of payment. As such, virtual currency can be transferred, stored or sold electronically. (Marszałek, 2019)	30.30%
2.	An innovative form of 'virtual coin' operating within a distributed ledger system, created through advanced cryptographic techniques. The system stores information about the holdings of individual wallets (referred to as nodes within the system) in pre-approved units of cryptocurrency. In this system, the security key takes the form of a token. ("Kryptowaluta – co to jest?," n.d.)	39.39%
3.	A distributed accounting system based on cryptography, storing information about holdings in contractual units. Holdings are associated with individual nodes of the system ('wallets') in such a way that only the holder of the corresponding private key has control over a given wallet and it is impossible to issue the same unit twice. ("https," n.d.)	13.64%
4.	This is virtual money, created online with the help of cryptocurrency miners, which uses cryptography to secure transactions. Based on the so-called proof of work consensus mechanism.	16.67%
	Variance	4.32%
	Standard deviation	20.79%

Source: Own work.

In the question assessing cryptocurrency ownership, the vast majority of respondents (86.36%) reported not owning any cryptocurrencies. A positive response to this question allowed the respondent to proceed to the subsequent question: *For what purposes do you use the cryptocurrencies you own?* In this case, of the five possible answers: (1) I make purchases using them; (2) I invest in them for speculative purposes – as a source of additional income; (3) I invest in them for speculative purposes – as a source of main income; (4) I trade on cryptocurrency exchanges; (5) I consider them a way of saving money; (6) for educational purposes. The most

popular choice was the second option (50.00%), followed by the fifth (31.25%) and the last (18.75%).

The level of trust in cryptocurrencies was examined by assessing their perception as a safe instrument, using a five-point scale: *definitely yes*; *rather yes*; *I don't know*; *rather not*; *definitely not*, the most frequently selected answer was *rather yes* - nearly 40%. The second most frequently chosen answer was *rather not* - 30.30%. Extreme choices were indicated in the positive variant in 1.52% of cases and negative in 7.58% of choices.

In the section on cryptocurrency recognition, respondents were asked to indicate any cryptocurrencies they were familiar with. A total of 290 choices were made by respondents from the set of 20 available options.

These included: Avalanche (AVAX); Binance Coin USD (BUSD); Bitcoin (BTC); Bitcoin Cash (BCH); BNB (BNB); Cardano (ADA); Dai (DAI); Dogecoin (DOGE); Ethereum (ETH); Litecoin (LTC); Polkadot (DOT); Polygon (MATIC); Shiba Inu (SHIB); Solana (SOL); Stellar (XLM); Tether (USDT); TRON (TRX); UNUS SED LEO (LEO); USD Coin (USDC); XRP (XRP).

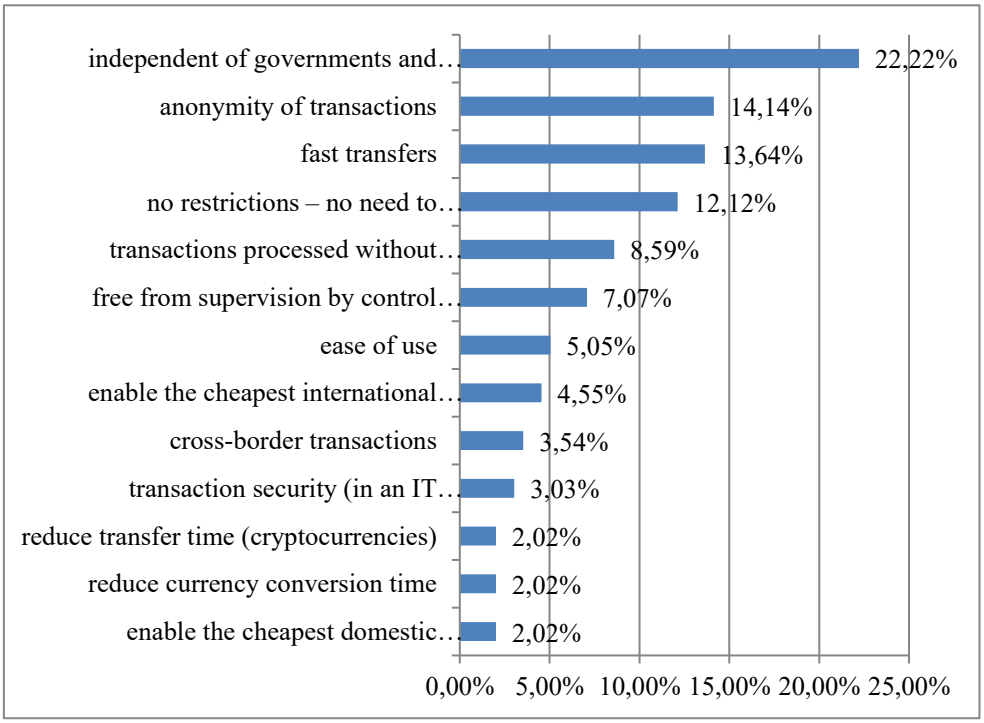
Among the most recognizable were: Bitcoin (BTC) - 21.73%, Dogecoin (DOGE) and Ethereum (ETH) virtually at the same level - 12% and Litecoin (LTC) - 8.62%. Four cryptocurrencies: Binance Coin USD (BUSD); Bitcoin Cash (BCH); Polkadot (DOT); Shiba Inu (SHIB) were indicated at the level of around 5%. The remaining options were recognized at much lower levels than the four mentioned above.

A study of the relevance of the advantages of cryptocurrencies showed that the most important quality was *its independence from state governments and banking systems*. Respondents were asked to identify the three most important positive features out of fourteen options available.

The advantages: *they enable the cheapest domestic transactions*; *they reduce currency conversion time*; *they reduce time to transfer funds (cryptocurrencies)* were the least important and were selected in only 2.02% of cases each. A summary of all responses is presented in Figure 1.

Figure 2 compares respondents' perceptions of cryptocurrency advantages as recorded in the 2023 survey conducted by another research group (Zborowski and Chmielarz, n.d.) and in the current study. It is worth noting that, in addition to the most frequently selected answer mentioned above, the next four most common responses were, fast transfers (17.53%), transaction anonymity (14.14%), no restrictions - no need to exchange for another currency (12.12%), and transactions processed without intermediaries (8.59%). The remaining responses did not exceed 10%.

Figure 1. *Summary of importance of cryptocurrency advantages*



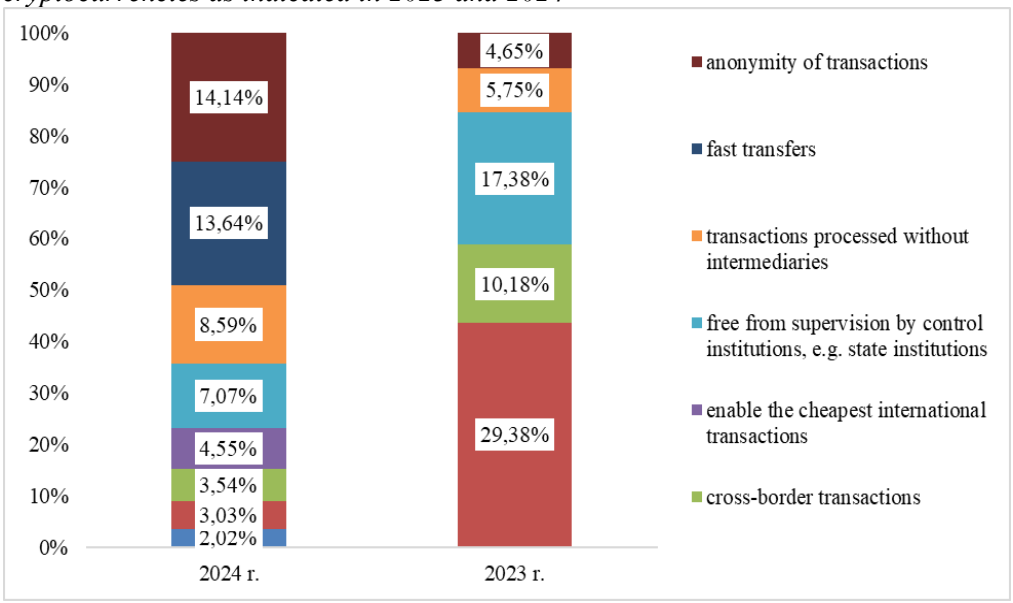
Source: *Own work.*

It is worth comparing the preferences regarding the relevance of features with the 2023 survey (Zborowski and Chmielarz, n.d.), where the most frequently indicated response was security of transactions (in an IT context), selected by 29.38% of respondents, while this indication in the present study this response did not exceed 3%. Details of the comparison of the structure of choices of advantages of cryptocurrencies are presented in Figure 3.

The analysis of the relevance of cryptocurrency advantages was based on a comparison of two surveys conducted in 2023 and 2024 on comparable respondent groups, with each survey considering a slightly different set of features. However, the same eight features were present in both surveys.

The comparison of the results indicates that the rankings of feature relevance are nearly reversed. The top three advantages identified in the previous year, with response rates clearly above 10%, were as follows: *security of transactions (in the IT context)* (29.38%); *protection from supervision by regulatory institutions such as the state* (17.38%) and *ease of use* (14.04%). In the 2024 survey, the perceived importance of these features was moderate, with response rates remaining below 10%.

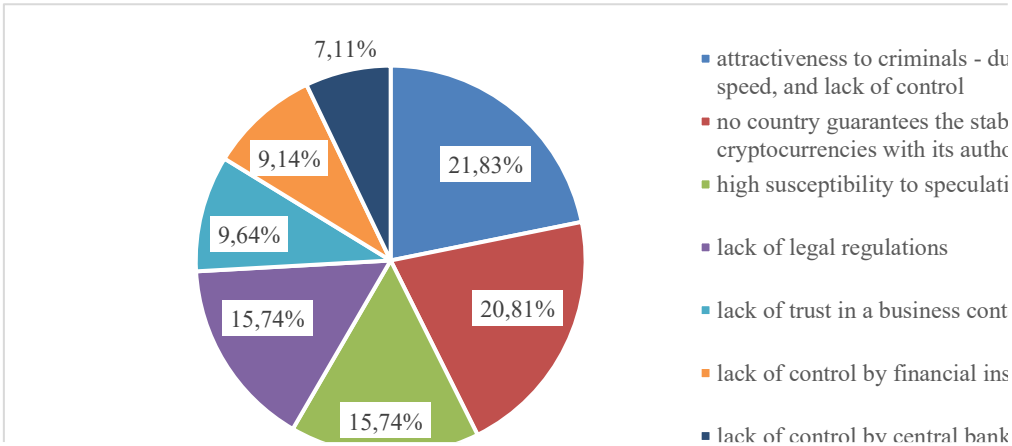
Figure 3. *Comparison of respondents' opinions on the advantages of cryptocurrencies as indicated in 2023 and 2024*



Source: *Own work.*

Like any solution, cryptocurrencies also have their disadvantages. As with the question concerning advantages, respondents were asked to select the three most significant disadvantages from eight possible options. The most commonly indicated disadvantages were: *attractiveness to criminals due to anonymity*, *speed and lack of control* (21.83%); and *no country guarantees the stability and value of cryptocurrencies with its authority* (20.81%). Figure 4 presents a summary of the significance of the disadvantages of the solution studied.

Figure 4. *Summary of the importance of cryptocurrency disadvantages*



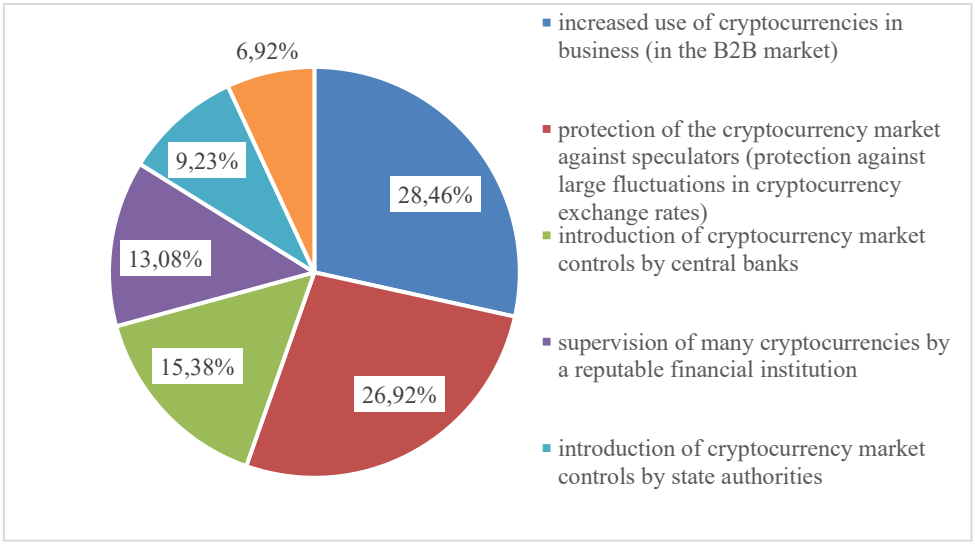
Source: *Own work.*

Referring to Figure 4, it is evident that, alongside the two most frequently indicated disadvantages, two additional categories emerge. Slightly less frequently indicated disadvantages include, *high susceptibility to speculation* and *lack of control* at 15.74% each. The least important disadvantages are, *lack of trust in the business context (investors)*; *lack of control by financial institutions*; *lack of control by central banks (money supply)*, selected in less than 10% of cases.

The second part of the survey focused on identifying factors that influence the initial adoption of cryptocurrencies. This section included aspects such as identifying the rationale for using cryptocurrencies, subjective perceptions of the popularity of this information technology solution and ranking the reasons for their low popularity. Subsequently, the determinants of cryptocurrency adoption were analyzed, focusing on the following factors: legal sanctioning, the need for additional knowledge acquisition, the influence of the respondent's immediate environment, and legal and economic justifications.

When it comes to the rationale for using cryptocurrencies, respondents indicated the following responses as the two strongest arguments: *increased use of cryptocurrencies in business (in the B2B market)* (28.46%), and *protecting the cryptocurrency market against speculators (protecting against large fluctuations in cryptocurrency exchange rates)* (26.92%). A detailed summary of responses is presented in Figure 5.

Figure 5. *Rationale for using cryptocurrencies*



Source: *Own work.*

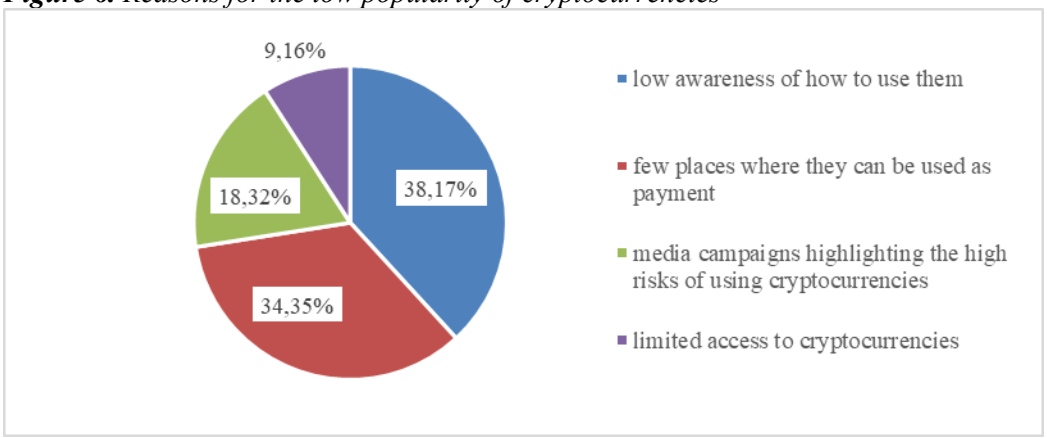
Referring to the data presented in Figure 5, the least important rationale was *one cryptocurrency being supervised by a reputable financial institution*, assessed at the

level of 6.92%. As in the case of the advantages of the cryptocurrency solution, the rationale for its use in the results shows a division into three groups. The second most frequently selected pair of responses is: the *introduction of cryptocurrency market controls by central banks*; *many cryptocurrencies being supervised by a reputable financial institution*, indicated in about 15% of cases, and the third is: *the introduction of cryptocurrency market controls by state authorities* and *one cryptocurrency being supervised by a reputable financial institution*, indicated in less than 10% of cases each.

Similarly to other technological solutions, cryptocurrencies are also subject to preference trends. When asked about the popularity of this solution, respondents were given three response options: *no*, *I don't know* and *yes*. The extreme responses were the most frequently selected, with the negative option indicated slightly more often at 43.94%, while the positive option was selected 4.55 percentage points less frequently.

A subsequent question, which may be viewed as the opposite of the previous one, i.e. *What is the reason that cryptocurrencies are not popular?* included four response options. The most frequently selected reason was *low awareness of how to use them*, indicated by 38.17% of respondents. The detailed structure of respondents' responses is presented in Figure 6.

Figure 6. *Reasons for the low popularity of cryptocurrencies*



Source: *Own work.*

Referring to the data presented in Figure 6, it can be noted that the second most frequently selected answer relates to *few places where cryptocurrencies can used as payment*, which was selected in 34.35% of cases. It is worth noting that the answer with the lowest rating, i.e., *limited access to cryptocurrencies*, indicates respondents' awareness of the ease of access to the instrument in question.

One of the main obstacles limiting the adoption of cryptocurrencies is that they are not recognized as an official means of payment. When asked whether their willingness to use cryptocurrencies would increase if they were recognized as an official means of payment, respondents provided very promising answers.

On a five-point descriptive scale, the most frequently selected answer was *rather yes* (56.09%), and *I don't know* (18.18%). The extreme responses, *definitely not* (4.55%) and *definitely yes* (6.06%), can be considered similar. It is noteworthy that combining the positive responses: *definitely yes*, *rather yes*, and the neutral *I don't know* resulted in a total of 80.33% support for this solution.

A similar distribution of responses was observed in the case of the question related to respondents' willingness to learn how to use the solution. As with the previous question, on a five-point scale, the most frequently chosen answer was *rather yes* (53.03%), while the least frequently chosen answer was *definitely not* (4.55%), with almost 20% undecided. Using the same approach of aggregating positive and neutral responses, the analysis yielded a high combined result of 81.82%.

The distribution of responses is no different for the question illustrating the strength of the influence of the immediate environment on the respondent's decision to use cryptocurrencies. The most frequently chosen answer was *rather yes* (40.91%), neutral *I don't know* (36.36%), while the rarest was *definitely not* (only 1.52%). Using a similar procedure of combining percentage points of positive and neutral responses, the result amounted to 77.27%.

Respondents were asked whether they would use this solution under a hypothetical scenario in which the main drawbacks were eliminated, i.e.: cryptocurrencies were recognized by central banks and governments as an official means of payment (alongside national currencies), businesses accepted cryptocurrency payments and exchange rates were stable.

The distribution of responses, on a five-point descriptive scale, was as follows. The most frequently chosen answer was *rather yes* (51.52%), and the least frequently chosen answer was *rather not* (1.52%). It is worth pointing out that the answer *definitely yes* was chosen by 22.73%. Combining the percentage points of positive responses resulted in 73.24%. When the neutral *I don't know* responses (24.24%) were added, the total reached the level of 97.48%. The variance in this question was 4.20%, and the standard deviation was 20.50%.

The third section of the survey contained questions designed to investigate how the attitudes of banking sector actors influence respondents' willingness to use cryptocurrencies. The survey explored several dimensions: respondents' personal propensity to maintain a cryptocurrency account; their expectations regarding the role of banks and financial institutions in providing cryptocurrency-related services;

and their views on the involvement of various actors in promoting the development of solutions that support cryptocurrency adoption.

The first set of questions examined several issues: the large-scale provision of crypto and asset storage solutions by banking institutions; whether respondents currently hold a cryptocurrency account with a bank; if not, whether they intend to open one; whether the prevalence of such services would influence their decision; and their level of concern about the potential blocking of such accounts due to the high risk of transactions being classified as suspicious.

The second section analyzed the perception of cryptocurrencies against the financial ecosystem, the willingness to take a loan denominated in cryptocurrencies, the respondent's acceptance that trading in the analyzed means of payment would be one of the components of banks' income, the respondent's willingness to take loans and purchase units of investment funds expressed in cryptocurrencies, the perception of the solution that each bank issues its own cryptocurrency, and whether the service of domestic and foreign transfers should be universally provided by banks. The third set of questions examined respondents' expectations concerning the involvement of entities operating within or influencing the financial market in the development of ICT infrastructure necessary to enable the widespread adoption of cryptocurrencies.

A key factor influencing the popularity of cryptocurrencies is the extent to which banks will offer services based on this solution. In the question assessing respondents' expectations regarding the introduction of mass storage services for cryptocurrencies and tokenized assets, the responses were not conservative. On a five-point descriptive scale, the most frequently chosen answer was neutral – *I don't know* (42.42%), the second was *rather yes* (close to 28%), and the third was *rather not* (21%). The remaining answers did not exceed 10%; however, combining the percentage points of positive answers and neutral resulted in a value of 77.27%.

The variance in this question was established at the level of 2.63%, and the standard deviation amounted to 16.23%. Cryptocurrency account service is already provided by some banks in Poland, so the survey asked whether respondents use such a service. One person confirmed having such an account. The survey further examined whether respondents planned to use such a service. The majority (73%) see no need for such a service, and 25% are not certain.

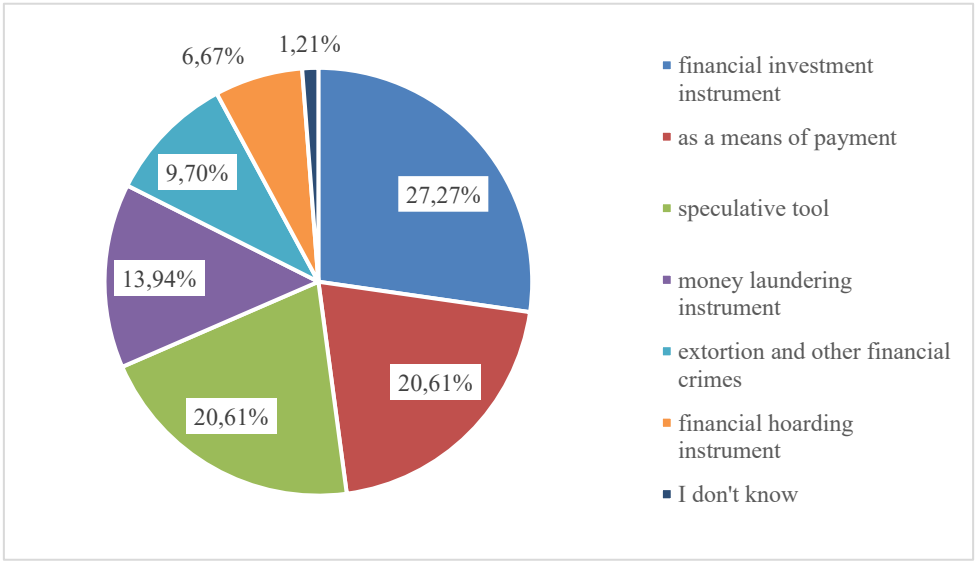
As a further step in the analysis, respondents were asked whether, assuming the widespread availability of cryptocurrency account services across many banks, they would use such a service. On a five-point descriptive scale, the most frequently selected answer was *I don't know* (37%), and the *rather yes* option was chosen by 33% of respondents. Combining percentage points for positive answers gave the total of 38%, and after adding neutral responses the level reached 74%. For respondents holding such an account, the survey examined whether they would be concerned about potential account blocking due to a high risk of transactions being

identified as suspicious (in the context of AML, Anti-Money Laundering and Countering the Financing of Terrorism). The distribution of responses may be interpreted as generally positive. Nearly 38% of respondents indicated that they would rather not be concerned about such actions by the bank, while 30% stated that they would be concerned, and 25% had no opinion.

Each issue may be examined from both a narrow perspective, reflecting individual preferences, and a broader perspective, as part of a more comprehensive system. With regard to the question examining the perception of cryptocurrencies within financial ecosystems, the response pattern suggests an acceptance of cryptocurrencies as a component of the broader financial system.

From the list of available options, respondents were instructed to select the three they considered most important. The most frequently chosen answer was that *it is a financial investment instrument* by just under 28% of respondents. The detailed structure of respondents' responses is presented in Figure 7.

Figure 7. *The status of cryptocurrencies in financial ecosystems*



Source: *Own work.*

As shown in Figure 7, the next most frequently selected options were *means of payment* (understood as official and widely accepted) and *speculative tool*, each receiving 21% of responses. While the least frequently selected substantive answer was *asset hoarding* (6.67%). It is worth noting that if one combines the percentage point values of the positive characteristics, i.e., *financial investment instrument*, *as a means of payment*, *asset hoarding*, the resulting value is 54.55%, and if one adds up the percentage point values of the negative characteristics, i.e., *money laundering*

instrument, *extortion and other financial crimes*, *speculative tool,* one receives 44%, which is lower than the previous group.

When asked about the respondent's willingness to borrow in cryptocurrency on a five-point descriptive scale, the two most frequently selected answers included: *rather not* (45%) and *definitely not* (43%). When asked about respondents' acceptance of cryptocurrencies becoming another source of income for banks, respondents most often indicated an evasive answer of *I don't know* (49%).

The responses *rather not* and *rather yes* ranked second and third, with 30% and 17% of responses, respectively. In the case of respondents' propensity to purchase units of cryptocurrency-denominated mutual funds, the only positive answer of *rather yes* was given by 17% of respondents. Negative and neutral answers together accounted for 83%. It is noteworthy that the answer *definitely yes* was not selected by anyone.

For the question of whether every bank should be an issuer of its cryptocurrency, the most frequently indicated answer was *rather not* (42%), combining this value with the answer *definitely not* results in 61%. The second most frequently chosen answer was *I don't know* 30%. It is worth mentioning that, as in the previous question, the extreme answer *definitely yes* did not appear.

In response to the question concerning expectations that banks should provide domestic and international transfer services using a variety of cryptocurrencies (not limited to their own), the distribution of answers indicated considerable uncertainty among respondents. The most frequently chosen answer was *I don't know* 42%, followed by *rather yes* 33%. Combining the values of positive responses yielded a value of 40%, and negative answers - 18%.

Any information technology to become popular needs an environment that supports it. In the question about respondents' expectations of banks' involvement in strong infrastructure development (e.g., mobile applications, extending the functionality of payment terminals) enabling payments with various cryptocurrencies, a positive expectation can be seen. The most frequently chosen answer was *rather yes* (49%), the second: *don't know* and *rather no* 23% each. The remaining responses did not exceed the threshold of 5%. The involvement of institutions within the financial sector, as well as those exerting influence over it, was examined in greater depth in the following question.

Among the five listed entities included, NBP National Bank of Poland (NBP Narodowy Bank Polski), Ministry of Digitization (Ministerstwo Cyfryzacji), Ministry of Finance (Ministerstwo Finansów), KNF Financial Supervision Commission (KNF, Komisja Nadzoru Finansowego), ZBP Association of Polish Banks (ZBP, Związek Banków Polskich), and two representing groups of several entities, i.e.: private commercial banks, state-owned banks, respondents did not indicate a strong leader. Respondents were asked to name three.

Among the most frequently chosen was the Ministry of Digitization (22.35%). The detailed structure of respondents' answers is presented in Table 3.

Table 3. *Entities or groups identified as providing strong support of infrastructure development for cryptocurrency popularization*

Name of institution or group	**%**
Ministry of Digitization	22.35%
private commercial banks	19.55%
Ministry of Finance	18.99%
KNF Financial Supervision Commission	13.41%
NBP National Bank of Poland	11.73%
state-owned commercial banks	8.38%
ZBP Union of Polish Banks	5.59%
Total	100%
Variance	0.59%
Standard deviation	7.67%

Source: *Own work.*

Referring to the values presented in Table 3, the second variant was private commercial banks at 19.55%, and the third was the Ministry of Finance at 18.99%. It is worth noting that the difference between the three most frequently chosen responses is relatively small, only about 2 percentage points whereas, if we combine the percentage points values for both Ministries, it is established at the value of 41.34%.

5. Discussion

The following conclusions can be drawn from the survey:

- respondents define the issue of cryptocurrencies by identifying characteristics that reflect both financial system attributes and information technology features. This may indicate a high level of awareness and understanding of the cryptocurrency topic within the surveyed group,
- the cryptocurrency solution is not widely adopted among respondents - only 14% of the sample reported holding cryptocurrencies. Those who do hold them primarily do so for financial purposes, such as earning money (through speculation or as a form of saving), or for educational purposes,
- over 40% of respondents perceive cryptocurrencies as safe, whereas 38% disagree with this opinion. The considerable share of respondents viewing cryptocurrencies as unsafe may be attributed to past information campaigns in the Polish media, which, in the years preceding the survey, emphasized the risks and potential threats linked to cryptocurrency use,
- among respondents who do not use cryptocurrencies, Bitcoin (BTC) remains the most recognizable, which is consistent with findings from multiple

studies. Nevertheless, Dogecoin (DOGE) and Ethereum (ETH) also exhibit significantly higher levels of recognition compared to other cryptocurrencies,

- similarly to the preferences expressed in defining cryptocurrencies, where respondents emphasized features such as independence from state institutions and virtuality (often associated with anonymity), when identifying the main advantages of cryptocurrencies, nearly 29% of respondents pointed to the fact that they are free from the supervision of government authorities and banking systems. The anonymity of transactions and the speed at which transactions are processed were identified as the next most important advantages. This may indicate that respondents tend to associate cryptocurrencies with features more commonly attributed to the Internet than to conventional payment instruments. They are more suited to an environment that is more easily recognized by respondents. Additional advantages identified by respondents included the absence of restrictions, such as the ability to avoid currency conversion and to carry out transactions without intermediaries. These preferences may reflect their self-assessed financial situation, with 59.09% describing it as *good (I'm not complaining, but it could be better)*. The search for secure ways to save money remains important for the majority of respondents. Comparing the results obtained with the survey conducted in 2023, where the most important features were: *security of transactions (in the IT context)* (30%) and *being free from supervision by regulatory institutions, e.g., state* (17%), it can be seen that both confidence in the solution and awareness that it is independent of state control institutions have increased. In the 2024 survey, these features did not exceed 10%,
- in the context of main disadvantages of cryptocurrencies, the most frequently selected were: *attractiveness to criminals due to anonymity, speed and lack of control*; *no state guarantees with its authority the stability and value of cryptocurrency*, and *high susceptibility to speculation*, which may indicate a high awareness of the disadvantages of the studied solution. Respondents are aware of the risks associated with cryptocurrencies and the underlying causes, both in the private context (e.g., theft) and in the systemic context (e.g., vulnerability to speculation and the absence of state protection),
- one of the factors that could motivate respondents to engage in wider use of cryptocurrencies is their growing adoption in business transactions, especially within the B2B sector (28.46%), and protection of the cryptocurrency market from speculators (protection from large fluctuations in cryptocurrency exchange rates) (26.92%). This may indicate that respondents expect cryptocurrencies to first gain wider adoption in the business market, suggesting that they see business adoption as a form of validation or authorization for the technology. In relation to the speculative aspect, respondents may expect the development of instruments that would

protect against price fluctuations, similar to the mechanisms employed by state-owned central banks to curb exchange rate speculation,

- in terms of the perceived popularity of cryptocurrencies, a positive response rate of 40% and a negative rate of 44% may indicate that cryptocurrencies are no longer considered a niche or unfamiliar phenomenon,
- low awareness of how to use them was cited as the main reason for low recognition, which may indicate the need for education or promotion of the solution. The second reason was the limited number of places accepting this form of payment, which may suggest that respondents would be willing to use cryptocurrencies for transactions; however, the lack of supporting ICT infrastructure poses a barrier to implementation. Should barriers be eliminated, nearly 60% of respondents indicated that they would rather be interested in using this form of payment. For the widespread use of cryptocurrencies to occur, a more comprehensive understanding of the underlying principles and regulatory frameworks would be necessary, and 53.03% of respondents declared a willingness to deepen their knowledge of the rules governing the use of this solution. Respondents noted that personal recommendations from trusted individuals or close relations would positively influence their inclination to adopt the solution. Of those surveyed, 40.91% would follow the suggestions of those close to them,
- a comparable scenario would emerge if cryptocurrencies were recognized by central banks and individual countries as official means of payment, were broadly accepted by businesses, and exhibited stable exchange rates, then 74% of respondents would be willing to use this form of payment, which also shows a high willingness to use cryptocurrencies,
- with regard to potential banking initiatives aimed at promoting cryptocurrencies, 43% of respondents remained neutral on the issue of widespread storage service offerings for cryptocurrencies and tokenized assets. This response seems to coincide with the previous ones illustrating the conclusion that cryptocurrencies are seen as a solution independent of state institutions or financial sector entities,
- respondents, practically 100% of the time, did not have a cryptocurrency bank account, and 73% of the time they do not plan to do so. The distribution of responses indicates that respondents are not yet ready, or do not perceive a compelling need, to open such accounts in the foreseeable future. Combining this response with the distribution of disadvantages of cryptocurrencies, it can be concluded that respondents do not plan to open a cryptocurrency account, due to the lack of infrastructure for making payments using them. This conclusion is also confirmed in the answers to the question about the willingness to open such an account if this service were provided by multiple banks, where 38% of people are ready to open such an account once the mentioned condition is met,
- with regard to concerns about potential account blocking due to transactions being classified as suspicious (within the AML and counter-terrorism

financing framework), nearly 40% of respondents reported no such concerns, which may reflect a growing understanding of the associated risks,

- in a broad context, as an entire financial ecosystem, more than half of the respondents described cryptocurrencies as a financial instrument, a means of payment and a means of asset hoarding. This may indicate that respondents are ready to treat cryptocurrencies as an equal means of payment to money. At the same time, nearly 44% indicated responses related to the negative characteristics of cryptocurrencies like: an instrument for money laundering, extortion and other financial crimes, a speculative tool, which suggests that while respondents are aware of these risks, they no longer perceive them as a barrier to the widespread adoption of cryptocurrencies,
- the observed reluctance to borrow in cryptocurrencies may be associated with respondents' age or their current financial circumstances. Students may be unwilling or unable to take on debt due to concerns about repayment,
- in the case of the propensity to invest in cryptocurrency-denominated mutual funds, despite more than 30% support for the idea, the majority of responses, i.e. 61%, were negative. This may indicate awareness or suspicion of too high a risk due to fluctuations in cryptocurrency exchange rates, as well as uncertainty about profit when investing in this type of financial instruments,
- respondents do not expect banks to issue their own cryptocurrencies, which supports the conclusion that the solution under consideration is perceived as something that should remain outside the portfolio of major financial sector institutions. However, there is a clear expectation (expressed by 40% of respondents) that banks should offer transfer services, both domestic and international, using various cryptocurrencies, not limited to those issued by the banks themselves. This may be indicative of respondents' expectation that, in addition to business, cryptocurrency-based services should also be accessible through banks,
- The analysis of responses regarding expectations for ICT infrastructure development to facilitate the widespread adoption of cryptocurrencies (such as mobile applications or expanded payment terminal capabilities) shows that 49% of respondents anticipate strong involvement from banks in these efforts. The Ministry of Digitization (22.35%) or the Ministry of Finance (19%), along with private commercial banks (20%), should take the lead in the development of appropriate infrastructure in Poland,
- in the context of financial ecosystems, of the three main characteristics grouping the features of a cryptocurrency solution, i.e.: accessibility, transparency and efficiency, the last one was chosen in 53% of cases.

The research conducted on the perception of cryptocurrencies, in the context of both individual customer readiness and the banking sector's preparedness for their widespread adoption, is strongly aligned with global research trends in this area. On the other hand, respondents rarely identified specific actions they expect from banks and state authorities in Poland to facilitate the widespread adoption of

cryptocurrencies. The emphasis on social aspects in the research is also an important element.

6. Conclusions

The analysis reveals that, although the vast majority of respondents do not personally own cryptocurrencies, they demonstrate clear preferences and a high level of awareness regarding the subject. Overall, respondents tend to perceive the examined solution as safe. Following Bitcoin as the best-known cryptocurrency, Dogecoin (DOGE) and Ethereum (ETH) rank next in terms of recognition. The key advantages highlighted by respondents include independence from state authorities and banking institutions.

Among the disadvantages of cryptocurrencies, the most frequently selected were: attractiveness to criminals due to anonymity, speed and lack of control, and the fact that no state guarantees with its authority the stability of the cryptocurrency market. Factors that would drive respondents to widespread use of cryptocurrencies included the increase in the use of cryptocurrencies in business (in the B2B market) (28.46%) and the protection of the cryptocurrency market from speculators.

As for the popularity of the solution itself, it was the respondents who viewed cryptocurrencies positively at 40% and negatively at 44%, which suggests that the solution has progressed beyond being a niche phenomenon or one characterized by low public recognition. The main reason cited for the low recognition of cryptocurrencies was: low awareness of how to use them, which may indicate the need for education or promotion of the solution.

Factors influencing the willingness to adopt cryptocurrencies include the existence of adequate supporting infrastructure, endorsements from family and friends, official recognition of cryptocurrencies as legal means of payment by central banks and state authorities, business acceptance of cryptocurrency payments, and the widespread availability of cryptocurrency services in commercial banks. Respondents are not concerned that the transactions they carry out using cryptocurrencies will be controlled by banks in AML procedures.

This indicates an understanding of the risks that financial institutions would face if such services were to become widespread. In a broader perspective, considering the entire financial ecosystem, over half of the respondents perceived cryptocurrencies simultaneously as financial instruments, means of payment and asset hoarding.

This may suggest increasing acceptance of the solution. Respondents expressed the view that responsibility for developing the ICT infrastructure necessary for the widespread adoption of cryptocurrencies should rest with the state administration, particularly the Ministry of Digitization, in collaboration with commercial banks.

The conducted analyses address a research gap in the area of cryptocurrency perception among potential users, stressing the important role of banks and other financial sector entities in the dissemination of this phenomenon.

The conclusions formulated may be useful for researchers examining the broader perception of the role of actors within the financial sector. The results of the analysis emphasize the growing acceptance of the widespread use of cryptocurrencies and the increasingly clear expectations of individual customers regarding their use. The presented research may also be useful for practitioners working towards preparing organizations to provide cryptocurrency-based products and services.

The research conducted also had some limitations. The first was that the research sample was limited to the academic community. The second limitation consisted in the fact that the study was carried out in just one country. The third limitation concerned the study's exclusive focus on potential cryptocurrency users, without considering the attitudes of financial institutions toward this solution. The fourth limitation involved the omission of the role and significance of cryptocurrency exchanges in the dissemination of the phenomenon under investigation.

Future studies on the solution examined should focus on four primary directions for further investigation. The first is to expand the research group to include other potential users of cryptocurrencies.

The second area of future research should explore perceptions of a hypothetical scenario where all services offered via electronic banking are conducted using cryptocurrencies, analyzing both the potential implementation mechanisms and the impact this might have on users' willingness to adopt alternative currencies.

The third direction would focus on examining the factors that influence the development of awareness regarding cryptocurrencies, with particular emphasis on the role of banks in promoting their adoption. Although the survey results indicate that respondents are not inclined to strongly associate cryptocurrencies with the banking sector, they do expect financial institutions to offer services involving cryptocurrencies.

The fourth area of research should focus on conducting international comparative studies to assess whether cultural factors and varying levels of IT adoption across countries shape the perception of cryptocurrencies.

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