Regulatory Challenges and Consumer Protection in the Context of the Growth of Electronic Money in Ukraine: A Literature Review

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Abstract. The fast growth of e-money has offered great opportunities but has also introduced regulatory challenges especially in Ukraine. This paper seeks to explore some issues associated with regulating e-money by analyzing relevant regulatory documents, interviewing selected stakeholders and conducting a survey on e-money users and providers. The analysis reveals that there are very serious issues such as inconsistencies in regulations, poor levels of protection for consumers and problems related to enforcement of those regulations. For example, it is because of these huge gaps in regulatory frameworks that consumers are left confused and not complying with anything. The current process of improving harmonization and oversight is evaluated too showing how far we have gone and what still needs to be done. This study emphasizes on how important it is to take a more comprehensive approach to regulation so as to close those gaps effectively. Such an approach includes creating an overarching reform plan in order to increase protection for consumers, promote consistency in regulation and facilitate the stable expansion of e-money systems. This all-encompassing approach is essential for accommodating the fluid character of digital financial transactions while taking advantage of the benefits associated with e-money as well as reducing its risks.

Keywords: electronic money, regulation, consumer protection, financial stability, Ukraine.

INTRODUCTION

The financial landscape has been fundamentally transformed by electronic money, with transactions getting faster, more efficient, and more borderless. The growing global acceptance of digital currencies and electronic payment systems makes their influence on economic activities and regulatory frameworks even greater. A robust regulatory framework is urgently required to deal with the distinct challenges and opportunities presented by these technologies, as evidenced by the rapid rise in use of electronic money.

Do you remember about electronic money or e-money? E-money is generally regarded as encompassing all forms of virtual currency including bitcoin among other digital payment systems which allow transaction over the internet. The most recent developments in

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technological fields together with the increasing choice for digital alternatives on personal as well as business basis have spurred on this rise in e-money consumption rates. Nevertheless it's expansion comes with a myriad of difficult regulatory challenges that require close attention and judgment.

At present, the electronic currency governance environment is highly split up and changing; thus, the various approaches adopted by various jurisdictions. This inconsistency presents challenges for cross-border businesses and raises questions concerning harmonizing regulations to facilitate innovation while guaranteeing security as well as consumer protection. Regulation of electronic money constitutes a matter of great importance since it affects financial stability, consumer protection and general efficiency of financial systems (Electronic money directive, 2018; Lesko et al., 2019).

E-money's emergence also connects with wider aspects of financial inclusion and sustainable growth. Digital payments can be used to promote for example by allowing those without banking access to have access into banks. However, there must be regulations which do not stifle innovations but address issues like fraud, money laundering and financial stability. Proper regulation is needed so that e-money can contribute positively to economic development while reducing such dangers as fraud, drugs trafficking or other forms of crime (The Financial Action Task Force, n.d.; Stack, 2015; Whisker & Lokanan, 2019).

Notwithstanding the growing volume of studies on electronic currency's technical and economic facets, its regulatory dimensions continue to be poorly covered in literature. Presently, much attention is directed towards technical advancement or economic effects but not enough is said about regulatory and legal issues. For instance, while many have spoken of blockchain's capabilities and how it can be used to carry out transactions (Catalini & Gans, 2016; Schilling & Uhlig, 2018), there is little argument made for regulations that would help in harmonizing these innovative technologies into regulated environments.

The necessity of enhancing the existing regulations on electronic money cannot be overemphasized in the face of the myriad challenges that accompany its utilization. Therefore, this study aims at:

1. To identify and evaluate the major regulatory challenges relating to electronic money such as jurisdictional issues, compliance and financial stability.

2. To examine how existing and proposed regulatory regimes can contribute towards sustainable development goals through maintaining a balance between innovation and regulation.

3. To suggest policy interventions which could fill in the current regulatory gaps and promote an enabling environment for growth of electronic currencies while ensuring consumer protection as well as financial stability.

Research Problem

Today's regulatory frameworks are not generally established enough to deal with the legal issues that arise as a result of the fast proliferation of electronic currencies such as virtual currencies and digital payment systems. For example, there are concerns about lack of clarity in jurisdiction, difficulty in adhering to regulations and the challenge of reconciling regulatory oversight with promotion of innovation. Furthermore, electronic money's potential contribution to sustainable development remains untapped due to absence of comprehensive and cohesive legal frameworks. Aiming to address these matters this study connects legal perspectives and sustainability objectives making a case for a more nuanced and integrated regulatory approach herewith.

Research Focus

E-money systems that will enhance sustainable growth should settle the legal issues emphasized by this study. Focal areas of concern are the identification of regions and facets of electronic currency that are inadequately legislative and suggesting remedies for the inadequacies in those areas. The aim of this paper is to give insight into regulatory modulations needed to remove current hindrances and advance not only technological progress but also sustainable development, through an examination of how regulatory frameworks facilitate achievement of sustainability objectives alongside accommodating technological innovation.

LITERATURE REVIEW

Changes in financial opportunities due to the rise of online currency happen to be significant, leading not only toward challenges but also chances which accompany the technical progress. The passage will discuss the evolution of electronic currency, its effects and regulatory issues surrounding it especially in relation to cryptographic currencies as well as digital payment systems.

Owing to the reason that digital currency can be described as wider sense of virtual money just like represented in cryptocurrencies, e-payment solutions or e-wallets. Such an extensive transformation is unheard of in this area. For a long time, the real identity for whom was Satoshi Nakamoto whose invention gobbling it was by year 2009 the PGP that operates via decentralized blockchain network and makes it possible to carry out person-to person transactions withoutr any third party (Squarepants; Squarepants, 2008; Wright, 2008). Afterwards, other classifications of digital currencies came up serving different purposes and functions.

The cryptocurrency market has undergone enormous changes since Bitcoin was first launched (Cryptocurrency prices, charts and market capitalizations | coinmarketcap, n.d.; Cryptocurrency prices, portfolio, forum, rankings, n.d.). Just some years ago there existed only approximately 1,500 cryptocurrencies but by 2024 this number had grown to over 20,000. This sharp rise both in number and variety of crypto currencies is as a result of greater attention from investors and extremely fast-paced innovations taking place in finance sector. For their ability to cut down transaction costs, promote rapid transactions and reach out to those without access to financial services; crypto currencies have been praised (Catalini & Gans, 2016). However, along with growth comes new complexity and dangers.

Financial technology have been significantly advanced by both cryptocurrencies and digital payment systems, albeit in different ways. A comparison of some of their most prominent features, advantages, and limitations is presented in the table below (Table 1).

Table 1. A Comparison Table of Digital Payment Systems and Cryptocurrencies

Feature/Aspect	Cryptocurrencies	Digital Payment Systems
Technology	Decentralized blockchain technology.	Centralized platforms with SSL/NFC encryption
Transaction Speed	The network congestion might cause it to be slow.	Generally fast due to established networks
Cost	Elimination of middlemen resulting in reduced transaction costs.	Often involve transaction fees and service charges
Security	Cryptography makes certain that the security of data is high while on the other hand being vulnerable to its volatility and hacking.	Generally secure but subject to data breaches and privacy issues
Volatility	High volatility (e.g., Bitcoin price fluctuations).	Stable value, less susceptible to volatility
Regulation	We see high volatility like what happens to the prices of Bitcoin.	More consistent regulation but still faces challenges related to privacy and data protection
Economic Inclusion	The potential is probably high because there are not many barriers in getting started.	Enhances financial inclusion, particularly in underbanked regions
Privacy	Anonymousness is a tool that can facilitate illicit actions.	Privacy concerns but regulated to protect user data (e.g., GDPR)
Legal Framework	New and erratic; problems with apathy towards money laundering and countering financing of terrorism rules	Well-established in many regions but faces issues with adapting to new technologies
Environmental Impact	Intense energy utilization (e.g., extraction)	Generally lower, though data centers have their own environmental footprint

Future Trends	CBDCs (Central Bank Digital Currencies) and stablecoins are on the rise.	Continued evolution with more focus on privacy and integration with traditional financial systems

Source: created by the authors

Digital payment systems, encompassing online banking services and e-wallets, are also a vital component of electronic money. By allowing users to store and transfer value electronically, these systems simplify transactions while improving financial inclusion. Near Field Communication (NFC) technology as well as Secure Socket Layer (SSL) encryption have enhanced the security and effectiveness of digital payment systems leading to their mass adoption (Table 2). (Arvidsson, 2019a; Arvidsson, 2019b)

Table 2. Comparative Analysis of Regulatory Approaches to Cryptocurrencies and Digital Payment Systems

Aspect	Cryptocurrencies	Digital Payment Systems
Regulatory Approach	Varied and evolving; some countries ban or heavily regulate	More consistent; established regulations but evolving
AML/CFT Compliance	Inconsistent enforcement; varies by jurisdiction	Generally well-regulated but faces enforcement challenges
Taxation	Inconsistent treatment; varies by country (property, commodities, or income)	More uniform but still facing adaptation issues
Data Privacy	Privacy issues related to anonymity and illicit use	Regulated by laws such as GDPR but faces ongoing challenges
Consumer Protection	Emerging frameworks; challenges in protecting users	Established protection mechanisms but need to adapt to new technologies
Legal Clarity	Often unclear and inconsistent; ongoing development	More clarity but regulatory frameworks need to keep pace with technological changes

Source: created by the authors

There are several economic ramifications for the technological breakthroughs behind e-money. At the core, cryptocurrencies are decentralized and are expected to issue transparency through blockchain technology. As a result, they are often disintermediated in global finance (therefore threatening the conventional financial system based on centrality and regulation) (Bitcoin and cryptocurrency technologies: A comprehensive introduction, 2016; Joseph et al., 2016). With this kind of structure, you eliminate the need to trust third parties and lessen transaction fees thereby making them cheaper to conduct as well as faster (Alex, 2018; Radziwill, 2018).

Though cryptocurrencies provide these advantages, they have also created additional dangers. The oscillation in the prices of cryptocurrency such as the Bitcoin fluctuations is a serious issue as per investors and regulators (Cheah & Fry, 2015; Münyas & Atasoy, 2021). Such volatility could cause extensive financial loss and raise doubts over the stability of financial markets. Further, anonymity linked with cryptocurrencies has been used for illegal operations like laundering money and tax evasion (Foley, Karlsen, & Putniii, 2018; Foley, Karlsen, & Putniņš, 2019).

In addition, a similar trend can be noticed in the economic transaction sphere with respect to the way digital payment systems have enhanced convenience and accessibility. Thus, this phenomenon is instrumental in widening the scope of financial services for underprivileged groups. The World Bank contends that digital financial services can enhance economic inclusion especially in developing nations where there are few or no banks (Bank, 2018; Demirguc-Kunt et al., 2015). However, it is worth noting that the extensive adoption of electronic payments has its downsides too such as problems with privacy and data protection. Since these types of payments create a lot of personal and financial information, it is essential to have stringent security measures against cybercrime (Secure payment processing, 2013).

Modern live lingo toners have precisely indicated the urgency for speedy regulatory framework implementation. Given that they are decentralized and operate across borders, cryptocurrencies particularly face distinct challenges from respective governments. The manner in which various jurisdictions respond to

cryptocurrencies differs immensely (Lishchynska, 2019; The Law The Law Library of Congress, 2019). A thorough legal framework for the usage of digital currencies together with matters such as protection of consumer interests or financial security was established by countries like Japan or Switzerland (Böhme et al., 2015; Powell, 2015). Consistently, some nations have imposed a complete ban or moreover on the non-ambiguous restrictions of their functioning. One significant obstacle confronting various other regulators includes ensuring the adherence to the anti-money laundering (AML) as well as counter-financing of terrorism (CFT) laws.

This makes it difficult to track and curb illegal activities due to the obscured nature of cryptocurrencies.

Consequently, different jurisdictions have set up regulations obliging cryptocurrency exchanges and wallets providers to adopt AML/CFT procedures like client verification and transaction supervision (Broby & Quimbayo, 2021; Hardjono et al., 2020; OECD, 2020). But these practices do not work in the same way everywhere, and enforcement continues to be an issue due to the distributed nature of cryptocurrency.

Another paramount regulatory problem facing us today is the taxation policy governing cryptocurrencies. Treatment of digital assets for tax purposes lacks uniformity across various jurisdictions. In some countries, cryptocurrencies are classified as either property or commodities and are therefore subjected to capital gains tax while in others, they are treated like income (Bal, 2015). This discrepancy may lead to confusion among investors and businesses making it difficult for them to comply with taxes.

Digital payment systems also find themselves under intense scrutiny from regulators especially in relation to data privacy and security issues. For instance, the European Union's general data protection regulation (GDPR) focuses on protecting user data by introducing transparency mechanisms on how such information is collected and used (Voigt & von dem Bussche, 2017). However, fast changing technologies have surpassed the capacity of regulatory frameworks to adapt giving rise to empty spaces when it comes to guarding people against technology related crimes and enforcing laws.

Despite its substantial amount of research, electronic money still requires further exploration in some sectors. The effects that new technologies like central bank digital currencies (CBDC) and stable coins have on the current regulatory framework are still not understood well. CBDC may reshape financial landscapes as they are government-backed alternatives to cryptocurrencies (Martin, 2021; Sinelnikova-Muryleva, 2020). On the other hand, stable coins which seek to maintain price stability by tying their value to conventional assets present fresh regulatory hurdles as well as chances (Adrian & Mancini-Griffoli, 2021; Hrytsai, 2022; International Monetary Fund, 2021).

Moreover, extensive studies are necessary in relation to the junction of e-money and sustainable growth. It is crucial to realize the ecologic and social impact of these systems because they are taking a bigger place in electronic money circles. For example, energy use related to cryptocurrency mining has raised alarm over its environmental footprint (Dittmar & Praktiknjo, 2019; Mora et al., 2018). Tackling these issues require integrated approach that takes into account both technological advancement and sustainability objectives.

To sum up, it essays within the web of e-money, how the financial universe is transformed by virtual currencies and payments schemes. Nevertheless, there are still some unanswered questions with regard to different regulators that have been left by bureaucrats in a sense. More studies are needed to find solutions to these issues with an aim of formulating laws that can provide room for creativity but also guarantee stability and safety against any threats to human life or environment.

RESEARCH METHODOLOGY

General Background

The financial sector has been greatly affected by cryptocurrencies, especially in transaction methods and regulatory measures. In this research paper, a thorough investigation is conducted on the use of digital currencies in the accounting and taxation of electronic commerce, analyzing the economic implications and problems that the contemporary regulatory frameworks encounter. The main goal for employing mixed methods in this research study is to gain a broader perspective on these issues.

Methodological Approach

A mixed-method research design is employed in this study, which integrates both qualitative and quantitative methods to assess the relationships between accounting practices, taxation and cryptocurrencies. This method provides an integrated analysis of the interactions between cryptocurrencies and financial systems.

Quantitative Methods

In the cryptocurrency market, quantitative analysis's predominant goal is to establish statistical models that are able to identify trends. More specifically, the significant use of linear and polynomial regression models help analyze transaction volumes and price volatility. Such pricing models were appropriate given that they reflected the general trends of the market for linear models and polynomial ones effectively captured more complex relationships. The analysis was done using SPSS and R software with key variables like transaction volumes, price volatility as well as market capitalization. This provided a thorough investigation into how cryptocurrencies affect financial markets.

Qualitative Methods

In-depth interviews with experts as well as professionals in the financial and crypto currency industry were used to conduct qualitative analysis. This interview provided insights on regulatory issues, challenges faced by professionals and experiences in cryptocurrencies. The interviews were recorded, transcribed, and analyzed using NVivo software for coding and thematic analysis so as to uncover key issues and viewpoints on cryptocurrency accounting and taxation.

Sample and Participants

This research sample totaled 200 respondents who were divided into three distinct categories.

- 100 Academic Scholars: Financial and cryptocurrency researchers, with theoretical and scholarly contributions.

- 50 Financial Experts: People who have worked with cryptocurrencies in order to gain practical insights.

- 50 Regulatory Officers: State regulators and auditors responsible for examining cryptocurrency activities.

Inclusion criteria were based on expertise and experience so that all perspectives are captured. In collecting data, structured questionnaires and interviews were used. Surveys that assessed different aspects of knowledge, experience, regulatory perspectives and professional challenges were developed for this purpose. Thereby it was possible to make the answers valid by ensuring anonymity while constructing well-thought-out questions.

Instruments and Procedures

Structured online surveys and in-depth interviews were the means of gathering primary data. For instance, several survey questions were asked regarding the participants' apprehension of cryptocurrency, their regulations, and some arising professional issues. On the other hand, interviews facilitated a more insightful understanding of this subject matter.

The qualitative data was assessed through NVivo while quantitative data was subjected to SPSS and R. Regression models were used to analyze market trends, while qualitative analysis assisted in identifying the key themes and issues found in interview data.

Comparative Analysis

I got secondary information on comparative analysis from places for example CoinMarketCap and regulatory records from the National Bank of Ukraine and the European Central Bank. This comparison analyzed the regulatory frameworks of Ukraine, the EU and the US, pinpointing differences and their consequences for cryptocurrency usage.

The mixed-methods approach ensured that there was an extensive investigation into the numeric and narrative facets of how cryptocurrency influences accounting and taxation systems. This is because cryptocurrencies have been shown to be highly disruptive to financial systems and accounting processes suggesting the need for a review of current regulations.

RESULTS

In Ukraine, various legislative acts as well as regulations are centered on the governing framework for electronic money. The most significant among them being the Law of Ukraine on Payment Systems and Money Transfers (Money transfers, 2011), which explains the principles that drive every payment system including electronic money. It is from this law that licensing of payment institutions is derived and standards meant for managing and ensuring safety during electronic currency transactions established.

Specific rules and guidelines serve to refine the use of regulation provided by the National Bank of Ukraine (NBU). For instance, NBU Regulation #32 (National Bank of Ukraine, n.d.) puts forth various requirements that must be fulfilled when issuing and circulating electronic money. Besides, NBU Regulation #100 (National Bank of Ukraine, n.d.) is concerned with ensuring secure payment systems, while NBU Regulation #23 (National Bank of Ukraine, n.d.) enables updated procedures for the monitoring and oversight of payment institutions (Table 3).

Table 3.Key Regulatory Acts Governing Electronic Money in Ukraine

Regulatory Act	Description
Law of Ukraine on Payment Systems and Money Transfers (2019)	On the subject of principles for payment systems, these include electronic money, licensing and consumer protection.
NBU Regulation #32 (2020)	Outlines rules for the operation of electronic money, including circulation and storage requirements.
NBU Regulation #100 (2021)	Sets requirements for the security of payment systems and the protection of information.
NBU Regulation #23 (2022)	Regulates monitoring procedures for payment systems and their participants.
Law of Ukraine on Electronic Commerce (2021)	Defines rules for electronic commerce, including payment processing through electronic platforms.
Law of Ukraine on Consumer Protection (2020)	Protects consumers in financial services, including electronic money, against fraud and poor service.
NBU Regulation #57 (2022)	The identification demands of users and information safeguarding in payment systems are established.
NBU Regulation #103 (2023)	Payment Institutions Licensing Regulation, which works in the realm of electronic money transfers.
NBU Regulation #85 (2021)	Specifies reporting requirements for payment institutions, including those handling electronic money.
NBU Regulation #14 (2023)	Establishes rules for international money transfers involving electronic money.

Source: Based on data created (National Bank of Ukraine, n.d.)

The formal legal structures in Ukraine are very well defined and this includes all aspects of e-money control, beginning from operational principles to client safeguarding. Accordingly, the combination of statutory provisions and regulations of the National Bank of Ukraine (NBU) creates a holistic approach of managing electronic monetary systems.

That electronic cash market of Ukraine has really gone far on the rise. Looking at information from National Bank of Ukraine, we can see an increasing amount of transactions involving electronic money which signifies that more people are embracing digital ways of paying for services (Table 2).

Table 2. Volume of Electronic Money Transactions by Year

Year	Total Transaction Volume (Billion UAH)	Number of Transactions (Million)	Average Transaction Amount (UAH)
2014	100.0	52.0	1,923
2015	110.0	55.0	2,000
2016	120.0	58.5	2,051
2017	130.5	61.7	2,116
2018	142.0	65.3	2,176
2019	155.0	70.5	2,199
2020	176.3	79.8	2,211
2021	190.2	85.3	2,230

2022	210.5	92.7	2,272
2023	225.8	98.4	2,293

Source: Based on data created and calculated according to (National Bank of Ukraine, n.d.)

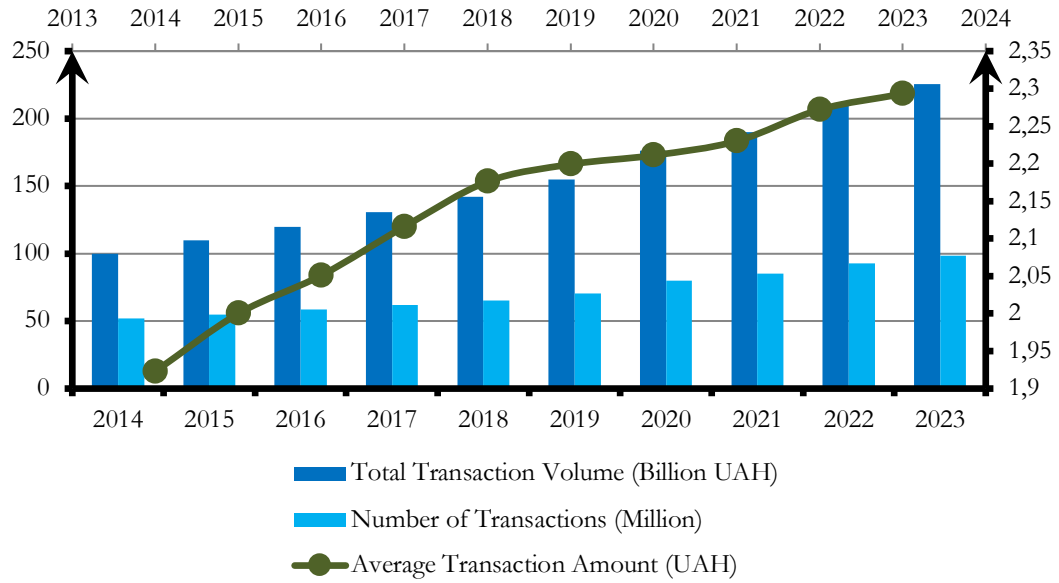

Fig. 1. Volume of Electronic Money Transactions in Ukraine (Billion UAH)
Source: developed according to (National Bank of Ukraine, n.d.)

From 176.3 billion UAH in 2020 it grew to 225.8 billion UAH by 2023, thereby displaying a considerable upward trend. The growth remarks the increasing use of electronic money among consumers as well as businesses.

The breakdown of each year's transaction volumes, number of transactions and average amount from 2014 to 2023 is shown in Table 2. Data for this period confirms the rise observed on Graph 1. In fact, total transaction volume has been progressively increasing with noticeable increase in number of transactions every year.

It can be observed that there has been a steady growth in average transaction amounts which implies that electronic cash is applied for both small and large transactions. This hike may be attributed to higher transaction values as well as boosting confidence levels with regard to electronic payment systems.

Hence it can be deduced from these statistics that e-money is gradually becoming part of Ukrainian finance through increasing volume and frequency of transactions over time. These figures indicate an expansion of digital payments use, as well as a rise in the number of electronic cash transactions. So what this means is that according to figure one and table two, electronic money transactions have been growing positively in Ukraine because of new technologies as well as greater acceptance among people.

Regulatory measures' effectiveness in electronic money has been assessed critically through a critical examination of various dimensions such as fraud occurrences, and security of electronic money systems at large. In efforts to protect financial transactions and ensure integrity of systems, regulatory bodies have a significant responsibility on a policy level, and they also enforce these regulations. This will minimize dangers and deter conmen from ruining transactions hence providing protection for consumers, while at the same time offering safety to firms.

The pattern of fraud cases over time is one of the main indicators of the efficiency of regulation (Table 4). Valuable information on the efficiency of these measures has indeed been provided by the State Service of Special Communication and Information Protection. A steady decline in instances of fraud over recent years is an indication that the regulatory framework and improvement of the security systems are working. The positive trend is indicative of a change in approach in detection and prevention of financial fraud that underscores the need for sustained policies to ensure safe electronic payments.

Table 4. Incidents of Fraud with Electronic Money by Year

Year	Number of Fraud Incidents	Fraud Incidents per 1000 Transactions
2014	1900	2.32
2015	1800	2.20
2016	1700	2.05
2017	1600	1.92
2018	1500	1.83
2019	1400	1.74
2020	1300	1.60
2021	1200	1.41
2022	1100	1.18
2023	1050	1.07

Source: Based on data created and calculated according to (Derzhavna sluzhba spetsialnoho zviazku ta zakhystu informatsii Ukrainy, n.d.)

The figure 2 showing fraud cases concerning electronic money from year 2014 to 2023 tell about a significant tendency in how often and how many people experienced fraud. Around 2014-2016, there was a peak of fraud cases which then started going down; thus, the graph indicates this.

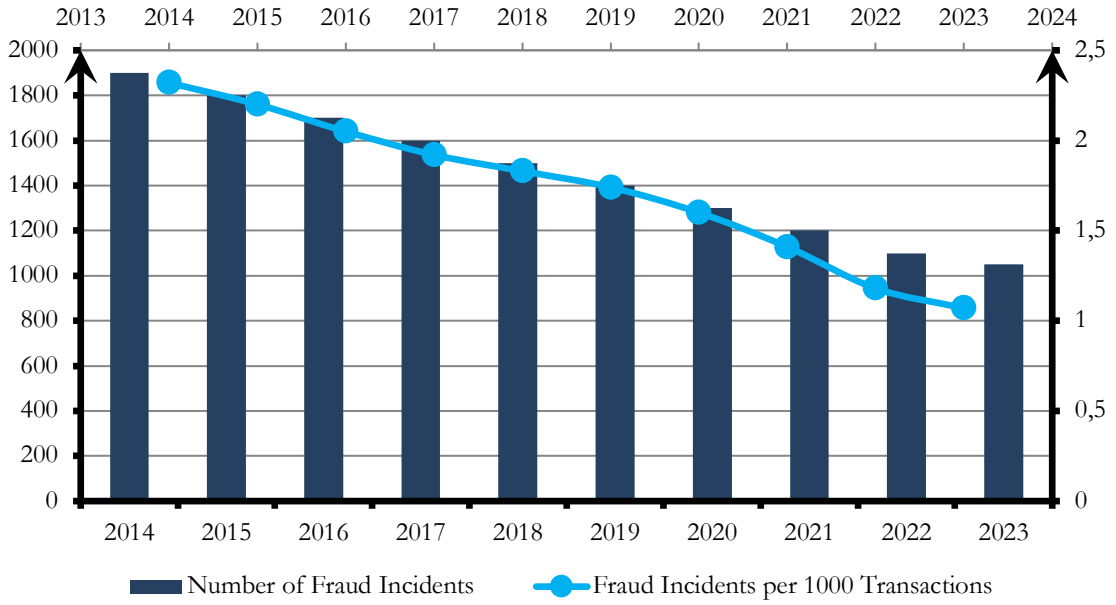

Fig. 2. Incidents of Fraud with Electronic Money by Year

Source: developed according to (State Service for Special Communications and Information Protection of Ukraine, n.d.)

The chart depicts that during the years from 2014 to 2016, there was an increase in the number of frauds and fraud rate per 1,000 transactions. In 2014, frauds were 1,900 at a per 1,000 terms of 2.32. In 2016, these figures reached 1,700 incidents and 2.05 per 1,000 transactions respectively. This increase in numbers shows growing difficulties in managing fraud as electronic money transactions became more common and complicated.

After 2017 onwards, the graph shows a clear downward trend. The number of fraudulent behaviors declined to about 1,050 by the year 2023 while incidence rate decreased to about 1.07 per every one thousand transactions as well. Such decline symbolizes effective regulations put out by various governments together with enhanced security measures adopted by commercial banks which deal with customer deposits on their behalf thus making online payment services secure and reliable respectively. The graphical association symbolically demonstrates this successful decline in scam cases through enhanced regulatory policies and better detection systems

concerning fraudulent activities like phishing among others.

This positive change in the security landscape of electronic money transactions is reflected by the downward trend in the chart. From the peak levels in 2016, there has been a significant drop to lower levels by 2023 indicating that countering fraud has been effective. These no doubt includes; improved regulatory oversight, better security measures and technological advancement among others. In essence, this graph displays significant progress on electronic money transaction security over the last ten years. Successes of regulatory interventions are demonstrated here through reduction of fraud incidence rates as well as absolute number of fraud cases reported which emphasize on continuing efforts towards improving integrity of e-payment systems.

Comparison of Ukraine's legislative framework with global practice, especially within EU countries reveals similarities in some aspects but differences in others. This enables us to find out which areas Ugandan policies conform to and where more work should be done (Table 5).

Table 5. Comparison of Electronic Money Regulation: Ukraine vs. EU

Aspect	Ukraine	EU
Licensing	Required for all payment system participants	Required for payment institutions and electronic money issuers
Consumer Protection	Basic requirements established	Stronger consumer protection under PSD2 directive
Innovation in Technology	Regulated under existing norms	Specialized regulations for cryptocurrencies and DeFi
International Transfers	Regulated for electronic money	Specific rules for SEPA, SWIFT, and other international transfers
Monitoring and Reporting	Regular checks and reports required by NBU	Systematic oversight with regular audits and detailed reporting
Technological Innovations	Focus on fraud prevention and system security	Includes new technologies and data protection measures under GDPR

Source: Based on data created and calculated according to (European central bank, n.d.; National Bank of Ukraine, n.d.; Verkhovna Rada of Ukraine, 2008)

Ukraine orders that all individuals in the payment system must hold licenses, which is a large contrast with the EU that recommends licenses mainly for such payments institutions and electronic money issuers. This distinctiveness demonstrates different ages of regulation and variations in the key areas of focus.

Consumer protection is more consolidated in EU with the Payment Services Directive 2 (PSD2) being put in place to safeguard consumers adequately. On the contrary, basic consumer protection is found in Ukraine's regulation hence there is a need for further amendment so as to meet European Union standards.

Emerging technologies like cryptocurrency and decentralized financial technology (DeFi) have been specifically regulated by EU. Nevertheless, Ukraine's regulatory system is still under construction amidst attempts at keeping up with these developments. Hence, it seems that Ukraine could consider developing more focused rules aimed at technological progress.

In terms of international transfers, the EU has laid down explicit guidelines for SEPA (Single Euro Payments) System; SWIFT (Society for Worldwide Interbank Financial Telecommunication); among others while Ukraine incorporates them with international transfers but more elaborate directions are lacking thus making it necessary for them to conform to global norms. Monitoring and reporting practices are also different, while the EU uses systematic oversight and regular audits. Ukraine does regular checks and reports as required by the NBU, but perhaps it could improve these practices to cover all areas.

In conclusion, although Ukraine's regulatory framework is in line with many international norms, there are still gaps where better adaptation to international practices could further improve its functioning in areas like consumer rights protection, innovation in technology and cross-border remittances.

DISCUSSION

In order to fully grasp the rapidly changing landscape of cryptocurrency, it is important to understand the workings of electronic money and the way different kinds of digital money are regulated. The results of our study present some vital trends in digital currencies' development, regulatory difficulties they encounter as well as their broader effects on economies. These findings serve to underline that there are opportunities and threats which characterize crypto currencies as a whole, and this has been widespread discussions among financial analysts.

This research follows the trend in literature where growth trajectories regarding digital currencies particularly BTC have been discussed extensively. Investors and researchers have paid much attention due to the exponential increase in prices for bitcoins and other cryptocurrency assets. Current studies such as those conducted by Bank of America indicate that many people within this group regard cryptocurrencies as bubble investments waiting to burst during bad times (Bank of America - banking, credit cards, loans and merrill investing, n.d.). Such view points call for sustained surveillance of crypto markets by concerned stakeholders focusing on comprehensive regulations addressing structural changes that make these currencies volatile.

On the opposite side of the coin, a segment of investors and analysts is increasingly viewing cryptocurrencies as a feasible long-term investment opportunity. Cryptocurrencies have anti-fragile properties in terms of their resistance to traditional stock market bearish trends thus offering an attractive proposition for investment (Dawood et al., 2019). This suggests that despite certain risks posed by digital currency, they also create possibilities for wealth accumulation and diversification. The contrast between these points of view illustrates the ambivalent nature surrounding the digital currency sector where great gains must accompany great losses.

A major concern we noticed during our investigation was how challenging it is for financial authorities to regulate virtual money. Indeed, the quick-paced advance in technology concerning electronic currencies as well as volatile market forces are quite troublesome for every regulator. Non-inventive approaches towards handling cryptocurrencies always result into the most futile norms, suggesting a need to develop more flexible and futuristic principles.

A commendable move has been made by the Dubai government to address these challenges through the establishment of The World Block Council. To this end, it intends to bring together 500 entities, as well as standards and guidelines for cryptocurrencies creating a unified regulatory framework that promotes innovation while maximizing market stability. This initiative is an anticipatory measure for dealing with multi-faceted issues attached to digital currency regulation and could act as a reference point for other regions trying to reconcile innovation and regulation.

Our findings support earlier studies regarding how digitalization affects the digital money market. Researchers have considered mobile platforms and distribution channels in relation to availability and adoption rates of cryptocurrencies (Basu et al., 2014). Our findings are consistent with these ones; cryptocurrencies remain attractive investment options that are likely to keep thriving.

Anyway, the study elaborates on these findings by pointing out how new economic models are emerging due to the development of digital currency. In contrast with earlier researches (for instance, Basu et al., 2014), which may have ignored these new models, our study highlights how digital currencies induce large-scale changes in financial strategies. Such transformations could lead to a revolution in conventional finance and its institutions. These observations call for more scrutiny into their consequences.

Surprisingly enough from our research is that cryptocurrency trading has become more significant on mobile platforms. Cryptocurrencies are now easier and more liquid than most people thought they would ever be (Novo, 2018; Ilham et al., 2022). This implies that they are even more liquidized than any other conventional financial asset; thereby causing a dramatic shift not only in market behavior but also in investor participation levels.

One of the most surprising find from our study is cryptocurrency mining's environmental impact. As far as Bitcoin is concerned, its mining requires a lot of energy, which is predominantly sourced from fossil fuels; thus, the issue of its environmental sustainability comes in place. A few authors have brought up this issue (Bitir-Istrate et al., 2021), but our data suggest that there is need for more integrated analysis on the

long-term ecological effects as well as opportunities for utilization of renewable energy.

The ecological consequences tied to cryptocurrency mining provide an essential prompt for future investigation and regulatory attention. There should be a concerted effort among actors in the sector, regulators and ecological professionals towards the sustainability of digital currencies by coming up with approaches that reduce negative environmental costs while at the same time fostering technological advancements.

Limitations of the Study

This study limitations in our research that may restrict the extent to which the findings can be applied more broadly. First of all, the fast-paced development of digital currency technologies and market tendencies means that as time advances, our results may become insignificant in this sector. The cryptocurrency market has an inherently dynamic nature which brings about variability in outcomes of studies thereby questioning their relevance over time.

Secondly, there are different ways through which jurisdictions handle virtual money thereby making it difficult for us to generalize. Our results can hardly be generalized due to the varying legal systems in which they were obtained since these have a great effect on how crypto currencies develop and get accepted around the world.

Implications for Future Research

There are some directions that future studies should take in order to expand what we have tested. Firstly, it is necessary to investigate more into the way emerging economic models powered by digital currencies affect conventional financial systems and institutions. The knowledge about such effects can guide financial managers and even policymakers to changing their strategies or facing altogether new forms of regulation.

Secondly, researches that delve deeper into the ecological consequences of cryptocurrency mining are very important. In particular, work must be done on locating and using eco-friendly energy sources as well as improving mining technology efficiency so as solve environmental issues relating to digital currencies.

Finally, it's important to investigate the impact that cryptocurrency adoption has on various social classes both in terms of social and economic implications. Doing so could shed light on how these digital currencies either help to bridge or widen existing socio-economic disparities.

In conclusion, our study comes with invaluable information about opportunities as well as challenges that surround digital currencies. This can help us to come up with better ideas on how we can bring these forms of money into our economies and societies properly by recognizing their limitations and identifying research gaps. Therefore, this ongoing research is necessary for developing an equal and fair atmosphere for the growth of such assets.

CONCLUSIONS

Consumer protection, accountability, financial tranquility and innovation are some of the biggest challenges that face electronic money regulation. There is a need for flexible and adaptable regulatory frameworks since the digital currencies including e-money have grown rapidly making them more uncertain. Thus, as electronic money becomes widely used, regulators ought to come up with comprehensive policies that harmonize between supporting innovations and ensuring strict measures.

On a global scale, changes in world economy and international transactions should be looked into when considering future with regards to regulation of electronic currencies. Knowledge on those factors will help in developing regulatory regimes which promote international cooperation and ensure uniformity across borders. Besides, there is a need for local investigations on the environmental as well as social impacts of proliferating digital currency like cryptomining energy consumption across other areas so as to comprehend how this finance shift at large works.

Reforms should align national regulations with international standards, especially in developing regions like Ukraine, for filling existing regulatory gaps. Such an alignment would enhance consumer protection and financial market integrity while promoting the growth of innovative technologies in finance. In addition, constant monitoring of current regulatory effectiveness is essential to adapt to emerging risks and opportunities.

The ongoing rise in market capitalization of digital currencies demonstrates their financial potential, but it also reveals the possibility of speculative bubbles. For that reason, they should remain suspicious and therefore carefully analyze the socio-economic impacts of digital cash, especially with regard to social disparity issues and accessibility to financial services. This means that by deepening inquiry into these areas, regulators will understand better how to handle related risks and take advantage of electronic money opportunities emerging within an evolving financial environment.

REFERENCES

Adrian, T., & Mancini-Griffoli, T. (2021). The rise of digital money. *Annual Review of Financial Economics*, *13*(1). https://doi.org/10.1146/annurev-financial-101620-063859

Alex, T. D. T. (2018). *Blockchain revolution: How the technology behind bitcoin is changing money, business, and the world*. Penguin Canada.

Arvidsson, N. (2019a). History of money: In the eye of the beholder. In *SpringerBriefs in economics* (pp. 9–22). Springer International Publishing. https://doi.org/10.1007/978-3-030-10689-8_2

Arvidsson, N. (2019b). Money: The greatest innovation in the history of humanity. In *SpringerBriefs in economics* (pp. 1–7). Springer International Publishing. https://doi.org/10.1007/978-3-030-10689-8_1

Bal, A. (2015). Taxing virtual currency: Challenges and solutions. *Intertax*, *43*(Issue 5), 380–394. https://doi.org/10.54648/taxi2015033

Bank of America - banking, credit cards, loans and merrill investing. (n.d.). Bank of America. https://www.bankofamerica.com

Bank, T. W. (2018). *Global findex database 2017: Measuring financial inclusion and the fintech revolution*. World Bank Publications.

Basu, S., Sreenivasan, R., & Tang, T. (2014). Bitcoin – bubble or reality? *Computer Law Review International*, *15*(3). https://doi.org/10.9785/cri-2014-0304

Bitcoin and cryptocurrency technologies: A comprehensive introduction. (2016). Princeton University Press.

Bitir-Istrate, I., Gheorghiu, C., & Gheorghiu, M. (2021). The transition towards an environmental sustainability for Cryptocurrency mining. *E3S Web of Conferences*, *294*, 03004. https://doi.org/10.1051/e3sconf/202129403004

Böhme, R., Christin, N., Edelman, B., & Moore, T. (2015). Bitcoin: Economics, technology, and governance. *Journal of Economic Perspectives*, *29*(2), 213–238. https://doi.org/10.1257/jep.29.2.213

Broby, D., & Quimbayo, C. V. (2021). The regulation of initial coin offerings, virtual assets and virtual asset service providers. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3946331

Catalini, C., & Gans, J. S. (2016). Some Simple Economics of the Blockchain. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2874598

Cheah, E.-T., & Fry, J. (2015). Speculative bubbles in Bitcoin markets? An empirical investigation into the fundamental value of Bitcoin. *Economics Letters*, *130*, 32–36. https://doi.org/10.1016/j.econlet.2015.02.029

Cryptocurrency prices, charts and market capitalizations | coinmarketcap. (n.d.). CoinMarketCap. https://coinmarketcap.com

Cryptocurrency prices, portfolio, forum, rankings. (n.d.). CryptoCompare. https://www.cryptocompare.com

Dawood, O. A., Hammadi, O. I., & Mohammed, F. M. (2019). Secure symmetric block cipher design for encrypting the bitcoin wallets in cryptocurrencies applications. *Journal of Computer Science*, *15*(5), 758–768. https://doi.org/10.3844/jcssp.2019.758.768

Demirguc-Kunt, A., Klapper, L., Singer, D., & Van Oudheusden, P. (2015). *The global findex database 2014: Measuring financial inclusion around the world*. The World Bank. https://doi.org/10.1596/1813-9450-7255

Dittmar, L., & Praktiknjo, A. (2019). Could Bitcoin emissions push global warming above 2 °C? *Nature Climate Change*, *9*(9), 656–657. https://doi.org/10.1038/s41558-019-0534-5

Electronic money directive. (2018). In *A guide to financial regulation for fintech entrepreneurs* (pp. 183–185). John Wiley & Sons,

Ltd. https://doi.org/10.1002/9781119436775.ch17

European central bank. (n.d.). European Central Bank. https://www.ecb.europa.eu/home/html/index.en.html

Foley, S., Karlsen, J. R., & Putniii, T. J. (2018). Sex, drugs, and bitcoin: How much illegal activity is financed through cryptocurrencies? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3102645

Foley, S., Karlsen, J. R., & Putniņš, T. J. (2019). Sex, drugs, and bitcoin: How much illegal activity is financed through cryptocurrencies? *The Review of Financial Studies*, *32*(5), 1798–1853. https://doi.org/10.1093/rfs/hhz015

Hardjono, T., Lipton, A., & Pentland, A. (2020). Toward a public-key management framework for virtual assets and virtual asset service providers. *The Journal of FinTech*, 2050001. https://doi.org/10.1142/s2705109920500017

Hrytsai, S. O. (2022). Digital money in ukraine – cbdc? *Juridical Scientific and Electronic Journal*, (4), 247–249. https://doi.org/10.32782/2524-0374/2022-4/57

Joseph, B., F. E., Andrew, M., & Steven, G. (Eds.). (2016). *Bitcoin and cryptocurrency technologies: A comprehensive introduction*. Princeton University Press.

Kozii, N., & Chernyshova, T. (2020). Analysis of the functioning of electronic money in Ukraine. *Business Navigator*, *2(58)*. https://doi.org/10.32847/business-navigator.58-17

Lesko, N. V., Slyvka, M. M., & Krasko, S. A. (2019). Legal regulation of electronic money in Ukraine. *Comparative-Analytical Law*, *6*, 279–282. https://doi.org/10.32782/2524-0390/2019.6.70

Lishchynska, V. O. (2019). Legal regulation of cryptocurrency circulation in the world. *Comparative-Analytical Law*, *4*, 246–249. https://doi.org/10.32782/2524-0390/2019.4.68

Martin, V. (2021). Central Bank digital currencies. *Bankarstvo*, *50*(3), 109–139. https://doi.org/10.5937/bankarstvo2103109m

Money Transfers. (2011). In *Money Laundering* (pp. 190–203). Routledge.

Mora, C., Rollins, R. L., Taladay, K., Kantar, M. B., Chock, M. K., Shimada, M., & Franklin, E. C. (2018). Bitcoin emissions alone could push global warming above 2°C. *Nature Climate Change*, *8*(11), 931–933. https://doi.org/10.1038/s41558-018-0321-8

Münyas, T., & Atasoy, F. (2021). An Empirical Investigation of the Relationship between Bitcoin and Developed and Developing Country Stock Markets. *journal of accounting finance and auditing studies (JAFAS)*, *7*(3), 104–120. https://doi.org/10.32602/jafas.2021.021

National Bank of Ukraine. (n.d.). National Bank of Ukraine. https://bank.gov.ua

Novo, O. (2018). Blockchain meets iot: An architecture for scalable access management in iot. *IEEE Internet of Things Journal*, *5*(2), 1184–1195. https://doi.org/10.1109/jiot.2018.2812239

OECD. (2020). *Taxing virtual currencies: An overview of tax treatments and emerging tax policy issues*. Organisation for Economic Co-Operation and Development (OECD).

Powell, M. (2015). Bitcoin: Economics, technology, and governance. *CFA Digest*, *45*(7). https://doi.org/10.2469/dig.v45.n7.15

Radziwill, N. (2018). Blockchain revolution: How the technology behind bitcoin is changing money, business, and the world. *Quality Management Journal*, *25*(1), 64–65. https://doi.org/10.1080/10686967.2018.1404373

Schilling, L., & Uhlig, H. (2018). Some simple bitcoin economics. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3155310

Secure payment processing. (2013). *British Dental Journal*, *214*(12), 650. https://doi.org/10.1038/sj.bdj.2013.621

Sinelnikova-Muryleva, E. V. (2020). Central bank digital currencies: Potential risks and benefits. *Voprosy Ekonomiki*, (4), 147–159. https://doi.org/10.32609/0042-8736-2020-4-147-159

Squarepants, S. (2008). Bitcoin: A peer-to-peer electronic cash system. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3977007

Stack, G. (2015). Money laundering in Ukraine. *Journal of Money Laundering Control*, *18*(3), 382–394. https://doi.org/10.1108/jmlc-05-2014-0013

State Service for Special Communications and Information Protection of Ukraine (n.d.). Gov.Ua. Retrieved September 17, 2021, from https://cip.gov.ua/en

*The Financial Action Task Force (FATF) (*n.d.). Home. https://www.fatf-gafi.org

The Law The Law Library of Congress. (2019). *Regulation of cryptocurrency around the world*. Independently Published.

The rise of public and private digital money. (2021). *Policy Papers*, *2021*(055), 1. https://doi.org/10.5089/9781513592039.007

Verkhovna Rada of Ukraine (2008). *On Approval of Regulation on Electronic Money in Ukraine: Letter of the National Bank of Ukraine No. 25-212/1645-10454 dated 30.07.2008*. https://zakon.rada.gov.ua/laws/show/v1045500-08#Text

Voigt, P., & von dem Bussche, A. (2017). Practical implementation of the requirements under the GDPR. In *The EU General Data Protection Regulation (GDPR)* (pp. 245–249). Springer International Publishing.https://doi.org/10.1007/978-3-319-57959-7_10

Whisker, J., & Lokanan, M. E. (2019). Anti-money laundering and counter-terrorist financing threats posed by mobile money. *Journal of Money Laundering Control*, *22*(1), 158–172. https://doi.org/10.1108/jmlc-10-2017-0061

Wright, C. S. (2008). Bitcoin: A peer-to-peer electronic cash system. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3440802