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Bachelor Thesis

A Comparative Study of Cryptocurrency and Traditional Payment Systems in International Trade: A New Trade Theory Perspective

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A Comparative Study of Cryptocurrency and Traditional Payment Systems in International Trade: A New Trade Theory Perspective

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Objectives of thesis

The objective of this study is to conduct a comparative analysis of cryptocurrency and traditional payment systems in the context of international trade, from a new trade theory perspective.

Methodology

This study research will be an exploratory research that will involve a comparative analysis of cryptocurrency and traditional payment systems, using a new trade theory framework. The data for this study will be collected from secondary sources such as academic journals, books, and online databases. The research will use descriptive statistics and data visualization techniques to represent the findings.

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Cryptocurrency, Traditional payment systems, International Trade, New Trade Theory, Comparative analysis.

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DANIAL, Kiana.; LAURENCE, Tiana.; KENT, Peter.; BAIN, Tyler.; SOLOMON, Michael G. *Cryptocurrency All-In-One for Dummies. [elektronický zdroj] /.* Newark: John Wiley & Sons, Incorporated, 2022. ISBN 9781119855811.

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Declaration

I declare that I have worked on my bachelor thesis titled " A Comparative Study of Cryptocurrency and Traditional Payment Systems in International Trade: A New Trade Theory Perspective" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 15.03.2024 _____

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A Comparative Study of Cryptocurrency and Traditional Payment Systems in International Trade: A New Trade Theory Perspective

Abstract

This thesis delves into the dynamics between traditional payment systems and the growing use of cryptocurrencies in the context of international trade. It examines traditional financial instruments such as bank transfers and credit cards that have dominated global trade, coupled with the emergence of blockchain technology and cryptocurrencies that are creating a new paradigm for financial transactions across borders. Through a methodological approach that includes comparative analysis, the study draws on sources to clarify the characteristics, benefits and problems associated with each payment system. It examines key aspects such as transaction speed, costs, security, regulatory frameworks and environmental impacts, offering detailed insight into their implications for international trade. The analysis shows the potential of cryptocurrencies to streamline transactions, reduce costs and increase accessibility, while also highlighting the challenges associated with volatility, regulatory uncertainty and environmental sustainability. The study concludes with a balanced view of the transformative potential of digital currencies alongside the enduring relevance of traditional payment systems, suggesting a future of coexistence and mutual evolution.

Keywords: Cryptocurrency, Traditional payment systems, International Trade, New Trade Theory, Comparative analysis.

Srovnávací studie kryptoměny a tradičních platebních systémů v mezinárodním obchodu: perspektiva nové obchodní teorie

Abstrakt

Tato práce se zabývá dynamikou mezi tradičními platebními systémy a rostoucím využíváním kryptoměn v kontextu mezinárodního obchodu. Zkoumá tradiční finanční nástroje, jako jsou bankovní převody a kreditní karty, které ovládly světový obchod, ve spojení se vznikem technologie blockchain a kryptoměn, které vytvářejí nové paradigma pro finanční transakce přes hranice. Prostřednictvím metodologického přístupu, který zahrnuje srovnávací analýzu, studie čerpá ze zdrojů, aby objasnila charakteristiky, výhody a problémy spojené s každým platebním systémem. Zkoumá klíčové aspekty, jako je rychlost transakcí, náklady, bezpečnost, regulační rámce a dopady na životní prostředí, a nabízí podrobný pohled na jejich důsledky pro mezinárodní obchod. Analýza ukazuje potenciál kryptoměn pro zefektivnění transakcí, snížení nákladů a zvýšení dostupnosti a zároveň zdůrazňuje výzvy spojené s volatilitou, regulační nejistotou a udržitelností životního prostředí. Studie končí vyváženým pohledem na transformační potenciál digitálních měn spolu s trvalým významem tradičních platebních systémů, což naznačuje budoucnost koexistence a vzájemného vývoje.

Klíčová slova: Kryptoměna, tradiční platební systémy, mezinárodní obchod, nová teorie obchodu, srovnávací analýza.

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1 Introduction

In the modern world, where everything is changing under the influence of globalization, international trade is a key element of economic development and interaction between countries. Efficiency and security of payment systems are fundamental factors for the stability and development of international trade. Traditional financial instruments such as bank transfers, credit and debit cards have long remained the undisputed leaders in the payment field. However, with the advent and rapid development of digital technologies, especially blockchain, cryptocurrencies began to gradually penetrate into the sphere of international trade, offering new opportunities and sparking discussions about the prospects and risks of their use.

The purpose of this work is to conduct a comparative analysis of cryptocurrencies and traditional payment systems in the context of international trade. The main attention is paid to studying the features of each of the systems, their advantages and disadvantages, as well as assessing the potential of cryptocurrencies as an alternative means of payment in the global economic space.

2 Objectives and Methodology

2.1 Objectives

The objective of this study is to conduct a comparative analysis of cryptocurrency and traditional payment systems in the context of international trade, from a new trade theory perspective.

2.2 Methodology

This study will be an exploratory research that will involve a comparative analysis of cryptocurrency and traditional payment systems, using a new trade theory framework. The data for this study will be collected from secondary sources such as academic journals, books, and online databases. The research will use descriptive statistics and data visualization techniques to represent the findings.

The main analysis is based on examining measures of central tendency (mean, median, mode) and dispersion (standard deviation, variance). These statistical methods provide fundamental insight into distributions, highlighting the overall trend, variability, and frequency of specific values in data set.

Range is calculated to understand the range from lowest to highest, which helps identify variability and potential outliers. This aspect of the analysis is critical for detecting extreme values that may affect the overall characteristics of the distribution. Additionally, distributional analysis with a focus on skewness allows us to determine the direction and degree of skewness in data set.

3 Literature Review

3.1 International Trade

3.1.1 Overview of International trade

The foundations of international trade theory are contained in three main models aimed at explaining the determinants of international trade and specialization: 1. The classical (Torrens-Ricardo) theory, according to which these determinants are to be found in technological differences between countries; 2. The Heckscher-Ohlin theory, which stresses the differences in factor endowments between different countries; 3. The neoclassical theory (which has had a longer gestation: traces can be found in J.S. Mill; A. Marshall takes it up again in depth, and numerous modern writers bring it to a high level of formal sophistication), according to which these determinants are to be found simultaneously in the differences between technologies, factor endowments, and tastes of different countries. The last element accounts for the possible presence of international trade, even if technologies and factor endowments were completely identical between countries. From the chronological point of view, model (2) post-dates model (1), while model (3), as we said, has had a longer gestation and so has been developing in parallel to the others. To avoid misunderstandings it must be stressed that the Heckscher-Ohlin theory is also neoclassical (in the sense in which the neoclassical vision is different from the classical one), as it accepts all the logical premises of, and follows the, neoclassical methodology. As a matter of fact the Heckscher-Ohlin model can be considered as a particular case of the neoclassical one in which internationally identical production functions and tastes are assumed. This loss in degree of generality is, according to some authors, the price that has to be paid if one wishes to obtain definite conclusions about the structure of the international trade of a country (Gandolfo, 2014).

3.1.2 Definition of International trade

Economic transactions that are made between countries. Among the items commonly traded are consumer goods, such as television sets and clothing; capital goods, such as machinery; and raw materials and food. Other transactions involve services, such as travel services and payments for foreign patents. International trade transactions are facilitated by

international financial payments, in which the private banking system and the of the trading nations play important roles (Britannica money, 2024).

International trade and the accompanying financial transactions are generally conducted for the purpose of providing a nation with commodities it lacks in exchange for those that it produces in abundance; such transactions, functioning with other economic policies, tend to improve a nation's standarts of living. Much of the modern history of international relations concerns efforts to promote freer trade between nations. This article provides a historical overview of the structure of international trade and of the leading institutions that were developed to promote such trade (Britannica money, 2024).

3.2 New Trade Theory

3.2.1 Overview of New Trade Theory

New trade theory is a collection of economic models in international trade theory which focuses on the role of increasing return to scale and network effects, which were originally developed in the late 1970s and early 1980s. The main motivation for the development of NTT was that, contrary to what traditional trade models would suggest, the majority of the world trade takes place between countries that are similar in terms of development, structure, and factor endowments. New trade models incorporate four innovations within neoclassical economics: market imperfections, strategic behaviour and the new industrial economics, new growth theory and political economy arguments. Many of the models based on market imperfections and strategic behaviour justify interventionist trade policy (Sonali and Fine, 2001).

Role of Economies of Scale and Network Effects: NTT emphasizes the importance of economies of scale and network effects in trade. It suggests that companies can lower costs and improve efficiency by producing at a larger scale, which can influence international trade patterns. This aspect is particularly relevant in industries where the cost of production decreases as the volume of production increases (Iwamura, Kitamura, Matsumoto, Saito, 2014).

Market Structure and Monopolistic Competition: The theory introduces the concept of monopolistic competition into the trade arena. It proposes that markets are characterized by many firms competing against each other but selling differentiated products. This differentiation, combined with economies of scale, allows firms to achieve monopoly-like power over certain products or services.

Product Differentiation and Innovation: NTT highlights the role of product differentiation and innovation in securing competitive advantage in global markets. Firms that innovate and create unique products can capture significant market share, leading to trade advantages (Sen, 2010).

Trade Patterns Not Just Determined by Comparative Advantage: Unlike traditional trade theories, which suggest that countries specialize in producing and exporting goods for which they have a comparative advantage, NTT suggests that trade patterns can also be influenced by factors like economies of scale and product differentiation. This means countries might export and import similar goods (intra-industry trade).

Implications for Government Policy: New Trade Theory has significant implications for government policy, including the justification for strategic trade policies that can help domestic firms achieve economies of scale and compete internationally. This has led to debates on the role of government in supporting key industries, potentially leading to trade disputes.

Impact on Globalization: NTT has contributed to understanding the complexities of globalization. It supports the idea that technology and scale economies drive international trade, leading to more interconnected and interdependent global markets.

Criticism and Limitations: While influential, NTT has faced criticism for justifying protectionist policies under certain conditions and for its assumptions regarding market structures and behavior. Critics also argue that it may not fully account for the dynamics of global trade, especially in services and digital products (MacDonald and Ricci, 2002).

3.3 Traditional Payment Systems

3.3.1 Overview of Traditional Payment Systems

A payment system is a set of instruments, banking procedures, and typically, interbank funds transfer systems that ensure the circulation of money. It is an essential component of the financial infrastructure of a country, facilitating transactions between buyers and sellers in the economy. Payment systems can range from traditional methods, such as cash transactions and checks, to modern digital and electronic payment mechanisms, including electronic funds transfers (EFT), credit and debit cards, mobile payments, and online payment platforms (Lee, Yu, Kuo, 2018).

Payment systems are crucial infrastructures that facilitate the circulation of money within an economy, enabling transactions between various parties through a variety of methods. These systems encompass a wide range of instruments, participants, infrastructure, regulatory frameworks, settlement processes, security protocols, and technological innovations.

Instruments refer to the diverse methods or vehicles through which payments are executed, including traditional means like cash and checks, as well as modern electronic payments and digital currencies. Participants in these systems include a broad spectrum of entities such as individuals, businesses, banks, and governments, all of whom engage in the exchange of payments (Lee et al., 2018).

The infrastructure of payment systems comprises both physical and electronic networks that support the transmission of payment instructions and the settlement of transactions. This includes payment gateways, card networks, and the broader banking system, which together facilitate the seamless flow of funds.

To ensure the safety, efficiency, and reliability of these systems, they are subject to regulation and oversight by central banks or financial regulatory authorities. This oversight involves establishing standards for security, implementing anti-money laundering (AML) measures, and safeguarding the integrity of transactions (Lee et al., 2018)..

Settlement systems are the mechanisms that enable the final transfer of funds between parties, which can occur in real-time or be deferred, depending on the specifics of the system. Ensuring the security of transactions and managing risks associated with fraud, operational failures, and market changes is crucial for maintaining trust and confidence in these systems (Lee et al., 2018).

Innovation and technology have played transformative roles in evolving payment systems, introducing more rapid, secure, and convenient transaction methods. Advancements such as blockchain technology and contactless payments have not only enhanced transaction efficiency but have also opened new avenues for financial services, reflecting the dynamic nature of payment systems in the digital age.

3.4 Cryptocurrency

3.4.1 Overview of Cryptocurrency

Money is a medium of exchange— something that is accepted in exchange for a valuable good or service, not for itself but to be exchanged later for another good or service. For thousands of years that medium has taken the form of a physical object whose supply is scarce, either naturally (precious metals) or artificially (a token issued by a monopolist). But it has taken more disembodied forms as well, such as enforceable claims on some individual or entity transferred between buyer and seller. Nowadays in the United States, base money takes the physical form of coins (tokens issued by the United States Mint under authority of Congress) and notes (which used to be circulating claims on the Federal Reserve but are now in the nature of paper tokens), as well as the electronic form of reserves, which are claims held on the books of the Federal Reserve by depository institutions (claims to notes and coins). Bitcoin is not a claim to a physical object or to a currency; it aims to be itself a currency and replace the physical object with a computer file. When a physical object is exchanged, there is little doubt that the giver owns it and the recipient receives it (whether the object is what it seems to be—and not a counterfeit—has always been a problem for money, but one that is mitigated in a variety of ways). A digital file is easily created and duplicated, so how do we avoid doubts about its authenticity as currency? The solution is basically recursive. Assume that my ownership of the file is ascertained (Berg, Davidson, 2018). The bitcoin protocol ensures that the transaction by which I cede ownership of the

bitcoin is validated by adding it to a record of all transactions. The recipient's ownership is now validated. A simple method of validating the transaction would be to entrust a central Bitcoin is an elegant implementation of a digital currency, but can it truly rival or replace existing currencies? record of the transactions to an authority—as medieval merchants did when they paid each other by transferring sums on a bank's books or as modern banks do when they settle their transactions on the books of the Fed. Bitcoin, however, does not rely on a single recordkeeper. It solves the two challenges of controlling the creation of a unit of digital currency and avoiding its duplication at once. Validation is difficult to do, and those who do it are rewarded for doing so by being allowed to create new bitcoins in a controlled way.

A cryptocurrency system can be understood as a system intended for the issuance of tokens which are intended to be used as a general or limited-purpose mediumof-exchange, and which are accounted for using an often collectively-maintained digital ledger making use of cryptography to replace trust in institutions to varying extents. Against such a backdrop, the singular term cryptocurrency can mean a token, intended to be used as a general or limited-purpose medium-of-exchange, issued via a cryptocurrency system.

3.4.2 Monetary Characteristics of Cryptocurrencies

Loosely speaking, the modern fiat monetary system consists of physical and digital credits—issued by state central banks, state treasuries, and private commercial banks—which circulate under a legal system that guarantees their redemption. The number of credits expands through issuance, after which they can be transferred in the course of exchange among those who use them, before being retired when they are returned to the issuers. This composite system of expandable-contractable credits is what we refer to as 'money' in everyday parlance. In this context, the term cryptocurrency is controversial, because—from its inception—the name has simply assumed that the tokens are money tokens. The controversy is amplified by the fact that enthusiasts sometimes use the term performatively to make the normative point that crypto tokens 'should be money', or—alternatively—to deny that what we currently call 'money' is in fact money. One strategy to negotiate these language politics is to initially strip the money assumption from the tokens by giving them the generic name crypto-tokens, and then listing their uncontroversial characteristics to compare them with fiat credits.

Tokens of early cryptocurrencies are data objects created through accounting, much like the act of typing out the number '1' creates the mental image of a 'thing'. This is what is referred to as a 'token', but they are 'blank tokens'. An example of a blank token in the physical world might be a clear plastic token with no inscription or rights attached to it. Bitcoin tokens, similarly, are empty signifiers, somewhat like the digital equivalent of blank physical tokens, but with strict supply limits 2 . These blank digital tokens however, are promoted with a name and branded logo that serves as a mental image for them, without which they would be almost entirely featureless. The tokens can be said to be digital bearer instruments, in the sense that transfers can only be initiated by the possessor of a private key that can unlock an 'unspent transaction output'. The 'bearer-instrument-like' nature is one reason why cryptocurrency sometimes gets referred to as 'digital cash' (physical cash being the bearer-instrument form of fiat currency). The tokens move around—Bitcoin and some of its descendants are processing hundreds of thousands of transfers of tokens every day (compare Hileman and Rauchs, 2017). Furthermore, they have a price measured in fiat currency and their tokens can be split into smaller pieces, or combined into larger ones. The fact that split-able and lump-able tokens with a fiat currency price can be moved gives the system a 'moneylike' feeling, and—under a shallow definition of money as something that is issued and moved around in association with commerce—the term cryptocurrency feels loosely plausible in everyday conversation.

Most 'purchases' conducted with bitcoin tokens, however, take the form of countertrade. The token, priced in fiat currency, is compared to a good or service, priced in fiat currency, and from this comparison of two fiat currency prices emerges an exchange ratio between the token and the good or service. This is the conceptual equivalent of superimposing a pair of two-way fiat currency transactions over each other and cancelling out the money flows, giving the residual appearance of the crypto-token being used as 'money' to 'pay' for a good or service.

Nevertheless, Bitcoin is used primarily for speculation (Baur, 2018)—buying the token with fiat currency with an intention to resell it for fiat currency—rather than using it to countertrade ('pay') for goods and services. This speculation (compare, among others, Yermack, 2015; Glaser et al., 2014; or Cheah, 2015) drives volatility in the fiat currency

price of tokens, which—when analysed through the lens of the conventional 'functions of money' paradigm favoured by economic textbooks (money as a medium-of-exchange, a store-of-value and a unit-of-account), poses problems for the 'moneyness' of the tokens. Not only are they not widely accepted in exchange for goods and services, but they are not widely used to price things, and attempts to provide prices are unintuitive 3 (Yermack, 2015). They also struggle to consistently 'store value', if we interpret that to mean 'maintain stable purchasing power' (which in the case of Bitcoin means 'maintain fiat price and countertrade ratios'). Put simply, while a person can generally predict how many bags of sugar US$ 100 will command in a month, they will be very uncertain as to how much sugar they can obtain through Bitcoin countertrade in a month.

Early cryptocurrencies had the declared intent of creating 'digital cash' or currency, but the proliferation of crypto token forms have destabilised how this is conceptualised. Not all development strands feature the objective of proposing general purpose monetary tokens.

First-layer tokens (e.g. Ether) that underlie smart contract platforms 6 (e.g. Ethereum), and informally even second-layer tokens (tokens running on respective platform) are called cryptocurrencies, but they exist first and foremost to activate smart contracts rather than aiming to provide a payment solution for goods and services more generally (see Bartoletti, 2017). Nevertheless, this more 'limited purpose' focus can be a strength, insofar as smart contract activation can be seen as a real service accessible via possession of the token, thereby 'anchoring' the tokens into a 'real economy', albeit one in cyberspace.

However, also 'general purpose' tokens are marked by changes. A response to the inherent instability in prices of archetypal cryptocurrency was the advent of 'stablecoins', which try to solve the issue of high volatility in purchasing power of Bitcoin and its descendants (Pernice, 2019). Stablecoins are tethered or pegged to fiat currencies, or 'backed' in some way with assets that have fiat currency prices. They are thus no longer 'blank' empty signifiers, and contain some reference point that is easier to estimate and communicate. There are very different types of stablecoins, and recently several frameworks have tried to unify and abstract existing stabilisation techniques (e.g., Bullmann et al., 2019; Pernice et al., 2019; Moin et al., 2020; Sidorenko, 2019; Clark et al., 2020). A national currency can be 'tokenized' by issuing a digital promise for it on a blockchain system, and

such tokenised funds might indeed be categorised as a “new form of electronic money” (Blandin et al., 2019) falling under the respective regulations for e-money, anti money laundering and counter terrorist financing regulations. This might ensure “moneyness” at least from a legal standpoint. With more complex stablecoin designs the legal case is not always clear, but from an economic standpoint their stability in purchasing power might contribute to an increase in their adoption as money in the future. Stablecoins, for now however, haven’t seen mainstream adoption in retail markets yet.

3.4.3 Types of Cryptocurrency

There are many reasons to invest in cryptocurrencies, but making a profit is by far most important. All the digital values are very unstable, so that is a big opportunity to make some big profits, but also it can be a big risk for the investment. A lot of websites offer users a simple way of buying, holding or selling cryptocurrencies like Coinbase, Bitstamp, Cryptsy, and BitPanda.

There are a few different online wallets, some of them allow you to keep only one type of digital currency and there are some of them where you can keep different kinds. Each of these websites offers you a wallet that you can download, and every wallet has a unique address that you use for receiving digital currencies from other people. The best way to buy or sell these cryptocurrencies is to go to a website which is used for exchange. All you have to do is open an account and download your wallet, and then you choose a way of payment. After that, you can buy any currency you want. Their price can vary depending on the website. Buying of a cryptocurrency can sometimes last a few seconds, minutes or sometimes a few hours, depending on the offered price and the type of cryptocurrency you wish to buy. After the system for exchange finds a seller that wants to sell at the price you offer, cryptocurrency is sent to your wallet, and the money goes to the seller. That is one way to buy them. The other way is to buy cryptocurrency at online communities (Luther, 2013). The price is very similar or even lower than the price on the websites. After you find and make an arrangement with the seller, you need to exchange your wallet’s addresses so you can receive the currency and the seller gets the money. This is a risky way of buying because sometimes it can happen that the seller decides not to send the cryptocurrency to your wallet.

Cryptocurrencies can be divided into those that belong to a decentralized system, or those that belong to a centralized blockchain system. When it comes to decentralized systems, that means that every computer is a working unit for itself, there is no institution that authorizes it. One of the main characteristics of this system is that it is anonymous in transactions, and everybody controls it, but nobody has the power over it. And in centralized systems, there is usually a group of people that manage the currency and they guarantee the success of the currency. They go by the rule – know your customer. In that way, they are trying to stop money abuse because it is possible to check the currency and pay taxes for it (Investopedia, 2017). Both systems have their advantages and disadvantages. It all depends on the market, whether the investor will earn or lose money. But, the most important things to pay attention to when buying a cryptocurrency are the final number of coins that will be circulation, the value of its market price, stability in certain periods of time, safety, number of users and traders that have said yes to that cryptocurrency, public support and legal regulative if some countries accepted them (Investopedia 2017). There are more than thousand different cryptocurrencies that can be bought, but here are some of the most valuable that have the biggest capital on the market.

1. Bitcoin – It appeared on the market in 2008, but it didn't attract much attention back then. It was represented by a person, or a group of people, it is still unknown that uses the pseudonym Satoshi Nakamoto in a scientific study called Bitcoin: A Peer-to-Peer Electronic Cash System. The greatest interest for this platform was in 2013. A lot of companies from all over the world, South Corea, India, Australia and Japan started to question the Bitcoin as a reserve currency in the future, but also as an alternative monetary and financial system (PUNEET, DEEPIKA, RAJDEEP, 2017). They have an opinion that if it keeps growing like this it could become a reserve currency instead of the American dollar. First, everybody thought that Bitcoin is just a powerful asset that helps criminal do their money laundering, but that image changed when everybody started investing their money in this cryptocurrency. And now, everybody wants a part of it, because it is anonymous and the transactions cannot be tracked. When it comes to adopting this way of trade, Japan has become the leader. It is possible to pay some services or buy certain products with a digital currency, called the Bitcoin (Wingreen, Kavanagh, Dylan-Ennis, Miscione, 2020).

2. Ethereum – It is a decentralized platform that appeared in the middle of 2015. Its market value is €28,6 billion. The creator of this cryptocurrency is Vitalik Buterin, a young crypto-genius. There are similarities between Bitcoin and Ethereum because they both use the blockchain technology, a decentralized public track about every transaction. But, they are completely different when comparing their design and the usage itself. The primary function of Bitcoin is payment currency, but Ethereum blockchain is designed to allow much more functions that could be useful to the business world. Many corporations were interested in buying this cryptocurrency because of the smart contracts. Smart contracts are computer algorithms that automatically fulfill the terms of the contracts as soon as the conditions are met. Ethereum has a goal to decentralize the Internet and so far, it has good chances to become the new internet. But it can't be considered as a single currency because of the Hack of the DAO – an Ethereum based smart contract. The developers agreed to a hard work with no consensus which only brought to the emerge of Ethereum Classic. And also Ethereum is a host of several Tokens like DigixDAO and Augur, which just makes it more a family of cryptocurrencies (CHEN, LI, ZHU, CHEN, LUO, LUI, LIN, ZHANG, 2020).

3. Ripple – It was introduced in 2012 by Authur Britto, Ryan Fugger, and David Schwartz. Ripple Transaction Protocol (RTXP) was built on distributive open-source Internet protocol and the native cryptocurrency called the XRP (ripples). Banks are rapidly adopting this system because its primary function is to enable secure global financial transactions of any size, without any fees and very quickly. Its market value is €10,3 billion (Armknecht, Karame, Mandal, Youssef, Zenner).

4. Litecoin – A former employee of Google company, Charles Lee, presented Litecoin in 2011. It is a P2P internet currency that allows very quick payments and it is almost free for everybody in the world. Litecoin is completely decentralized global payment network. Technically it is very similar to Bitcoin, but it has some improvements such as the greater amount of transactions that can be done at the same time. But Litecoin is like a younger brother of Bitcoin which hasn't found its real use, so now it is just a backup just in case if Bitcoin fails (Jumaili, Sulaiman, 2021).

5. Monero – It was created in 2014 and it was focused on privacy and it is a decentralized system. It is the best example of the kryptonite algorithm. It was

invented with the aim to add those privacy features that Bitcoin didn't have. Every transaction made in Bitcoin is documented in the blockchain and the track can't be traceable. When they introduced the concept of ring-signatures, this algorithm was able to cut the trails. The first time this cryptonite called the Bytecoin was implemented, it was rejected by everyone. It achieved great popularity in 2016 when some darknet markets accepted it as a currency but its price still remains very low. Many other currencies are a clone of the native Bitcoin code, but Monero uses CryptoNote protocol which is an evolution of ideas behind Bitcoin. The main difference is that it is very difficult to follow digital currencies that are based on CryptoNote protocol, and also the inner algorithms are different (Miller, Moser, Lee, Narayanan, 2017).

6. Ethereum Classic – It is just like Ethereum, but it is used only for smart contracts, it has applications that work just the way they are programmed. There is no room for any sort of delay, censure, fraud or involvement of the third party. This is just a sequel to the original Ethereum, in which there is history that didn't change, there are no external interference and subjective changes that represent a consequence of the transactions. Its market value is €1,7 billion (Kaidalov, Kovalchuk, Nastenko, Rodinko, Shevtsov, Oliynykov, 2017.).

7. NEM – This is a Peer-to-Peer cryptocurrency and it has a blockchain platform that was started in 2015. It is a platform that entered some new functions in the blockchain technology (Kleinberg, 2018). It has an algorithm of proof-of-importance, coded messages, and a different reputation system. Its value is almost €1,6 billion.

8. Dash – It was presented in 2014 and it was known by the name of Darkcoin and Xcoin. Its market value is €1,2 billion (Duffield, Diaz).

9. IOTA – It is the first cryptocurrency that didn't use the blockchain technology, but instead, it uses Tangle, which is based on directed acyclic graph technology (DAC). The transactions are done without any fees, no matter how big is the transaction, and the system can easily scale. It was founded by David Sonstebo, Sergey Ivancheglo, Dominik Scheiner, and Dr. Serguei Popov, but it is run by the IOTA Foundation. With Tangle technology, every transaction creates a new chain that confirms itself. Its market value is more than €1 billion (Tenant, 2017).

10. Waves – It enables making custom tokens so it is possible to make your own cryptocurrencies. It is also used for trading and crowdfunding and it integrates fiat currency gateways in your wallet.

11. Augur – It is a decentralized market platform that is built on the Ethereum, as a set of smart contracts that exist on the Ethereum blockchain. It was created in 2014 by Jack Peterson and Joey Krug (Peterson., Krug, Zoltu, Austin, Williams, 2023.).

3.4.4 Overview of Wallet in Cryptocurrency

A cryptocurrency wallet is an application that functions as a wallet for your cryptocurrency. It is called a wallet because it is used similarly to a wallet you put cash and cards in. Instead of holding these physical items, it stores the passkeys you use to sign for your cryptocurrency transactions and provides the interface that lets you access your crypto.

Modern cryptocurrency wallets make the blockchain accessible to everyone. When cryptocurrency was first introduced, sending cryptocurrency was a manual task that required entering long keys. Today, the software does most of it for you (Investopedia 2023). The first wallet was that of Bitcoin's developer, Satoshi Nakamoto. The second wallet belonged to Hal Finney, who corresponded with Nakamoto and reportedly was the first to run the Bitcoin client software wallet. Nakamoto sent him 10 bitcoins as a test.

Cryptocurrency wallets are software applications on computers or mobile devices such as phones or tablets. They use an internet connection to access the blockchain network for the cryptocurrency you're using.Cryptocurrencies are not "stored" anywhere—they are bits of data stored in a database (Rezaeighaleh, Zou, 2019). These bits of data are scattered all over the database; the wallet finds all of the bits associated with your public address and sums up the amount for you in the app's interface.

Sending and receiving cryptocurrency is very easy using these applications. You can send or receive cryptocurrency from your wallet using various methods. Typically, you enter the recipient's wallet address, choose an amount to send, sign the transaction using your private key, add an amount to pay the transaction fee, and send it (Houy, Schmid, Bartel, 2023).

Receiving is even easier—the sender enters your address and goes through the same routine. You accept the payment, and the transaction is done.

3.4.5 Cryptocurrency Wallet Types

The are two main types of wallets, custodial and noncustodial. Custodial wallets are hosted by a third party that stores your keys for you. This could be a company that provides enterprise-level data security systems businesses use to preserve and secure data. Some cryptocurrency exchange offer custodial wallets for their customers. Noncustodial wallets are wallets in which you take responsibility for securing your keys. This is the type that most cryptocurrency wallets on devices are.

There are two subcategories of wallets, hot and cold. A hot wallet has a connection to the internet or to a device that has a connection, and a cold wallet has no connection. Lastly, there are three subcategories of wallets—software, hardware, and paper. Each of these types is considered either a hot or cold wallet (Hossein, 2020).

So, you can have a noncustodial software hot wallet, a noncustodial hardware cold or hot wallet, or a custodial hardware cold wallet. These are the most common types, but you may also encounter other combinations.

- Software wallets

Software wallets include applications for desktops and mobile devices. These wallets are installed on a desktop or laptop computer and can access your cryptocurrency, make transactions, display your balance, and much more. Some software wallets also include additional functionality, such as exchange integration if you're using a wallet designed by a cryptocurrency exchange (Investopedia 2023).

Many mobile wallets can facilitate quick payments in physical stores through NFC or by scanning a QR-code. Mobile wallets tend to be compatible with iOS or Android devices. Trezor, Electrum, and Mycelium are examples of wallets that you can use. Software wallets are generally hot wallets.

- Hardware wallets

Hardware wallets are the most popular type of wallet because you can store your private keys and remove them from your device. These devices resemble a USB drive, and modern hardware wallets have several features (Investopedia 2023).

You can make a cryptocurrency transaction on your computer or device by plugging in the hardware wallet. Most of them can sign cryptocurrency transactions automatically without requiring you to enter the key, circumventing a hacker's ability to log your keypresses or record your screen.

These devices often cost between $100 to $200. Ledger and Trezor are both well-known hardware wallets. Hardware wallets are generally considered cold wallets because they don't have an active connection until they are plugged in.

- Paper wallets

Early crypto users would write or type their keys on paper, which they called paper wallets. These evolved to include the keys and QR codes so wallets on mobile devices could scan them. However, paper wallets are easily damaged or lost, so many crypto owners do not use them anymore (Houy, Schmid, Bartel, 2023).

4 Practical Part

4.1 Cryptocurrency in International Trade

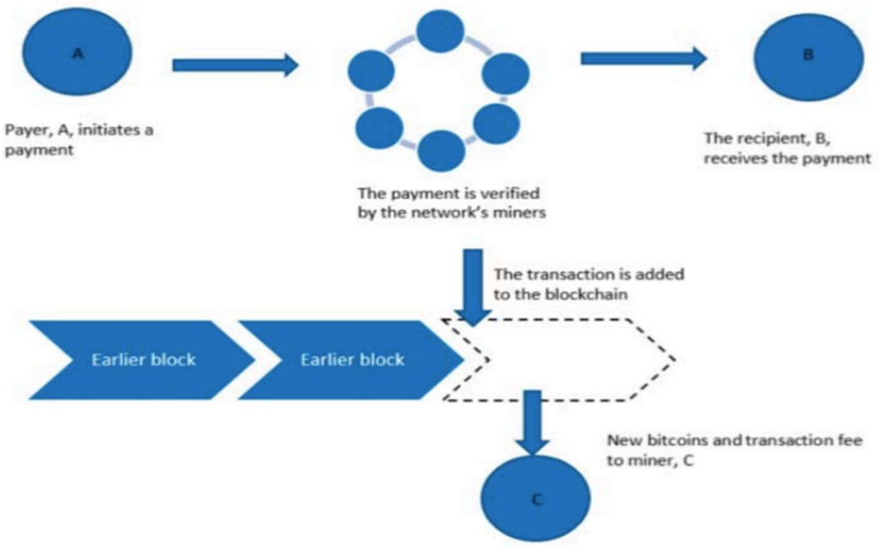
4.1.1 The Benefits of Using Cryptocurrencies in International Transactions

The advent of cryptocurrencies has been nothing less than a revolution in the way we conduct international transactions. These digital transactions using blockchain technology have changed the landscape of traditional banking and fiat currencies by offering many benefits. Not only are they convenient, but they also offer enhanced security, lightning-fast data transfers, and an ease of use that's hard to beat. The benefits of diving into the cryptocurrency space for cross-border transactions are enormous, including lower transaction fees, increased security, unmatched speed, the spirit of decentralization, greater financial inclusion, crystal-clear transparency and seamless market access.

One of the outstanding benefits of cryptocurrencies is their ability to reduce the cost of transaction fees. Old methods of sending money across borders are notorious for their huge costs due to the many fees charged by banks and transfer services. Think about currency conversion fees, service fees, and those intermediaries who charge interest on every transaction they make. Cryptocurrencies bypass these financial pitfalls by eliminating intermediaries, resulting in cost savings, especially for companies or people who deal with the international market (Velde, 2013).

When it comes to security, cryptocurrencies are in a league of their own. The basis of these digital currencies is blockchain technology (Figure 1), a decentralized ledger that records transactions across a network of computers (Söderberg, 2018). This makes any transaction tamper-proof and protected from fraud and hacking, a stark contrast to the traditional banking system where your personal and financial details are an open book. When using cryptocurrencies, all you need is a wallet address, greatly reducing the risk of identity theft.

Figure 1 Blockchain process



Source: Söderberg (2018)

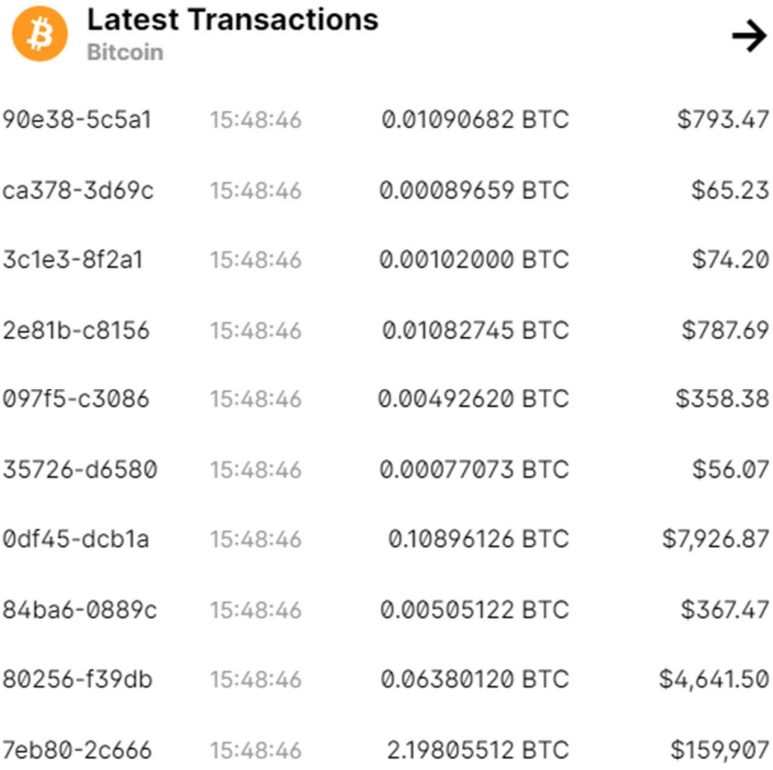
The speed at which cryptocurrencies operate is another game-changing factor. In comparison, traditional bank transfers are slower and take several days to process. On the other hand, cryptocurrency transactions are completed in minutes or even seconds. Since the cryptocurrency world never sleeps, there is no need to wait for banking hours or processing times, making it ideal for time-sensitive transactions.

Decentralization is another advantage of cryptocurrencies. Free from the control of any single entity such as a government or central bank. Cryptocurrencies offer a transaction experience that is not only cheaper and less prone to failure, but also helps create a fairer financial system. This peer-to-peer model represents democracy in action, from a financial perspective.

Cryptocurrencies are not limited to facilitating transactions. They open the doors of financial inclusion. For those living in remote or underserved areas with only an Internet connection, participation in the global economy is becoming a reality. This democratization of finance means that anyone, anywhere can send and receive money, opening the door to trade and investment opportunities that were previously unavailable.

The transparency of cryptocurrency transactions is unparalleled. Every transaction is recorded on a public ledger that anyone can check (Figure 2). This level of openness helps combat fraud and corruption, creating a foundation of trust for international relations. For businesses, this means that transaction details can be scrutinized and independently verified, easing the path to international partnerships.

Figure 2 Public ledger of cryptocurrency transactions



Source: Blockchain (2024)

Cryptocurrencies provide access to the global market. They allow individuals and businesses to connect with partners around the world without worrying about currency restrictions or exchange rates. This global handshake is a boon, especially for small and medium-sized enterprises previously constrained by the complexities and costs of conducting international banking transactions.

Cryptocurrencies are redefining international transactions, promising a safer, faster and more inclusive future. With their many benefits—from cost savings to increased

security, from faster transactions to decentralization, and from financial inclusion to transparency—they fill a niche that traditional financial systems struggle to fill. As technology advances and regulatory frameworks evolve, the impact of cryptocurrencies on international transactions will deepen, ushering in a new era of global financial connectivity.

4.1.2 Challenges and Risks Associated With Cryptocurrencies

At the moment, we can accurately answer that in the financial world of the 21st century, the creation of cryptocurrencies is one of the most revolutionary events. We have already talked about the fact that with the advent of cryptocurrencies, new opportunities have appeared and they help us move forward in the development of financial systems, but like any innovative technology, cryptocurrency has its drawbacks that require improvement.

In our world, financial regulation plays a big role, due to the fact that this system is decentralized and has a borderless nature, the lack of a clear regulatory framework in different jurisdictions introduces uncertainty for investors and companies working with cryptocurrencies. At the moment, there is no unified regulation in this area and this creates a definition of complexity that can lead to a kind of labyrinth of rules in different countries.

A corollary to the previous issue is the risk of high volatility. Cryptocurrency price movements are influenced by many factors, such as speculation, regulatory announcements, changes in market sentiment, or public statements. Such factors cause significant fluctuations in a very short period of time (Figure 3). This volatility is a risk to the adoption of cryptocurrencies as a reliable medium of exchange or store of value for everyday transactions (LIU, 2019).

Figure 3 Bitcoin price since 2014 to 2024

Source: CoinGecko (2024)

There is a risk of cryptocurrency being used in illegal activities. Although blockchain technology provides transparency and you have every opportunity to track any transactions due to anonymity and pseudonyms, this technology can be used for illegal purposes.

It can also be noted that the impact of cryptocurrencies on nature is still under investigation and has the status of uncertainty and is under close control. Since the process of mining such cryptocurrencies as Bitcoin has high energy consumption, which can have a detrimental effect on the environment, therefore the issue of alternative energy sources for this activity is now being deeply studied.

4.2 Traditional Payment Systems in International Trade

4.2.1 Advantages of Traditional Payment Systems in International Trade

Speaking about traditional payment systems, we can notice that they are the main, and for some, the only possible payment method. For a long time they have played a major role in the implementation of payment transactions around the world. These include bank

transfers, checks and cash payments. They play an important role in the global trading market, let's look at what positive aspects they have.

Such systems have existed for quite a long time and have global recognition. Companies and people all over the world trust such systems and use them both as a means of concluding transactions and in everyday life. This trust is based on many years of experience working with these systems, as well as billions of transactions made using these payment systems. Their use also guarantees international cooperation for many companies.

Speaking about trust, we can understand that the inclination towards these payment systems comes from the fact that traditional payment systems are regulated with the help of authoritative financial authorities. This legal framework shows that it can provide a high level of security, mitigating various types of financial crimes. This also indicates a reduction in risks and fewer losses. It also adds a layer of protection for all parties involved in the transaction. This legal clarity is particularly useful when resolving disputes and enforcing contracts across multiple jurisdictions, which can be a complex aspect of international trade.

The financial opportunities offered by such systems play an important role. This aspect is expressed in the provision of financial management mechanisms. They can include payment terms as well as credit options. This scheme is universal for enterprises and offers opportunities for planning their finances, and also gives flexibility in actions, allowing you to manage cash flows with a guarantee that all conditions are met and providing the opportunity for growth when using certain tools.

We can also see that such systems use a documentary trail through invoices, receipts, and invoices, which in turn simplifies accounting and is a guarantee for resolving financial disputes.

Thanks to the positive aspects listed earlier, this can guarantee good support for strengthening international relations. The use of such systems speaks about the reliability and ability of the company. This ensures that a wide range of businesses can participate in international trade.

Well, one of the most important positive reasons is high availability. This inclusivity ensures that a wider range of businesses can participate in international trade, supporting economic diversity and growth.

Financial institutions play a supporting role in international trade by offering advisory services and expertise in managing cross-border transactions. This support is invaluable to businesses navigating the complexities of cross-border payments, ensuring compliance with regulations, and streamlining financial transactions for greater efficiency and security.

4.2.2 Limitations and Risks in Traditional Payment Methods

Although traditional methods have a definition of advantages. We live in an era where flexibility and time become more important factors. We cannot downplay the great positive aspects of traditional payment methods, but like everything else, they also have many fairly global and serious shortcomings that lead to risks and limitations. These issues can significantly impact the business and the company's competitiveness and performance in certain aspects. Now we will analyze in more detail the restrictions and risks associated with such payment methods in international trade.

First of all, you need to pay attention to the speed of the transaction. In traditional payment methods it is quite low. Transactions such as bank transfers, letters of credit and especially checks can take several days to clear. In an era where businesses operate on tight schedules and rely on quick transactions for cash flow and inventory turnover, delays can be costly. Transaction speed lags are often exacerbated in international trade due to different time zones, banking systems and the need for manual processing and verification at multiple points.

Transaction costs also play a significant role. Huge commissions are a large part of the cost, which discourages small and medium-sized entrepreneurs from international trade. They are also burdensome for large companies.

When conducting long-distance trade, each company is exposed to currency risk, which occurs due to fluctuations in exchange rates between the beginning and completion of the transaction. At the moment, there are no effective tools in traditional payment methods that could reduce this risk. As a result, companies are exposed to potential financial losses. Not least, the speed of transaction processing exacerbates this problem as longer processing times provide a window for exchange rate volatility.

While traditional payment methods are regulated and considered secure, they are not immune to fraud and security risks. For example, check fraud, where fraudsters change the beneficiary details or the amount on a check, remains a serious problem. Even with electronic

bank transfers, there is a risk of hacking and phishing attacks when attackers gain access to confidential information and intercept funds. Businesses must invest in security measures and remain vigilant, which can increase operating costs

Speaking about the availability of such payment methods, there are several noticeable disadvantages arising from other reasons. Reliance on banking institutions and credit systems can exclude small businesses and individuals who do not meet the criteria set by these financial institutions. This restriction may hinder the expansion of international trade to a wider audience and slow economic growth in emerging markets.

A large number of regulations hinder intercity trade. Compliance with these regulations can be complex and time-consuming, requiring businesses to implement compliance programs and continually update them to reflect changes in legislation. Failure to comply with requirements can result in large fines and damage to reputation. Traditional payment methods directly depend on the banking infrastructure, which in turn causes a negative impact in regions where financial systems are underdeveloped, as well as a large number of strikes or holidays, which negatively affects and increases the transaction time. During a financial crisis, there is the possibility of limited access to funds, which poses a great risk to the ability of a business to operate continuously.

The complexity of dispute resolution is one of the topics that can affect many companies. In traditional payment methods, due to the large amount of documentation, dispute resolution requires legal intervention, and can also lead to the freezing of accounts and negatively affect the conduct of the company's affairs.

4.3 Comparative Characteristics

In order to conduct a comparative analysis of cryptocurrencies and traditional payment methods in long-distance trade, I chose to identify characteristics that are due to the fact that they have a great impact on the efficiency, accessibility and security of international transactions. All presented characteristics were selected based on the requirement to best conduct the analysis, each of them concerns a certain aspect of these payment systems, which

is of high importance for companies and entrepreneurs engaged in international trade. Next, the rationale for the choice of each individual characteristic will be provided.

- Transaction speed

This characteristic was chosen because time plays a major role in international trade. Transactions completed in less time can lead to more efficient operations and faster access to goods and services.

- Transaction costs

This characteristic was chosen because high transaction costs can be detrimental to small businesses and cause high costs that can impact the bottom line.

- Safety

This characteristic was chosen because the security of transactions is of great importance for protection against phishing, fraud and other types of financial risks.

- Regulation

This characteristic was chosen because enterprises and companies involved in international trade must comply with legal regulations so that this does not lead to financial risks.

- Availability

This characteristic was chosen because it provides greater participation of various enterprises in the international market, especially for smaller businesses.

- Currency volatility

This characteristic was chosen because stable currencies are preferable for pricing, planning and reducing financial risk associated with currency fluctuations.

- Anonymity

This characteristic was chosen because it is ambiguous and can be considered in different aspects as an unconditional positive impact for protecting confidentiality, but at the same time the risk is the correct compliance with regulatory requirements.

- Cross-border efficiency

This characteristic was chosen because the ability to conduct seamless cross-border transactions is fundamental to international trade, reducing barriers and facilitating global trade.

- Dispute resolution

This characteristic was chosen because clear dispute resolution mechanisms are needed to provide businesses and consumers with confidence in their transactions.

- Acceptance and trust

This characteristic was chosen because understanding and trust in a payment method between two parties influences its adoption and convenience for companies.

- Reversibility of payments

This characteristic was chosen because when an error or a certain type of fraud occurs, there must be the ability to resolve and resolve the problem.

- Financial infrastructure

This characteristic was chosen because the influence of other financial departments may increase the difficulty of completing a transaction or using the necessary payment system tools.

- Environmental impact

This characteristic was chosen because the world in which we live depends only on us and we must understand what can bring more harm to it.

These characteristics were chosen because they cover a wide range of considerations that influence both the practicality and ethical implications of using traditional payment methods versus cryptocurrencies in international trade.

4.4 Statistical Analysis

4.4.1 Transaction cost of cryptocurrency

This section presents a statistical analysis of transaction costs. The data provides information on the average cost of transaction fees (Bitcoin Visuals, 2024).

Figure 4 Descriptive statistics of transaction average cost

Frequencies

Statistics

Average

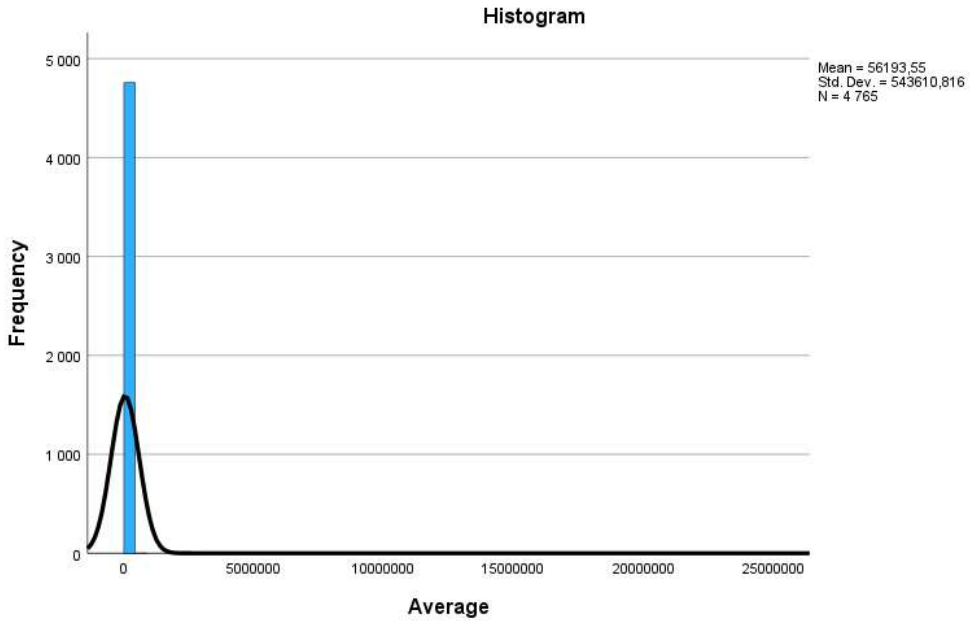
N	Valid	4765
	Missing	1
Mean		56193,55
Median		19394,00
Mode		50000
Std. Deviation		543610,816
Variance		2,955E+11
Range		21997872
Minimum		2128
Maximum		22000000
Sum		267762254

Source: own processing

Central Tendency and Dispersion

The mean transaction fee is quite high at 56,193.55, which suggests that on average, the fees are substantial (Figure 4). However, the median fee is significantly lower at 19,394.00, indicating that more than half of the transaction fees are below the average, pointing towards a right-skewed distribution. This is supported by the mode, which is 50,000, implying a common transaction fee amount that occurs more frequently than any other value in the dataset.

Figure 5 Histogram frequency of transaction average cost



Source: own processing

The standard deviation is exceptionally large at 543,610.816, which means there is a vast spread in the transaction fees (Figure 5). This high dispersion is also confirmed by the variance (2.955E+11), which is a large figure indicating that the transaction fees are not clustered around the mean but rather spread out over a wide range of values.

Range and Outliers

The range of the data is 21,997,872, suggesting a substantial discrepancy between the lowest and highest fees. This is further evidence of significant variability in the transaction fees and potential outliers. The minimum fee reported is 2,128, which is markedly lower than the mean, while the maximum fee is an extreme value of 22,000,000, indicating the presence of outlier transactions with exceptionally high fees.

Total Impact

The sum of all the transaction fees is 267,762,254, which gives an idea of the total volume of fees within the dataset.

Analysis of Distribution

The large difference between the mean and median, combined with the high standard deviation and the wide range, suggests that the distribution of transaction fees is right-skewed. This skewness is typically indicative of a distribution where a majority of data points are clustered to the left (lower fees), with a long tail to the right (higher fees).

The transaction fee data are highly variable and skewed. A few transactions with very high fees are likely skewing the mean upwards. Most transaction fees are lower than the mean, as indicated by the median. There is a common transaction fee value present in the data, which is indicated by the mode. The data might contain outliers or extreme values, particularly on the higher end.

4.4.2 Transaction cost of traditional payment methods

This section presents a statistical analysis of transaction costs. The data provides information on the average cost of transaction fees (The World Bank, 2020).

Figure 6 Transaction average cost EU

Statistics

transaction_average_cost_EU

N	Valid	13
	Missing	0
Mean		7,1652
Median		7,0057
Mode		6,44[a]
Std. Deviation		,87661
Variance		,768
Skewness		1,046
Std. Error of Skewness		,616
Kurtosis		1,500
Std. Error of Kurtosis		1,191
Range		3,30
Minimum		5,97
Maximum		9,27
Sum		93,15

a. Multiple modes exist. The smallest value is shown

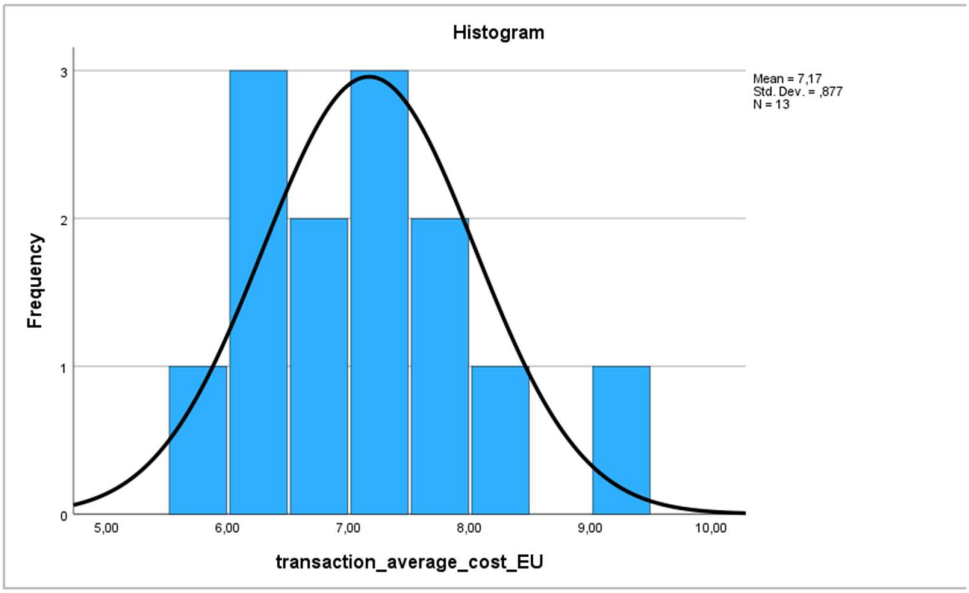
Source: own processing

The average transaction cost in the EU over the years is approximately 7.17 units, with a median value slightly lower at 7.00, suggesting that half the values are above and half below this point (Figure 6). There are multiple modes, with the smallest being 6.44, indicating that this value occurs more frequently than others, though there are several values that occur with the same frequency. The standard deviation is 0.88, which shows a relatively small variation around the mean, and this is supported by the variance of 0.77, suggesting that the transaction costs don't widely differ from the average.

The distribution of transaction costs is slightly right-skewed, as indicated by the skewness value of 1.046, which means there's a longer tail of data stretching towards higher costs. The kurtosis of 1.5 suggests a more peaked distribution than a normal bell curve, implying a higher probability of transaction costs occurring near the mean rather than at the extremes.

The range between the lowest and highest transaction cost is 3.30 units, with the minimum recorded value at 5.97 and the maximum at 9.27. This delineates the full spread of transaction costs in the dataset. The total sum of all the transaction costs over the observed years amounts to 93.15 units.

Figure 7 Histogram Transaction average cost EU



Source: own processing

The average transaction cost in the EU over the years is approximately 7.17 units, with a median value slightly lower at 7.00, suggesting that half the values are above and half below this point. There are multiple modes, with the smallest being 6.44, indicating that this value occurs more frequently than others, though there are several values that occur with the same frequency. The standard deviation is 0.88, which shows a relatively small variation around the mean, and this is supported by the variance of 0.77, suggesting that the transaction costs don't widely differ from the average (Figure 7).

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The range between the lowest and highest transaction cost is 3.30 units, with the minimum recorded value at 5.97 and the maximum at 9.27. This delineates the full spread of transaction costs in the dataset. The total sum of all the transaction costs over the observed years amounts to 93.15 units.

The histogram visualizes the frequency of transaction costs and displays a distribution that clusters around the mean of 7.17, with most data points falling between 6.5 and 7.5 (Figure 7). While the graph exhibits a slight skew to the right, it is relatively symmetrical around the mean, indicating that while there are outliers, the bulk of the data does not stray too far from the average.

These statistical measures provide a summary of the data and suggest that while there is some variation and slight skewness in the transaction costs, the majority of the costs are not far from the mean, indicating a degree of consistency over the years within the EU region.

Figure 8 Transaction average cost Africa

Statistics

transaction_average_cost_Africa

N	Valid	13
	Missing	0
Mean		8,4018
Median		8,5116
Mode		7,61[a]
Std. Deviation		1,01656
Variance		1,033
Skewness		,190
Std. Error of Skewness		,616
Kurtosis		-,765
Std. Error of Kurtosis		1,191
Range		3,27
Minimum		6,84
Maximum		10,11
Sum		109,22

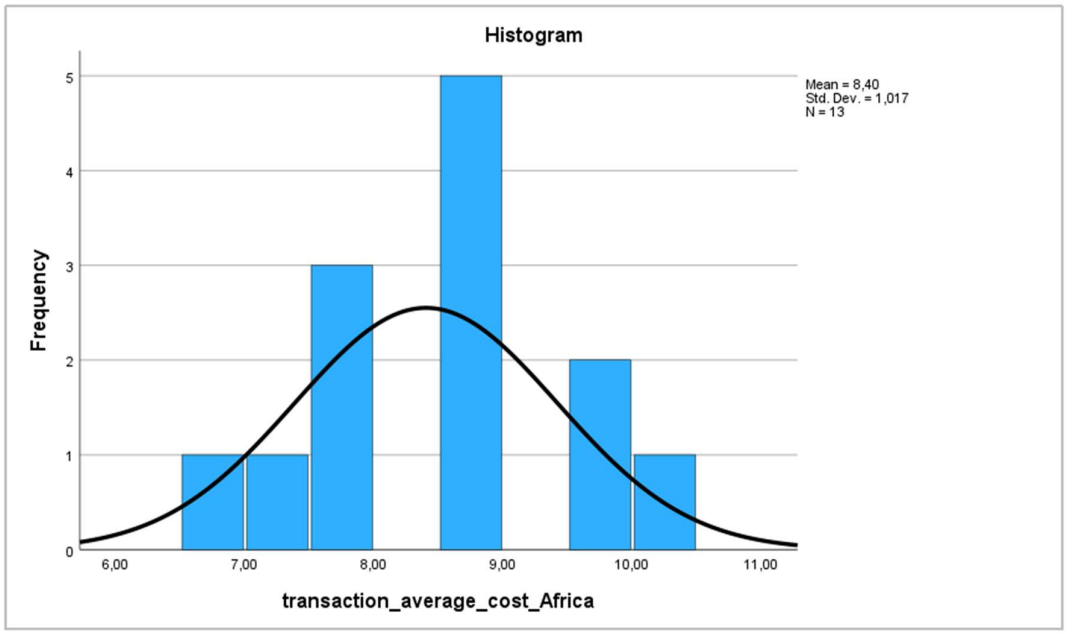
a. Multiple modes exist. The smallest value is shown

Source: own processing

The dataset for average transaction costs in Africa from 2012 to 2024 presents a mean value of about 8.40 units, with the median being slightly higher at 8.51, indicating a data distribution that leans slightly towards higher transaction costs (Figure 8). The mode, which occurs more than once in the dataset, is shown to be 7.61, representing a common transaction cost within the set. The standard deviation of around 1.02 points to a moderate level of variability in transaction costs from year to year, and this is further evidenced by the variance of approximately 1.033.

The skewness of the data is measured at 0.19, showing a slight asymmetry that leans towards the higher end of transaction costs, yet overall, the data is quite symmetrically distributed. This symmetry is also reflected in the negative kurtosis value of -0.765, indicating a flatter peak compared to a normal distribution and fewer extreme values on either end of the scale.

Figure 9 Histogram Transaction average cost Africa



Source: own processing

The range between the lowest and highest transaction costs is 3.27 units, with the specific values spanning from 6.84 to 10.11. This demonstrates the extent of variation in transaction costs across the years. The histogram supports this, revealing a distribution with most values concentrated between 7.5 and 9.5 units and showing a fairly symmetrical spread around the mean (Figure 9).

The transaction cost data for Africa indicates higher average costs compared to the EU and a moderate degree of fluctuation over the years. The pattern of distribution suggests a fairly stable transaction cost environment, with a central clustering of values and fewer instances of extreme highs or lows. The total sum of all transaction costs for the period covered is 109.22 units, reflecting the cumulative measure of the dataset.

Figure 10 Transaction average cost Americas

Statistics

transaction_average_cost_Americas

N	Valid	13
	Missing	0
Mean		3,6115
Median		3,9702
Mode		5,23
Std. Deviation		1,76464
Variance		3,114
Skewness		-,214
Std. Error of Skewness		,616
Kurtosis		-1,996
Std. Error of Kurtosis		1,191
Range		4,37
Minimum		1,29
Maximum		5,66
Sum		46,95

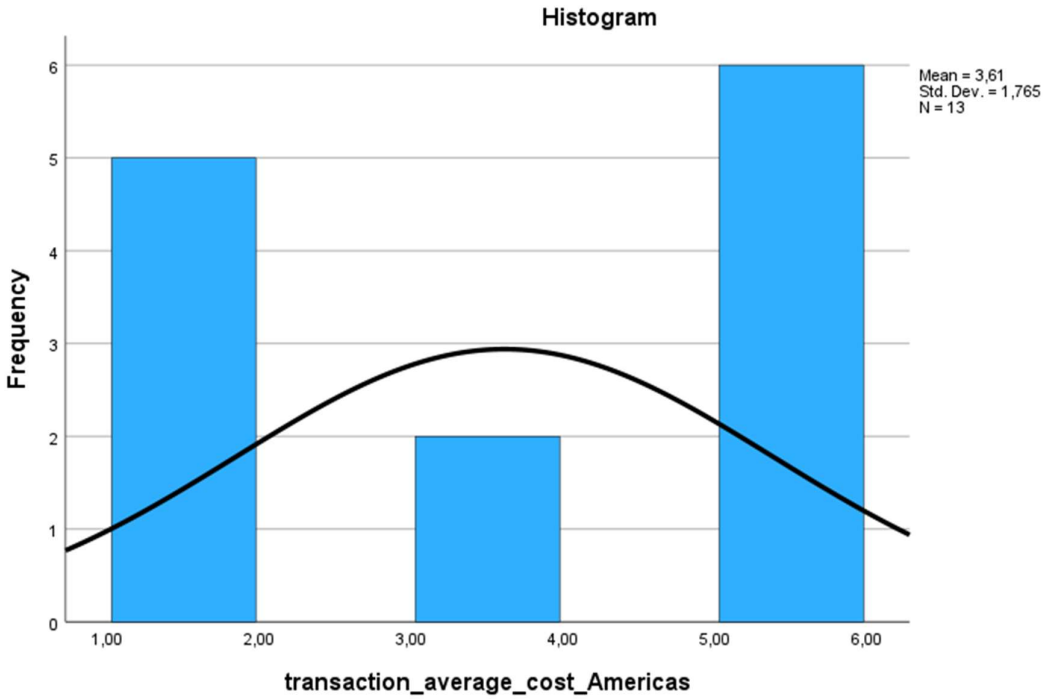
Source: own processing

Analyzing the data for the Americas' average transaction costs from 2012 to 2024 reveals a mean of approximately 3.61 units with a higher median of 3.97, suggesting a skew towards lower transaction costs. Multiple modes are present with a most common value of 5.23, indicating several values that recur with frequency. The standard deviation is 1.76, pointing to a considerable spread and variation in transaction costs from year to year, which is further supported by a variance of 3.114 (Figure 10).

The skewness of the distribution is -0.214, revealing a slight tendency for more frequent lower transaction costs, which is somewhat counterintuitive given the mean-median relationship. The kurtosis is -1.996, indicating a flatter distribution than the normal curve, suggesting a broad range of transaction cost outcomes with fewer extreme values on either end.

The range between the minimum transaction cost of 1.29 and the maximum of 5.66 is 4.37 units, showing a significant variability within the dataset over the observed period.

Figure 11 Histogram Transaction average cost Americas



Source: own processing

The histogram shows a distribution with a significant number of years recording costs just above the 1 unit mark, and a peak at around 5 units, suggesting that while there is a spread of transaction costs, there's a concentration of values around certain points (Figure 11).

The transaction costs in the Americas over these years demonstrate a wide variability with a general tendency towards the lower end of the cost spectrum. The flatter distribution suggests diverse outcomes with some years having significantly different costs than others, and the sum of transaction costs over the period is 46.95 units, encapsulating the total spread and distribution of costs.

Figure 12 Transaction average cost Asia

Statistics

transaction_average_cost_Asia

N	Valid	13
	Missing	0
Mean		6,8674
Median		6,8470
Mode		5,98[a]
Std. Deviation		,70269
Variance		,494
Skewness		1,224
Std. Error of Skewness		,616
Kurtosis		2,001
Std. Error of Kurtosis		1,191
Range		2,59
Minimum		5,98
Maximum		8,57
Sum		89,28

Source: own processing

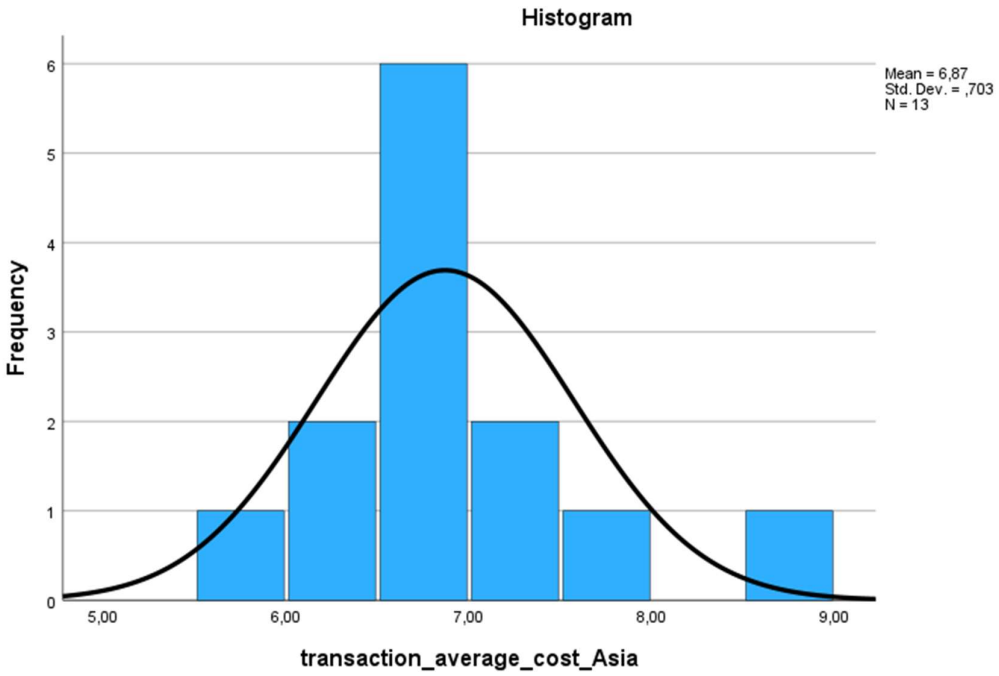
The data for average transaction costs in Asia from 2012 to 2024 indicate a mean cost of approximately 6.87 units with a closely related median of 6.85 units, suggesting a fairly symmetric distribution of data (Figure 12). The mode of the dataset is 5.98, which appears to be one of the most common values along with other values not shown but presumably of equal frequency, as indicated by the mention of multiple modes.

The standard deviation is 0.70, which signals that the transaction costs are not spread out widely from the mean, corroborated by the variance of 0.494. The skewness value is relatively high at 1.224, indicating a distribution with a longer tail on the right, suggesting that there are a few years with significantly higher transaction costs compared to the rest.

Kurtosis is positive at 2.001, pointing towards a "leptokurtic" distribution; this means the distribution is more peaked than a normal distribution, with values more concentrated around the mean and tails that contain extreme values or outliers.

The range between the minimum and maximum transaction cost is 2.59 units, with the smallest cost being 5.98 and the largest being 8.57. The sum of all transaction costs over the period is 89.28 units.

Figure 13 Histogram Transaction average cost Asia



Source: own processing

The histogram illustrates that the distribution has a strong central peak and tails off towards higher values, which is consistent with the positive skewness and kurtosis values (Figure 13). This suggests that while most of the transaction costs are concentrated around the mean, there are occasional years with significantly higher costs.

The transaction cost data for Asia shows a relatively stable pattern with most years having costs close to the average, but with a few years experiencing higher transaction costs. The distribution is more peaked with fewer outliers, indicating that extreme values are not as common in the dataset.

4.5 Comparative Analyse

Table 1 Comparative analyses of traditional payment method and cryptocurrencies

Characteristics	Traditional payment methods	Cryptocurrencies
Transaction speed	Can take days due to bank processing times and operating hours	Typically fast, ranging from a few minutes to a few hours, independent of banking hours.
Transaction cost	Can be high, especially for international transfers, including bank fees and currency conversion charges.	Generally lower, though it depends on the network and the transaction load at the time.
Security	High level of security through regulated financial institutions, but subject to traditional forms of fraud and hacking.	Offers strong security through blockchain technology, though still vulnerable to digital wallet and exchange hacks.
Regulation	Heavily regulated with strict KYC (Know Your Customer) and AML (Anti-Money Laundering) policies.	Regulatory landscape is evolving, with varying degrees of regulation depending on the country.
Accessibility	Requires access to banking services, which can be a barrier in regions with limited banking infrastructure.	Accessible to anyone with an internet connection, offering potential for greater inclusivity in global trade.
Currency volatility	Generally stable, backed by central authorities and national economies.	Can be highly volatile, with prices fluctuating widely in short periods.
Anonymity	Transactions are traceable to individuals or companies through bank records.	Offers higher degrees of anonymity, though transactions are traceable on the blockchain.
Cross-border efficiency	Subject to currency exchange rates and cross-border regulations, which can complicate and slow transactions.	Designed for cross-border transactions, potentially simplifying and speeding up international trade.
Dispute resolution	Established legal frameworks and mechanisms exist for dispute resolution through financial institutions and courts	Less clear dispute resolution mechanisms; largely depends on the consensus and community governance of the cryptocurrency.
Acceptance and trust	Widely accepted and trusted due to longstanding use and regulation.	Growing acceptance but still faces skepticism from some businesses and governments

		due to volatility and regulatory uncertainties.
Payment reversibility	Transactions can often be reversed in cases of fraud or error, with established processes for dispute resolution.	Transactions are generally irreversible, which can reduce fraud but also means errors or unauthorized transactions cannot be easily corrected.
Financial infrastructure	Relies on existing financial infrastructure and institutions, which can be robust but also excludes unbanked populations.	Operates independently of traditional financial infrastructure, offering potential financial inclusion but requiring digital literacy and access.
Environmental impact	Relatively low direct environmental impact, though physical banking infrastructure has its own environmental costs.	Energy consumption and environmental impact can be significant for cryptocurrencies using proof-of-work consensus mechanisms, though alternatives like proof-of-stake are more energy-efficient.

Source: own processing

Based on the data presented in the table (Table 1) comparing traditional payment methods and cryptocurrency in international trade based on selected characteristics, we will analyze the data in more detail.

Speed and efficiency of transactions: Cryptocurrencies offer a significant advantage in terms of transaction speed, enabling near-instant transfers around the world, regardless of traditional banking hours. This is in stark contrast to traditional payment methods, which can be slow due to processing times and the involvement of multiple intermediaries. Faster cryptocurrency transactions can improve cash flow and reduce wait times for goods to be released, which is especially useful in time-sensitive trading scenarios.

Transaction costs: Traditional payment methods often incur higher transaction costs, especially for international transfers, due to bank fees, currency conversion fees and intermediary costs. Cryptocurrencies can reduce these costs by eliminating many of the middlemen involved in traditional banking transactions. These cost efficiencies can make

cryptocurrencies an attractive option for small and medium-sized enterprises (SMEs) involved in international trade.

Security and risk of fraud: Both payment methods provide a high level of security, but through different mechanisms. Traditional payment methods are protected by regulated financial institutions with established fraud prevention and customer protection mechanisms. Cryptocurrencies are based on blockchain technology, which provides a secure and immutable ledger of transactions. However, the irreversible nature of cryptocurrency transactions raises concerns about fraud and lack of recourse in case of errors.

Regulatory Environment: The regulatory framework for cryptocurrencies is still evolving, which poses a risk of non-compliance with existing financial regulations, including anti-money laundering (AML) and Know Your Customer (KYC) requirements. Traditional payment methods, which are well established, have a clear regulatory framework, offering businesses a familiar and compliant environment for cross-border transactions.

Accessibility and Financial Inclusion: Cryptocurrencies excel at accessibility, requiring only an internet connection to participate. This opens up international trade opportunities for populations without access to banking services and for residents of regions with underdeveloped financial infrastructure. However, traditional payment methods rely on access to banking services, which can exclude certain groups from participating in global trade.

Currency volatility: The high volatility of cryptocurrencies can result in significant financial risk in transactions, impacting pricing, planning and profitability. Traditional currencies tend to be more stable, providing a predictable environment for international trade agreements.

Cross-border efficiency: Cryptocurrencies are inherently suitable for cross-border transactions, offering a streamlined process without the need for currency exchange or the complexities of cross-border banking regulations. This could simplify international trade processes, making cryptocurrencies an attractive option for global transactions.

Environmental Considerations: The environmental impact of cryptocurrencies, especially those using proof-of-work (PoW) consensus mechanisms, is a growing concern due to their significant energy consumption. Traditional payment methods, while not without environmental impacts, generally have less direct impact on the environment.

We can note that the choice between traditional payment methods and cryptocurrencies in international trade depends on a complex interaction of factors, including transaction speed, cost, regulatory compliance, security and environmental impact. While cryptocurrencies offer promising benefits in terms of efficiency and accessibility, their volatility, regulatory uncertainty and environmental impact pose significant challenges.

5 Result and Discussion

The practical part of the dissertation highlights the various characteristics, advantages and problems associated with the use of cryptocurrencies and traditional payment systems in international trade. Cryptocurrencies using blockchain technology offer innovations in transaction speed, cost efficiency and access to global markets, marking a departure from traditional systems rooted in banking institutions. Despite their potential, cryptocurrencies face significant headwinds, including regulatory uncertainty, price volatility and environmental concerns. Traditional payment systems, although established and trusted, face challenges of transaction delays, higher costs and limited availability, especially in underbanked regions.

Taking a closer look, we can see that cryptocurrencies demonstrate a clear advantage in transaction speed, enabling near-instantaneous global transactions outside of traditional banking hours. This efficiency can greatly benefit international trade, where time-sensitive transactions are common. Conversely, traditional payment systems are often plagued by processing delays that can hamper business operations and cash flow. Transaction costs are a critical factor in international trade. Cryptocurrencies typically require lower transaction fees by eliminating intermediaries and cross-border fees, providing a cost-effective alternative for traders. Traditional systems, with their complex fee structures and intermediaries, often result in higher costs for users, which can be burdensome. The evolving regulatory framework for cryptocurrencies presents both opportunities and challenges. While some jurisdictions have begun to establish frameworks for digital currencies, the lack of uniformity across regions creates complexity and legal uncertainty. Traditional payment systems, backed by established regulatory mechanisms, offer a level of security and legal clarity, albeit at the expense of flexibility and innovation.

The environmental impact of cryptocurrencies, especially those that rely on energy-intensive proof-of-work algorithms, has become a major concern. The sustainability of digital currencies combines with the relatively lower direct environmental impact of traditional payment infrastructures, highlighting an area where traditional systems may have an advantage.

Cryptocurrencies excel at providing global access without the need for traditional banking infrastructure, potentially democratizing international trade. This inclusiveness contrasts with traditional payment methods, which are not accessible to all segments of the world's population, especially in underdeveloped regions.

Market acceptance of the two systems differs significantly. Cryptocurrencies are gradually gaining acceptance, but still face scepticism and limited understanding among mainstream users. Traditional payment methods, deeply rooted in the global financial system, continue to enjoy widespread trust and acceptance, facilitating smoother transactions across established merchant networks.

Regulatory uncertainty surrounding cryptocurrencies is a double-edged sword. On the one hand, this represents a serious barrier to widespread adoption in international trade. On the other hand, it offers regulators and the crypto industry a unique opportunity to collaborate in creating structures that promote innovation while ensuring security, transparency and consumer protection. The development of such a regulatory environment could mitigate the risks associated with digital currencies, increasing their viability as instruments of international trade.

Balance between efficiency and environmental sustainability The superior transaction efficiency of cryptocurrencies highlights their potential to streamline international trade processes. However, the environmental costs associated with some cryptocurrencies should not be overlooked. This dilemma requires the cryptocurrency industry to prioritize sustainable practices, such as implementing energy-efficient consensus mechanisms such as proof of stake. At the same time, traditional payment systems must evolve to incorporate technological advances that improve efficiency and sustainability.

The accessibility of cryptocurrencies is a key benefit, especially in promoting financial inclusion and increasing access to international trade opportunities. Traditional payment systems, while reliable, often fail to reach underserved populations. Bridging this gap requires innovative financial solutions that combine the security and trust of traditional systems with the accessibility and efficiency of digital currencies.

The juxtaposition of cryptocurrencies and traditional payment systems in international trade illustrates the complex interplay of innovation, tradition, challenges and opportunities. The future is likely to see a hybrid model where digital currencies and traditional payment methods co-exist and complement each other, leveraging their respective strengths to facilitate more efficient, inclusive and sustainable international trade.

A comparative analysis of cryptocurrencies and traditional payment systems in international trade shows a situation marked by both change and stability. As digital currencies continue to evolve, addressing their challenges through regulatory clarity, technological innovation, and a commitment to sustainability will be critical. At the same time, traditional payment systems must adapt, incorporating digital advances, to meet the demands of modern commerce. The path forward involves a collaborative effort between governments, financial institutions and the crypto industry to create an integrated financial ecosystem that leverages the strengths of both worlds, driving forward the future of international trade.

6 Conclusion

The choice between traditional payment methods and cryptocurrencies for international trade depends on a complex interplay of factors, including transaction speed, cost, regulatory compliance, and environmental considerations. Cryptocurrencies offer promising benefits in terms of efficiency and inclusivity. However, their volatility, regulatory uncertainty, and environmental impact present formidable challenges. This study highlights the need for continued innovation and regulation to harness the potential of cryptocurrencies in international trade, addressing their limitations while leveraging their strengths to create a more efficient, inclusive, and sustainable global trade ecosystem.

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8 List of pictures, tables, graphs and abbreviations

8.1 Table of figures

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8.3 List of abbreviations

NTT…New Trade Theory

EFT… Electronic Funds Transfer

AML... Anti-Money Laundering

DAO... Decentralized Autonomous Organization

RTXP… Ripple Transaction Protocol

NEM... New Economy Movement

DAC... Decentralized Autonomous

SMEs... Small and Medium-sized Enterprises

AML...Anti-money laundering

KYC...Know Your Customer

PoW…Proof-of-work