Variables and Theories for Cryptocurrency Adoption

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***Abstrak*— This systematic literature review paper discusses cryptocurrency. Various theories of cryptocurrency adoption have been developed to identify its factors. The expansion of adoption theory aims to address issues related from multiple perspectives. This methodology uses a Systematic Literature Review (SLR) method by filtering 270.000 reputable articles related to cryptocurrency adoption, This study aims to classify the journey of technology adoption focuses on cryptocurrency to identify the factors driving future adoption. This paper a systematic literature review study focuses on various aspects of cryptocurrency, including factors, domains, and theories of adoption and sustainability. The results of the study showed five theories underlying the implementation of cryptocurrency and found forty-three main influencing factors. Several studies also show prospects for cryptocurrency sustainability. Thus, research on the development of cryptocurrency theory and prospects is still open for further exploration research.**

Keywords— cryptocurrency, adoption theories, influencing factors, sustainability.

I. INTRODUCTION

Cryptocurrency is a type of decentralized digital currency that does not require the intermediary of a financial institution, allowing direct transactions between users [1]. It is based on a peer-to-peer payment system managed by open-source software and realized by lower transaction costs, better security, and scalability than fiat money, and does not require a central bank [2].

Cryptocurrency has the potential to upgrade various aspects of the financial system, economy, and society at large [3]. Cryptocurrency can provide new solutions for more efficient transactions [4]. Cryptocurrency allows access to financial services in many areas [5].

In addition, the adoption of cryptocurrency brings new challenges and opportunities that need to be understood more deeply, such as regulation, risks, price volatility, and security [6] , [7] , [8]. As innovation in this field continues to grow, it is important to examine the various variables related to cryptocurrency adoption to optimize its benefits and minimize possible risks [9] , [10] , [11].

The Importance of Sustainability Issues As part of the cryptocurrency trend, there is a need to understand the trends in factors that support cryptocurrency adoption [3] ,

[12] , [13] , [14]. This article will classify the technology adoption journey in cryptocurrency to highlight the drivers of its adoption in the future [15] , [16] , [17] , [18] , [19]. Developing appropriate strategies based on these drivers can improve the sustainability of cryptocurrency adoption and its integration into the broader financial ecosystem [12].

This study aims to answer the existing problems by using a Systematic Literature Review (SLR). Section 1 is an introduction that describes the background of this study. Section 2 explains the methodology used to obtain an overview of cryptocurrency adoption, including theories, variables, and the sustainability prospects of such adoption. Meanwhile, Section 3 presents the findings obtained from the literature that will be discussed further. Conclusions and suggestions for further research are presented at the end..

II. METHODOLOGY

A. *Systematic Literature Review*

A systematic literature review (SLR) will be used in this study by performing the stages of related research using a PRISMA flow diagram for the systematic review method [20]. The process carried out in this study is shown in Figure 1.

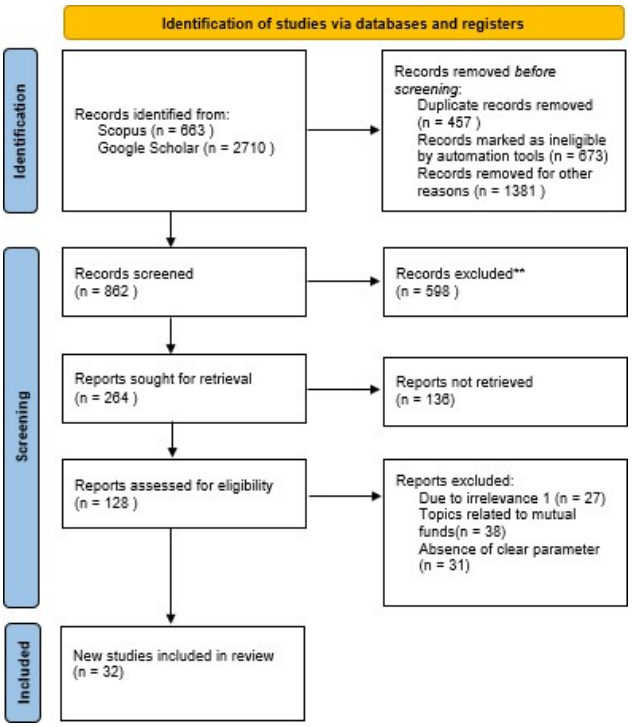

Fig. 1. Prisma Flow Diagram

To identify, screen, and Include steps in Fig 1. We need to filter the Inclusion and exclusion criteria for 32 articles SLR Prisma Flow Diagram.

TABLE I
THE CRITERIA OF INCLUSION AND EXCLUSION ARTICLES

Inclusion Criteria	**(I1)** Article sourced from Scopus and Google Scholar top quartile Q1 Q2 Q3 **(I2)** Articles discussing theories, factors,sustainability of cryptocurrency adoption **(I3)** The Article must written in the English language
Exclusion Criteria	**(E1)** Articles involved book review, technical paper **(E2)** Article found in other journal **(E3)** Articles discuss theories, factors, and sustainability but are not specific about cryptocurrency.

TABLE II.
AMOUT OF ARTICLES

ID	Publication	Articles
1	Q1	20
2	Q2	10
3	Q3	2
Total		**32**

As the table above shows. We chose several articles Q1, there are eighteen publications; Q2 comprises ten; Q3 includes four publications, Publications from Q1, Q2, Q3 constitute 62%, 32%, and 6%, out of the 32 titles

B. *Research Questions*

Research questions should be defined from the beginning to ensure that the research remains focused on its objectives [21]. As outlined in Table II below, this study will address three specific research topics.

TABEL III.
RESEARCH QUESTION

ID	Research Question	Motivation
RQ1	What theories related to cryptocurrency adoption have been formulated so far?	To identify theories of cryptocurrency adoption derived from case studies conducted in different countries.
RQ2	What factors influence the adoption of cryptocurrency?	To identify the determinants of cryptocurrency adoption.
RQ3	What are the prospects between cryptocurrency adoption and sustainability?	To identify the prospect between cryptocurrency adoption and sustainability

C. *Literature Analysis*

Once the research question is established, the next step is to identify the keywords for filtering 270.000 reputable articles in the journal database. The keywords used to address the research question are **("theories" OR "factors") AND ("cryptocurrency adoption") AND ("cryptocurrency sustainability.")** The initial search, conducted using Publish and Perish tools, resulted in 2,710 documents.

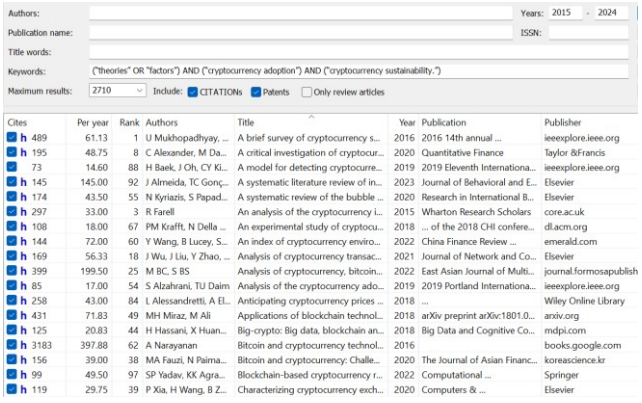

Fig 2. Journal Databases Publish and Perish Tools

These keywords were further refined to enhance the specificity of the references by excluding similar terms. Scopus was selected as the journal database due to its broader range of journals for citation analysis. Additionally, the researchers also included papers from Google Scholar and IEEE eXplore to diversify the references.

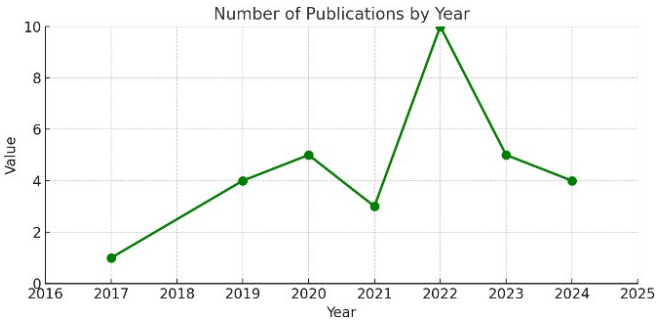

Fig 3. Document Distributions

Figure 3 illustrates the period of the papers used that are the most recent and relevant to the current research, where the period interval per 7 years, articles in 2017, 2019, 2020, 2021, 2022, 2023, and 2024.

TABEL IV.

IMPACT FACTOR BY SCIMAGO JOURNAL AND WOS

Heading	SJR	Top Quartile	H-Index	Clarivate
Technological Forecasting and Social Change	3.12	Q1	179	✓
Sustainability	0.67	Q1	169	✓
Energies	0.65	Q1	152	✓
Technology in Society	2.25	Q1	88	✓
Information Systems and E-Business Management	0.6	Q1	47	✓
Quality and Quantity	0.74	Q1	78	✓
Electronic Markets	1.65	Q1	57	✓
Journal of Theoretical and Applied Electronic Commerce Research	0.89	Q1	47	✓
Journal of Innovation and Knowledge	3.37	Q1	54	✓
Emerging MarketsReview	1.18	Q1	69	✓
Telematics and Informatics	1.83	Q1	106	✓
Financial Innovation	1.16	Q1	46	✓
IEEE Access	0.96	Q1	242	✓
Sustainable Energy Technologies and Assessments	1.57	Q1	77	✓
SAGE Open	0.51	Q2	60	✓
Frontiers in Psychology	0.8	Q2	184	✓
Cogent Social Sciences	0.38	Q2	27	✓
Cogent Business and Management	0.57	Q2	44	✓
Journal of Islamic Marketing	0.79	Q2	55	✓
International Journal of Emerging Markets	0.62	Q2	41	✓
Investment Management and Financial Innovations	0.25	Q3	25	✓

Table 4. above, we're categorizing references to evaluate that quality by SCImago Journal & Country Rank (SJR), considering the top quartile, and evaluating them based on the publication's H-Index. 22 international journals that have the top h-index and Top Quartile Q1 Q2 Q3 were used.

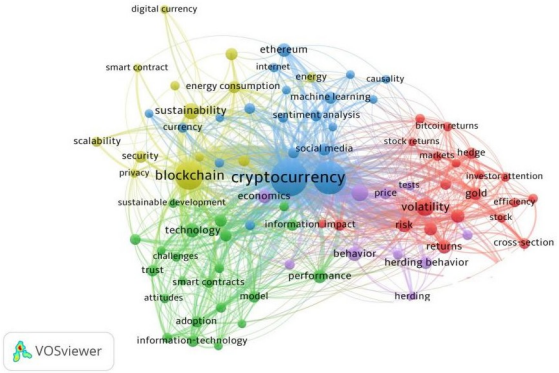

Fig 4. The network involves all keywords "cryptocurrency"

Figure 4 conducts a bibliometric investigation, utilizing VOSviewer software to identify the main research keywords in cryptocurrency. This analysis reveals the relationship between all aspects of cryptocurrencies and the development of scientific information in the field. Long term, cryptocurrency research will continue to be interesting and trend as the technology is in the early stages with millions of users. This research has a potential transformational impact on the global financial sector and the digital economy, cryptocurrency studies offer valuable insights into the future of the economy, society, and the ethical and legal challenges that may arise.

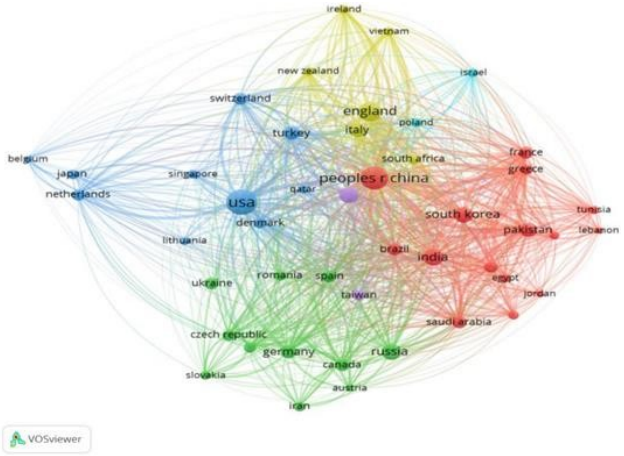

Fig 5. The network involves all country

From Figure 5, China has the most extensive network in the research sector, indicating its significant presence and impact. The country has strong ties with countries such as Jordan, Korea, Brazil, and France, reflecting partnerships and shared interests in cryptocurrency research. Meanwhile, the United States is the second largest country with the largest network,

indicating a strong interest in this research area. The US also has strong ties with countries such as the Netherlands, Turkey, Japan, Switzerland, and Denmark, indicating cooperation and aligned research goals. Interestingly, cryptocurrency user publications coming from developed countries, indicate significant interest in this research. The majority of these publications indicate that this area is an important aspect of cryptocurrency studies and can be studied extensively with developing countries as the object.

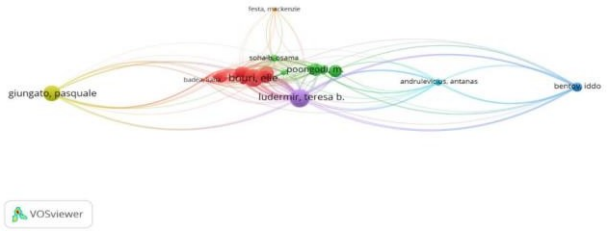

Fig 6. The network involves all author

Figure 6 Bibliometrics analysis of the most cited author paper and top writer of cryptocurrency research

III. REAULT

The obtained data will be analyzed to address RQ1, RQ2, and RQ3, forming the basis for further analysis.

A. *RQ1: What theories of cryptocurrency adoption have been developed to date?*

After researching 32 articles, several theories of cryptocurrency adoption were obtained, as shown in Fig. From the overall theories, the researcher concludes that cryptocurrency adoption theories that have been developed to date are Theory of reasoned action (TPB), theory of planned behavior (TPB), technology acceptance model (TAM), Unified of Theory of Acceptance and Use of Technology.

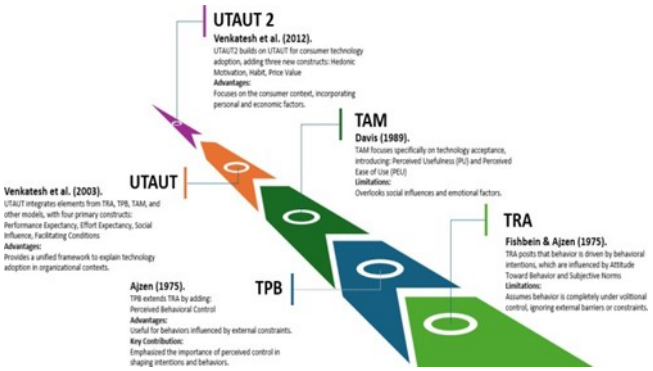

Fig 7. Evolution Theory of Technology Adoption

TABEL IV.
CLASSIFICATION VARIABLES OF TECHNOLOGY ADOPTION THEORY

Theory	Variables
Theory of Reasoned Actions (TRA)	1. Perceived Behavioral Control 2. Subjective Norm. 3. Attitude 4. Behaviour Intention
Theory of Planned Behavior (TPB)	1. Normative beliefs and subjective norms 2. Behavioural intention and behaviour 3. Control beliefs and perceived behavioral control 4. Conceptual comparison and operational comparison
Technology Acceptance Model (TAM)	1. Perceived usefulness 2. Perceived ease of use 3. Attitude toward using 4. Behaviour Intention 5. Action system
Unified Theory of Acceptance Use (UTAUT)	1. Performance Expectancy 2. Effort Expectancy 3. Social Expectancy 4. Facilitating Conditions
UTAUT 2	1. Performance Expectancy 2. Effort Expectancy 3. Social Expectancy 4. Facilitating Conditions 5. Habit 6. Hedonic Motivation 7. Price Value

From the five theories above, it can be concluded that the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) is more suitable for cryptocurrency adoption compared to other theories such as TRA, TPB, TAM, and UTAUT for several main reasons related to the unique characteristics of cryptocurrency and dynamics of reception [22] , [23] , [24] . UTAUT2 adds several new variables such as hedonic motivation, price value, and habit which are not in UTAUT or other theories [6] , [17].

This is relevant to cryptocurrency adoption because adoption is often influenced by personal motivations as well as habits. These variables provide an understanding of how the perceived price or enjoyment of using the technology plays a role in the decision to adopt cryptocurrencies [25], [26].

These five theories offer different frameworks for understanding user intentions and behavior in technology adoption. TRA and TPB are more generic, while TAM, UTAUT, and UTAUT2 are more specific in the technology context, with UTAUT2 being the more current version [27], [28] .

B. *RQ2: What are the factors of cryptocurrency adoption?*

From the literature review conducted, there are several variables of cryptocurrency adoption. The top variable most frequently found in research is Behavioral Intention. The mapping of all variables from 32 articles indexed by Scopus is shown in Table V below

TABEL V.
VARIABLES OF CRYPTOCURRENCY ADOPTION

No	Variable	Domain	References
1.	Attitude	TRA, TAM	[4] [15] [21] [23] [24]
2.	Subjective Norm	TRA, TPB	[11] [15] [22] [23] [28]
3.	Behavior Intention	TRA, TPB, TAM, UTAUT	[1] [2] [4] [5][6] [7] [9] [10] [11] [13][15] [16] [17][18] [19] [22][23] [25] [26][27] [28] [29] [30] [31] [32]
4.	Perceived Usefulness	TAM	[1] [2] [11][13] [15] [22] [31]
5.	Perceived Ease of Use	TAM	[1] [2] [11][13] [15] [22] [28] [31]
6.	Social Influence	UTAUT	[4] [5] [6][10] [13] [17][18] [19] [24] [25] [26] [27]
7.	Effort Expectancy	UTAUT	[5] [6] [10][17] [18] [19][24] [25] [26] [27]
8.	Performance Expectancy	UTAUT	[5] [6] [10][17] [18] [19] [24] [25] [27]
9.	Facilitating Conditions	UTAUT	[5] [6] [10][15] [17] [18][19] [24] [25] [26] [27] [28]
10.	Habit	UTAUT	[11]
11.	Hedonic Motivation	UTAUT	[5] [6] [26]
12.	Price Value	UTAUT	[4] [6] [16] [24] [26]
13	Transaction	Cryptocurrency Dimension	[1] [6] [7][29]
14.	Financial Literacy	Cryptocurrency Dimension	[10] [11] [16][18] [19] [27]
15.	Government Regulation	Cryptocurrency Dimension	[6] [7] [22]
16.	Security	Additional Variabel	[1] [2] [7] [10] [29]
17.	Innovativeness	Additional Variabel	[2] [13] [26][27]
18.	Discomfort	Additional Variabel	[2]
19.	Optimism	Additional Variabel	[2]
20.	Customer Satisfaction	Additional Variabel	[4]
21.	Transparency	Additional Variabel	[4] [7] [30]
22.	Traceability	Additional Variabel	[4]
23.	Trust	Additional Variabel	[5] [9] [15][16] [17] [18][27] [29] [30] [31]
24.	Knowledge	Additional Variabel	[7] [9] [23]
25.	Opennes	Additional Variabel	[7]
26.	Stability	Additional Variabel	[7]
27.	Profitability	Additional Variabel	[7] [28]
28.	Decentralization	Additional Variabel	[7]
29.	Ownership	Additional Variabel	[9]
30.	Education	Additional Variabel	[9]
31.	Awareness	Additional Variabel	[10] [18] [22] [27] [28]
32.	Perceived Risk	Additional Variabel	[11] [15] [16] [17] [18] [19][22] [23] [26] [27] [31] [32]
33.	Anxiety	Additional Variabel	[11]
34.	Self Efficacy	Additional Variabel	[11] [13] [23]
35.	Strtgic Orientation	Additional Variabel	[13]
36.	Gender	Additional Variabel	[13]
37.	Perceived Enjoyment	Additional Variabel	[15]
38.	Design	Additional Variabel	[18]
49.	CryptocurrencyUsage	Additional Variabel	[25] [26]
40.	Compatibility	Additional Variabel	[28]
41	Technology Attachment	Additional Variabel	[30]
42.	Ethical Concern	Additional Variabel	[30]
43.	Experience	AdditionalVariabel	[32]

From mapping variables above, we got forty-three variables of cryptocurrency adoption related to five theories of

technology adoption and also find research findings of three variables of the cryptocurrency domain encompass transaction, price volatility, and government regulation.

C. *RQ3: What are the prospects of cryptocurrency adoption for sustainability?*

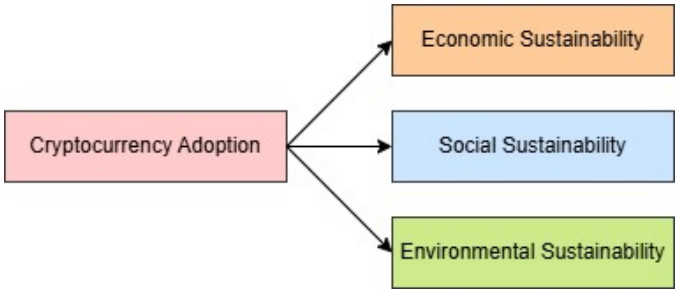

Fig 8. Cryptocurrency Sustainability

D. *Cryptocurrency and Economic Sustainability*

Cryptocurrency reduces transaction costs like traditional transactions in general, thus facilitating financial services and decentralizing the economy [12]. Cryptocurrency also drives economic efficiency in various sectors. In addition, cryptocurrency facilitates transactions in industry by improving business processes, and supporting decentralized markets [3].

Cryptocurrency also can be an alternative as a "store of value" to protect people's wealth from the decline in the value of local currencies [13]. On the other hand, the cost of transactions between countries can be significantly reduced compared to conventional methods [14]. Thus, making it easier for individuals and companies to improve and maintain constant inflation in the digital economy sustainability.

E. *Cryptocurrency and Social Sustainability*

Cryptocurrency supports transparency and contributes to social equality by enabling peer-to-peer transactions, it supports inclusivity across gaps by providing access to services, such as secure data sharing [14]. However, cryptocurrency's reliance on technological infrastructure may limit accessibility for lower-middle-class communities [6]. Cryptocurrency adoption can provide access to financial services for people who previously did not have access to banks or financial institutions, especially in developing countries or small areas [21].

Cryptocurrency prioritize long-term sustainability to be inclusive, empowering the wider community, and distributing benefits fairly [5],[14]. Socio-technical approaches need to align technology with social needs, support trust, security, and accessibility, and ensure benefits [3]. This can support social inclusion so that more people can be involved in the digital transformation sustainability.

F. *Cryptocurrency and Environmental Sustainability*

Cryptocurrency has the large impact of energy use from the mining process which requires high computing power. Efforts to make it more environmentally friendly include reducing mining energy, switching to more efficient technologies such as proof-of-stake [14]. Cryptocurrency as virtual money can be environmentally sustainable because it maintains and preserves the value exchange system through the use of digital currency compared to other payments or banking that must use credit cards or physical money [12].

Through ever-evolving technological innovation, cryptocurrency has great potential to become a financial solution that is not only efficient, but also supports global environmental sustainability.

IV. CONCLUSION AND FUTURE WORKS

Based on the research results, there are five main theories of cryptocurrency adoption, namely TPB, TRA, TAM, UTAUT, and UTAUT2. This study also found that there are forty-three cryptocurrency adoption variables. Most studies have examined cryptocurrency adoption, but few have examined the prospects of cryptocurrency for economic, social, and environmental sustainability

TABEL VI.
FUTURE RESEARCH MAPPING

No	Future Research	References
1.	Further research needs to further examine the integration of cryptocurrency adoption using several variables from the cryptocurrency domain	[1] [6] [7] [10][11] [15] [16][18] [19] [22][27]
2.	Additional research is necessary to explore the relationship between different types of variables, including independent, dependent, and moderating variables. Some studies categorize various adoption theory variables as independent, dependent, and moderating. In the original adoption theory, all essential variables are considered as part of a single category. Further investigation is required to reveal the distinctions in how these variables are positioned.	[2] [4] [7] [15][18] [22]
3.	Further studies are needed to propose new models with the addition of the sustainability concepts within cryptocurrency adoption	[3] [12] [13][14]

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