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THE CRYPTOCURRENCY ASSETS MARKET IN THE CONDITIONS OF MILITARY AGGRESSION

ABSTRACT

The Russian-Ukrainian war transformed the needs of consumers of financial services, both in Ukraine and abroad. On the one hand, the civilian population and the Armed Forces of Ukraine needed immediate help from the international community. On the other hand, individual and institutional investors were concerned about threats to traditional financial investments. The purpose of the article is to identify the priority directions for the development of the cryptocurrency asset market against the background of the Russian-Ukrainian war. The article presents an analysis of the cryptocurrency asset market with an emphasis on its structural changes in the conditions of the Russian-Ukrainian war. In the study, a survey was conducted to find out the impact of the war on the Ukrainian cryptocurrency market. The analysis of the survey results substantiates the hypothesis about the impact of increased hacking attacks by pro-Russian forces and missile attacks on the functioning of the cryptocurrency market in Ukraine. It has been confirmed that investments and payments are promising segments of the cryptocurrency market in Ukraine, in which, the most interested users and potential users of cryptocurrency are. Based on the received data, the weaknesses and strengths of the functioning of the cryptocurrency market in the conditions of war were identified. Threats and opportunities for the development of the cryptocurrency market against the background of Russian armed aggression are substantiated. The conducted research made it possible to formulate scenarios for the development of the cryptocurrency asset market in Ukraine in war conditions and the conditions for their implementation.

Keywords: cryptocurrency market, cryptocurrency assets, crypto machines, charitable funds, humanitarian aid, charitable crowdfunding, mining, war

JEL Classification: G23, G32, G41, H84

INTRODUCTION

The unprovoked Russian aggression against Ukraine caused economic, security, humanitarian, and environmental challenges at both the local and global levels. Escaping from the devastating consequences, more than [16] almost 4.9 million Ukrainians became internally displaced persons, and more than 6.3 million people became refugees, of which more than 5.9 million found refuge in European countries [21]. According to various estimates, the estimated damage to the environment in Ukraine caused by the Russian invasion reaches EUR 69.6 billion against the background of their daily increase of EUR 102 million [23]. According to various estimates, more than 170,000 sq. m. km of the territory of Ukraine must be demined [23], which requires a significant amount of financial resources and relevant specialists. Ukrainian ports are blocked, and as a result, the export of Ukrainian food is impossible, which provokes an increase in food prices in the world and exacerbates hunger in some countries. The result of the Russian-Ukrainian war is also an increase in energy prices, disruption of logistics, and increased instability of financial markets. This gave a new impetus to the development of the cryptocurrency asset market. The unprovoked Russian aggression against Ukraine led to an increase in the need for fast, safe payments, reliable instruments for saving savings of households and businesses, quick transfer of funds, assistance to the Ukrainian army to ensure the protection of the country, for humanitarian assistance for the Ukrainian people, for the removal of funds by refugees, for assistance to relatives and friends affected by the war, which led to significant transformations of the cryptocurrency asset market. Cryptocurrency assets will help meet these needs. The basis for this is minimal

regulation or its absence in individual countries, the speed and anonymity of transactions, and minimal commissions for transactions. As we can see, the Russian military aggression in Ukraine has caused several challenges to the functioning of the cryptocurrency asset market, which require research.

LITERATURE REVIEW

Due to its characteristics as a component of decentralized finance in conditions of instability, cryptocurrencies remain a popular tool in the payment and investment markets. Thus, cryptocurrencies arose as a result of the challenges of the financial crisis of 2008. Confirmation of their unique characteristics was also received during the COVID-19 pandemic. The Russian-Ukrainian war led to an increase in the interest of scientists in researching the possibilities of the development of the cryptocurrency market in the context of its liquidity, profitability, and increased regulation. Research by Aidan Arasasingham, and Gerard DiPippo (2022) is dedicated to identifying the possibilities of strengthening the regulation of the cryptocurrency market in wartime conditions [2]. At the same time, a group of BAFFI centre researchers found that the role of cryptocurrencies in the transfer of funds to the government of Ukraine is significant against the background of the fact that their role as a tool to avoid sanctions by Russia is uncertain [3].

Rabeh Khalfaoui, Giray Gozgor, and John W. Goodell (2023) found that co-variations between war attention and cryptocurrencies depend on investment horizon and market condition. At the same time, the motivation of investors is based on the search for cryptocurrency liquidity [13].

Research by Saliha Theiri, Ramzi Nekhili, and Jahangir Sultan (2023) showed a significant but temporary impact of the Russian-Ukrainian war on the liquidity of Bitcoin and Ethereum. Thus, during the first two days after the beginning of the Russian invasion, the level of their liquidity increased significantly and then returned to the previous value [25]. Isaac Appiah-Otoo (2023) determined that the Russian-Ukrainian war affected the decrease in the volume of bitcoin trades and the drop in the profitability of their trade, which may have negative consequences in the long term for the cryptocurrency market. At the same time, it is emphasized that such influence was more noticeable at the very beginning of the Russian invasion [1].

E. Mnif, K. Mouakhar, and A. Jarboui (2023) found an increase in the efficiency of the markets of energy-saving cryptocurrencies (Ethereum and Ripple) as a result of the Russian invasion of Ukraine [17]. Aija Lejneice (2022) emphasized the need to strengthen the regulation of the crypto-currency asset market in the context of the application of sanctions to subjects of the Russian Federation that carry out crypto-currency operations [15]. Michael Burda (2021) suggested that the exchange rate of the cryptocurrency can be influenced solely by the expectation of a future increase in the exchange rate [6]. A study by Tiam Bakhtiar, Xiaojun Luo, and Ismail Adelopo (2023) shows the importance of sentiment and suggests that the fear and greed index may be key in the decision to invest in cryptocurrency, with Google search interest in cryptocurrency being decisive in choosing a particular type of cryptocurrency [4]. Nikolaos Kyriazis, Stephanos Papadamou, Panayiotis Tzeremes, and Shaen Corbet (2023) found that low-cost cryptocurrencies typically exhibit moderate levels of volatility, even under moderate economic uncertainty or investor optimism [14]. These types of cryptocurrencies are unaffected by volatile investor sentiment or financial crises. Previously, a team of researchers (2023) emphasized that the development of the cryptocurrency market is influenced by such groups of factors as macroeconomic, price, environmental, geographic, market, behavioural, and technological [27]. At the same time, they proved that the Bitcoin exchange rate during the pandemic is dependent on the prices of gold, oil, the daily detected number of COVID-19 patients and deaths from COVID-19, the MSCI ACWI global stock index, iShares MSCI All Country Asia ex Japan ETF, Wilshire 5000 Total Market Index. However, in the conditions of the Russian-Ukrainian war, the influence of certain factors is somewhat transformed.

These discussions led to the need for our research because, for the further functioning of the cryptocurrency asset market in Ukraine, it is important to identify the threats and expectations of users and potential market participants in war conditions.

AIMS AND OBJECTIVES

The aim of the article is to identify the priority directions for the development of the cryptocurrency asset market against the background of the Russian-Ukrainian war.

The objectives include revealing the impact of the threat of missile attacks and shelling, disconnection of the Internet, power outages, increased threats of hacker attacks, increased regulation of the cryptocurrency market in conditions of

war, insufficient protection of consumer rights on the development of the cryptocurrency market from the point of view of respondents, and further clarification of the attractiveness of cryptocurrency in the quality of the instrument for carrying out operations on the financial market.

METHODS

The following methods were used to achieve the specified goal and objectives. The use of comparative analysis contributed to the identification of the weak and strong points of the functioning of the cryptocurrency market in Ukraine during the war. To identify trends in the development of the cryptocurrency market in Ukraine under martial law, a survey was conducted among 104 respondents, among whom 8.7% were representatives of the insurance business, 11.5% - the banking business, 24.0% - IT sphere, 33.7% - other types of entrepreneurial activity, 7.7% are representatives of state administration bodies and 14.4% are full-time students of economic specialities. 47.1% of respondents are men and 52.9% are women. The vast majority of 39.4% are respondents aged 18-22, 18.3% are respondents aged 23-28, 8.7% are respondents aged 29-33, 20.2% are respondents aged 34-40 and 13.3% - respondents over 40 years old. The results of the survey were subjected to processing and statistical analysis, based on which the segments of the cryptocurrency market were identified that are attractive for users and potential users of cryptocurrencies in Ukraine for carrying out operations in war conditions.

RESULTS

In global finance, cryptocurrencies act as a tool for the democratization of society [2] and the number of their supporters is growing. According to research by Chainalysis, investing in virtual assets was among the TOP 5 venture investment trends in 2022, when the global volume of cryptocurrency transactions amounted to about USD 15.8 trillion [8].

The main reasons that encourage consumers to use cryptocurrency are [11]:

- expansion of the composition of the investment portfolio;
- transactions with cryptocurrency are considered a game of chance, the result of which can be both receiving and losing cryptocurrency;
- the desire not to lose the opportunity to purchase cryptocurrency;
- implementation of a long-term savings plan, in particular, the formation of a pension fund;
- political/ideological reasons, in particular, mistrust of the financial system.

According to the Global Crypto Adoption Index in 2022, Ukraine ranked third among 146 countries after the Philippines and Vietnam in terms of cryptocurrency usage. India and the USA also entered the TOP-5 [8]. According to Statista research (2019-2023) conducted among 56 countries, in most countries during 2022-2023 there was an increase in respondents' interest in cryptocurrency (Figure 1). As for Ukraine, this process took place continuously during 2020-2023. Such a position of Ukraine in this list can be explained, on the one hand, by the traditionally significant interest of Ukrainians in cryptocurrency and, on the other hand, by the challenges caused by the COVID-19 pandemic and the intensified consequences of military actions for the domestic financial system. Against the background of the war, the need for a reliable tool for saving, making payments, and receiving aid has intensified among Ukrainians.

Against the background of the close integration of the Ukrainian market of financial services into the global crypto-community and the democratization of society, there are stimulating and restrictive shifts in the market of cryptocurrency assets in the conditions of war.

As part of the stimulating changes, it is possible to single out the attraction of funds by charitable foundations and the state, the issue and sale of NFT tokens, the assistance of certain cryptocurrency exchanges to their Ukrainian users, and the increase in the number of business entities that offer goods and services for cryptocurrency.

Raising funds in cryptocurrency is organized both by charitable foundations that help civilians affected by military operations and the Armed Forces of Ukraine and by the state. Yes, the Ministry of Digital Transformation of Ukraine already on the first day of the war opened cryptocurrency wallets for donations to Ukraine (currently there are about 14 of them). In the first month of the war, the Ukrainian government received more than USD 56 million in cryptocurrency donations. At the same time, most of the donations were made in bitcoins and Ethereum (weforum, 2023) [9]. Ethereum founder Vitalik Buterin, who allocated 1,500 ETH (more than USD 4.7 million) to help Ukraine, founder of the blockchain platform and Polkadot cryptocurrency Gavin Wood - USD 5.8 million in DOT tokens, Justin Sun — USD 200,000 in Stubcoins, FTX Crypto

Exchange Chairman Sam Bankman-Fried USD 250,000 in USDT [28], an unknown donor donated USD 3 million worth of Bitcoins to an NGO [26].

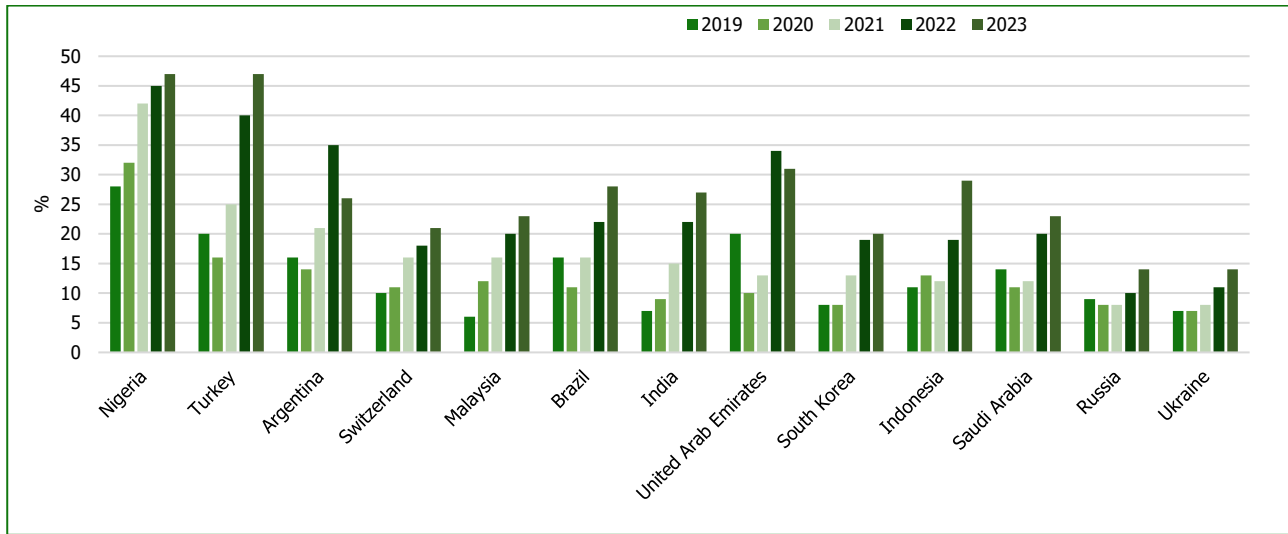


Figure 1. Share of respondents owning cryptocurrency in different countries from 2019 to 2023, %. (Source: built on the basis of [22])

However, already at the end of 2022 and during the first half of 2023, the amount of monthly donations in cryptocurrency did not exceed the equivalent of USD 10,000 USA. As of June 2023, USD 225 million USA had been collected [5]. As can be seen from Figure 2 Tether (USDT) already has the 2nd largest share in collected cryptocurrency funds - 37%. It is followed by ETH - 35% and BTC - 18%. The vast majority of collected funds were used for humanitarian purposes (60%) and only 40% - for the needs of the Armed Forces of Ukraine.

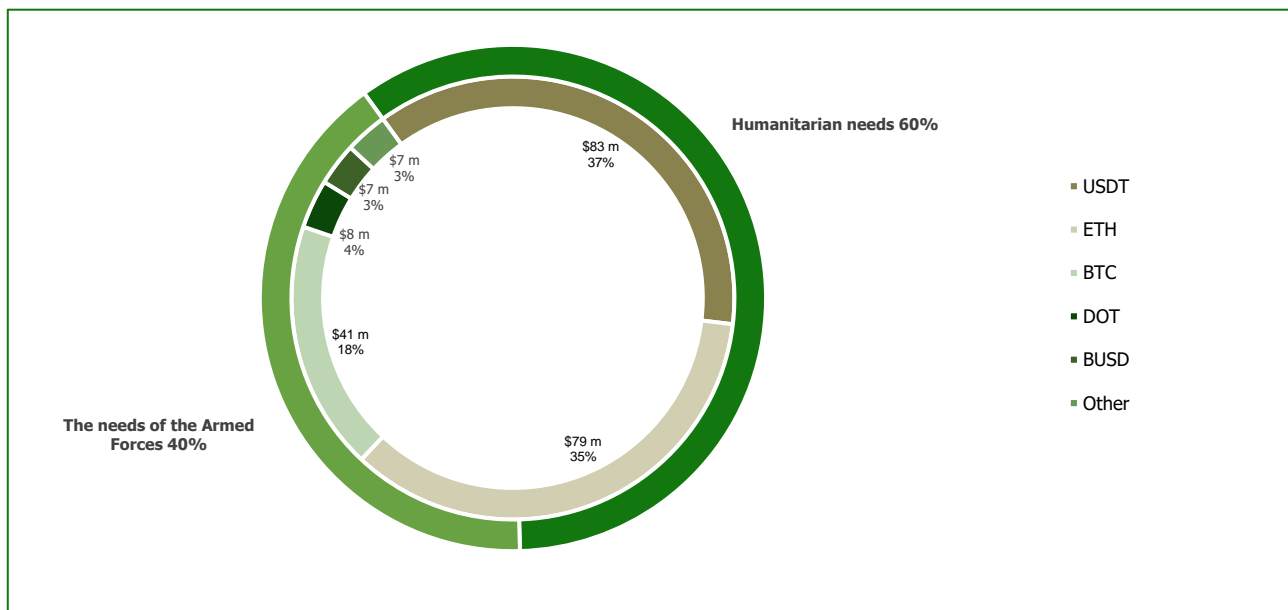


Figure 2. The structure of funds collected in cryptocurrency by Ukraine and their use as of June 2023. (Source: built on the basis of [5])

As can be seen from Table 1, the vast majority of charitable funds in Ukraine raise funds in Bitcoin and Ethereum.

Table 1. Cryptocurrencies raised by charitable funds in Ukraine for humanitarian and military purposes. (Source: built on the basis of [28])

The name of the charity fund	Cryptocurrency in which funds are raised			
	BITCOIN	ETHEREUM	SOLANA	Other cryptocurrencies
CF "Come back alive"	+	+	+	-
Serhiy Prytula Charitable Foundation	+	+	-	-
NSOU Plast	+	+	-	-
CF Tablets	+	+	+	+
CF "Army SOS"	+	+	-	-
CF "Vostok-SOS"	+	+	-	-
CO "Circle"	+	+	+	-
CF Dobrobut	+	+	-	-
CO "Hospitaliers"	+	+	-	-
CF "Voices of Children"	+	+	-	-
NGO "Ukrainian Cyber Alliance"	+	-	-	-
CF "Palyanytsia"	+	+	+	+
CF "Eyes of the Army"	+	+	-	-
CO "Nova Ukraine"	+	+	-	+
CF "Uchain Ukraine"	+	+	+	+
CO "Hope for Ukraine"	+	+	-	-

An interesting trend for charitable organizations is to raise funds through the sale of NFT tokens. One of the first projects was the ArtWARks collection - a collection of NFTs of Ukrainian artists sold on the OpenSea platform. Mother I See War and Art under Artillery launched NFT collections of war-themed children's drawings. The Ukraine DAO organization managed to collect about USD 7 million in aid for Ukrainians through the sale of an NFT picture of the Ukrainian flag [17]. The well-known project Rebel Society NFT released three limited editions of NFT under the name Good Rebels, the proceeds from the sale will be transferred to the Armed Forces of Ukraine. Volodymyr Klitschko launched the issue of NFT to raise funds for UNICEF and the Red Cross of Ukraine. The NFT charity project — "Meta History: Museum of War" with the support of UNITED24, the Ministry of Education and Science of Ukraine, the Ministry of Digital Transformation of Ukraine, and the Ministry of Culture and Information Policy is published by the NFT with illustrations by Ukrainian artists on the theme of the war in Ukraine. Due to this activity, "Meta History: Museum of War" collected more than USD 1.5 million, which will be directed to the restoration of cultural infrastructure objects destroyed as a result of military actions [18]. The basis of the UAF (Ukrainian Army Forces coin) volunteer crypto coin is the transfer of approximately USD 45-50 from the sale of NFTs to the needs of the Armed Forces of Ukraine every hour. The purchase of UAF affects the growth of the value of the coin and hourly transfers, allow making a profit. At the same time, UAF subscribers get access to unique content, in particular, war comics, and NFT art auctions [19].

Separate cryptocurrency exchanges made aid payments to Ukrainians. So, the Kraken cryptocurrency exchange reported that Ukrainians who had open accounts until March 9, 2022, can receive up to USD 1,000 in cryptocurrency or internal tokens from the exchange. Binance donated more than USD 11 million to a Ukrainian humanitarian fund and launched a refugee crypto card for all current and new users from Ukraine who became forcibly displaced due to the war with Russia, which was credited with BUSD 75 (equivalent to USD 75) for three months. The FTX exchange held a similar promotion, giving away USD 25 to each Ukrainian account (totalling USD 10 million). The British-Ukrainian crypto exchange BTC-Alpha launched a cryptocurrency donation fund for the needs of the Armed Forces of Ukraine and the population of Ukraine affected by the war, called Alpha for Ukraine. Separate bonuses for citizens from Ukraine were the cancellation of commissions for transactions or Airdrops on the wallets of Ukrainians [19].

For consumers in Ukraine during the war, opportunities to purchase goods, works and services with cryptocurrency payments are expanding. Thus, in May 2022, the Foxtrot trading network began to sell goods for cryptocurrency through cooperation with the Binance cryptocurrency exchange. In the first month, Foxtrot accepted more than 1,000 payments

in cryptocurrency. From August 2022, the chains of electronics stores "TechnoYizhak" and Stylus began to accept cryptocurrency as payment, integrating the Ukrainian crypto-processing WhitePay. They make every 13-15th payment in cryptocurrency. In September 2022, the Varus supermarket chain and the Binance blockchain ecosystem began to cooperate, offering buyers to use a crypto wallet based on Binance Pay technology. The ability to pay for fuel in cryptocurrency is provided by the WOG gas station network through the WOG PAY service in the PRIDE application. The OKWINE chain of stores in individual stores in Kyiv and Lutsk provides access to the company's website for cryptocurrency payments. Increasing the use of cryptocurrency when paying for goods, works, and services is facilitated by the activation of the use of cryptocurrency cards and the increase in the network of crypto machines. In 2022, the Weld payment card was put into circulation by the Ukrainian bank Unex Bank, Mastercard, and the fintech startup Weld Money, which is tied to a cryptocurrency wallet on the Weld Money platform with automatic conversion into hryvnia. By the end of 2023, the number of cryptocurrency cards used in Ukraine increased. Trustee Plus, issued by Trustee in partnership with MasterCard, Binance Card, issued by Binance exchange for the European Economic Area, Bybit Card, issued by Bybit exchange for the European Economic Area, Coinbase Card, issued by Coinbase exchange in cooperation with Visa, Crypto were added to their list.com Visa Card, issued by the Crypto.com exchange in cooperation with Visa, Wirex card, issued by the electronic wallet provider Wirex, CL Card Powered by Ledger, issued by the hardware wallet provider for storing cryptocurrencies Ledger in partnership with Baanx and Visa.

Shifts of a restrictive nature in the market of cryptocurrency assets in the conditions of the Russian-Ukrainian war relate to the application of sanctions to subjects of the Russian Federation and groups financing the Russian military machine by identifying them and blocking cryptocurrency wallets or banning their activities. The use of cryptocurrency collection to finance Russia's military actions in Ukraine was carried out by the groups "Rusych", Romanov Light, the Coordination Center for Assistance to Novorossiia (NACC), the cybercriminal group KillNet, the media sites Rybar and Southfront, and the Russian arms manufacturer Lobaev. According to various estimates, cryptocurrencies from USD 1.8 billion to USD 7.2 billion were used to finance Russian military groups [5, 20]. However, the ratio of funds raised in cryptocurrency to support Ukraine and pro-Russian funding is approximately 44:1 (World Economic Forum, 2023) [9]. According to Chinalysis, cryptocurrency markets are too illiquid to support mass evasion of Russian sanctions, although, of course, this activity is occurring on a much smaller scale [7]. As a response to the unprovoked Russian invasion of Ukraine, the British-Ukrainian crypto exchange BTC-Alpha stopped serving residents of the aggressor country. Crypto exchange Kraken disclosed the profits of its Russian customers for more than USD 10 million. Coinbase blocked 25 thousand wallets associated with Russians and Russian companies [19]. Russian exchanges such as SUEX, Garantex, Chatex, Bitzlato, and Hydra were added to the US sanctions list due to the conversion of cryptocurrency into fiat money intended to finance the war in Ukraine.

At the same time, the military actions and restrictions of the National Bank of Ukraine on the transfer of hryvnias to cryptocurrency to prevent the outflow of funds abroad affected the activity of domestic stock exchanges. So, the oldest cryptocurrency exchange Kuna moved its headquarters to Lithuania, reorienting its activities to the European market.

As can be seen from Table 2, the biggest threat to the functioning of the cryptocurrency market in Ukraine in the conditions of war, respondents consider the strengthening of regulation of cryptocurrency operations (28.57%). This especially applies to employees of the IT sector (8.57%), banking business, insurance business, and other types of entrepreneurial activity (4.76% each). The second place was taken by the threat of increasing hacker attacks (26.67%). Those employed in the IT field and full-time students are inclined to this opinion. The third most significant threat is the threat of missile attacks and shelling (14.28%). At the same time, compared to men, women prefer to influence the development of the cryptocurrency market through threats such as power outages, Internet shutdowns, missile attacks, and hacker attacks. At the same time, men consider the strengthening of regulation of the cryptocurrency market to be the biggest threat. This was largely influenced by the opinion of male respondents aged 34-40. Regarding the age structure of threat perception, respondents aged 18-22 perceive them most acutely. As can be seen from Table 2, business representatives (except for the IT sphere, banking, and insurance business), in contrast to other respondents, indicated the importance of the impact of power outages (8.57%) and the threat of missile attacks and shelling and the development of the cryptocurrency market in Ukraine in war conditions (7.62%). Representatives of state authorities see the least threats to the development of the cryptocurrency market in Ukraine.

Table 2. Threats to the development of the cryptocurrency market in Ukraine in conditions of war, %. (Source: built on the basis of a survey conducted by the authors)

Categories of respondents	Threats					
	Increasing hacker attacks	Increasing regulation of the cryptocurrency market	Inadequate protection of consumer rights	Power out-ages	Internet blackouts	Threats of rocket attacks and shelling
Sex:						
Female	14.29	11.43	5.71	8.57	3.81	9.52
Male	12.38	17.14	5.71	3.81	2.86	4.76
Age:						
18-22 years old	14.29	6.67	5.71	5.71	2.86	3.81
23-28 years old	2.86	5.71	1.90	3.81	0.95	3.81
29-33 years old	2.86	1.90	0.95	0.00	0.95	1.90
34-40 years old	5.71	9.52	0.95	0.00	0.00	3.81
more than 40 years	0.95	4.76	1.90	2.86	1.90	0.95
Field of activity:						
IT sphere	7.62	8.57	2.86	1.90	0.95	1.90
Banking business	2.86	4.76	1.90	0.95	0.00	1.90
Insurance business	1.90	4.76	0.95	0.95	0.00	0.00
State administration bodies	1.90	3.81	0.00	0.00	0.00	1.90
Other types of business activity	4.76	4.76	4.76	8.57	2.86	7.62
Full-time student	7.62	1.90	0.95	0.00	2.86	0.95

Despite the recognition of threats to the functioning of the cryptocurrency market in Ukraine in war conditions, 58.3% of respondents intend to carry out operations with cryptocurrency in the future. Investments, payments, and charity are considered the most promising directions for carrying out cryptocurrency operations.

As can be seen from Table 3, in general, 76.19% of respondents consider investing in cryptocurrency to be attractive (with the answers 'yes' and 'rather yes'). Undoubtedly, 19.05% of male respondents think so, and 29.52% of female respondents rather so. Respondents aged 18-28 and 34-40 consider the most attractive investments in cryptocurrency. In terms of spheres of activity, the idea of the investment attractiveness of cryptocurrency is supported by representatives of the IT sphere and employees of various spheres of business activity, excluding banking and insurance businesses.

Table 3. Investment attractiveness of cryptocurrency in Ukraine in war conditions, %. (Source: built on the basis of a survey conducted by the authors)

Categories of respondents	Answer options			
	Yes	Rather yes	No	Rather no
Sex:				
Female	10.48	29.52	5.71	7.62
Male	19.05	17.14	4.76	5.71
Age:				
18-22 years old	12.38	20.95	1.90	3.81
23-28 years old	6.67	7.62	2.86	1.90
29-33 years old	1.90	1.90	0.95	0.95
34-40 years old	3.81	8.57	4.76	2.86
more than 40 years	2.86	6.67	2.86	3.81
Field of activity:				
IT sphere	6.67	7.62	4.76	4.76
banking business	2.86	5.71	2.86	0.95
insurance business	1.90	4.76	0.95	0.95
state administration bodies	3.81	2.86	0.00	0.95
other types of business activity	13.33	15.24	1.90	2.86
full-time student	1.90	9.52	0.00	2.86

The results of the conducted survey testify to the predominance of optimistic attitudes of the respondents regarding the development of the investment component of the cryptocurrency market (36.19%) compared to the segments of payments, trading, and mining (Table 4). Pessimistic sentiments concern the prospects of the cryptocurrency mining segment in Ukraine (9.52%). This approach is supported by the respondents in terms of the age and gender structure of the respondents and their field of activity.

Table 4. Prospective segments of the development of the cryptocurrency market in Ukraine in conditions of war, %. (Source: built on the basis of a survey conducted by the authors)

Categories of respondents	Cryptocurrency market segments			
	Payments	Investments	Mining	Trading
Sex:				
Female	16.19	20.00	7.62	9.52
Male	14.29	16.19	1.90	14.29
Age:				
18-22 years old	9.52	17.14	3.81	8.57
23-28 years old	5.71	3.81	0.95	8.57
29-33 years old	2.86	3.81	0.95	0.95
34-40 years old	7.62	7.62	1.90	2.86
more than 40 years	4.76	3.81	1.90	2.86
Field of activity:				
IT sphere	7.62	7.62	2.86	5.71
Banking business	3.81	3.81	0.95	3.81
Insurance business	3.81	1.90	0.00	2.86
State administration bodies	0.00	4.76	0.95	1.90
Other types of business activity	11.43	13.33	4.76	3.81
Full-time student	3.81	4.76	0.00	5.71

As can be seen from Table 5, a large part of the respondents (64.76%) consider cryptocurrency to be a tool with high and moderate possibilities of providing humanitarian aid to Ukrainians affected by military operations.

Table 5. The possibility of using cryptocurrency as a tool for humanitarian aid to victims of the war in Ukraine, %. (Source: built on the basis of a survey conducted by the authors)

Categories of respondents	Answer options			
	High	Moderate	Low	Episodic
Sex:				
Female	13.33	20.00	15.24	4.76
Male	13.33	18.10	10.48	4.76
Age:				
18-22 years old	7.62	15.24	13.33	2.86
23-28 years old	9.52	3.81	4.76	0.95
29-33 years old	1.90	0.95	3.81	1.90
34-40 years old	4.76	10.48	2.86	1.90
more than 40 years	2.86	7.62	0.95	1.90
Field of activity:				
IT sphere	6.67	8.57	6.67	1.90
Banking business	3.81	3.81	3.81	0.95
Insurance business	1.90	3.81	0.95	1.90
State administration bodies	2.86	2.86	0.95	0.95
Other types of business activity	7.62	14.29	8.57	2.86
Full-time student	3.81	4.76	4.76	0.95

Respondents aged 18-22 and 34-40 support the optimistic idea of using cryptocurrency in humanitarian projects. In terms of employment spheres, this is insisted mainly by those employed in the IT sphere (5.24%) and business representatives

excluding banking and insurance businesses (21.91%). Representatives of the insurance business (2.85%) and state administration bodies (1.9%) are the most sceptical about the prospects of using cryptocurrency in humanitarian projects.

Identifying the specifics of the use of cryptocurrency in the conditions of the Russian-Ukrainian war and analyzing the results of the survey made it possible to identify the strengths and weaknesses of the functioning of the cryptocurrency asset market in Ukraine, as well as threats and opportunities for its further development.

Strengths:

1. Fast collection of funds for humanitarian and military aid compared to receiving aid from other states and international organizations.
2. Expanding the possibilities of crypto-acquiring.
3. Strengthening the cooperation of cryptocurrency market players with banks.
4. Increasing acceptance of cryptocurrency by the population.
5. Development of the infrastructure of the cryptocurrency market, in particular, the expansion of the network of crypto machines and the possibility of using cryptocurrency cards.

Weak sides:

1. Cryptocurrency operations as a way to avoid currency regulation.
2. Withdrawal of capital from Ukraine against the background of its deficit.
3. Insufficient liquidity of cryptocurrency assets.
4. Possibility of tax evasion.
5. Problems with crypto-currency transactions against the background of attacks on power plants and energy supply infrastructure, and rising prices of electricity.

Threats:

1. Use of cryptocurrency by entities of the Russian Federation to evade sanctions.
2. Application of taxation of electricity costs for cryptocurrency mining companies.
3. Fall of financial stability.
4. The threat of replacing the national currency.
5. Attracting funds using cryptocurrency to finance armed aggression by Russia.

Opportunities:

1. The possibility of collecting donations to help the Ukrainian army against the background of the fact that a significant number of charitable crowdfunding platforms prohibit the collection of funds for such purposes.
2. Expansion by business entities of the possibilities of payments in cryptocurrency for consumers.
3. Strengthening control over cryptocurrency transactions.
4. Growth of financial inclusion and competition in the financial market.
5. Development of cryptocurrencies with energy-saving mining protocols
6. Strengthening the fight against environmental pollution.

Table 6 presents possible scenarios for the development of the cryptocurrency market in Ukraine.

Table 6. Scenarios for the development of the cryptocurrency asset market in Ukraine. (Source: built on the basis of research conducted by the authors)

Market segments and impact on market participants	Optimistic	Neutral	Pessimistic
Mining	The restoration of cryptocurrency mining to pre-war volumes and the implementation of projects planned before the war, in particular, the cooperation agreement between the Ministry of Energy of Ukraine, SE «NNEGC «Energoatom» and the mining equipment manufacturing company Hotmine on the construction of a digital energy station [24].	Preservation of unchanged conditions for conducting mining activity.	A significant reduction in mining volumes due to the increase in the price of electricity, the destruction of energy infrastructure facilities by attacks of Russian troops, and increased taxation of mining, in particular, an environmental tax.
Payments	Expansion of establishments that accept payments in cryptocurrency for goods and services and offer to use cryptocurrency cards.	Preservation of current options for payments in cryptocurrency in trading networks.	Episodic use of cryptocurrency as payment.
Including charitable payments	Diversification of the activities of charitable funds in terms of collecting funds in cryptocurrency and directing them to finance the restoration of housing, assistance to victims, and prosthetics.	Reduction of charitable contributions and limitation of financing only certain exclusively humanitarian needs.	Curtailment of fundraising activities in cryptocurrency by charitable foundations.
Investments	The growing interest in investing savings in cryptocurrencies and the share of cryptocurrencies in investment portfolios against the background of optimistic forecasts regarding the crypto fear and greed index and the expectations of the surveyed segments of respondents.	Unchanging perception of cryptocurrency as an investment tool.	Reduction of opportunities to carry out investment operations against the background of curtailment of economic activity as a result of military operations.
Crypto machines	Increasing the number of crypto machines. Expansion of operations performed with their help.	Saving the current number of crypto machines.	The disappearance of crypto machines.
The use of cryptocurrency as a tool of the shadow economy	Impossibility of using cryptocurrency as a tool of the shadow economy due to increased regulation of the cryptocurrency market.	Strengthening the crypto community's use of identifying suspicious wallets and transactions and applying restrictive measures to them.	Episodic use of cryptocurrency as a tool of the shadow economy.
Protection of cryptocurrency users	Increasing protection through legal levers and increasing the technical level of user protection by participants in the cryptocurrency market infrastructure.	Activation of the crypto community regarding the protection of data of cryptocurrency users.	Deterioration of protection due to increased hacker attacks, and imperfection of technical support of participants in the infrastructure of the cryptocurrency market.

The implementation of possible scenarios for the development of the cryptocurrency market in Ukraine can take place under certain conditions, in various segments of the cryptocurrency asset market, changes in the regulation and control of market operations, and activities of service providers to protect sensitive customer information to prevent its theft.

DISCUSSION

This work is a continuation of S. Volosovych, A. Sholoiko, and L. Shevchenko's (2023) [27] study of the cryptocurrency market in the context of the Covid-19 pandemic. It supplemented the previous study in terms of identifying the impact of threats of military action on the functioning of the cryptocurrency asset market. Our article contributes to the scientific literature on the transformation of the strengths and weaknesses of the cryptocurrency asset market in wartime based on the identification of threats to its functioning, in particular, missile attacks and shelling, power outages, and increased hacker attacks. This extends the approach of D. Kerr, K. Loveland, K. Smith, and L. Smith (2023) [12] on the impact of various fraud threats on the cryptocurrency market.

Our article continued the research of S. Yermak, and M. Satanievska [29] (2020) on the problems and directions of development of the cryptocurrency market in Ukraine. S. Yermak and M. Satanievska (2020) emphasized that the main problem of the development of both the primary and secondary cryptocurrency markets is the lack of proper state regulation. However, in the conditions of the Russian-Ukrainian war, there was a transformation of the conditions of both the

internal and external environment of the functioning of the cryptocurrency asset market. As a result, we proposed optimistic, pessimistic, and neutral scenarios for the development of the cryptocurrency asset market in Ukraine (Table 6). We are inclined to the possible implementation of an optimistic scenario, taking into account the attitudes of the respondents regarding the use of cryptocurrency as payment, investment tools, trading, and humanitarian aid. This will be greatly facilitated by the disclosure of information about the risks of cryptocurrency assets in order to reduce information asymmetry (J. Field and A. Inci, 2023 [10]). Thus, on the one hand, the Russian-Ukrainian war created challenges for the financial services market in terms of ensuring safe and fast payments, profitability of business investment portfolios, and population savings. On the other hand, the military actions led to an increase in the attractiveness of cryptocurrency assets for investments and payments for businesses and households in Ukraine.

T. Bakhtiar, X. Luo, I. Adelopo (2023) [4], K. Nikolaos, P. Stephanos, T. Panayiotis, C. Shaen (2023) [14], analyzed the impact of savers' expectations on the investment attractiveness of cryptocurrency. This became the basis for identifying the sentiments of potential investors in Ukraine regarding the possibility of investing in cryptocurrency. Optimistic sentiments of investors regarding the attractiveness of cryptocurrency assets in the conditions of Russian military aggression were revealed. This complemented the approaches to the growing interest of investors in cryptocurrency not only in the conditions of the financial crisis but also in the conditions of the implementation of political risks.

Our study confirmed the hypothesis of a group of BAFFI centre researchers regarding the significant potential of cryptocurrencies as a component of charitable crowdfunding in war [3]. Almost 65% of respondents confirmed the possibility of using cryptocurrency as a tool for financing humanitarian aid to Ukraine (Table 5). This will be facilitated by the functioning of the appropriate payment infrastructure of the cryptocurrency asset market.

Further research should be related to an in-depth analysis of the impact of the risks of the Russian-Ukrainian war on the functioning of the cryptocurrency asset market.

CONCLUSIONS

This study reveals the priority directions of the development of the cryptocurrency asset market in Ukraine in the context of the Russian-Ukrainian war. To identify the specifics of the functioning of the market against the background of military operations, it was found that it is characterized by stimulating and limiting shifts. Structural changes of a stimulating nature relate to the active attraction of funds in cryptocurrency assets by charitable funds and the state, the provision of assistance by individual cryptocurrency exchanges to Ukrainian users, and the activation of the development of crypto-acquiring in Ukraine. The restrictive shifts are due to increased regulation and control at both the global and national levels amid sanctions against Russian cryptocurrency users.

To illustrate the structural changes in the market of cryptocurrency assets in Ukraine during the war, dominant threats and expectations regarding the use of cryptocurrency operations among respondents were identified. Respondents consider the most significant threats to the functioning of the cryptocurrency market in Ukraine in war conditions to be the strengthening of regulation of cryptocurrency operations, the strengthening of hacker attacks, and missile attacks and shelling.

This analysis proved a high level of adoption of cryptocurrency by the population in Ukraine based on the analysis of the survey results, which showed interest in investment and payment operations on the cryptocurrency market and confirmed expectations about the capabilities of cryptocurrency in providing humanitarian aid to Ukraine in wartime conditions. Optimistic sentiments regarding the development opportunities of the cryptocurrency market in Ukraine prevail among young people aged 18-22 and among female respondents.

In conclusion, the market of cryptocurrency assets in the conditions of war in Ukraine can develop according to an optimistic, pessimistic, or neutral scenario, depending on the implementation of certain conditions. These conditions relate to the state of the energy infrastructure, the technical and legal infrastructure of the cryptocurrency asset market, and changes in the sentiment of cryptocurrency users.

ADDITIONAL INFORMATION

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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РИНОК КРИПТОВАЛЮТНИХ АКТИВІВ В УМОВАХ ВОЄННОЇ АГРЕСІЇ

Неспровокована російська агресія до України загострила потребу споживачів фінансових послуг у швидких, безпечних платежах, у надійних інструментах збереження заощаджень, у швидкому переказі коштів, у гуманітарній допомозі та допомозі українській армії, що спричинило суттєві трансформації ринку криптовалютних активів. Метою дослідження є виявлення пріоритетних напрямів розвитку ринку криптовалютних активів на тлі російсько-української війни. У статті представлено аналіз ринку криптовалютних активів з акцентами на його структурних зрушеннях в умовах російсько-української війни. Для з'ясування впливу війни на український криптовалютний ринок було проведено опитування. Аналіз результатів опитування обґрунтовує гіпотезу про вплив посилення хакерських атак російських сил і ракетних обстрілів на функціонування криптовалютного ринку в Україні. Підтверджено, що інвестиції та платежі є перспективними сегментами криптовалютного ринку в Україні, у яких найбільші зацікавлені користувачі та потенційні користувачі криптовалюти. На основі отриманих даних виявлено слабкі та сильні сторони функціонування криптовалютного ринку в умовах війни. Обґрунтовано загрози та можливості розвитку криптовалютного ринку на тлі російської збройної агресії. Проведене дослідження дозволило сформулювати сценарії розвитку ринку криптовалютних активів в Україні в умовах війни та умови їх реалізації.

Ключові слова: ринок криптовалют, криптовалютні активи, криптомати, благодійні фонди, гуманітарна допомога, благодійний краудфандинг, майнінг, війна

JEL Класифікація: G23, G32, G41, H84