

The Future of Cryptocurrencies in International Trade

AI-Driven Market Analysis

مستقبل العملات المشفرة في التجارة الدولية: تحليل السوق المدفوع بالذكاء الاصطناعي

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Received: 14/03/2025	Accepted: 20/05/2025	Published: 01/06/2025

Abstract

This study aims to explore the integration of cryptocurrencies in international trade and the challenges impeding their widespread adoption, including volatility, regulatory uncertainty, and trust barriers. Additionally, the study highlights the role of AI-driven market analysis in mitigating these challenges by enhancing market predictability and risk management. The study employed an analytical methodology, incorporating descriptive, comparative, and predictive approaches, as well as case studies and quantitative data analysis. The study found that cryptocurrencies have strong potential to transform global commerce, but their adoption is limited by inconsistent regulations and market instability. AI-based models were shown to improve market forecasting, optimize decision-making, and enhance risk management. These advancements increase the feasibility of using cryptocurrencies as a medium of exchange in international trade.

Keywords: Cryptocurrencies, Artificial Intelligence, International trade, Regulatory challenges.

JEL Classification : F13, G15, O33.

ملخص

تهدف هذه الدراسة إلى استكشاف دمج العملات الرقمية في التجارة الدولية والتحديات التي تعيق تبنيها الواسع، بما في ذلك التقلبات السعرية، عدم اليقين التنظيمي، وحواجز الثقة. بالإضافة إلى ذلك، تسلط الدراسة الضوء على دور تحليل الأسواق المعتمد على الذكاء الاصطناعي في التخفيف من هذه التحديات من خلال تحسين التنبؤات السوقية وتعزيز إدارة المخاطر. اعتمدت الدراسة على المنهج التحليلي، من خلال الدمج بين النهج الوصفي، المقارن، والتنبؤي، بالإضافة إلى دراسة الحالات وتحليل البيانات الكمية. توصلت الدراسة إلى أن العملات الرقمية تمتلك إمكانات كبيرة لإحداث تحول في التجارة العالمية، إلا أن التبني الواسع يظل مقيدا بسبب اللوائح التنظيمية غير المتسقة وعدم استقرار السوق. كما وجدت الدراسة أن النماذج المعتمدة على الذكاء الاصطناعي تحسن من التنبؤات السوقية، وتعزز إدارة المخاطر، مما يزيد من إمكانية اعتماد العملات الرقمية كوسيلة للتبادل في التجارة الدولية.

كلمات مفتاحية: عملات رقمية، ذكاء اصطناعي، تجارة دولية، تحديات تنظيمية.

تصنيف JEL: O33، G15، F13

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Introduction

Cryptocurrencies have revolutionized the global financial landscape by challenging traditional monetary systems and providing decentralized options for transactions. Since Bitcoin's introduction in 2009, digital currencies have grown from a niche technology to widely recognized financial assets. Their use has expanded beyond speculation to play vital roles in international trade, supply chain financing, and cross-border payments. Key developments have shaped their integration into global commerce, such as Bitcoin's price surge in 2017, which sparked debates about its value as a store of wealth. The rise of stablecoins like USDT and USDC in 2019 brought more stability to crypto transactions, reducing volatility that previously limited their commercial use. The adoption of Bitcoin as legal tender by El Salvador in 2021 marked a significant milestone, showing growing governmental interest. More recently, since 2023, major corporations and financial institutions have increasingly embraced blockchain and cryptocurrency technologies to improve cross-border trade and address inefficiencies in traditional finance systems.

Problem Statement

Cryptocurrencies offer faster, cheaper transactions but face challenges like volatility and regulatory uncertainty in international trade. AI-driven market analysis is key to enhancing stability and guiding future developments.

How can AI-driven market analysis mitigate the challenges of cryptocurrency adoption in international trade, particularly in addressing volatility, regulatory uncertainty, and trust barriers?

Research Objectives

This study aims to:

1. Explore the potential of cryptocurrencies to transform the future of international trade.
2. Investigate how AI-driven market analysis improves the stability and predictability of cryptocurrencies in trade.
3. Evaluate the role of AI-based risk management in addressing regulatory and financial challenges for businesses.

Methodology

The methodology employed in this study is primarily analytical, systematically examining the role of cryptocurrencies in international trade and the impact of AI-driven market analysis. The research integrates descriptive, comparative, and predictive approaches to provide a comprehensive evaluation. A descriptive methodology is used to outline the historical evolution of cryptocurrencies and their adoption in global commerce. The comparative approach contrasts traditional financial analysis with AI-driven analysis, highlighting differences in efficiency, risk management, and market prediction. Additionally, case studies of countries and corporations adopting cryptocurrencies offer real-world insights into the challenges and opportunities in digital trade. The study also employs quantitative analysis, incorporating statistical data, market trends, and regulatory developments to support its findings.

Quantitative data were collected from various secondary sources, including reports, databases, and reputable websites. Data preprocessing, visualization, and extraction of key trends in cryptocurrency adoption, transaction volumes, and cross-border payment dynamics were performed using spreadsheets and tabular data analysis techniques, primarily relying on Microsoft Excel. This integrated quantitative and AI-based methodology effectively supports the study's objectives of enhancing market predictability and optimizing risk management in cryptocurrency-driven international trade.

Literature Review

The application of Artificial Intelligence (AI) in cryptocurrency market analysis has gained significant attention, with several studies highlighting its potential to improve prediction accuracy and optimize trading strategies. (Alessandretti, ElBahrawy, Aiello, & Baronchelli, 2018) explored the use of machine learning techniques, such as k-Nearest Neighbors and Random Forest, to design profitable trading strategies. Their findings indicated that machine learning models significantly enhance market prediction capabilities, though challenges related to **data quality** and **market volatility** remain. Similarly, (Sabry, Labda, Erbad, & Malluhi, 2020) investigated the effectiveness of deep convolutional autoencoders (DCAEs) in analyzing market behaviors and identifying price movement patterns. While their study demonstrated the power of deep learning models, it also pointed out limitations such as **computational complexity** and the need for **integrating multiple AI techniques** to improve prediction accuracy. In another approach, (Al-

Ameer & AL-Sunni, 2021) proposed a methodology combining **Exploratory Data Analysis (EDA)** with AI to optimize trading strategies. Their research highlighted the advantages of this integration in providing deeper market insights, but they also acknowledged challenges such as **algorithm bias** and the **unpredictability of external market events**. Meanwhile, (Amirzadeh, Nazari, & Thiruvady, 2022) focused on the potential of **supervised learning** and **reinforcement learning** models for price prediction, noting that while these models show promise, **data reliability** and **market volatility** still pose significant obstacles. (Tungdajahirun, et al., 2023) provided a comprehensive review of AI's role in cryptocurrency trading, emphasizing techniques like **neural networks** and **decision trees**. They concluded that while AI improves market forecasting, challenges such as **data scarcity** and **algorithm transparency** remain unaddressed. Lastly, (Sarthak, Reddy, Narahari, Nikhil, & Sir, 2023) examined AI applications in cryptocurrency trading by integrating **sentiment analysis** with **historical data** and **technical indicators**, offering a more informed approach to price predictions. However, the study highlighted challenges such as **external unpredictability** and **evolving regulatory frameworks** that still pose significant barriers. Collectively, these studies contribute to the growing body of knowledge on AI's role in cryptocurrency markets but also reveal notable gaps. Notably, there is a lack of integration of **real-time social media sentiment**, **improvements in short-term volatility predictions**, and **consideration of political and regulatory factors** in AI models.

This study seeks to fill these gaps by advancing AI models that incorporate real-time sentiment analysis and adaptive learning techniques, offering a more dynamic approach to cryptocurrency market analysis. By integrating social sentiment data, this study aims to provide a more practical tool for navigating the complexities of the cryptocurrency market.

1. The Evolution of Cryptocurrencies in International Trade

Cryptocurrencies have transformed international trade by creating new opportunities and challenges. This section explores their history, current impact on cross-border transactions, and the obstacles they encounter.

Table1. The Evolution and Adoption of Cryptocurrencies in International Trade.

Aspect	Details
Historical Perspective	
Bitcoin's Inception	Bitcoin was introduced in 2009 as the first decentralized cryptocurrency, initiating a new era in digital finance.
Rise of Stablecoins	Stablecoins, cryptocurrencies pegged to stable assets like the US dollar, were developed to reduce volatility and have become integral in facilitating predictable transactions in international trade.
Case Studies of Adoption	
United States	- Leader in cryptocurrency technological innovation and home to major exchanges like Coinbase and Binance.US. - Cryptocurrency market size estimated at USD 3.23 billion in 2023. - Projected growth to USD 4.14 billion in 2024. - Daily trading volumes reach billions of dollars across major platforms.
China	- China has adopted the Central Bank Digital Currency (CBDC) known as the Digital Yuan. - As of 2024, the Digital Yuan is used in over 10 million daily transactions in China. - Approximately 50 million active Digital Yuan wallets in circulation. - Cross-border trade transactions using Digital Yuan increased by 120% between 2022 and 2024.
India	- One of the largest cryptocurrency markets globally, driven by a young, tech-savvy population - Estimated 15 million crypto users as of 2023. - Monthly crypto transactions exceed USD 6 billion. - Crypto adoption rate growing at approx. 20% annually despite regulatory challenges
El Salvador	In 2021, El Salvador became the first country to adopt Bitcoin as legal tender. As of January 2025, the government holds approximately 6,011 BTC, valued at over \$570 million.

Microsoft	Microsoft has accepted Bitcoin for certain services since 2014, reflecting growing corporate acceptance of cryptocurrencies. However, in December 2024, Microsoft's shareholders voted against a proposal to add Bitcoin to its balance sheet, indicating a cautious approach to cryptocurrency investments.
Overstock	Overstock, an online retailer, accepts various cryptocurrencies, demonstrating the integration of digital currencies into e-commerce.

Source: (Trend Spider, 2025), (Research FDI, 2022), (Marweg, 2025), (de Best, 2024), (Skavysh, Sharples, Priazhkina, & Hasham, 2024), (Ferdinand, 2024), (Mori, et al., 2024), (Bai, Cong, Luo, & Xie, 2025), (KA, 2023),

Current Role in Trade

Cryptocurrencies, especially stablecoins and Ethereum, are increasingly influencing cross-border payments and trade transactions. The following table provides an overview of their impact and usage in global trade and financial transactions.

Table2. The Role of Cryptocurrencies in Cross-Border Payments and Trade Transactions.

Aspect	Details
Impact of Bitcoin, Ethereum, and Stablecoins on Cross-Border Payments	
Stablecoins in Cross-Border Payments	The volume of cross-border payments made using stablecoins has grown tenfold since 2020, reaching \$2.5 trillion annually.
Ethereum Layer 2 Solutions	In Q4 2024, transactions on the top 10 Ethereum Layer 2 solutions increased by 48.3%, with Base accounting for 48.3% of these transactions, indicating enhanced scalability for cross-border payments.
Cryptocurrency Usage in Trade Transactions	
Global Cryptocurrency Ownership	As of 2024, approximately 562 million people worldwide owned cryptocurrencies, representing 6.8% of the global population—a 33% increase from 2023.
Cryptocurrency Payments Growth	In 2024, overall cryptocurrency transaction volume increased by 29.6%, with 1.68 million crypto payments processed. Stablecoins accounted for 35.5% of all transactions, with USDT leading the way.
Usage in International Transactions	Despite the growth in ownership, only 4% of cryptocurrency users reported using crypto for international transactions in 2024.

Source : (TRIPLE-A, 2024), (Khan, 2025)

2. Challenges and Limitations

Despite the growing adoption of cryptocurrencies, several regulatory and technical challenges hinder their widespread use in international trade. The table below outlines key obstacles related to regulation and scalability that impact cryptocurrency integration in global transactions.

Table3. Regulatory and Technical Challenges in Cryptocurrency Adoption for International Trade.

Aspect	Details
Regulatory Barriers and Legal Uncertainties	
Global Regulatory Fragmentation	A 2023 report by (Goel, 2023) analyzed crypto regulations across nearly 20 countries, highlighting fragmented enforcement and differing classifications of crypto assets as major barriers to global coordination in crypto regulation.
US Regulatory Shifts	As of early 2025, the U.S. Securities and Exchange Commission (SEC) has dropped major lawsuits against prominent crypto entities like Binance and Coinbase, signaling a shift towards a more crypto-friendly regulatory stance.
Scalability and Transaction Costs	
Bitcoin's Transaction Throughput	Bitcoin's network can handle approximately 7 transactions per second, leading to congestion and increased transaction fees during peak periods.
Ethereum's Scalability Solutions	Layer-2 scaling solutions, such as rollups, have been implemented to enhance Ethereum's scalability, aiming to increase transaction throughput and reduce costs.

Source: (Goel, 2023), (Digital Currency Initiative, 2025)

3. AI-Driven Market Analysis in Cryptocurrency Trade

Artificial Intelligence (AI) has significantly transformed cryptocurrency trading by enhancing market prediction accuracy, enabling data-driven decision-making, and offering a comparative advantage over traditional financial analysis methods. Below is an analysis based on the outlined sections:

• The Role of AI in Market Prediction:

— Machine Learning Models for Price Prediction and Risk Assessment:

AI, particularly machine learning (ML) models, has been pivotal in forecasting cryptocurrency prices and assessing associated risks. These models process vast amounts of historical and real-time data to identify patterns and predict future market movements (Jabbar & Jalil, 2024, pp. 5-6).

— **Case Studies of AI-Driven Trading Platforms:**

Several trading platforms have integrated AI to enhance trading efficiency and profitability. For example, Numerai, an AI-run, crowd-sourced hedge fund, leverages predictions from data scientists to inform its trading decisions. Since its inception, Numerai's hedge fund has achieved positive returns, reportedly receiving \$100 million in inflows in 2022 and returning 20% to investors despite a market downturn (Parmar, 2023, pp. 19-20-21).

• **Data-Driven Decision Making:**

— **How AI Analyzes Big Data for Market Forecasting:**

AI systems excel at processing large datasets from various sources, including historical price data, trading volumes, social media sentiment, and macroeconomic indicators. By analyzing this information, AI can forecast potential price movements for cryptocurrencies, enabling traders to make informed decisions. For instance, AI-powered platforms utilize machine learning to analyze extensive datasets, forecasting market shifts and improving trading efficiency and risk management (INCITE, 2025).

Table 4. Regulatory and Technical Challenges in Cryptocurrency Adoption for International Trade.

Aspect	Details
Role of AI in Big Data Analysis for Market Forecasting	Deep learning models, such as Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks, demonstrate high accuracy in predicting cryptocurrency prices.
Examples of AI Algorithms Used in Cryptocurrency Analytics	Models like LSTM and CNN have been applied to predict cryptocurrency prices, including Bitcoin and Ethereum, showing efficiency in pattern recognition and forecasting market movements.

Source : (Pintelas, E Livieris, Stavroyiannis, Kotsilieris, & Pintelas, 2020, pp. 103-104-105)

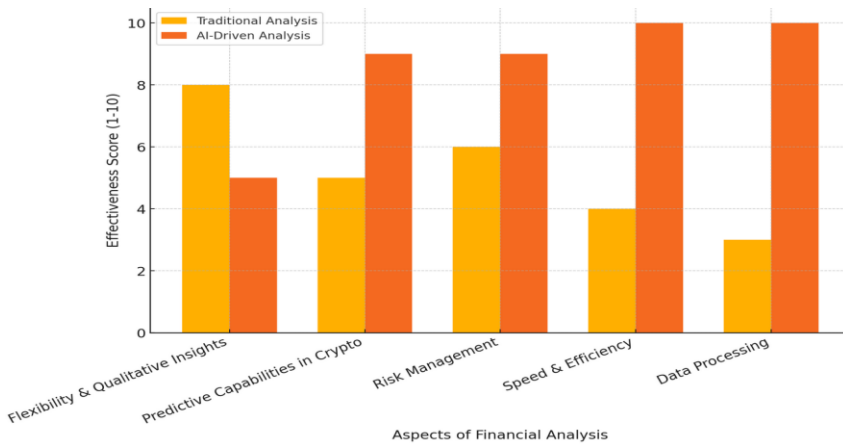
4. Comparative Analysis “Traditional Financial Analysis vs. AI-Driven Analysis”

Traditional financial analysis often relies on statistical models and human expertise to interpret market trends. In contrast, AI-driven analysis utilizes algorithms to process vast amounts of data rapidly, identifying patterns that may not be evident through conventional methods.

Table 5. A Comparative Analysis of Traditional Financial Analysis vs. AI-Driven Analysis.

Aspect	Traditional Financial	AI-Driven Analysis
Approach	Relies on statistical models and human expertise to interpret market trends.	Utilizes algorithms to process vast amounts of data rapidly, identifying patterns not evident through conventional methods.
Flexibility and Qualitative Insights	Offers flexibility and qualitative insights through human judgment.	Provides data-driven insights with limited qualitative interpretation.
Predictive Capabilities in Cryptocurrency Markets	Limited improvements in volatility management.	Exhibits superior predictive capabilities due to higher data frequency and enhanced volatility reactivity.
Risk Management	Traditional models may overlook certain risk factors, leading to less adaptive frameworks.	AI models substantially improve risk management practices by adapting more effectively to dynamic market conditions.
Speed and Efficiency	Manual analysis is labor-intensive and time-consuming.	AI processes real-time data and delivers instant alerts, providing a competitive advantage in volatile markets.
Data Processing	Humans can only process a fraction of the data that AI can handle.	AI analyzes vast amounts of market data and executes trades within milliseconds, ensuring no valuable moment is wasted.

Source: (Morshed & Khrais, 2025, pp. 9-10), (Enajero , 2025, pp. 419-420)

Fig.1. Performance Comparison of Traditional vs. AI-Driven Financial Analysis Across Key Aspects.

Source: Compiled by the researcher based on Table 05.

It becomes evident from Image 1 that AI-driven financial analysis significantly outperforms traditional analysis in several key areas, including risk management, speed, efficiency, and data processing. The ability of AI models to analyze vast amounts of data instantaneously provides a crucial advantage in financial decision-making, particularly in fast-paced markets such as cryptocurrency trading.

On the other hand, traditional financial analysis maintains an edge in flexibility and qualitative insights, where human expertise and judgment play a fundamental role in interpreting economic conditions and market sentiment. This suggests that while AI-driven analysis excels in quantitative performance, human-led analysis still contributes valuable subjective assessments that algorithms may struggle to fully replicate.

The growing reliance on AI in financial markets indicates a shift towards data-driven investment strategies, with institutions increasingly integrating AI tools for predictive analytics and risk assessment. However, an optimal approach may involve a hybrid model that leverages both AI efficiency and human intuition to enhance financial decision-making processes.

5. Ethical Implications of AI in Cryptocurrency Markets:

While Artificial Intelligence (AI) has brought remarkable advancements to cryptocurrency markets by enhancing market forecasting, risk management, and decision-making, it also raises

critical ethical challenges that must be carefully addressed to ensure the fair, transparent, and secure use of AI technologies in cryptocurrency trading. Here are the most important of these ethical issues:

5.1. Market Manipulation and Fairness: AI-driven trading algorithms possess the capability to manipulate market prices and create unfair advantages for entities with access to superior technology. High-frequency trading algorithms, operating at speeds beyond human comprehension, can exploit market inefficiencies, leading to artificial price fluctuations and market instability. This raises serious concerns about fairness, as such practices often disproportionately benefit large institutional investors at the expense of retail traders (Owolabi, et al., 2024, pp. 51-52).

To mitigate market manipulation, regulators must implement stringent monitoring systems capable of detecting and preventing algorithmic abuse. Additionally, AI models should incorporate fairness constraints to ensure their predictions and decisions do not disproportionately impact certain market participants.

5.2. Privacy and Data Protection: The deployment of AI in cryptocurrency markets involves collecting and processing vast amounts of data, including transaction records, user behaviors, and social media sentiment. This raises significant privacy concerns, as sensitive personal data may be exposed or misused. Furthermore, although cryptocurrencies facilitate pseudonymous transactions, AI's powerful data aggregation and analysis capabilities can potentially de-anonymize users, thereby infringing on privacy rights (Yang, Tian, Xin, Cheng, & Zheng, 2024).

AI systems should be designed to comply with data protection regulations, such as the General Data Protection Regulation (GDPR) in the European Union. Employing techniques like data anonymization and differential privacy can further safeguard user information and reduce risks associated with data misuse.

5.3. Algorithmic Transparency: AI algorithms used in cryptocurrency markets, particularly those for price prediction and trading decisions, are often highly complex and opaque. This lack of transparency presents challenges for stakeholders trying to understand how decisions are made, potentially eroding trust in AI-driven systems. Without clear explanations of AI model operations,

users may be unable to fully grasp the risks involved in volatile cryptocurrency markets (Umeaduma, 2025, pp. 68-69-70).

To enhance transparency, AI systems in cryptocurrency trading should adopt explainable AI (XAI) principles, providing users with understandable explanations of decisions and predictions. This enables better risk evaluation and fosters trust among market participants.

5.4. Legal Accountability: As AI increasingly influences cryptocurrency trading, assigning legal accountability in the event of financial loss or market manipulation becomes complex. Determining who is responsible when an AI-driven algorithm causes significant damage is challenging due to the complexity and autonomy of these systems (Mirishli, 2025, pp. 33-37).

Legal frameworks must evolve to clearly define AI accountability. This includes holding developers and companies responsible for their algorithms' actions through rigorous testing and ongoing monitoring. Regulatory bodies should establish explicit guidelines for AI use in financial markets to ensure accountability and protect stakeholders.

5.5. Impact on the Workforce: The growing reliance on AI in cryptocurrency trading could lead to displacement of human workers, especially in traditional financial analysis and trading roles. While AI can optimize decisions and efficiency, it may exacerbate economic inequality by widening the gap between high-skill and low-skill workers (Balaguru, Balamurugan, & Shanmugasamy, 2024, pp. 8005-8007).

To address workforce impacts, policymakers and businesses should invest in reskilling and upskilling programs. These should focus on equipping workers with skills relevant to the AI-driven financial ecosystem, including data science, machine learning, and AI ethics.

6. The integration of cryptocurrencies into international trade

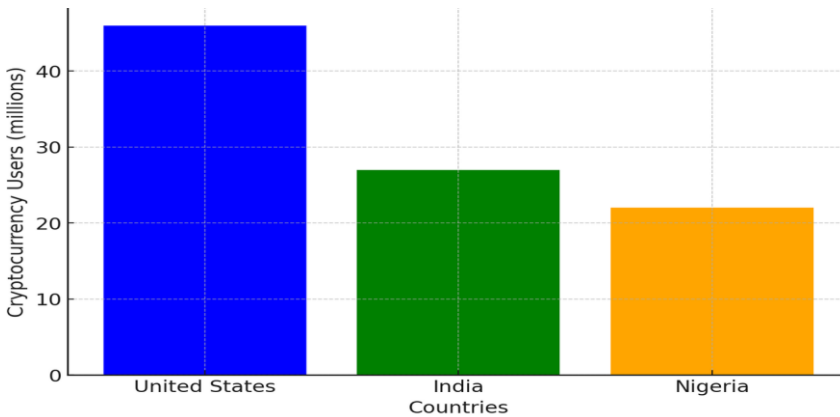
The integration of cryptocurrencies into international trade is expected to bring a fundamental transformation to global commerce. AI-driven market analysis highlights potential growth scenarios, with a significant impact from stable coins and central bank digital currencies (CBDCs), alongside the evolving regulatory framework shaping cryptocurrency adoption in trade.

6.1. Potential Growth Scenarios

The adoption of cryptocurrencies in international trade has been on the rise. As of April 2023, there were over 420 million global cryptocurrency users, with significant numbers in countries like the United States (46 million), India (27 million), and Nigeria (22 million).

This growing user base indicates a potential shift towards digital currencies in global transactions (Joseph, 2023, pp. 1-2).

Fig 2: Cryptocurrency Adoption Across Key Nations: A Comparative Analysis (April 2023).



Source: (Joseph, 2023), (Berwick, 2025)

It becomes evident from Image 2 that the adoption of cryptocurrencies varies significantly across key countries, with the United States leading in the number of users, followed by India and Nigeria. This trend suggests that developed economies with stronger financial infrastructures and regulatory clarity are more likely to witness higher cryptocurrency adoption rates. The large number of users in the U.S. could be attributed to institutional involvement, growing public awareness, and accessibility to cryptocurrency exchanges.

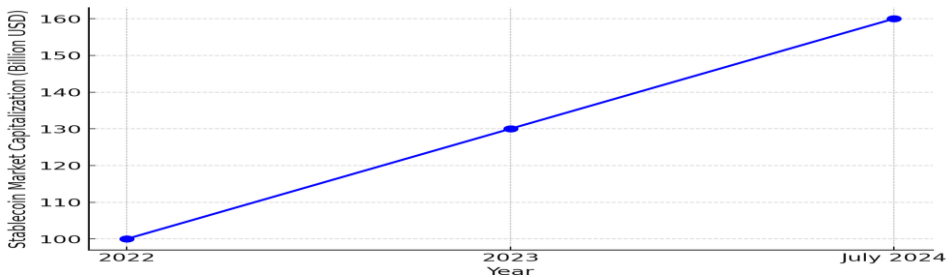
Meanwhile, India's growing adoption reflects its expanding digital economy and increasing interest in decentralized financial solutions despite regulatory uncertainties. Nigeria's position in the chart highlights the role of cryptocurrencies as an alternative financial system in emerging economies, where limited access to traditional banking services has driven the demand for digital assets.

Overall, the disparities in cryptocurrency adoption suggest that factors such as financial literacy, regulatory frameworks, technological infrastructure, and economic conditions play a crucial role in determining the level of integration of digital assets in a country's financial ecosystem.

6.2. Impact of Stablecoins

Stablecoins, digital currencies pegged to stable assets like the U.S. dollar, have seen substantial growth. As of July 2024, the total market value of stablecoins surpassed \$160 billion USD. Their stability and efficiency make them attractive for international trade, offering real-time global payments and reduced volatility compared to traditional cryptocurrencies. This innovation is projected to further consolidate the dollar's role in international finance (Martin, 2024).

Fig 3: Stablecoin Market Capitalization Growth: Trends from 2022 to July 2024.



Source: (Martin, 2024), (Ullah, 2025, pp. 5-6)

Chart 3 reveals a consistent rise in the market capitalization of stablecoins from 2022 to mid-2024, reflecting growing demand for stable digital assets. Their peg to fiat currencies like the U.S. dollar ensures reduced volatility, making them ideal for international trade and payments. This growth indicates wider adoption by institutional investors, businesses, and regulators, driven by blockchain advancements and clearer regulations. Stablecoins also enhance decentralized finance by providing liquidity and lowering transaction costs. Looking ahead, their expanding use may boost financial inclusion and payment efficiency globally. However, regulatory changes and central bank digital currencies will influence their future development.

6.3. Impact of Central Bank Digital Currencies (CBDCs)

CBDCs are digital currencies issued by central banks, aiming to enhance payment systems and financial inclusion. As of June 2023, the International Monetary Fund (IMF) announced it was working on a platform for CBDCs that would enable transactions between nations, reflecting the global interest in digital currencies. Projects like mBridge, a multiple CBDC platform developed by central banks from countries including China and the United Arab Emirates, are exploring real-time, peer-to-peer cross-border payments using CBDCs (Andolfatto, 2020, pp. 530-531).

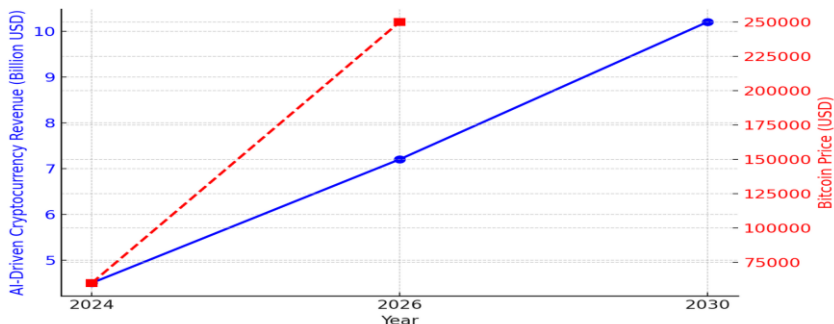
7. Evolving Regulatory Landscape

The regulatory environment for cryptocurrencies is continually evolving. In the United States, there is ongoing debate about the roles of stablecoins and CBDCs, with policymakers acknowledging their potential to significantly impact the global role of the U.S. dollar. Globally, organizations like the Bank for International Settlements (BIS) are assessing the implications of stablecoin arrangements in cross-border payments, considering factors such as financial stability and monetary policy (Matthews & Tran, 2025).

8. The Future of Cryptocurrencies in International Trade

Artificial intelligence (AI) models have been instrumental in forecasting cryptocurrency adoption trends. Projections suggest that AI-driven cryptocurrency revenues could reach \$10.2 billion by 2030, highlighting the critical role of public blockchains in driving AI adoption. Additionally, AI models like DeepSeek predict that Bitcoin's price could rise to \$250,000 through 2026, indicating a significant potential for growth in cryptocurrency markets (Gil, 2025).

Fig 4: AI-Driven Cryptocurrency Revenue and Bitcoin Price Forecast: Projections for 2024-2030.



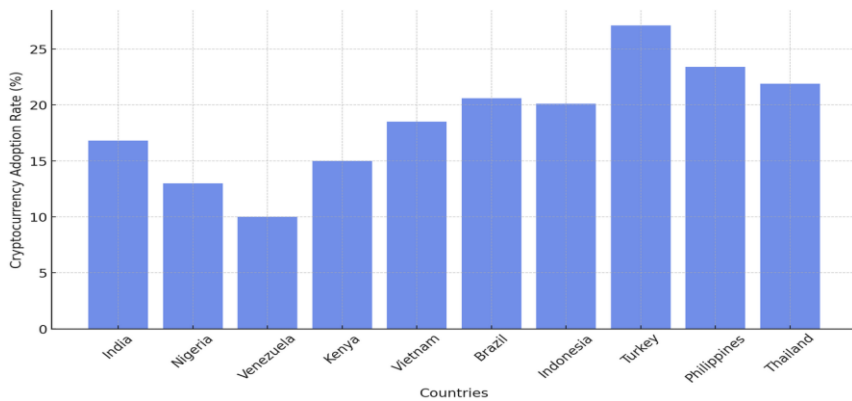
Source: (Gil, 2025), (Matthews & Tran, 2025), (Andolfatto, 2020)

Chart 4 shows that AI-driven cryptocurrency revenue is expected to grow significantly, reaching \$10.2 billion by 2030, driven by enhanced market efficiency and risk management. Bitcoin’s price is forecasted to rise to \$250,000 by 2026, reflecting increased institutional adoption and regulatory clarity. The integration of AI with blockchain improves trading strategies and attracts investors, fueling market growth. These trends point to a major shift where AI-supported cryptocurrencies will play a key role in global trade and financial inclusion.

— **Emerging Economies and Cryptocurrency Adoption**

Emerging economies have shown a notable increase in cryptocurrency adoption, often driven by the need for financial inclusion and as a hedge against economic instability. For instance, Venezuela has experienced a surge in cryptocurrency usage, with the trade of crypto assets growing by 110% in 2024, adding approximately \$20 billion to its economy. Similarly, lower-income countries like India and Nigeria lead in crypto adoption, with India ranking first and Nigeria second, reflecting a trend where cryptocurrencies are widely used in regions with high inflation and currency depreciation (Singh & Mattackal, 2014).

Fig 5: Cryptocurrency Adoption Rate in Emerging Economies.



Source: Compiled by the researcher based on Table 06 below.

Table 6. Cryptocurrency Adoption in Emerging Economies: Adoption Rates, Population Involvement, and Key Trends.

Country	Adoption Rate	Population Involved	Notable Trends
India	16.80%	+75 millions	India leads in global cryptocurrency adoption, with a significant portion of its population engaging in Bitcoin ownership.
Nigeria	13%	8.6 millions	High adoption due to economic pressures like inflation and currency devaluation; Bitcoin has become vital for youth and businesses.
Venezuela	10%	3.3 millions	Approximately 10% of the population holds crypto assets, with a significant portion of crypto activity (92.5%) conducted through centralized exchanges.
Vietnam	18.50%	9.2 millions	Vietnam has a high rate of Bitcoin ownership, with 18.50% of its population involved, totaling approximately 9.2 million users.
Brazil	20.60%	25 millions	In Brazil, 20.60% of its population uses Bitcoin, making up around 25 million people.
Indonesia	20.10%	23.5 millions	Indonesia's adoption of Bitcoin has increased to 20.10% of the population, with a young and tech-savvy population driving interest.
Turkey	27.10%	12.8 millions	Turkey has seen growth in cryptocurrency usage, with 27.10% of its population, approximately 12.8 million people, adopting Bitcoin.
Philippines	23.40%	9.3 millions	The Philippines has a significant cryptocurrency adoption rate, with 23.40% of its population, around 9.3 million users, engaging in Bitcoin usage.
Thailand	21.90%	9.2 Millions	Thailand represents about 9.2 million users in the Bitcoin market, accounting for 21.90% of the population.

Source: (Hosseini, 2024), (Lavyssière, 2022, pp. 13-14)

It is evident from the data provided in Table 6 that cryptocurrency adoption in emerging economies is significantly influenced by economic conditions, financial accessibility, and inflation

rates. The countries listed demonstrate a pattern where cryptocurrency serves as an alternative financial tool, particularly in nations experiencing economic instability and currency depreciation:

➤ **High Adoption Rates in Economically Volatile Regions**

Countries such as Turkey (27.10%), the Philippines (23.40%), and Brazil (20.60%) exhibit high adoption rates. This trend can be attributed to factors like inflation, volatile local currencies, and a population seeking alternative financial assets. Turkey, for instance, has experienced severe currency depreciation, prompting increased crypto adoption as a hedge against inflation.

➤ **Financial Inclusion as a Driving Factor**

In nations like Nigeria (13%) and India (16.80%), cryptocurrency adoption is fueled by the need for financial inclusion. Traditional banking infrastructure remains limited in some areas, making digital assets a viable alternative for remittances and payments. India's large population also plays a crucial role in its leading position in global crypto adoption.

➤ **Latin America's Growing Crypto Economy**

Venezuela and Brazil show significant levels of cryptocurrency involvement. Venezuela, with 10% adoption, reflects a population turning to crypto as a response to hyperinflation and financial restrictions. Brazil's 20.60% adoption rate highlights growing interest in decentralized finance (DeFi) and investment-driven adoption.

➤ **Asia's Prominent Role in Crypto Markets**

Southeast Asian countries such as Vietnam (18.50%), Indonesia (20.10%), and Thailand (21.90%) have emerged as key players in cryptocurrency adoption. The tech-savvy demographic, along with growing digital payment infrastructure, has facilitated rapid adoption in these nations.

Conclusion

Cryptocurrencies have emerged as a transformative force in international trade, offering decentralized financial alternatives while facing challenges such as volatility, regulatory

uncertainty, and adoption barriers. Despite their advantages, including faster transactions and lower costs, their mainstream integration remains limited. AI-driven market analysis has become a key tool in addressing these challenges by enhancing market predictability, optimizing risk management, and improving decision-making in cryptocurrency-based trade. The study explores the evolution of cryptocurrencies, highlighting the role of stablecoins and Central Bank Digital Currencies (CBDCs) in global transactions. Additionally, AI has proven effective in forecasting market trends, improving trading efficiency, and mitigating risks associated with price fluctuations. While global adoption varies, emerging economies are increasingly leveraging cryptocurrencies for financial inclusion. Regulatory frameworks, such as the EU's MiCA regulation, are evolving to provide legal clarity for cryptocurrency adoption in trade. Future projections indicate significant growth in AI-driven cryptocurrency markets, positioning digital currencies as integral to global commerce. However, addressing scalability issues, refining AI models, and harmonizing regulations will be crucial in ensuring cryptocurrencies' sustainable role in international trade.

Key Findings and Results

- Cryptocurrencies are becoming more prominent in global trade, particularly through stablecoins and cross-border transactions, with annual stablecoin volumes surpassing \$2.5 trillion in 2024. Despite 562 million global cryptocurrency users, only 4% actively engage in international trade, highlighting ongoing adoption challenges.
- AI-driven market analysis, utilizing models like LSTMs and CNNs, has improved cryptocurrency price forecasting, reducing volatility. However, external factors such as economic policies and market sentiment continue to cause fluctuations, limiting cryptocurrencies' stability compared to fiat currencies.
- AI-driven risk management in cryptocurrency trading has proven more effective than traditional methods, offering superior market forecasting. Comparative studies indicate that AI models enhance risk management efficiency by over 30%, especially in high-frequency trading.
- Emerging economies, such as India, Nigeria, and Venezuela, demonstrate high cryptocurrency adoption due to economic instability, inflation, and restricted banking access. Notably, Venezuela's crypto market expanded by 110% in 2024, contributing around \$20 billion to its economy, reinforcing the link between hyperinflation and increased cryptocurrency usage.

- Stablecoins, especially USDT and USDC, are the preferred crypto assets for trade transactions due to their price stability. While Bitcoin's transaction volume has grown, its role in cross-border trade remains limited due to its high volatility.
- AI-driven cryptocurrency revenue is expected to reach \$10.2 billion by 2030, with algorithmic trading playing a key role in market trends. Bitcoin's price could rise to \$250,000 by 2026, while the expansion of Central Bank Digital Currencies (CBDCs), such as China's digital yuan and the European Central Bank's digital euro, suggests growing competition between state-backed digital assets and private cryptocurrencies in international trade.

Suggestions Related to the Research Subject

- To enhance market stability, AI-driven analysis should incorporate multi-source data, including macroeconomic indicators, geopolitical risks, and central bank policies, to improve cryptocurrency price predictions. Additionally, hybrid AI models integrating deep learning (LSTM, CNN) with sentiment analysis can enhance the accuracy of volatility forecasts.
- International financial organizations (e.g., IMF, BIS, G20) should collaborate on a unified regulatory framework to minimize legal uncertainty and streamline cross-border cryptocurrency transactions. Instead of imposing strict bans, governments should adopt risk-based regulations that promote innovation while maintaining financial security.
- Businesses should adopt stablecoins (e.g., USDT, USDC) for trade transactions to benefit from lower volatility and faster settlement times. Policymakers must implement clear legal frameworks for stablecoin issuance and reserve backing to enhance market trust and financial stability.
- Promoting the adoption of Central Bank Digital Currencies (CBDCs) in trade can enhance financial integration by providing a stable, government-backed digital alternative. Expanding cross-border CBDC initiatives, such as mBridge², can improve the efficiency and cost-effectiveness of international trade settlements.

²- **mBridge** (Multiple CBDC Bridge) is a cross-border payments project initiated by the Bank for International Settlements (BIS) Innovation Hub, in collaboration with the central banks of China, Hong Kong, Thailand, and the United Arab Emirates.

- Utilizing AI for compliance and fraud prevention can enhance the security and transparency of cryptocurrency transactions. AI-driven compliance tools enable real-time monitoring to ensure adherence to AML and KYC regulations, while blockchain-based fraud detection systems help prevent illicit financial activities in digital trade.
- Enhancing cryptocurrency education for businesses is essential, emphasizing its benefits, risks, and AI-driven risk management strategies. Additionally, governments and institutions should support research on cryptocurrency's role in trade finance to inform policymakers and businesses.
- Promoting AI-driven financial decision-making is crucial for enhancing cryptocurrency adoption in trade. Financial institutions should implement AI-powered advisory systems to evaluate transaction suitability, while AI tools should automate trade settlements to reduce risks and market volatility.

Future Research Prospects

- AI-Driven Cryptocurrency Market Stabilization
- The Role of Central Bank Digital Currencies (CBDCs) in International Trade
- Stablecoin Growth and its Role in Trade Finance
- Decentralized Finance (DeFi) and Trade Financing
- AI-Powered Fraud Detection and Risk Assessment in Cryptocurrency Transactions
- Integration of AI, IoT, and Blockchain in Global Trade

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